KING EDWARD VI
HANDSWORTH GRAMMAR
SCHOOL FOR BOYS

KING EDWARD VI
ACADEMY TRUST
BIRMINGHAM

# Year 7

# 2023 Mathematics 2024

# Unit 5 Tasks – Part 1

## DO NOT WRITE INSIDE

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BIRMINGHAM

# Year 7

# 2023 Mathematics 2024

# Unit 5 Tasks – Part 2

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ACADEMY TRUST
BIRMINGHAM

# Year 7

# 2023 Mathematics 2024

# Unit 5 Tasks – Part 3

## DO NOT WRITE INSIDE

# Contents

1 Fractions, Decimals and Percentages

2 Ordering Numbers

3 Percentages

4 Angle Basics

# 1 Fractions, Decimals and Percentages

# Fluency Practice

Question 1: Convert the following decimals to percentages

(a) 0.25 (b) 0.75 (c) 0.13 (d) 0.88

(e) 0.49 (f) 0.92 (g) 0.61 (h) 0.07

(i) 0.03 (j) 0.44 (k) 0.5 (l) 0.9

(m) 0.72 (n) 0.8 (o) 0.01 (p) 0.36

Question 2: Convert the following decimals to percentages

(a) 0.125 (b) 0.953 (c) 0.382 (d) 0.603

(e) 0.075 (f) 0.021 (g) 0.1425 (h) 0.9682

(i) 0.003 (j) 0.072 (k) 0.844 (l) 0.7003

Question 3: Convert the following recurring decimals to percentages

(a) 0.3333… (b) 0.6666… (c) 0.474747… (d) 0.808080…

(e) $0.\dot{8}$ (f) $0.\dot{1}$ (g) $0.\dot{5}\dot{2}$ (h) $0.\dot{1}2\dot{3}$

Question 4: Convert the following decimals to percentages

(a) 1.63 (b) 1.25 (c) 1.8 (d) 1.01

(e) 2.5 (f) 2.97 (g) 3.15 (h) 3.82

(i) 4.7 (j) 10.62 (k) 15.8 (l) 10.08

# Intelligent Practice

Convert the following decimals into percentages:

1) $0.48$
2) $0.49$
3) $0.50$
4) $0.5$
5) $0.05$
6) $0.005$
7) $0.085$
8) $0.85$
9) $1.85$
10) $1.085$
11) $2.085$
12) $2.058$
13) $2.58$
14) $2.5$
15) $2$
16) $0.2$

# Fluency Practice

Question 1: Match up any decimal and percentage that are equivalent.
Not all the decimals and percentages will match up

| | |
|---|---|
| 40% | 0.04 |
| 15% | 0.3 |
| 4% | 1.5 |
| 150% | 0.4 |
| 30% | 0.9 |

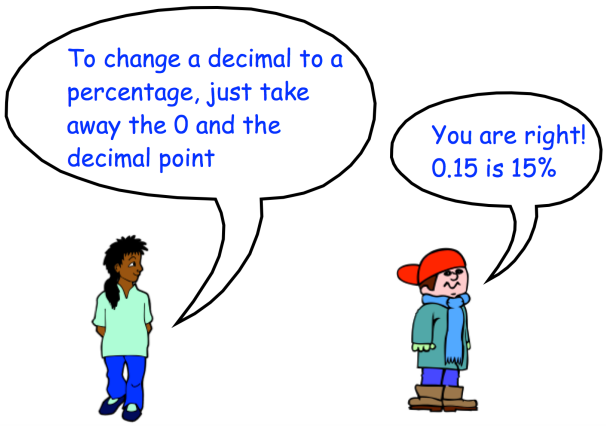
Question 2: Arrange in order from smallest to largest

(a) 0.4, 20%, 0.5, 45%, 0.09

(b) 0.59, 85%, 20%, 0.8, 13%

(c) 29%, 0.3, 35%, 0.33, 25%

Question 3: Jessica and Daniel are incorrect.
Explain why.




Question 4: Which is larger, 0.306 or 31%?
Explain your answer.

# Fluency Practice

Question 1: Convert each of the following percentages to decimals

| | | | |
|---|---|---|---|
| (a) 53% | (b) 19% | (c) 25% | (d) 74% |
| (e) 65% | (f) 50% | (g) 70% | (h) 10% |
| (i) 90% | (j) 3% | (k) 8% | (l) 5% |
| (m) 57% | (n) 88% | (o) 36% | (p) 99% |

Question 2: Convert each of the following percentages to decimals

| | | | |
|---|---|---|---|
| (a) 15.2% | (b) 23.5% | (c) 90.3% | (d) 62.81% |
| (e) 1.7% | (f) 6.8% | (g) 8.15% | (h) 0.5% |
| (i) 0.49% | (j) 0.03% | (k) 49.68% | (l) 0.598% |
| (m) 64.553% | (n) 80.05% | | |

Question 3: Convert each of the following percentages to decimals

| | | | |
|---|---|---|---|
| (a) 162% | (b) 190% | (c) 115% | (d) 144% |
| (e) 150% | (f) 212% | (g) 285% | (h) 538% |
| (i) 102.5% | (j) 352.8% | (k) 1047% | (l) 2938% |

# Intelligent Practice

Convert the following percentages into decimals:

1) $32\%$
2) $31\%$
3) $30\%$
4) $3\%$
5) $0.3\%$
6) $1.3\%$
7) $1.23\%$
8) $12.3\%$
9) $123\%$
10) $1023\%$
11) $1003\%$
12) $103\%$
13) $130\%$
14) $129\%$
15) $12.9\%$
16) $12.92\%$

Question 1: Match up any decimal and percentage that are equivalent.
Not all the decimals and percentages will match up.

| | |
|---|---|
| 80% | 0.08 |
| 25% | 0.25 |
| 8% | 2.5 |
| 250% | 0.03 |
| 30% | 0.8 |

Question 2: Arrange in order from largest to smallest.

(a) 21%, 0.25, 16%, 0.2, 3%

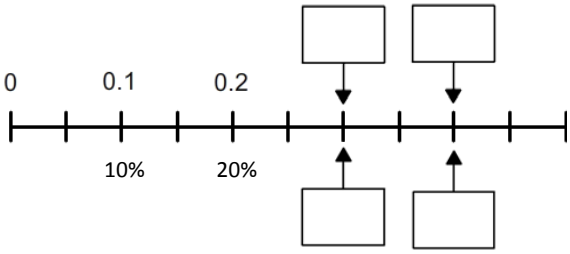
(b) 64%, 0.05, 100%, 0.99, 1.25, 3%

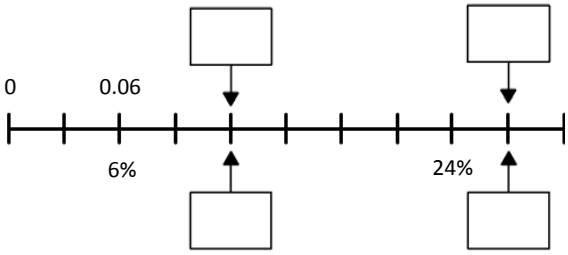
Question 3: James says "1.45 is equal to 145%"
Matt says "that is impossible, you cannot have a percentage greater than 100%"
Who do you agree with? Explain your answer.

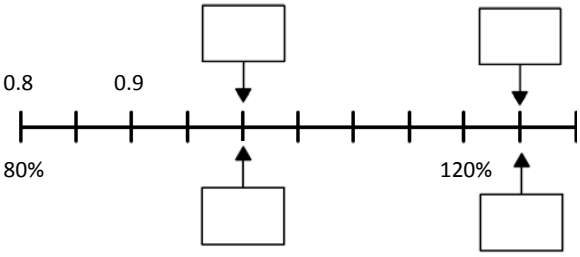
# Fluency Practice

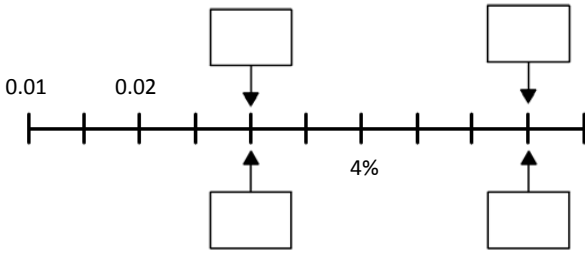
Work out the numbers indicated by the boxes.

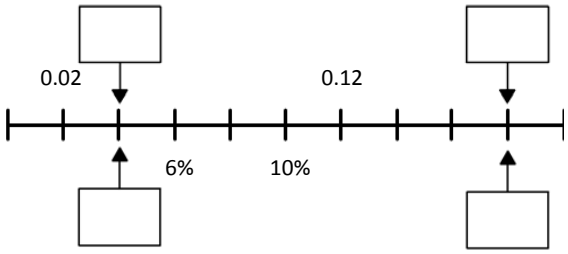
Write decimals in the boxes above the number line and percentages in the boxes below.

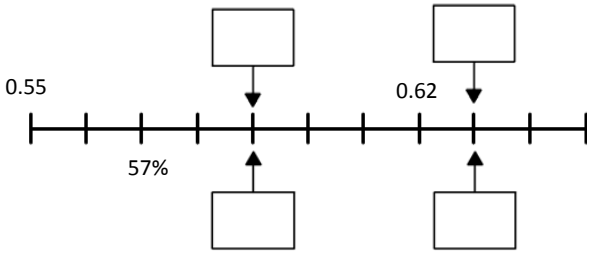


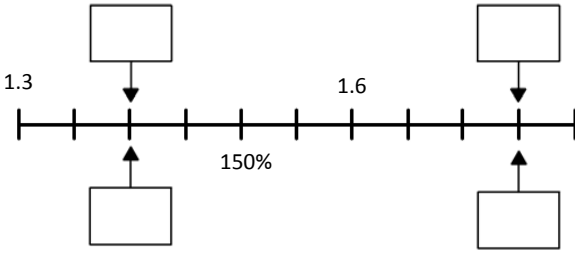



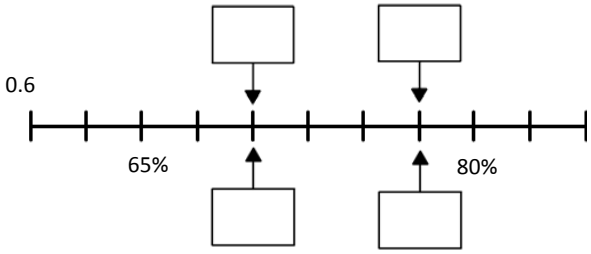



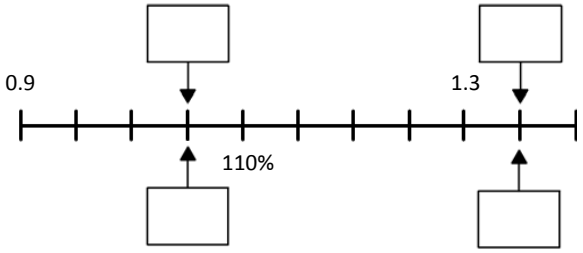



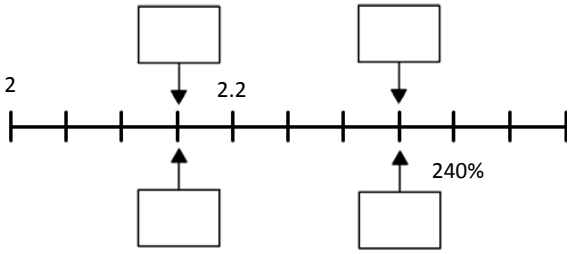



# Fluency Practice

Question 1: Write each of the following percentages as fractions.
If possible, simplify each answer.

| | | | |
|---|---|---|---|
| (a) 3% | (b) 14% | (c) 66% | (d) 10% |
| (e) 17% | (f) 30% | (g) 50% | (h) 25% |
| (i) 15% | (j) 29% | (k) 16% | (l) 44% |
| (m) 99% | (n) 85% | (o) 52% | (p) 80% |
| (q) 60% | (r) 20% | (s) 5% | (t) 72% |
| (u) 98% | (v) 2% | (w) 88% | (x) 15% |

Question 2: Write each of the following percentages as fractions.
If possible, simplify each answer.

| | | | |
|---|---|---|---|
| (a) 111% | (b) 130% | (c) 150% | (d) 110% |
| (e) 125% | (f) 165% | (g) 160% | (h) 144% |
| (i) 240% | (j) 390% | (k) 358% | (l) 820% |

Question 3: Write each of the following percentages as fractions.
If possible, simplify each answer.

| | | | |
|---|---|---|---|
| (a) 12.5% | (b) 0.2% | (c) 1.8% | (d) 15.2% |
| (e) 30.5% | (f) 87.4% | (g) 31.25% | (h) 0.28% |

# Intelligent Practice

Convert the following percentages into fractions in their simplest form:

1) $4\%$
2) $40\%$
3) $44\%$
4) $400\%$
5) $440\%$
6) $444\%$
7) $44.4\%$
8) $45\%$
9) $450\%$
10) $4.5\%$
11) $0.45\%$
12) $4.55\%$
13) $45.5\%$
14) $455.5\%$

# Fluency Practice

Question 1: Match up any fraction and percentage that are equivalent.
Not all the fractions and percentages will match up.

| | |
|---|---|
| $\frac{3}{4}$ | 30% |
| $\frac{3}{10}$ | 50% |
| $\frac{1}{2}$ | 80% |
| $\frac{1}{20}$ | 25% |
| $\frac{4}{5}$ | 5% |

Question 2: 10% of the world are left handed.
What fraction of the world are right handed?

Question 3: 32% of people voted for the Yellow Party in an election.
What fraction of people voted for the Yellow Party?

Question 4: Rebecca spent 85% of her pocket money this week.
What fraction of her pocket money did she spend?

Question 5: Neil got 52% of questions correct on a test.
What fraction of questions did he get correct?

Question 6: In a school, students either study French, German or Spanish.
They study one language each.
11% of students study French
27% of students study Spanish
What fraction of the students study German?

Question 7: Louis is completing his homework.
Can you spot any mistakes?

## Q1

Write 30% as a fraction.
Give your answer in its simplest form.

$$\frac{30}{100} = \frac{15}{50}$$

## Q2

Write 6% as a fraction.
Give your answer in its simplest form.

$$\frac{6}{10} = \frac{3}{5}$$

# Fluency Practice

Question 1: Convert the following fractions into percentages.

(a) $\frac{9}{50}$ (b) $\frac{3}{10}$ (c) $\frac{4}{5}$ (d) $\frac{12}{25}$

(e) $\frac{3}{4}$ (f) $\frac{9}{10}$ (g) $\frac{36}{50}$ (h) $\frac{13}{20}$

(i) $\frac{1}{5}$ (j) $\frac{3}{20}$ (k) $\frac{24}{25}$ (l) $\frac{7}{10}$

(m) $\frac{17}{20}$ (n) $\frac{13}{10}$ (o) $\frac{184}{200}$ (p) $\frac{39}{300}$

Question 2: Convert the following fractions into percentages.

(a) $\frac{3}{8}$ (b) $\frac{32}{40}$ (c) $\frac{13}{200}$ (d) $\frac{7}{8}$

(e) $\frac{7}{40}$ (f) $\frac{5}{8}$ (g) $\frac{48}{60}$ (h) $\frac{60}{400}$

(i) $\frac{171}{200}$ (j) $\frac{52}{80}$ (k) $\frac{19}{40}$ (l) $\frac{57}{40}$

Question 3: Convert the following fractions into percentages.

(a) $\frac{1}{8}$ (b) $\frac{17}{40}$ (c) $\frac{5}{16}$ (d) $\frac{53}{400}$

(e) $\frac{38}{125}$ (f) $\frac{15}{16}$ (g) $\frac{7}{32}$ (h) $\frac{10}{64}$

Question 4: Convert the following fractions into percentages.

(a) $\frac{2}{3}$ (b) $\frac{4}{9}$ (c) $\frac{4}{15}$ (d) $\frac{5}{6}$

(e) $\frac{11}{30}$ (f) $\frac{7}{12}$ (g) $\frac{8}{33}$ (h) $\frac{2}{7}$

(i) $\frac{9}{22}$ (j) $\frac{5}{14}$ (k) $\frac{28}{45}$ (l) $\frac{19}{15}$

# Intelligent Practice

Convert the following fractions into percentages:

1) $\frac{7}{10}$

2) $\frac{7}{5}$

3) $\frac{7}{50}$

4) $\frac{700}{50}$

5) $\frac{350}{50}$

6) $\frac{35}{50}$

7) $\frac{35}{500}$

8) $\frac{350}{500}$

9) $\frac{175}{500}$

10) $\frac{3}{10}$

11) $\frac{3}{5}$

12) $\frac{3}{20}$

13) $\frac{30}{20}$

14) $\frac{30}{40}$

15) $\frac{30}{80}$

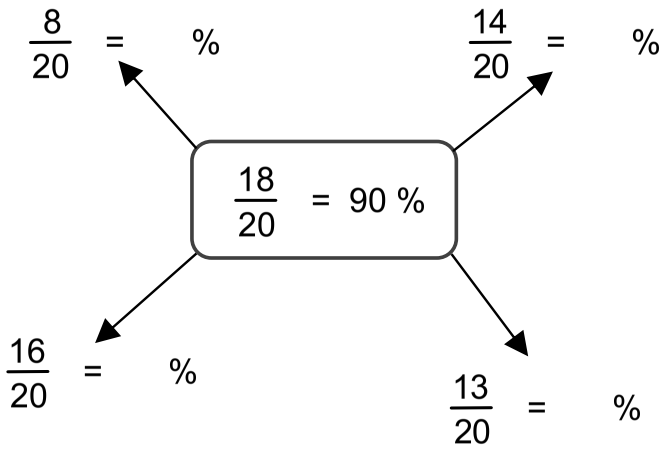
16) $\frac{60}{80}$

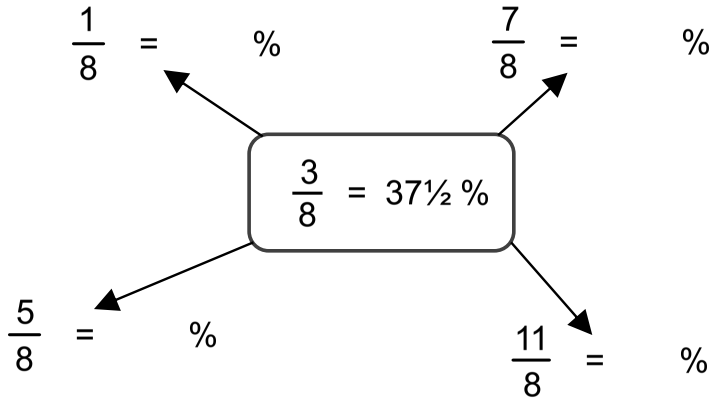
17) $\frac{60}{800}$

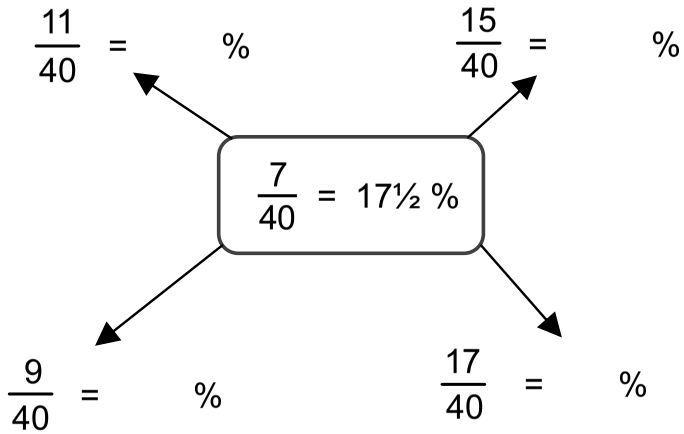
18) $\frac{6}{800}$

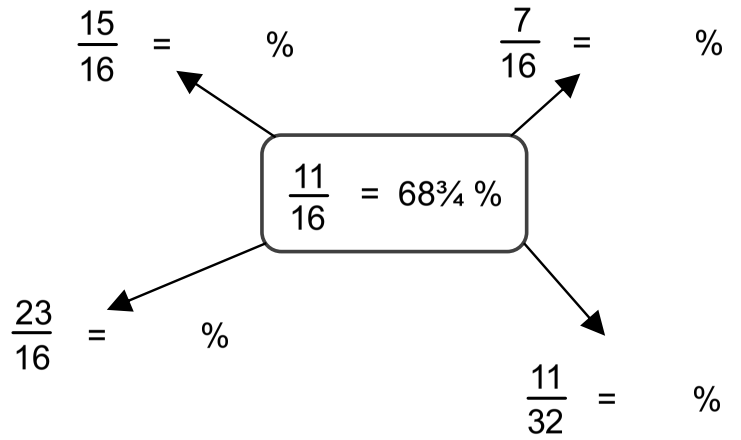
# Fluency Practice

given a fraction as a % (i)

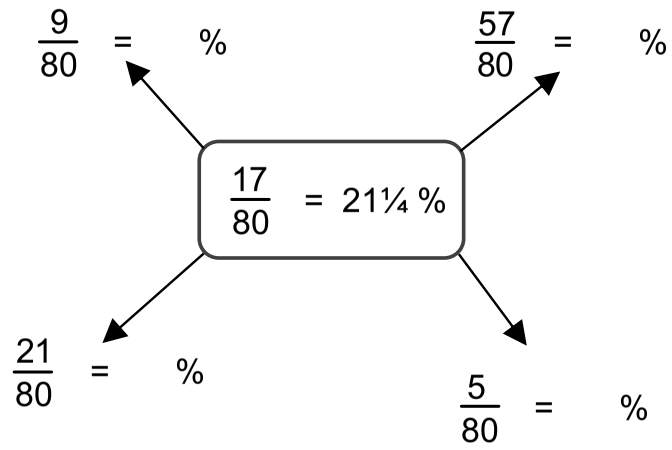


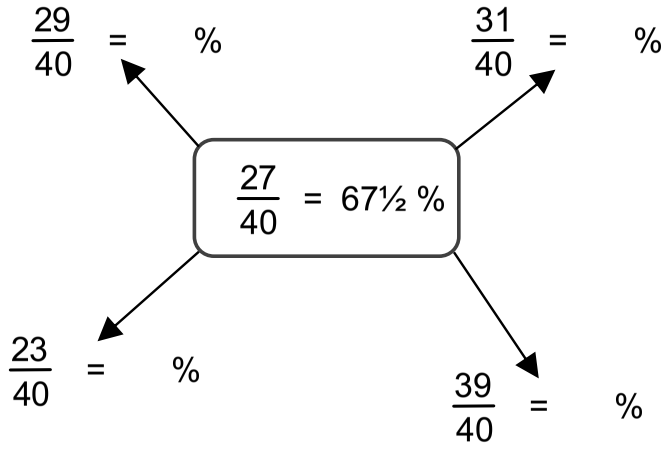



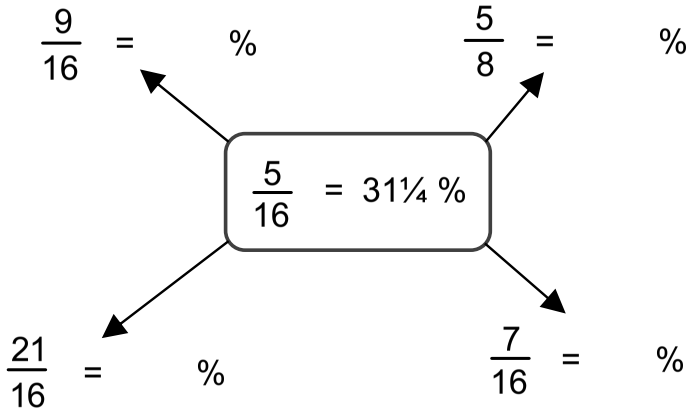



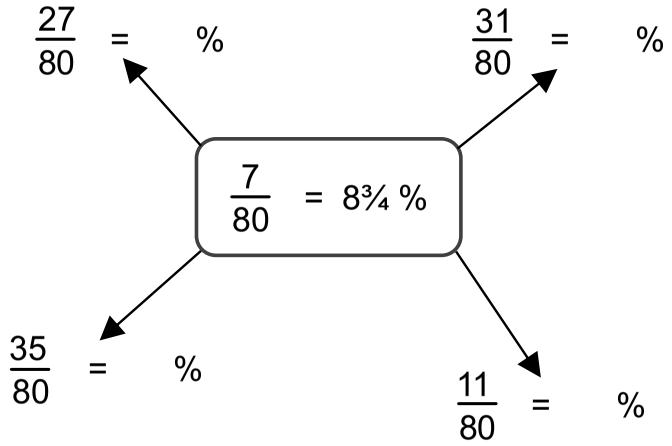



given a fraction as a % (ii)



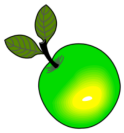



# Fluency Practice

Question 1: There are 20 apples on a tree.
3 of the apples are bad.
What percentage of the apples are bad?



Question 2: James sat an English test.
He scored 39 out of 50.
What percentage did he get right?

Question 3: Helen takes 25 shots at basketball training.
She misses 7 shots.
What percentage of the shots did Helen miss?

Question 4: There are 40 passengers on a bus.
14 passengers are going to Newport.
What percentage of the passengers are going to Newport?

Question 5: Randalstown Rugby Club play 8 matches and win 7 of the matches.
What percentage of the matches did Randalstown win?

Question 6: Freddy sits a physics test.
He gets 38 out of 40 correct.
What percentage did he get right?

Question 7: There are 500 students at a school.
141 of the students study Spanish.
What percentage of the students study Spanish?

Question 8: There are 30 students in a class.
4 of the students are left handed.
What percentage of the students are right handed?

# Fluency Practice

Question 1: Convert the following decimals to fractions, in their simplest forms

| | | | |
|---|---|---|---|
| (a) 0.5 | (b) 0.3 | (c) 0.7 | (d) 0.1 |
| (e) 0.8 | (f) 0.2 | (g) 0.9 | (h) 0.6 |
| (i) 0.13 | (j) 0.22 | (k) 0.31 | (l) 0.12 |
| (m) 0.42 | (n) 0.89 | (o) 0.15 | (p) 0.84 |
| (q) 0.25 | (r) 0.02 | (s) 0.45 | (t) 0.07 |
| (u) 0.92 | (v) 0.95 | (w) 0.16 | (x) 0.83 |

Question 2: Write the following decimals as fractions, in their simplest forms

| | | | |
|---|---|---|---|
| (a) 0.123 | (b) 0.402 | (c) 0.676 | (d) 0.888 |
| (e) 0.195 | (f) 0.625 | (g) 0.225 | (h) 0.1234 |
| (i) 0.5005 | (j) 0.2244 | (k) 0.9702 | (l) 0.7007 |

Question 3: Convert the following decimals to fractions, in their simplest forms

| | | | |
|---|---|---|---|
| (a) 1.3 | (b) 1.9 | (c) 1.4 | (d) 1.5 |
| (e) 2.5 | (f) 3.9 | (g) 8.5 | (h) 1.12 |
| (i) 1.75 | (j) 1.72 | (k) 2.75 | (l) 3.55 |

# Intelligent Practice

Convert the following decimals into fractions in their simplest form:

1) $0.6$
2) $0.06$
3) $0.66$
4) $0.65$
5) $0.56$
6) $0.55$
7) $0.006$
8) $0.055$
9) $0.065$
10) $0.605$
11) $6.5$
12) $6.05$
13) $6.005$
14) $5.06$

# Fluency Practice

Question 1: Match up any decimal and fraction that are equivalent.
Not all the decimals and fractions will match up

| | |
|---|---|
| $\frac{1}{3}$ | 0.6 |
| $\frac{3}{5}$ | 1.3 |
| $\frac{1}{2}$ | 0.5 |
| $\frac{3}{10}$ | 0.625 |
| $\frac{5}{8}$ | 0.3 |

Question 2: Danny has tried to complete his homework.
Can you spot any mistakes?

**Q1** Write 0.6 as a fraction.
Give your answer in its simplest form.

$$\frac{6}{10}$$

**Q2** Write 0.08 as a fraction.
Give your answer in its simplest form.

$$\frac{2}{50}$$

**Q3** Write 0.902 as a fraction.
Give your answer in its simplest form.

$$\frac{46}{500} = \frac{23}{250}$$

# Fluency Practice

Here are some decimals.

0.15 0.55555 0.4545 8.105 1.25 0.705705...

0.5 0.55555... 45.4565 0.454545... 0.12525 0.15555... 7.5

Terminating

Recurring

# Intelligent Practice

Write the following out fully:

1) $0.\dot{5}$
2) $0.4\dot{5}$
3) $0.\dot{4}\dot{5}$
4) $0.3\dot{4}\dot{5}$
5) $0.\dot{3}4\dot{5}$
6) $0.2\dot{3}4\dot{5}$
7) $0.\dot{2}34\dot{5}$
8) $1.\dot{2}34\dot{5}$

Write the following using dot notation:

1) $0.666\ldots$
2) $0.7666\ldots$
3) $0.767676\ldots$
4) $0.8767676\ldots$
5) $0.876876876\ldots$
6) $0.9876876876\ldots$
7) $0.987698769876\ldots$
8) $10.987698769876\ldots$

# Fluency Practice

Question 1: Convert the following fractions to decimals.

(a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{3}{4}$ (d) $\frac{1}{5}$ (e) $\frac{3}{5}$ (f) $\frac{4}{5}$

(g) $\frac{1}{10}$ (h) $\frac{3}{10}$ (i) $\frac{7}{10}$ (j) $\frac{9}{10}$ (k) $\frac{67}{100}$ (l) $\frac{99}{100}$

Question 2: Convert the following fractions to decimals.

(a) $\frac{1}{8}$ (b) $\frac{7}{20}$ (c) $\frac{5}{8}$ (d) $\frac{3}{20}$ (e) $\frac{3}{25}$ (f) $\frac{7}{8}$

(g) $\frac{19}{20}$ (h) $\frac{43}{50}$ (i) $\frac{1}{3}$ (j) $\frac{9}{200}$ (k) $\frac{9}{40}$ (l) $\frac{13}{20}$

(m) $\frac{2}{3}$ (n) $\frac{123}{200}$ (o) $\frac{21}{40}$ (p) $\frac{401}{500}$ (q) $\frac{161}{200}$ (r) $\frac{3}{8}$

(s) $\frac{1}{9}$ (t) $\frac{19}{50}$ (u) $\frac{51}{80}$ (v) $\frac{11}{80}$ (w) $\frac{5}{9}$

Question 3: Convert the following fractions to decimals.

(a) $\frac{3}{2}$ (b) $\frac{5}{4}$ (c) $\frac{11}{2}$ (d) $\frac{9}{5}$ (e) $\frac{53}{20}$ (f) $\frac{177}{100}$

# Intelligent Practice

Convert the following fractions into decimals:

1) $\frac{1}{5}$

2) $\frac{2}{5}$

3) $\frac{3}{5}$

4) $\frac{3}{50}$

5) $\frac{30}{50}$

6) $\frac{3}{500}$

7) $\frac{5}{3}$

8) $\frac{1}{6}$

9) $\frac{2}{6}$

10) $\frac{2}{60}$

11) $\frac{20}{60}$

12) $\frac{20}{66}$

13) $\frac{21}{66}$

14) $\frac{66}{21}$

# Intelligent Practice

1) a) Convert the following fractions to decimals

| | | | |
|---|---|---|---|
| $\frac{1}{2} =$ | $\frac{2}{2} =$ | $\frac{3}{2} =$ | $\frac{4}{2} =$ |
| $\frac{1}{4} =$ | $\frac{2}{4} =$ | $\frac{3}{4} =$ | $\frac{4}{4} =$ |
| $\frac{1}{8} =$ | $\frac{2}{8} =$ | $\frac{3}{8} =$ | $\frac{4}{8} =$ |
| $\frac{1}{16} =$ | $\frac{2}{16} =$ | $\frac{3}{16} =$ | $\frac{4}{16} =$ |

1) b) What patterns do you notice in your answers?

2) Convert the following to decimals? What do you notice?

a) $\frac{7}{10}$ b) $\frac{7}{5}$ c) $\frac{7}{20}$ d) $\frac{7}{40}$

3) Convert the following to decimals? What do you notice?

a) $\frac{6}{25}$ b) $\frac{3}{25}$ c) $\frac{12}{25}$ d) $\frac{36}{25}$

4) Convert the following to decimals? What do you notice?

a) $\frac{42}{200}$ b) $\frac{42}{300}$ c) $\frac{42}{600}$ d) $\frac{42}{1200}$

5) Convert the following to decimals? What do you notice?

a) $\frac{35}{50}$ b) $\frac{35}{25}$ c) $\frac{35}{250}$ d) $\frac{350}{25}$

6) If I know $\frac{1}{4} = 0.25$, how could I work out:

a) $\frac{1}{40}$ b) $\frac{1}{400}$

7) If I know $\frac{1}{8} = 0.125$, how could I work out (explain your method):

a) $\frac{9}{8}$ b) $\frac{7}{8}$ c) $\frac{70}{8}$ d) $\frac{77}{8}$

8) If I know $\frac{1}{64} = 0.015625$, how could I work out (explain your method):

a) $\frac{2}{64}$ b) $\frac{65}{64}$ c) $\frac{63}{64}$ d) $\frac{128}{640}$ e) $\frac{33}{64}$

f) What else can you work out? Be creative.

# Fluency Practice

Question 1: Match up any fraction and decimal that are equivalent.
Not all the fractions and decimals will match up.

| | |
|---|---|
| $\frac{1}{2}$ | 0.4 |
| $\frac{3}{4}$ | 0.5 |
| $\frac{2}{5}$ | 0.25 |
| $\frac{7}{10}$ | 0.34 |
| $\frac{1}{4}$ | 0.7 |

Question 2: Which is larger, 0.65 or $\frac{3}{5}$ ?

Explain your answer.

Question 3: Arrange in order, from smallest to largest.

$\frac{7}{10}$ | 0.9 | $\frac{4}{5}$ | 0.77 | $\frac{3}{4}$

Question 4: In 2015, $\frac{13}{20}$ of adults in the UK owned a smart phone.

Write $\frac{13}{20}$ as a decimal.

Question 5: Leon has completed his homework.
Can you spot any mistakes?

Write $\frac{4}{5}$ as a decimal.

$$4\overline{)5.^{1}0^{2}0} \quad 1.25$$

Answer: 1.25

Write $\frac{3}{20}$ as a decimal.

$$20\overline{)3.^{3}0^{1}0^{10}0} \quad 0.105$$

Answer: 0.105

# Fluency Practice

Question 1: Write these decimals as percentages

(a) 0.31 (b) 0.16 (c) 0.22 (d) 0.06 (e) 0.02 (f) 0.8

(g) 0.4 (h) 0.185 (i) 0.204 (j) 0.092 (k) 1.24 (l) 2.8

Question 2: Write these percentages as decimals

(a) 18% (b) 27% (c) 60% (d) 3% (e) 55% (f) 80%

(g) 1% (h) 9.2% (i) 41.5% (j) 0.8% (k) 180% (l) 315%

Question 3: Write these decimals as fractions

(a) 0.7 (b) 0.4 (c) 0.15 (d) 0.88 (e) 0.79 (f) 0.04

(g) 0.404 (h) 0.125 (i) 0.625 (j) 0.123 (k) 1.6 (l) 2.25

Question 4: Write these fractions as decimals

(a) $\frac{3}{10}$ (b) $\frac{3}{5}$ (c) $\frac{81}{100}$ (d) $\frac{9}{20}$ (e) $\frac{1}{8}$ (f) $\frac{19}{40}$

(g) $\frac{7}{8}$ (h) $\frac{13}{20}$ (i) $\frac{33}{50}$ (j) $\frac{19}{10}$ (k) $\frac{83}{20}$ (l) $\frac{123}{40}$

Question 5: Write these percentages as fractions

(a) 70% (b) 60% (c) 95% (d) 24% (e) 79% (f) 82%

(g) 37.5% (h) 1.8% (i) 11.5% (j) 0.06% (k) 160% (l) 285%

Question 6: Write these fractions as percentages

(a) $\frac{9}{10}$ (b) $\frac{1}{5}$ (c) $\frac{99}{100}$ (d) $\frac{3}{25}$ (e) $\frac{17}{20}$ (f) $\frac{7}{8}$

(g) $\frac{7}{40}$ (h) $\frac{3}{8}$ (i) $\frac{43}{50}$ (j) $\frac{123}{200}$ (k) $\frac{5}{9}$ (l) $\frac{53}{20}$

# Fluency Practice

Question 6: Which is larger? Show your working out

(a) 78% or 0.8

(b) $\frac{1}{5}$ or 0.23

(c) $\frac{3}{4}$ or 0.73

(d) $\frac{17}{20}$ or 0.87

(e) $\frac{5}{8}$ or 0.61

(f) 109% or 1.1

(g) 43% or $\frac{17}{40}$

(h) $\frac{13}{10}$ or 128%

(i) $\frac{5}{2}$ or 2.8

Question 7: Arrange the following in order, from smallest to largest.

(a) $\frac{1}{4}$ 0.19 0.3 26% $\frac{1}{5}$

(b) 0.9 $\frac{17}{20}$ $\frac{4}{5}$ 88% 0.79

(c) 11% 0.2 13% $\frac{3}{20}$ $\frac{1}{8}$

(d) $\frac{2}{3}$ 65% 0.68 $\frac{7}{10}$ $\frac{5}{8}$

(e) 101% $\frac{11}{10}$ 1.2 $\frac{19}{20}$ 0.9

(f) 1.5 $\frac{5}{3}$ 82% $\frac{7}{4}$ $\frac{37}{40}$

Question 8: Copy and complete the tables below

(a)

| Fraction | Decimal | Percentage |
|---|---|---|
| | | 10% |
| $\frac{4}{5}$ | | |
| | 0.17 | |
| $\frac{3}{20}$ | | |

(b)

| Fraction | Decimal | Percentage |
|---|---|---|
| | 0.11 | |
| $\frac{9}{20}$ | | |
| | | 68% |
| $\frac{3}{8}$ | | |

(c)

| Fraction | Decimal | Percentage |
|---|---|---|
| $\frac{2}{3}$ | | |
| | 0.003 | |
| | | 10.5% |
| $\frac{9}{80}$ | | |

(d)

| Fraction | Decimal | Percentage |
|---|---|---|
| | 1.4 | |
| $\frac{19}{10}$ | | |
| | | 265% |
| $\frac{11}{4}$ | | |

# Fluency Practice

Question 1: $\frac{3}{5}$ of a fruit punch is orange juice.

What percentage of the fruit punch is orange juice?

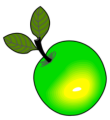
Question 2: 18% of a class wear glasses.
What fraction of the class wear glasses?

Question 3: Benny says that 0.2 is smaller than 19%.
Is he correct? Explain your answer.

Question 4: Mike got 58% of questions correct on a test.
What fraction of questions did he get correct?

Question 5: A school has three year groups: year 7, year 8 and year 9.
30% of the students are in year 7
36% of the students are in year 8
What fraction of the students at the school are in year 9?

Question 6: In a crate, there are 40 apples.
3 of the apples are bad.
What percentage of apples in the crate are good?



Question 7: James sat an English quiz.
He scored 7 out of 8.
What percentage did he get right?

Question 8: Randalstown Rugby Club play 20 matches and win 17 of the matches.
What percentage of the matches did Randalstown win?

Question 9: Ricky has sat his summer exams.
His scores are below.

Maths: 17 out of 22
English: 19 out of 30
Science: 51 out of 60
French: 11 out of 12
German: 10 out of 14
Music: 19 out of 42
Geography: 19 out of 28
History: 30 out of 38
Welsh: 65 out of 70

(a) Change his scores into percentages.
Give each answer to 1 decimal place.

(b) List Ricky's top 3 subjects

# Fluency Practice

Write each percentage as a decimal.

(a) 27% (b) 85%

(c) 13% (d) 6%

(e) 80% (f) 32%

Write each decimal as a percentage.

(a) 0.29 (b) 0.55

(c) 0.03 (d) 0.16

(e) 0.6 (f) 1.25

Write each percentage as a fraction in its simplest form.

(a) 8% (b) 50%

(c) 25% (d) 35%

(e) 90% (f) 88%

Write each decimal as a fraction in its simplest form.

(a) 0.12 (b) 0.4

(c) 0.45 (d) 0.68

(e) 0.125 (f) 0.625

Write each fraction as a decimal.

(a) $\frac{37}{100}$ (b) $\frac{7}{100}$

(c) $\frac{7}{20}$ (d) $\frac{17}{50}$

(e) $\frac{3}{25}$ (f) $\frac{11}{40}$

Write each fraction as a percentage.

(a) $\frac{23}{100}$ (b) $\frac{9}{50}$

(c) $\frac{19}{25}$ (d) $\frac{3}{20}$

(e) $\frac{5}{8}$ (f) $\frac{27}{40}$

Write each fraction as a decimal.

(a) $\frac{7}{9}$ (b) $\frac{1}{6}$ (c) $\frac{4}{30}$

# Fluency Practice

Convert 0.45 to a percentage.

$0.45 \times 100 = 45$

**45%**

Convert $\frac{7}{20}$ to a percentage.

$\frac{7}{20} = \frac{35}{100} = 35\%$

**35%**

Convert $\frac{3}{75}$ to a percentage.

$\frac{3}{75} = \frac{1}{25} = \frac{4}{100} = 4\%$

**4%**

1. Convert these fractions to percentages:

   a) $\frac{23}{100}$ b) $\frac{24}{200}$ c) $\frac{11}{20}$

   d) $\frac{13}{50}$ e) $\frac{9}{10}$ f) $\frac{24}{25}$

   g) $\frac{36}{400}$ h) $\frac{7}{25}$ i) $\frac{17}{20}$

2. Convert to percentages:

   a) $\frac{12}{30} = \frac{\quad}{10} = \frac{\quad}{100} = \quad\%$ b) $\frac{30}{75} = \frac{\quad}{25} = \frac{\quad}{100} = \quad\%$

   c) $\frac{8}{40} = \frac{\quad}{20} = \frac{\quad}{100} = \quad\%$ d) $\frac{36}{80} = \frac{\quad}{20} = \frac{\quad}{100} = \quad\%$

   e) $\frac{4}{5} = \frac{\quad}{10} = \frac{\quad}{100} = \quad\%$ f) $\frac{36}{150} = \frac{\quad}{50} = \frac{\quad}{100} = \quad\%$

3. Which of the following are the same as 20%? Choose all that apply.

   a) $\frac{1}{5}$ b) 0.02 c) 0.2 d) $\frac{5}{25}$ e) $\frac{20}{200}$

4. A bag contains only red and blue pencils.
   70% of the pencils are blue.
   What percentage of the pencils are red?

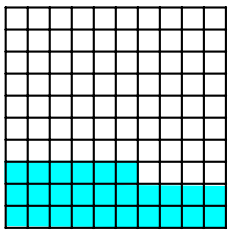
5. On a spelling test, John scores 6 out of 10. What percentage did John score?

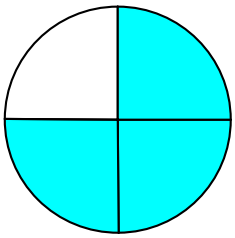
6. In a quiz, a team correctly answer 21 out of 25 questions. What percentage of questions did the team answer correctly?

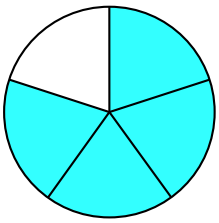
7. One day, 15% of the pupils in class 6B were absent. What percentage were present?

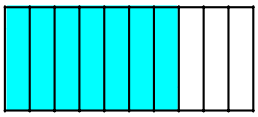
# Fluency Practice

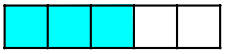
8. Write down the percentage of each shape that is shaded.

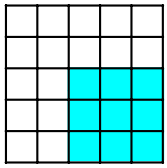
a) 

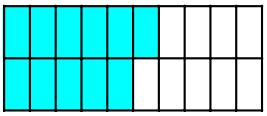
b) 

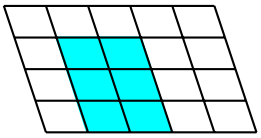
c) 

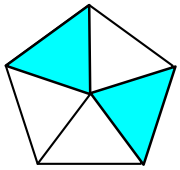
d) 

e) 

f) 

g) 

h) 

i) 

9. Jane says "0.4 is equivalent to 4%." Explain why Jane is wrong.

10. Convert these decimals to percentages:

a) 0.32 b) 0.07 c) 0.91

d) 0.5 e) 0.15 f) 0.02

g) 0.84 h) 0.3 i) 0.08

11. Which is larger, 28% or $\frac{6}{20}$?

12. Which is larger, 85% or $\frac{21}{25}$?

13. On a test Julie scored $\frac{60}{80}$ and Andrew scored 65%. Who did better?

14. Write each set of numbers in order of size, starting with the smallest.

a) $\frac{1}{2}$ 0.4 $\frac{23}{50}$ 35%

b) $\frac{3}{20}$ 12% $\frac{4}{25}$ 0.2

c) 0.1 0.08 $\frac{1}{5}$ 18%

d) 0.82 $\frac{19}{25}$ 87% 0.9

# Fluency Practice

fpd connections 1

example

























fill in the gaps

fpd connections 3

fill in the gaps

to convert between
- fractions
- decimals
- percentages

the fraction should be in reduced form – with all of the common factors cancelled

| *simplified fraction* | *decimal* | *percentage* |
|---|---|---|
| | 0.05 | % |
| | | 45% |
| 7/20 | | % |
| | 0.12 | % |
| | | 55% |
| 23/50 | | % |
| | 0.36 | % |
| | | 62½% |
| 13/20 | | % |
| | 0.0375 | % |
| | | 33¾% |
| 9/40 | | % |
| | | 87½% |

# fractions, decimals & percentages

Match these cards into groups of three that are equivalent.
Record your answers in the table on the right.

$\frac{1}{5}$ $\frac{1}{20}$ 0.08 $\frac{8}{25}$ 0.8 $\frac{55}{100}$ $\frac{8}{100}$ 0.15 $\frac{15}{20}$

0.32 0.55 0.75 0.02 $\frac{1}{2}$

$\frac{3}{20}$ 5% $\frac{1}{25}$ 0.04 0.5 0.05

0.25 $\frac{1}{4}$ 20% 40% 8% 2%

$\frac{1}{50}$ 50% 0.2 $\frac{4}{5}$ $\frac{4}{10}$ 80% 0.4

55% 25% 75% 15%

4% 32%

| Fraction | Decimal | Percentage |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Fluency Practice

# Fluency Practice

In each box, cross off pairs that are **equivalent** to each other.
Circle the number that is left over.

**A**

| | | |
|---|---|---|
| 0.4 | 50% | 13% |
| 4% | $\frac{1}{4}$ | 40% |
| 0.25 | $\frac{13}{100}$ | $\frac{1}{2}$ |

**B**

| | | |
|---|---|---|
| $\frac{3}{10}$ | 0.02 | $\frac{1}{10}$ |
| $\frac{3}{4}$ | 10% | 0.2 |
| 2% | 0.3 | 75% |

**C**

| | | |
|---|---|---|
| $\frac{1}{5}$ | 0.15 | $\frac{1}{2}$ |
| 0.25 | 15% | 20% |
| 0.5 | 5% | $\frac{5}{20}$ |

**D**

| | | |
|---|---|---|
| $\frac{3}{5}$ | 80% | $\frac{9}{10}$ |
| 70% | 0.6 | 40% |
| $\frac{4}{5}$ | 0.9 | $\frac{7}{10}$ |

**E**

| | | |
|---|---|---|
| 5% | $\frac{1}{25}$ | 6% |
| 0.06 | 0.4 | $\frac{1}{20}$ |
| $\frac{1}{50}$ | 2% | 0.04 |

**F**

| | | |
|---|---|---|
| $\frac{13}{50}$ | 16% | 0.13 |
| 20% | $\frac{3}{20}$ | 15% |
| $\frac{4}{25}$ | 0.2 | 0.26 |

**G**

| | | |
|---|---|---|
| 25% | $\frac{12}{16}$ | 0.015 |
| 0.08 | $\frac{2}{8}$ | $\frac{1}{8}$ |
| 0.125 | 1.5% | 75% |

**H**

| | | |
|---|---|---|
| $\frac{1}{3}$ | 0.03 | $\frac{3}{10}$ |
| $\frac{3}{5}$ | $0.\dot{3}$ | $\frac{2}{9}$ |
| $0.\dot{2}$ | 3% | 60% |

**I**

| | | |
|---|---|---|
| 37.5% | $\frac{19}{50}$ | 0.88 |
| $\frac{22}{25}$ | $\frac{8}{9}$ | 0.38 |
| $\frac{3}{8}$ | 19% | $88.\dot{8}\%$ |

**J**

| | | |
|---|---|---|
| 120% | $\frac{9}{20}$ | 0.9 |
| 90% | 18% | $\frac{6}{5}$ |
| $1\frac{4}{5}$ | 0.45 | 1.8 |

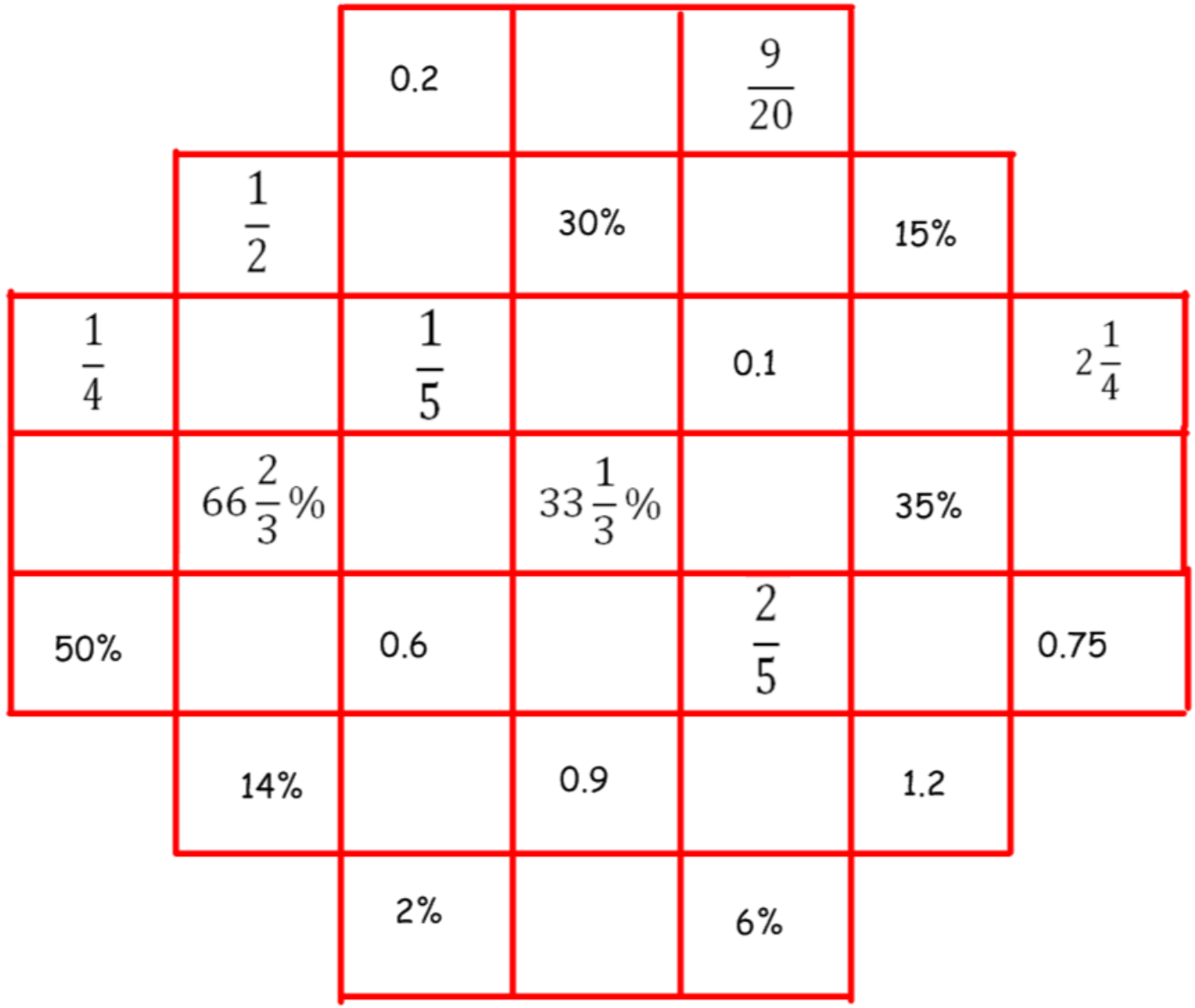
**K**

| | | |
|---|---|---|
| 105% | 14% | $1\frac{1}{25}$ |
| $\frac{7}{50}$ | $1\frac{1}{20}$ | $\frac{11}{10}$ |
| 1.4 | 1.1 | $\frac{7}{5}$ |

**L**

| | | |
|---|---|---|
| $\frac{14}{9}$ | 1.3 | $\frac{5}{3}$ |
| $1.6\dot{}$ | 0.6 | 160% |
| $\frac{8}{5}$ | $1.\dot{5}$ | 130% |

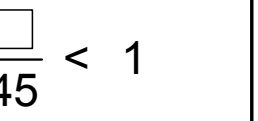
Calculate the numbers in the empty boxes by adding the boxes surrounding it



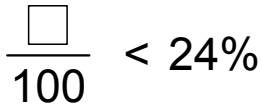
# Problem Solving

*For each statement, work out the biggest whole number that could go in the empty box to make the statement true*

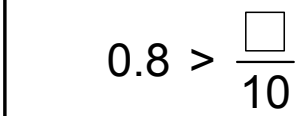
A



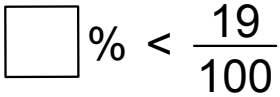
B



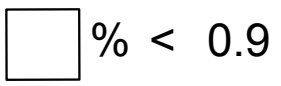
C



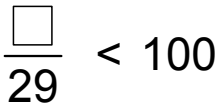
D



E



F



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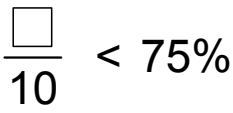

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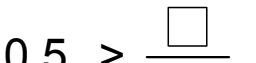

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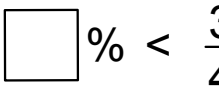

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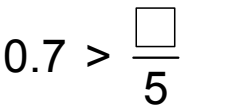

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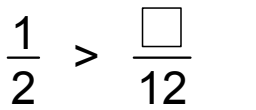

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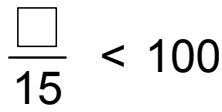

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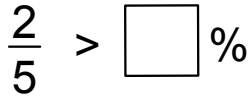

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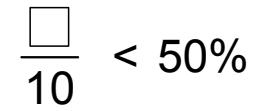

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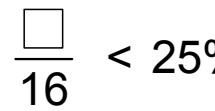

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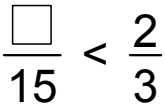

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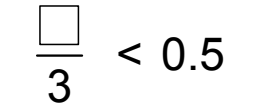

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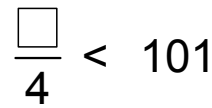

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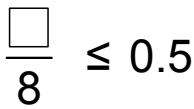

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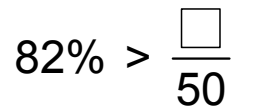

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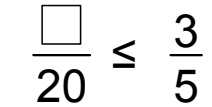

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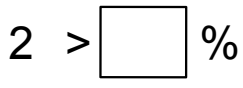

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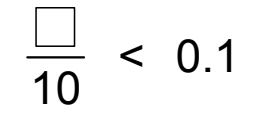
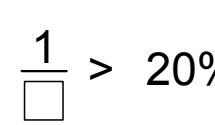


X



# Problem Solving

*For each statement, work out the biggest whole number that could go in the empty box to make the statement true*

A

$$\frac{\square}{5} < 1$$

B

$$\frac{\square}{100} < 72\%$$

C

$$0.4 > \square\,\%$$

D

$$\frac{\square}{18} < \frac{4}{9}$$

E

$$\square\,\% < \frac{13}{50}$$

F

$$\frac{\square}{10} \leq 0.7$$

G

$$\frac{\square}{25} < 85\%$$

H

$$0.38 > \frac{\square}{10}$$

I

$$\frac{\square}{27} < 100\%$$

J

$$0.55 > \frac{\square}{5}$$

K

$$\frac{3}{15} > \frac{\square}{20}$$

L

$$\square\,\% < \frac{2}{9}$$

M

$$\frac{2}{5} > \square\,\%$$

N

$$20\% \leq \frac{1}{\square}$$

O

$$\frac{\square}{9} < 0.84$$

P

$$2 > \square\,\%$$

Q

$$\frac{\square}{9} < 0.\dot{4}$$

R

$$0.1 < \frac{1}{\square}$$

S

$$0.89 > \frac{\square}{9}$$

T

$$\frac{7}{\square} > 1$$

U

$$40\% < \frac{1}{\square}$$

V

$$0.125 \geq \frac{\square}{8}$$

W

$$0.\dot{7} \leq \frac{7}{\square}$$

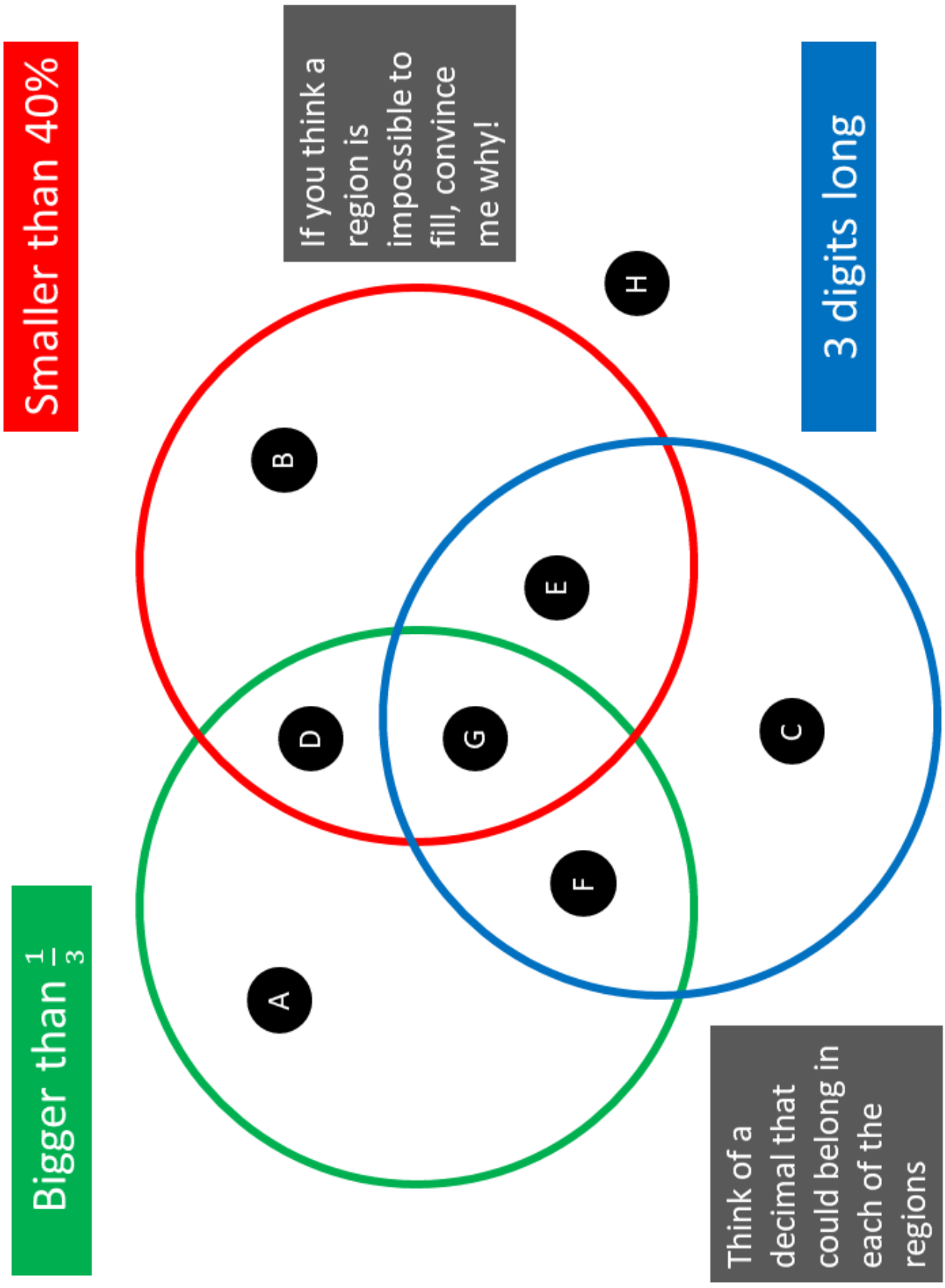
X

$$\frac{3}{\square} > 5\%$$

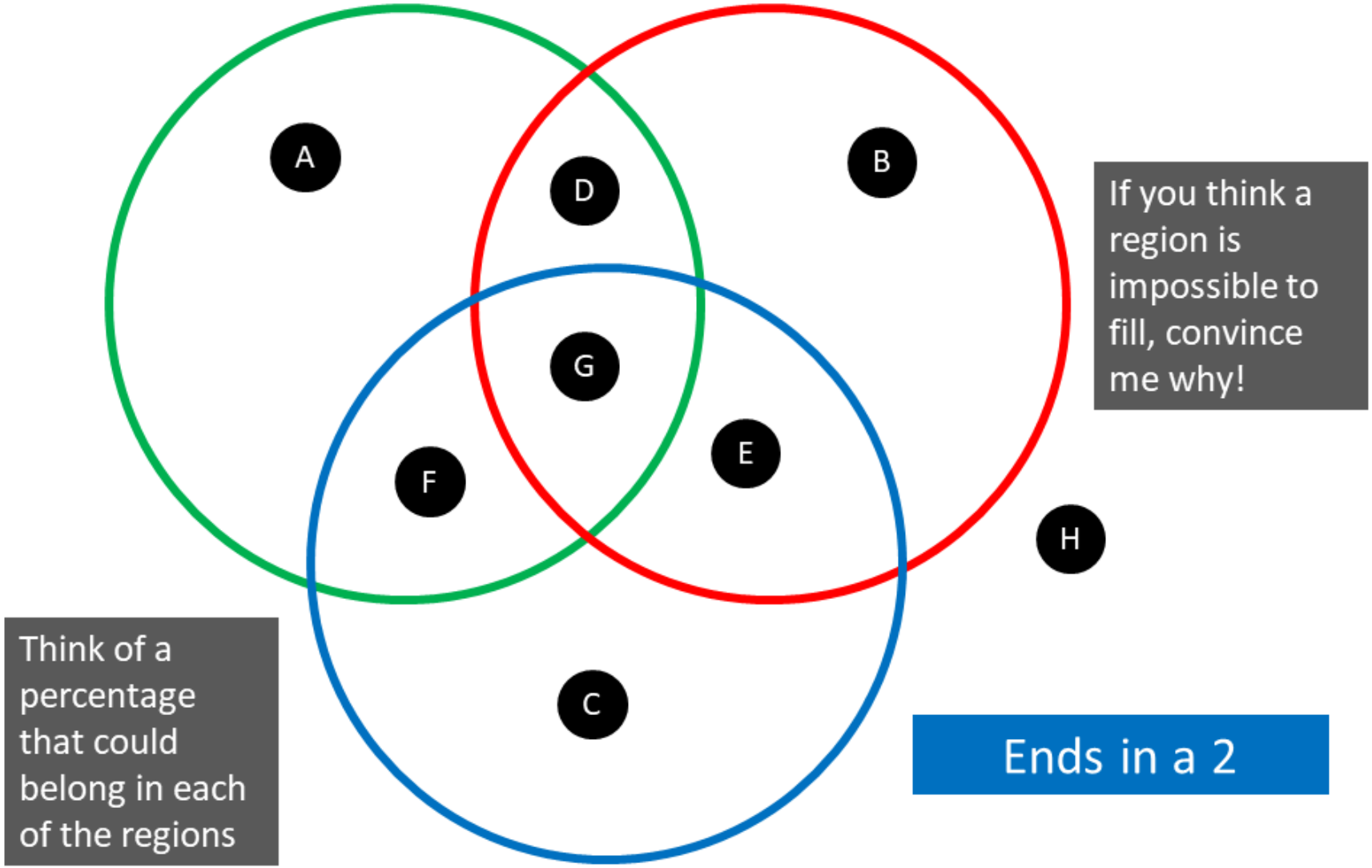
# Maths Venns


Smaller than 0.8
If you think a region is impossible to fill, convince me why!
Denominator is 20
Bigger than 70%
Think of a fraction that could belong in each of the regions
A
B
C
D
E
F
G
H

# Maths Venns


Smaller than 40%
If you think a region is impossible to fill, convince me why!
3 digits long
Bigger than $\frac{1}{3}$
Think of a decimal that could belong in each of the regions
A
B
C
D
E
F
G
H

# Maths Venns


Smaller than $\frac{4}{5}$
Bigger than 0.7
A
D
B
G
E
F
H
C
If you think a region is impossible to fill, convince me why!
Think of a percentage that could belong in each of the regions
Ends in a 2

# 2 Ordering Numbers

# Fluency Practice

Question 2: Arrange in order from smallest to largest

(a) 3, −5, 1, 0, −2, 4

(b) −1, 8, −5, 2, −9, −4, 3

(c) −1, −7, −2, 5, −6, 1

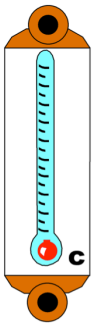
(d) 10, −7, −3, 5, −9, −2, −12

(e) 21, −3, 16, −19, −15, 23, −30

(f) −25, 35, 15, −5, 25, −45, 20

(g) 129, 101, −11, −111, 92, −91, 133, −29

Question 3: Arrange these temperatures in order, from lowest to highest




(a) 8°C, 12°C, 9°C, 15°C, 11°C, 7°C, 2°C

(b) 2°C, −5°C, 4°C, 8°C, −3°C, 1°C, −7°C

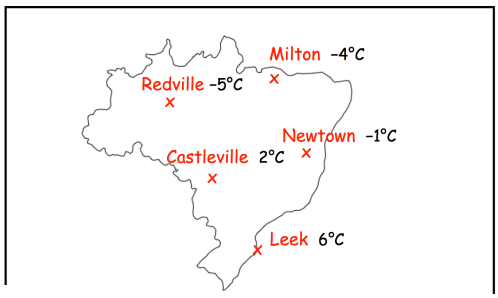
(c) 5°C, −3°C, 11°C, 9°C, −14°C, 21°C, −1°C

Question 5:

(a) Arrange the towns in order of temperature, starting with the lowest.

(b) How much warmer is it in Leek than Newtown?

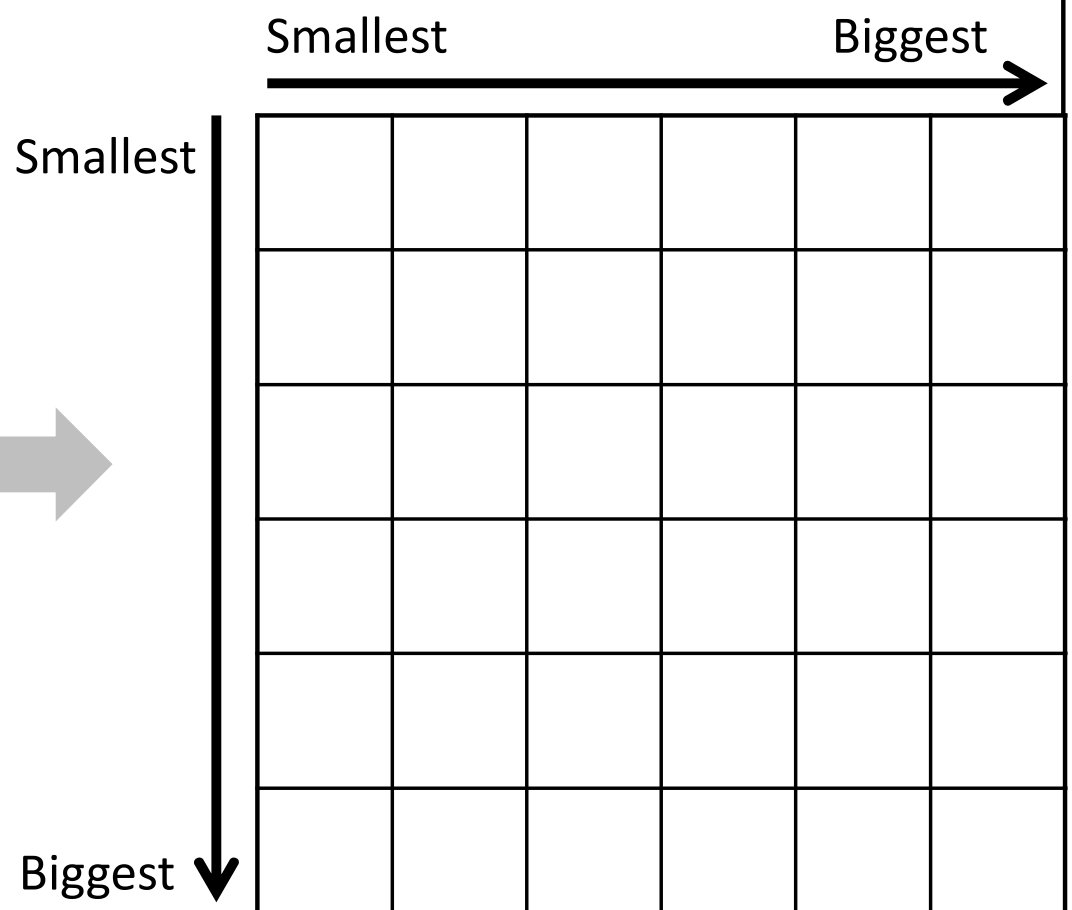
(c) Which town has a temperature closest to 0°C



## Ordering Negative Numbers

Place each number into the grid so that every column and every row is in ascending order (smallest to biggest).

| | | |
|---|---|---|
| −6 | −5 | 0 |
| 5 | 7 | −18 |
| −3 | −23 | −9 |
| −12 | −2 | 11 |
| 0 | 3 | −42 |
| −23 | 4 | −8 |
| 5 | −9 | −12 |
| −4 | 31 | −4 |
| 2 | −16 | 0 |
| −17 | −7 | 9 |
| 7 | −1 | −1 |
| −6 | −2 | −7 |



Question 1: Arrange in order from smallest to largest

(a) 3.7, 3.5, 3.9, 3.4, 3.8

(b) 9.2, 2.9, 5.4, 1.8, 8.7

(c) 4.6, 4.9, 14.1, 0.9, 1.2

(d) 8.13, 8.05, 8.24, 8.09, 8.15, 8.02

(e) 1.53, 1.48, 1.59, 1.44, 2.11, 0.98

(f) 0.59, 1.24, 0.45, 1.34, 0.88, 2.01

Question 2: Arrange in order from smallest to largest

(a) 1.2, 1.08, 1.13, 1.6, 1.29

(b) 5.25, 5.2, 5.19, 5.08, 5.1, 5.21

(c) 40.6, 46.1, 40.49, 40.68, 46, 46.09

(d) 0.24, 0.3, 0.125, 0.2, 0.199, 0.18

(e) 0.82, 0.082, 0.9, 0.807, 0.8

(f) 65, 6.5, 0.65, 7.65, 0.076, 7

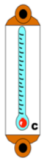
(g) 0.25, 0.3, 0.2, 0.06, 0.19

(h) 7.81, 7.49, 7.9, 7.007, 7.1, 7.107

(i) 10.083, 10.08, 10.009, 10.56, 10.3

(j) 0.342, 0.075, 0.256, 0.34, 0.6, 0.4

# Fluency Practice



Question 1: Arrange these temperatures in order, from lowest to highest

(a) 11 °C, 10.8°C, 12.3 °C, 15 °C, 12.7 °C

(b) 8.5 °C, 0.7 °C, −3 °C, 0.9 °C, 6 °C, 1.3 °C, −5.1°C

Question 2: Arrange these amounts of money in order, from highest to lowest.

(a) £6.74, £10, £1.99, £8, £3.30, £2

(b) 80p, £1, £0.09, 23p, £2.75, £0.82, £20

Question 3: The distance of various landmarks from Big Ben are listed below.
Arrange the landmarks in order, from closest to furthest.

| | |
|---|---|
| London Eye | 0.41 miles |
| Wembley | 11.62 miles |
| Buckingham Palace | 0.8 miles |
| Trafalgar Square | 0.63 miles |
| Hyde Park | 2.27 miles |
| Thorpe Park | 24.7 miles |

Question 4: Arrange these measurements in order from largest to smallest

(a) 6.2m, 6.077m, 6.31m, 6.19m, 6.4m, 6.009m

(b) 5kg, 800g, 1.2kg, 90g, 0.6kg

Question 5: The heights of seven footballers are listed below.

1.9m, 1.82m, 1.78m, 1.8m, 1.88m, 1.86m, 1.7m

(a) Arrange the heights in order from smallest to largest.

(b) Write down the median height.

(c) A player is picked at random.
Write down the probability that he is over 1.85m.

Question 6: The lengths of time that it takes to complete a jigsaw are below.

0.5 hours, 1.25 hours, 100 minutes, 0.75 hours, 40 minutes,

2 hours, 1.5 hours, 180 minutes, 61 minutes, 0.25 hours.

(a) Arrange the times in order, from quickest to longest.

(b) What fraction of the people completed the jigsaw in under 1 hour?

(c) What percentage of people took 2 hours or longer?

# Fluency Practice

Write these decimals in order from smallest to largest:

(a) $0.66, 0.606, 0.666, 0.6, 0.06$

(b) $1.281, 1.28, 1.82, 1.18, 1.208$

(c) $5.32, 5.02, 5.003, 5.3, 5.203$

(d) $0.77, 0.7, 0.077, 0.707, 0.71$

Write these numbers in ascending order:

(a) $4, -2, 0, 7, -5$

(b) $-4, 12, 3, -1, -11$

(c) $-2.5, 6, 0, -4, 1.5$

(d) $3.2, -4.1, -0.3, 7.6, 0.8$

Write these numbers in descending order:

(a) $3.9, 9.39, 3.99, 3.393, 3.39$

(b) $6, -5, -2, 7, -10$

(c) $4.5, -1.5, 1, -1, -4$

(d) $6.3, -6.6,\ 3.6, -3.6, -3.3$

These are the top five women's javelin throws in the 2016 Olympics. Order the athletes from 1st to 5th place.

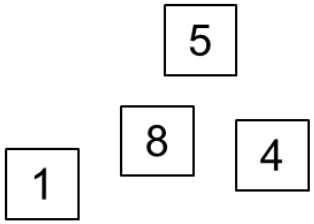
| | |
|---|---|
| Linda Stahl | 63.95 m |
| Barbora Spatakova | 64.65 m |
| Sarah Kolak | 64.3 m |
| Maria Andrejczyk | 67.11 m |
| Tatsiana Khaladovich | 63.78 m |

These are the top five men's 100 m times in the 2016 Olympics. Order the athletes from 1st to 5th place.

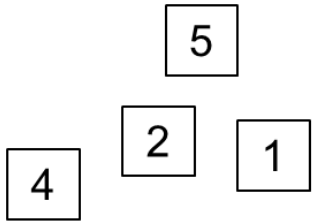
| | |
|---|---|
| Andre de Grasse | 9.91 seconds |
| Usain Bolt | 9.81 seconds |
| Yohan Blake | 9.93 seconds |
| Akani Simbine | 9.94 seconds |
| Justin Gatlin | 9.89 seconds |

**closest**

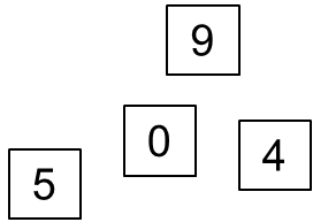
(1) use all four digits and a decimal point to create a number as close to 15 as you can



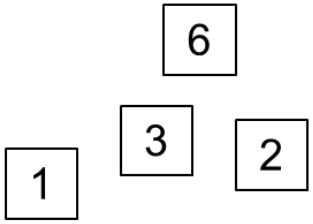

(2) use all four digits and a decimal point to create a number as close to 25 as you can



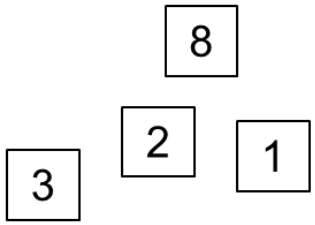

(3) use all four digits and a decimal point to create a number as close to 5 as you can



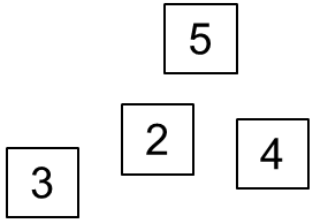

(4) use all four digits and a decimal point to create a number as close to 125 as you can



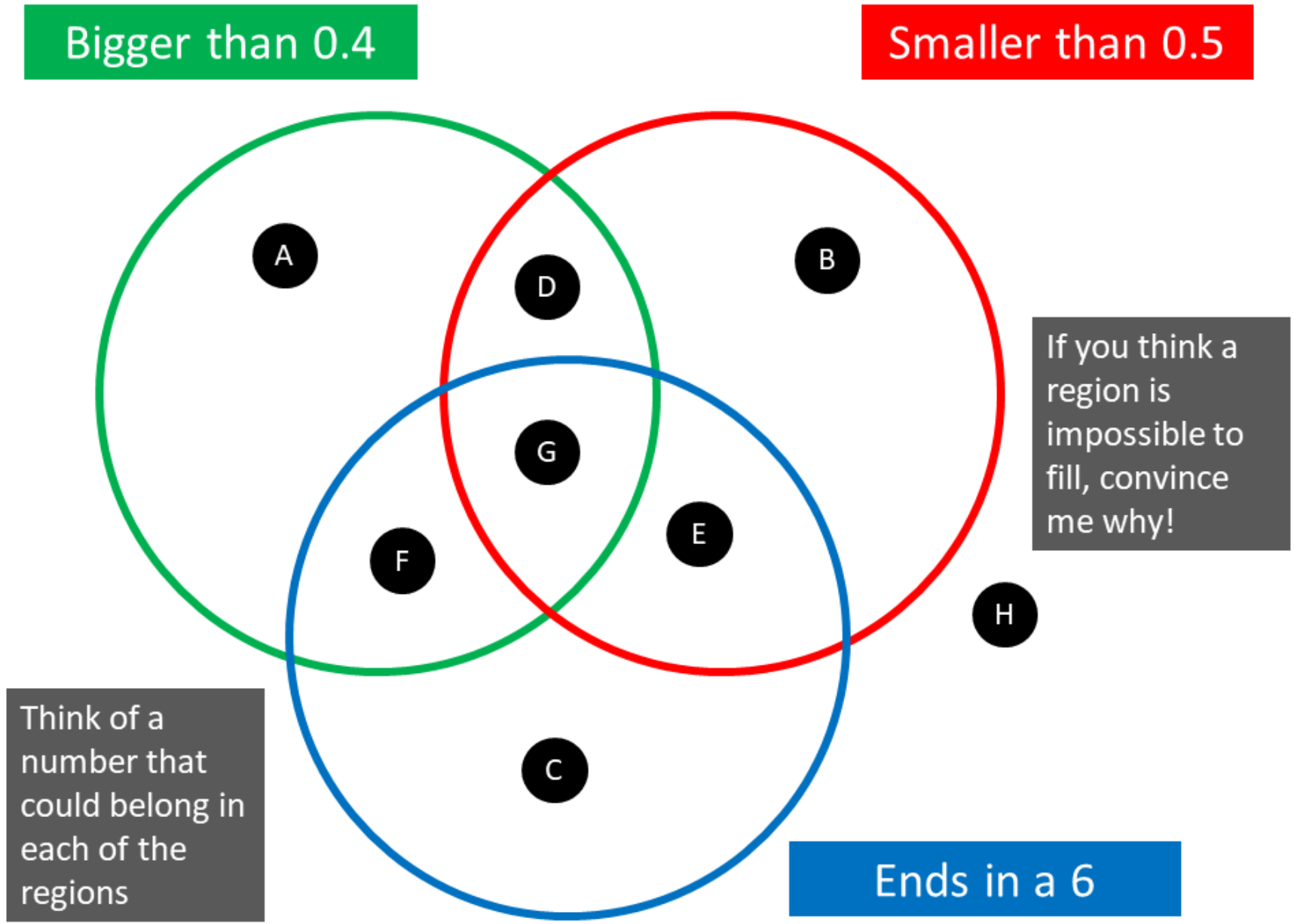

(5) use all four digits and a decimal point to create a number as close to 3.2 as you can




(6) use all four digits and a decimal point to create a number as close to 3.488 as you can



# Maths Venns


Bigger than 0.4
Smaller than 0.5
A
D
B
G
E
F
H
C
Ends in a 6
If you think a region is impossible to fill, convince me why!
Think of a number that could belong in each of the regions

# Fluency Practice

Question 1: Arrange the following sets of fractions in order, from smallest to largest

(a) $\frac{6}{7}, \frac{1}{7}, \frac{2}{7}, \frac{5}{7}$ (b) $\frac{3}{10}, \frac{9}{10}, \frac{1}{10}, \frac{7}{10}$ (c) $\frac{2}{9}, \frac{8}{9}, \frac{5}{9}, \frac{1}{9}$

Question 2: Arrange the following sets of fractions in order, from smallest to largest

(a) $\frac{1}{5}, \frac{3}{10}, \frac{2}{5}, \frac{1}{10}$ (b) $\frac{1}{8}, \frac{1}{4}, \frac{5}{8}, \frac{3}{4}$ (c) $\frac{5}{9}, \frac{2}{3}, \frac{7}{9}, \frac{1}{3}$

(d) $\frac{3}{5}, \frac{13}{20}, \frac{2}{5}, \frac{9}{20}$ (e) $\frac{5}{6}, \frac{7}{12}, \frac{5}{12}, \frac{11}{12}$ (f) $\frac{7}{20}, \frac{23}{60}, \frac{9}{20}, \frac{29}{60}$

Question 3: Arrange the following sets of fractions in order, from smallest to largest

(a) $\frac{2}{3}, \frac{11}{15}, \frac{7}{15}, \frac{3}{5}$ (b) $\frac{13}{20}, \frac{3}{4}, \frac{7}{10}, \frac{11}{20}$ (c) $\frac{1}{2}, \frac{2}{3}, \frac{7}{12}, \frac{5}{6}$

(d) $\frac{13}{16}, \frac{3}{4}, \frac{5}{8}, \frac{11}{16}$ (e) $\frac{3}{50}, \frac{7}{100}, \frac{1}{10}, \frac{9}{200}$ (f) $\frac{13}{20}, \frac{4}{5}, \frac{7}{10}, \frac{23}{40}$

Question 4: Arrange the following sets of fractions in order, from smallest to largest

(a) $\frac{3}{4}, \frac{2}{3}, \frac{5}{6}, \frac{1}{3}$ (b) $\frac{1}{4}, \frac{3}{8}, \frac{1}{6}, \frac{5}{12}$ (c) $\frac{9}{20}, \frac{5}{12}, \frac{3}{10}, \frac{17}{30}$

(d) $\frac{3}{25}, \frac{1}{10}, \frac{1}{8}, \frac{7}{50}$ (e) $\frac{27}{40}, \frac{3}{5}, \frac{5}{8}, \frac{6}{15}$ (f) $\frac{7}{20}, \frac{1}{3}, \frac{3}{8}, \frac{2}{5}$

Question 1: Write down a fraction between $\frac{2}{3}$ and $\frac{4}{5}$

Question 2: Write down a fraction between $\frac{5}{8}$ and $\frac{2}{3}$

Write each set of fractions in ascending order

(A) $\frac{7}{5}$ $\frac{1}{5}$ $\frac{4}{5}$ $\frac{3}{5}$

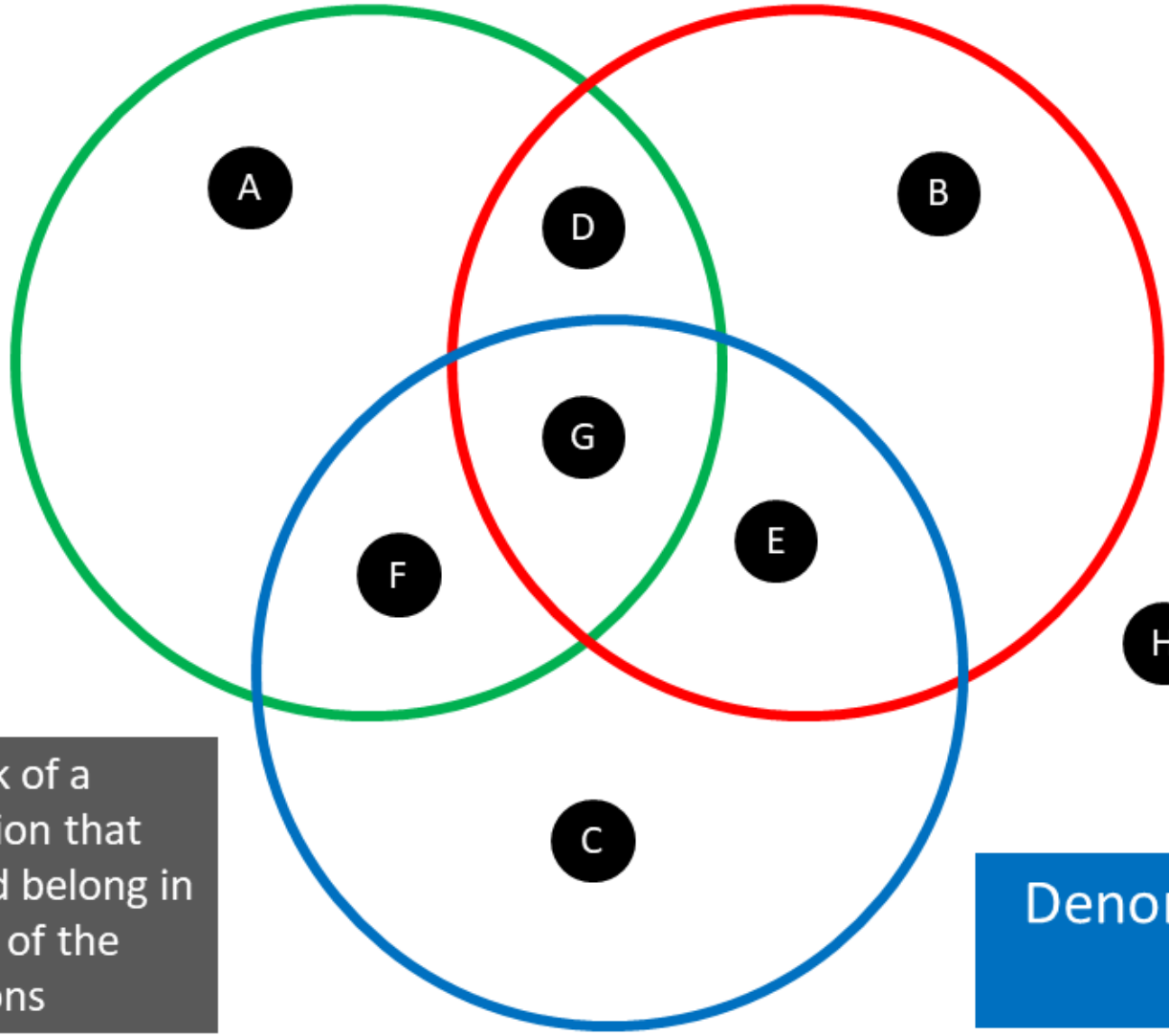
(B) $\frac{1}{5}$ $\frac{1}{3}$ $\frac{1}{2}$ $\frac{1}{7}$

(C) $\frac{3}{4}$ $\frac{4}{5}$ $\frac{1}{2}$ $\frac{7}{10}$

# Maths Venns

Simplifies

Bigger than $\frac{1}{2}$




If you think a region is impossible to fill, convince me why!

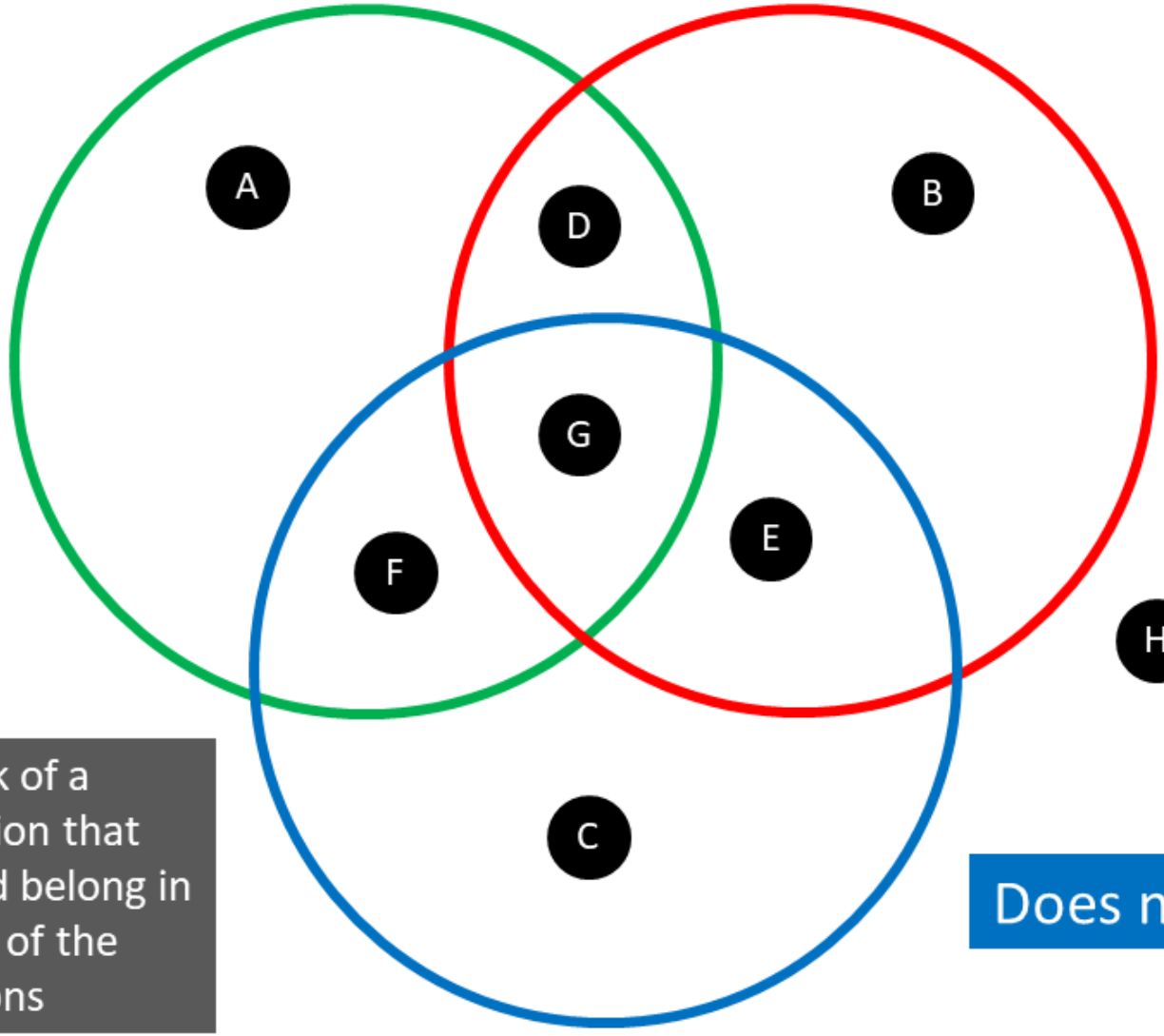
Think of a fraction that could belong in each of the regions

Denominator is 12

# Maths Venns


Smaller than $\frac{3}{4}$
If you think a region is impossible to fill, convince me why!
Has a numerator of 2
Bigger than $\frac{1}{2}$
Think of a fraction that could belong in each of the regions
A
B
C
D
E
F
G
H

# Maths Venns




If you think a region is impossible to fill, convince me why!

Think of a fraction that could belong in each of the regions

Does not simplify

# Fluency Practice

## Ordering Fractions, Decimals & Percentages

1

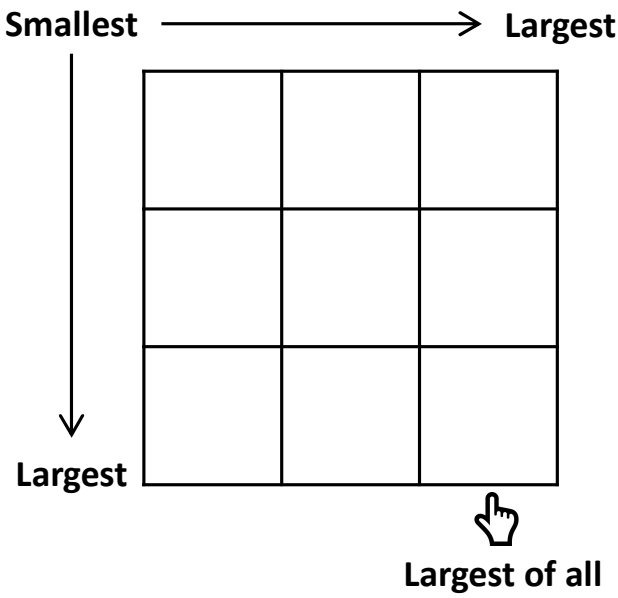
Put all the values into the empty grid so that every **row**, and every **column**, are in **ascending** order (going from smallest to largest).

**A**)

$\frac{6}{20}$ $\quad$ $61\%$ $\quad$ $\frac{1}{2}$

$0.9$ $\quad$ $\frac{1}{10}$ $\quad$ $\frac{4}{5}$

$22\%$ $\quad$ $\frac{3}{4}$ $\quad$ $0.43$



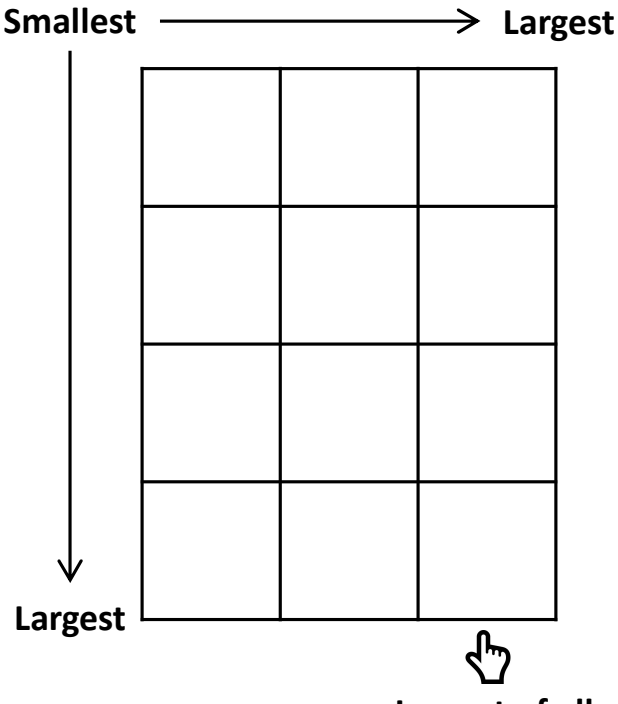

**B**)

$\frac{4}{10}$ $\quad$ $0.33$ $\quad$ $83\%$

$0.62$ $\quad$ $\frac{19}{20}$ $\quad$ $61\%$

$\frac{9}{25}$ $\quad$ $5\%$ $\quad$ $\frac{7}{10}$

$0.89$ $\quad$ $\frac{4}{25}$ $\quad$ $\frac{1}{4}$



# Fluency Practice

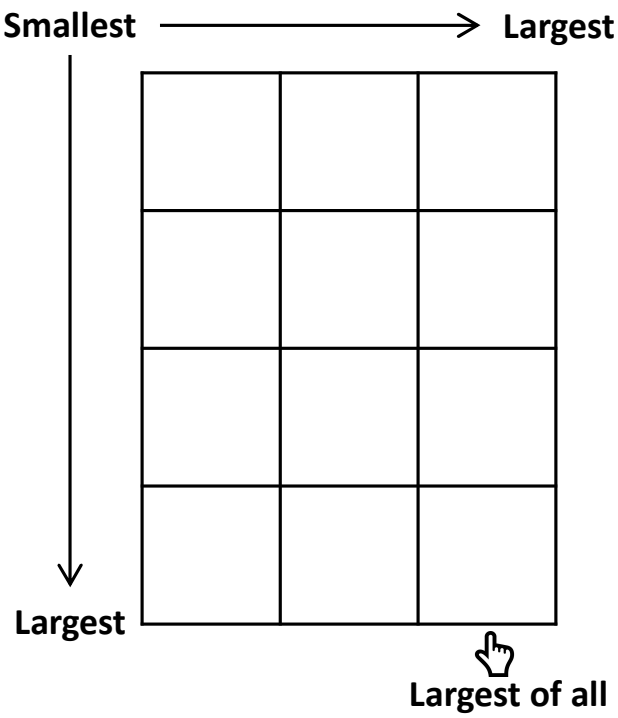
## Ordering Fractions, Decimals & Percentages

②

Put all the values into the empty grid so that every **row**, and every **column**, are in **ascending** order (going from smallest to largest).

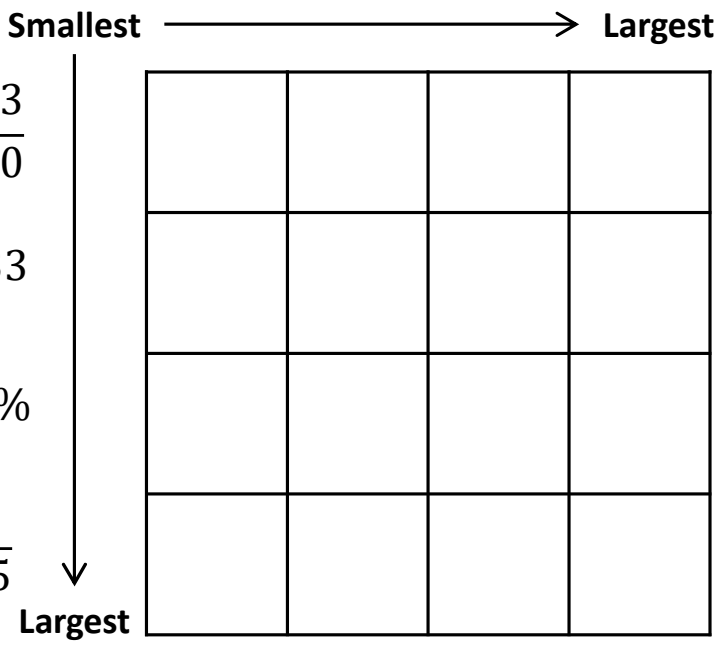
**A)**

| | | | |
|---|---|---|---|
| | $80\%$ | $0.3$ | $55\%$ |
| | $\frac{3}{20}$ | $0.64$ | $\frac{21}{25}$ |
| | $0.5$ | $\frac{13}{20}$ | $0.05$ |
| | $33\%$ | $0.805$ | $\frac{12}{25}$ |




**B)**

| | | | |
|---|---|---|---|
| $\frac{3}{4}$ | $\frac{75}{1000}$ | $101\%$ | $\frac{123}{200}$ |
| $0.801$ | $7\%$ | $\frac{19}{25}$ | $0.33$ |
| $\frac{1}{3}$ | $0.\dot{6}$ | $\frac{6}{5}$ | $67\%$ |
| $1.04$ | $0.06$ | $30.3\%$ | $\frac{3}{25}$ |



Question 2: Write down an inequality for each of the following

(a) x is greater than 8

(b) x is less than 3

(c) x is less than or equal to 1

(d) x is greater than or equal to 0

(e) x is less than 7

(f) x is greater than or equal to −2

(g) x is less than or equal to −10

(h) x is greater than 5

Question 3: Write down the meaning of these inequalities

(a) $x > 6$

(b) $x < 2$

(c) $x \geq 1$

(d) $x \leq 4$

(e) $x \geq 0$

(f) $x \leq -4$

(g) $x < -2$

(h) $x > 20$

(i) $x < y$

(j) $a \geq b$

(k) $c > 5$

(l) $y \leq 100$

# Fluency Practice

Write an inequality or equality in between the two numbers:

1) $9 \quad 5$

2) $3 \quad 3.5$

3) $3.55 \quad 3.5$

4) $3.09 \quad 3.091$

5) $4.44 \quad 4.04$

6) $0.5 \quad \frac{1}{2}$

7) $0.89 \quad 0.98$

8) $0.99 \quad 1.01$

9) $3.101 \quad 3.099$

10) $\frac{1}{4} \quad 0.26$

11) $\frac{1}{4} \quad \frac{3}{8}$

12) $0.1 \quad 0.1001$

13) $-3 \quad -4$

14) $-3.2 \quad -3.3$

15) $-11 \quad -10.9$

16) $0.33 \quad \frac{1}{3}$

# Fluency Practice

Question 3: Place the correct sign, < or >, between the following pairs of numbers

(a) 3 ☐ 1 (b) 2 ☐ 7 (c) 10 ☐ 11

(d) 8 ☐ 5 (e) 33 ☐ 25 (f) 28 ☐ 21

(g) 102 ☐ 99 (h) 110 ☐ 113

Question 4: Place the correct sign, < or >, between the following pairs of numbers

(a) -3 ☐ 2 (b) 4 ☐ -1 (c) -5 ☐ 3

(d) -3 ☐ -1 (e) -19 ☐ 15 (f) -20 ☐ -30

(g) -8 ☐ -11 (h) -12 ☐ -9

Question 3: Place the correct sign, < or > between the following pairs of decimals

(a) 6.3 ☐ 6.7 (b) 0.8 ☐ 0.5 (c) 2.2 ☐ 2.15

(d) 8.21 ☐ 8.9 (e) 9.099 ☐ 9.0971 (f) 1.205 ☐ 1.23

Question 1: Write out the following with either an < or > symbol

(a) 8 ☐ 6 (b) 2 ☐ 3 (c) 7 ☐ 10 (d) 5 ☐ 0

(e) 4 ☐ −1 (f) −4 ☐ 6 (g) 9 ☐ 9.4 (h) 0 ☐ −1

Write the correct inequality symbol in each circle

$\sqrt{16} + 9 \quad \bigcirc \quad \sqrt{16 + 9}$

$\sqrt{160} \quad \bigcirc \quad 12$

$15 \quad \bigcirc \quad \sqrt{200}$

$15 \quad \bigcirc \quad \sqrt{250}$

$\sqrt{20} \quad \bigcirc \quad 5$

$\sqrt{25} + \sqrt{5} \quad \bigcirc \quad \sqrt{30}$

$\sqrt{15} + 16 \quad \bigcirc \quad \sqrt{16} + 16$

$\sqrt{15} + 17 \quad \bigcirc \quad \sqrt{16} + 16$

$\sqrt{15} - 3 \quad \bigcirc \quad \sqrt{16} - 3$

$\sqrt{15} - 3 \quad \bigcirc \quad \sqrt{16} - 4$

# Fluency Practice

Decide if the following statements are true or false for the values given.

| | | | | |
|---|---|---|---|---|
| 1) $n = 7$ | | | | |
| a) $n > 8$ | b) $n < 8$ | c) $n \geq 8$ | d) $n < 3$ | e) $n \leq 7$ |
| 2) $n = 0.5$ | | | | |
| a) $n > 0$ | b) $n < 0.55$ | c) $n \geq 0.05$ | d) $n < -1$ | e) $n \leq 1$ |
| 3) $n = -3$ | | | | |
| a) $n > -4$ | b) $n < -2$ | c) $n \geq 0$ | d) $n < -3.5$ | e) $n \leq -2.9$ |
| 4) $n = \frac{1}{3}$ | | | | |
| a) $n > \frac{2}{6}$ | b) $n < \frac{1}{4}$ | c) $n \geq \frac{5}{12}$ | d) $n < \frac{5}{12}$ | e) $n \leq \frac{1}{2}$ |

1. Use the < and > symbols to fill in each box

a. 65 ☐ 67 b. 18 ☐ 15 c. 132 ☐ 113 d. 525 ☐ 552 e. 612 ☐ 620

f. 1213 ☐ 1203 g. 987 ☐ 978 h. 332 ☐ 323 i. 2049 ☐ 2051 j. 5188 ☐ 5185

2. Use the < and > symbols to fill in each box

a. 4 ☐ −4 b. 8 ☐ −11 c. −3 ☐ 1 d. −4 ☐ −7 e. −10 ☐ −8

f. −12 ☐ 6 g. −15 ☐ −20 h. −13 ☐ −11 i. 2 ☐ −9 j. 0 ☐ −5

3. For each set of integers, write them in order starting with the smallest

a. 12 18 16 15 19 14 b. 28 32 33 29 37 30 c. 58 75 88 78 55 77 d. 95 99 93 90 89 94

e. 102 107 105 101 104 f. 506 500 504 509 505 g. 123 130 103 120 133 h. 259 295 229 299 252

4. For each set of integers, write them in order starting with the smallest

a. 3 -5 6 0 -4 2 b. -2 9 -7 1 -6 -4 3 c. -8 -11 0 -7 4 -14 d. 11 -8 -2 6 -8 -1 -10

5. On your number lines, draw an arrow to label each number

a. A. 88 B. 79 C. 82 b. A. 45 B. 57 C. 61 c. A. 134 B. 146 C. 137 d. A. 550 B. 572 C. 543

1. Use the < and > symbols to fill in each box

a. 0·4 ☐ 0·5 b. 0·34 ☐ 0·37 c. 3·45 ☐ 3·4 d. 7·03 ☐ 7·08

e. 0·2 ☐ 0·25 f. 2·9 ☐ 2·89 g. 5·11 ☐ 5·101 e. 4·6 ☐ 4·55

2. For each set of decimals, write them in order starting with the smallest

a. 3·4 3·9 3·2 3·7 3·8 b. 7·11 7·15 7·13 7·19 7·14 c. 5·4 5·42 5·37 5·3 5·45

d. 1·05 1·5 1·1 1·55 1·15 e. 6·98 6·8 8·9 8·86 6·66 f. 4·72 4·2 2·74 4·7 4·27

g. 3·3 3·03 3 3·33 0·3 h. 0·46 0·6 0·664 0·4 0·64 i. 8·19 9·8 8 8·191 9·08

j. 1·2 1·02 1·202 1·022 1·22 k. 0·04 4 4·004 4·4 0·44 l. 5·3 5·03 5·33 5·303 5·033

3. On your number lines, draw arrows to label each number

a. A. 1·5 B. 1·8 C. 1·1 D. 1·65 E. 1·35 b. A. 7·4 B. 8·5 C. 7·7 D. 8·35 E. 7·15

c. A. 3·2 B. 3·8 C. 3·45 D. 3·555 E. 3·005 d. A. 0·2 B. 0·24 C. 0·12 D. 0·265 E. 0·105

4. Write down a decimal that is between

a. 0·6 and 0·7 b. 0·78 and 0·79 c. 2·9 and 3 d. 0·8 and 0·81

e. 1·2 and 1·25 f. 5·1 and 5·11 g. 7·8 and 7·81 h. 4·35 and 4·36

# 3 Percentages

# Intelligent Practice

1) Write $5$ as a percentage of $20$

2) Write $50$ as a percentage of $200$

3) Write $150$ as a percentage of $200$

4) Write $15$ as a percentage of $20$

5) Write $5$ as a percentage of $40$

6) Write $50$ as a percentage of $400$

7) Write $150$ as a percentage of $400$

8) Write $15$ as a percentage of $40$

9) Write $150$ as a percentage of $40$

10) Write $40$ as a percentage of $150$

# Fluency Practice

Question 1:

(a) Write £5 as a percentage of £10

(b) Write 5cm as a percentage of 20cm

(c) Write 7 days as a percentage of 10 days

(d) Write 27 as a percentage of 50

(e) Write 3g as a percentage of 20g

(f) Write 4m as a percentage of 5m

(g) Write 164 as a percentage of 200

(h) Write 130ml as a percentage of 1000ml

Question 2:

(a) Write 6 out of 8 marks as a percentage

(b) Write 10kg as a percentage of 40kg

(c) Write 22 as a percentage of 40

(d) Write $15 as a percentage of $75

(e) Write £21 as a percentage of £30

(f) Write €18 as a percentage of €40

(g) Write 20p as a percentage of £1

(h) Write 60cm as a percentage of 2m

Question 3:

(a) Write 3 as a percentage of 8

(b) Write 13 out of 200 as a percentage

(c) Write 7cm as a percentage of 40cm

(d) Write $5 as a percentage of $16

(e) Write 19 marks out of 32 as a percentage

(f) Write 20 out of 30 as a percentage

Question 4: Give each answer to 1 decimal place

(a) Write 8 as a percentage of 18

(b) Write £1000 as a percentage of £1200

(c) Write 128 as a percentage of 153

(d) Write 5 hours as a percentage of 1 day

(e) Write 394000 people as a percentage of 2490000

# Fluency Practice

Question 1: Kristina receives £5 from her Grandmother.
She gives £1 to her sister.
What percentage of the £5 did she give to her sister?

Question 2: For every 50 fans at an ice hockey match between Belfast and Cardiff, 20 of the fans support Cardiff.
(a) Work out 20 as a percentage of 50.

1000 fans attend the match between Belfast and Cardiff.
(b) How many Cardiff fans attend the match?

Question 3: Danny scored 13 out of 20 in a quiz.

(a) Work out the percentage of questions Danny answered correctly.
(b) Work out the percentage of questions Danny answered incorrectly.

Question 4: Jake brings 400 cupcakes to a school fête.
He sells 350 of the cupcakes.
Jake says that he has sold over 85% of the cupcakes.

Is Jake correct?

Question 5: A cereal bar weighs 24g.
The cereal bar contains 3.8g of protein.
Work out what percentage of the cereal bar is protein.

Question 6: Hannah scored 60 out of 90 in a French test.
She scored 50 out of 80 in a drama test.
Hannah scored 85 out of 130 in an art test.
She scored 13 out of 20 in a maths test.
Arrange the subject in order from the highest percentage to lowest percentage.

Question 7: Bryan and Ryan are buying a car that costs £15000.
Bryan pays a deposit of £2000
Ryan pays a deposit that is 40% more than Bryan's deposit.
Work out the percentage of total cost that is left to pay.

Question 8: 370 students attend a primary school.
Mrs Jones says that at least 95% of students attended the school every day.

| Mon | Tues | Wed | Thurs | Fri |
|---|---|---|---|---|
| 360 | 355 | 352 | 347 | 357 |

Is Mrs Jones correct?

Question 9: The population of a town is $4.52 \times 10^4$
The number of people that own a goldfish is $1.34 \times 10^3$
Calculate the percentage of the population that own a goldfish.

# Fluency Practice

## one number as a percentage of another

Round answers to 1 decimal place where necessary.

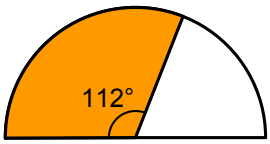
1. Work out each of these as a percentage:

   a) 18 out of 35 b) 47 out of 80 c) 30,000 out of 2 million

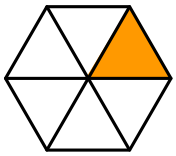
   d) 492 out of 540 e) 45cm out of 3.5m f) 85p out of £2.75

2. What percentage of each shape is shaded?

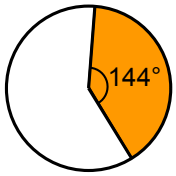
   a)




   b)



   c)




3. A quiz has 15 questions. Ebony answers 11 of the questions correctly.
   What percentage of the questions has Ebony answered correctly?

4. Candidates must score 65% or more to pass a test on a training course.
   Naz is awarded 51 out of 75 possible marks. Has Naz passed the test?

5. Selena asked some pupils at her school whether or not they liked the uniform.
   52 out of 80 boys said they liked the uniform.
   43 out of 60 girls said they liked the uniform.
   Use percentages to help you decide whether boys or girls liked the uniform more.

6. John believes that at least 35% of his students will choose to study Maths at University. The choices of his students are shown in the table.

   a) Is John correct?
   b) What percentage of his students chose medicine?

| Subject | No. Chosen |
|---|---|
| Medicine | 8 |
| Maths | 15 |
| Engineering | 9 |
| Other | 6 |

7. Over the course of twenty minutes, 72 vehicles passed over a bridge.
   47 of the vehicles were cars and 16 were vans.
   What percentage of the vehicles were neither cars nor vans.

8. Some children were surveyed to find out whether they were left- or right-handed. The two-way table shows the results.

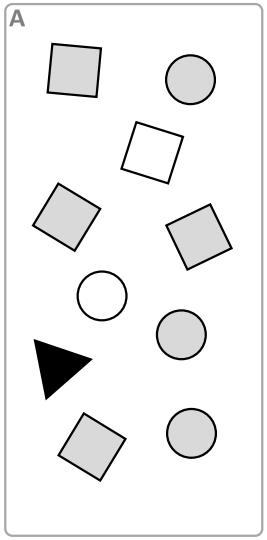
   a) What percentage of males were left-handed?
   b) What percentage of females were left-handed?
   c) What percentage of all the children were left-handed?

| | Left-handed | Right-handed |
|---|---|---|
| **Male** | 18 | 175 |
| **Female** | 17 | 139 |

## Shape %s

For each group of shapes, calculate…

A



…the % of shapes that are squares.

…the % of shapes that are black.

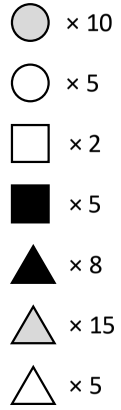
…the % of shapes that are circles.

…the % of shapes that are white.

…the % of shapes that are grey circles.

…the % **of squares** that are white.

B




…the % of shapes that are grey circles.

…the % of shapes that are circles.

…the % of shapes that are black squares.

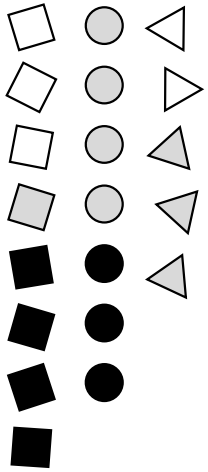
…the % of shapes that are squares.

…the % of shapes that are circles or squares.

…the % of shapes that are not black.

…the % **of triangles** that are grey.

C



…the % of shapes that are grey squares.

…the % of shapes that are triangles.

…the % of shapes that are white squares.

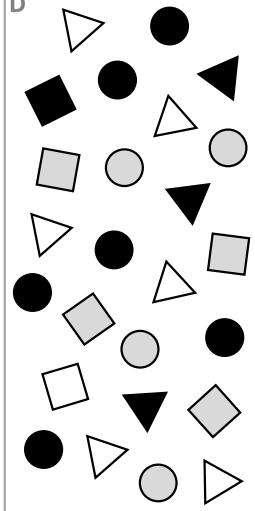
…the % of triangles that are white.

…the % of squares that are black.

…the % of shapes that are not black circles.

…the % of white shapes that are squares.

D



…the % of shapes that are white squares.

…the % of shapes that are black triangles.

…the % of shapes that are black circles.

…the % of shapes that are triangles or squares.

…the % of black shapes that are circles or squares.

…the % of shapes that are black or square.

…the % of triangles that are white.

# Fluency Practice

(a) Write 13 as a percentage of 50
(b) Write 17 as a percentage of 25
(c) Write 26 as a percentage of 40
(d) Write 432 as a percentage of 1000

Round your answers to 1 decimal place.
(a) Write 37 as a percentage of 85
(b) Write 4 as a percentage of 11
(c) Write 154 as a percentage of 270
(d) Write 3.6 as a percentage of 8.3

Round your answers to 1 decimal place.
(a) Aaliyah scored 35 out of 40 in her spelling test. Write this as a percentage.
(b) In a class of 32 students, 15 have brown hair. What percentage have brown hair?
(c) In a field there are 42 cows and 38 sheep. What percentage of the animals in the field are sheep?

(a) Which is bigger – 25 out of 60, or 45%?
(b) Which is bigger – 85% or 104 out of 120?
(c) The pass mark for a driving theory test is 70%. Betty has scored 56 out of 80, and Bilal has scored 63 out of 80. Has either of them passed the test?

(a) Yusuf scored 33 out of 45 in his Spanish test, and 72 out of 90 in his French test. In which of his tests did he do better?
(b) In class 7A, 13 out of 27 students wear glasses. In class 7B, 15 out of 32 students wear glasses. In which class do the higher percentage of students wear glasses?

**different ways (a/b as a percentage)**

(1) use each of the six digits 0, 1, 2, 3, 5, and 6
to make the statement true:

$$\frac{\square\square}{\square\square} = \square\square\,\%$$

the numbers $\square\square$ are 2-digit numbers, like 65

try to find 8 different solutions
(there are also others if you ease the restriction of having 2 – digit numbers)

(2) use each of the six digits 3, 4, 5, 6, 7, and 8
to make the statement true:

$$\frac{\square\square}{\square\square} = \square\square\,\%$$

the numbers $\square\square$ are 2-digit numbers, like 84

try to find 4 different solutions

(3) use any four *different* digits in the fraction
to make the percentage equivalent as big as possible but less than 100%

$$\frac{\square\square}{\square\square} = \bigcirc\,\%$$

the numbers $\square\square$ are 2-digit numbers, like 28

what different numbers would you pick to make the percentage equivalent as small as possible?

12%

how close can you get?

23%

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7 | out of | | is | % | 9 | out of | | is | % |
| | out of | 49 | is | % | | out of | 50 | is | % |
| 20 | out of | | is | % | 30 | out of | | is | % |
| | out of | 70 | is | % | | out of | 81 | is | % |
| 15 | out of | | is | % | 45 | out of | | is | % |
| | out of | 102 | is | % | | out of | 102 | is | % |
| 3½ | out of | | is | % | 7½ | out of | | is | % |

how close can you get?

55%

| | | | | | |
|---|---|---|---|---|---|
| 11 | out of | | is | | % |
| | out of | 60 | is | | % |
| 20 | out of | | is | | % |
| | out of | 180 | is | | % |
| 27 | out of | | is | | % |
| | out of | 80 | is | | % |
| 2¾ | out of | | is | | % |

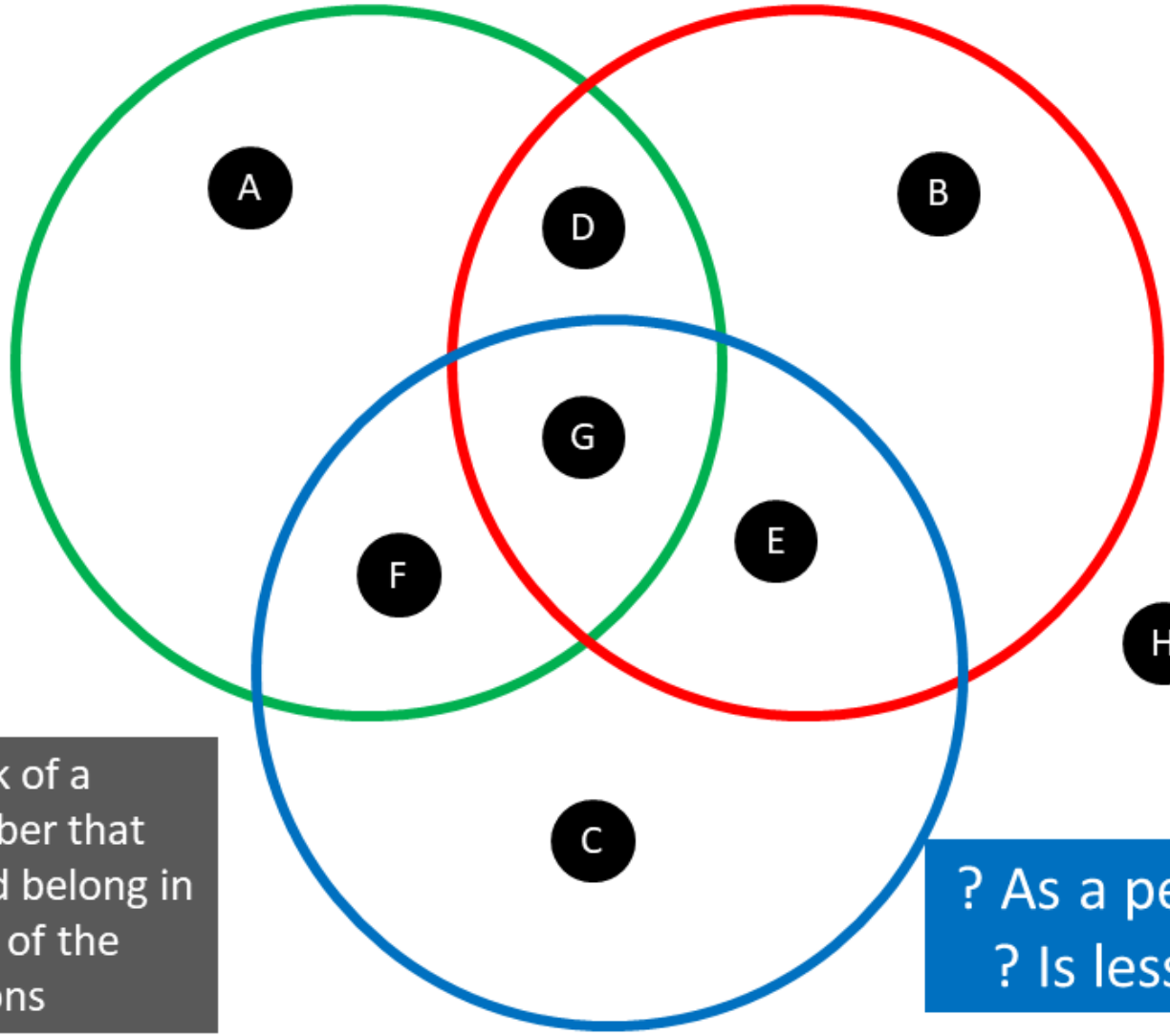
77%

| | | | | | |
|---|---|---|---|---|---|
| 12 | out of | | is | | % |
| | out of | 40 | is | | % |
| 30 | out of | | is | | % |
| | out of | 75 | is | | % |
| 24 | out of | | is | | % |
| | out of | 120 | is | | % |
| 3.1 | out of | | is | | % |

# Maths Venns

? As a percentage of ? Is between 30 and 40 percent

? As a percentage of ? Is between 35 and 50 percent




If you think a region is impossible to fill, convince me why!

Think of a number that could belong in each of the regions

? As a percentage of ? Is less than 70%

# Fluency Practice

## Leap Frog! 1

Start in the middle and work outwards!

25% =

75% =

60% =

150% =

50% =

10% =

200% =

100% = 400

15% =

5% =

300% =

1% =

20% =

40% =

400% =

6% =

80% =

## Leap Frog! 2

Start at 50% and work outwards!

25% =

75% =

60% =

50% = 180

150% =

10% =

15% =

100% =

200% =

5% =

20% =

300% =

1% =

40% =

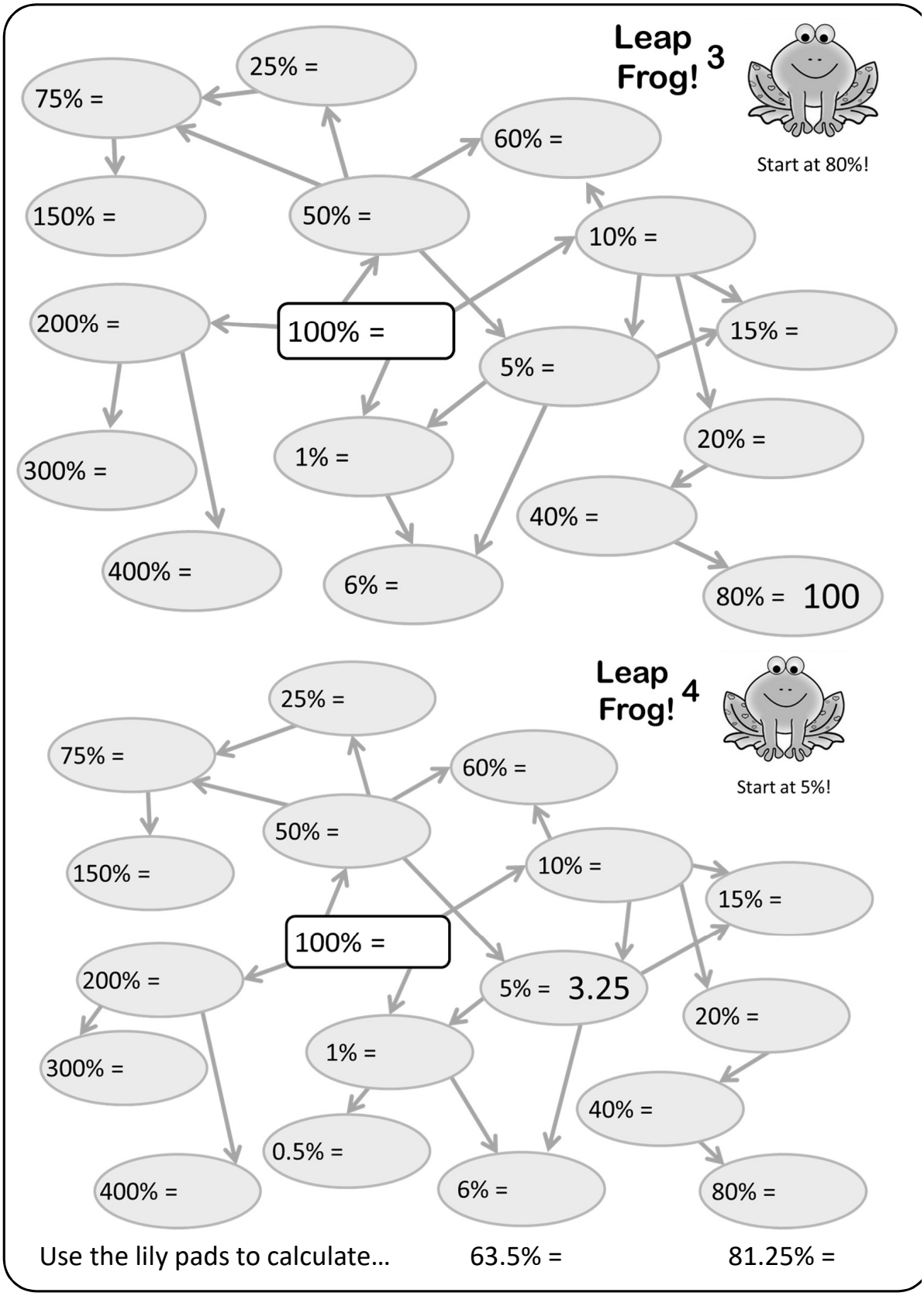
400% =

6% =

80% =

Use the lily pads to calculate… 94% = 47% =

# Fluency Practice



**percentages 'of' (try to work out the answer mentally, or just with a few jottings)**

(1) 50% of £24

(2) 50% of £72

(3) 25% of £120

(4) 25% of £480

(5) 75% of £120

(6) 10% of £90

(7) 10% of £9

(8) 10% of £19

(9) 20% of £55

(10) 20% of £110

(11) 20% of £165

(12) 40% of £5

(13) 40% of £55

(14) 40% of £155

(15) 80% of £50

(16) 80% of £250

(17) 80% of £3000

(18) 28% of £50

(19) 25% of £56

(20) 35% of £40

(21) 56% of £25

(22) 75% of £48

(23) 75% of £240

(24) 90% of £60

(25) 90% of £15

(26) 70% of £70

(27) 70% of £7

(28) 70% of £35

(29) 16% of £25

(30) 18% of £50

(31) 20% of £45

(32) 45% of £20

(33) 5% of £64

(34) 15% of £64

(35) 8% of £125

(36) 16% of £125

(37) 116% of £125

(38) 3% of £123

(39) 103% of £123

(40) 9% of £320

(41) 19% of £320

(42) 99% of £320

Fluency Practice

# Fluency Practice

Use what we have just learnt to answer these.

48% of 50

49% of 50

2% of 50

18% of 10

31% of 10

0.5% of 10

8% of 25

48% of 25

84% of 25

40% of 75

6% of 150

17% of 200

# Fluency Practice

Question 1: Work out the following

(a) 10% of 70m (b) 25% of 16 seconds (c) 10% of 400kg (d) 50% of 26g

(e) 75% of 40ml (f) 1% of £300 (g) 25% of 36 days (h) 50% of 9 days

(i) 75% of 24p (j) 25% of £18 (k) 1% of $6300 (l) 10% of £7

(m) 1% of 60m (n) 75% of 8 miles (o) 1% of 80kg (p) 50% of 1.6km

Question 2: Work out the following

(a) 20% of 30km (b) 5% of £60 (c) 2% of 600m (d) 30% of 70p

(e) 3% of $9000 (f) 40% of 75 seconds (g) 15% of 90 hours (h) 5% of 14kg

(i) 60% of 30km (j) 30% of £40 (k) 70% of 900cm (l) 20% of 13cm

(m) 11% of 420m (n) 26% of 4000m (o) 55% of £8 (p) 15% of 340kg

Question 3: Work out the following

(a) 35% of £800 (b) 6% of 160g (c) 23% of 330cm (d) 52% of 910m

(e) 61% of 1400 (f) 7% of 640GB (g) 45% of 350g (h) 80% of 450 people

(i) 90% of 1250ml (j) 76% of £80,000 (k) 85% of 90 hours (l) 12% of £6

(m) 6% of £20 (n) 11% of 6m (o) 28% of 3km (p) 71% of 4 tonnes

Question 4: Calculate the following

(a) 30% of 245m (b) 5% of 84g (c) 30% of £254 (d) 35% of 82 seconds

(e) 15% of 688kg (f) 45% of 3mm (g) 18% of 25miles (h) 65% of 108ml

(i) 98% of 6m (j) 55% of 18 points (k) 20% of 1.8kg (l) 19% of 705ml

(m) 27% of 84g (n) 63% of 38 seconds (o) 86% of 5km (p) 92% of 80 litres

# Fluency Practice

| To find 50%: | To find 10%: | To find 1%: |
|---|---|---|
| *divide by 2* | *divide by 10* | *divide by 100* |

1. Work out:

   a) 50% of 90 b) 10% of 90 c) 1% of 90

   d) 50% of 35 e) 10% of 35 f) 1% of 35

   g) 50% of 240 h) 10% of 240 i) 1% of 240

2. True or false?

   a) 50% of 43 = $\frac{1}{2}$ of 43 b) 10% of 20 = 50% of 10

   c) 10% of 28 = $\frac{1}{10}$ of 28 d) 50% of 200 = $\frac{1}{50}$ of 200

   e) 1% of 90 = $\frac{1}{1}$ of 90 f) 1% of 300 = 10% of 30

   g) $\frac{1}{100}$ of 75 = 10% of 7.5 h) 50% of 1 = 1% of 50

3. Use the cards (once each) to complete these statements.

   a) 50% of £9 = _____ b) 1% of £45 = _____

   c) 10% of £450 = _____ d) 50% of _____ = £35

   e) 10% of _____ = 7p f) 1% of _____ = 7p

| 45p | £7 | £45 | 70p | £4.50 | £70 |
|---|---|---|---|---|---|

4. Sue thinks of a number. 50% of Sue's number is 35.

   a) Work out 10% of Sue's number.

   b) Work out 1% of Sue's number.

5. Dora thinks of a number. 10% of Dora's number is 1.2.

   a) Work out 50% of Dora's number.

   b) Work out 1% of Dora's number.

# Fluency Practice

If you know 50%, 10% and 1% of a number, other percentages can be found:

| To find 25%: | To find 20%: | To find 3%: | To find 5%: |
|---|---|---|---|
| Divide 50% by 2 | Multiply 10% by 2 | Multiply 1% by 3 | Divide 10% by 2 |

6. Given **50% of 220 = 110** **10% of 220 = 22** **1% of 220 = 2.2**
Work out:

a) 20% of 220 b) 5% of 220 c) 25% of 220

d) 3% of 220 e) 40% of 220 f) 80% of 220

7. Complete these percentage chains:

a)

| 100% **42** | → | 10% 4.2 | → | 20% ..... | → | 40% ..... | → | 80% ..... |
|---|---|---|---|---|---|---|---|---|

b)

| 100% **80** | → | 1% ..... | → | 2% ..... | → | 3% ..... | → | 4% ..... |
|---|---|---|---|---|---|---|---|---|

c)

| 100% **84** | → | 10% ..... | → | 5% ..... | → | 2.5% ..... |
|---|---|---|---|---|---|---|

d)

| 100% **20** | → | 1% ..... | → | 3% ..... | → | 6% ..... |
|---|---|---|---|---|---|---|

8. Work out:

a) 30% of 50 b) 25% of 48 c) 3% of 30

d) 5% of 40 e) 75% of 24 f) 20% of 80

g) 40% of 60 h) 60% of 40 i) 90% of 320

9. Tyrell thinks of a number. 30% of Tyrell's number is 15.

a) Work out 60% of Tyrell's number.

b) Work out 3% of Tyrell's number.

10. Natalie thinks of a number. 20% of Natalie's number is 18.
Work out 25% of Natalie's number.

# Fluency Practice

Percentages of an amount can be added or subtracted to find more percentages.

**Find 51% of 120**

50% = 60
1% = 1.2 +
51% = 61.2

**Find 12% of 120**

10% = 12
2% = 2.4 +
12% = 14.4

**Find 9% of 120**

10% = 12
1% = 1.2 −
9% = 10.8

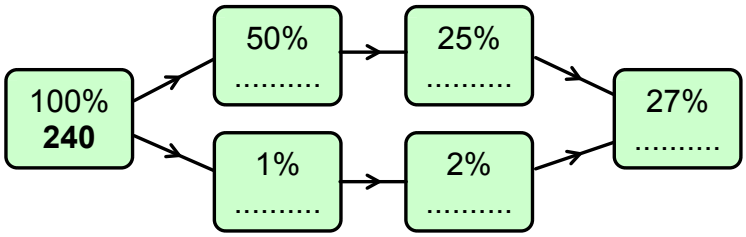
1. Given **50% of 140 = 70** **10% of 140 = 14** **1% of 140 = 1.4**
   Work out:

   a) 11% of 140 b) 51% of 140 c) 60% of 140

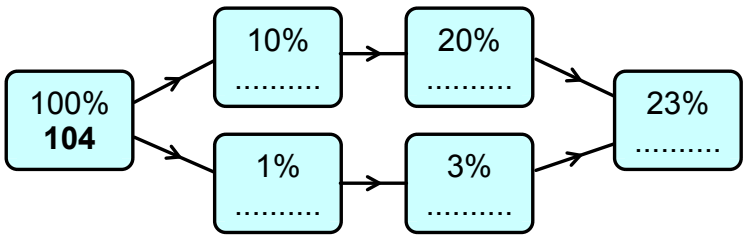
   d) 61% of 140 e) 49% of 140 f) 9% of 140

2. Complete these percentage chains:

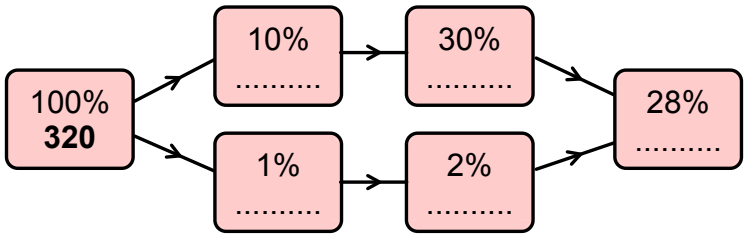
a)



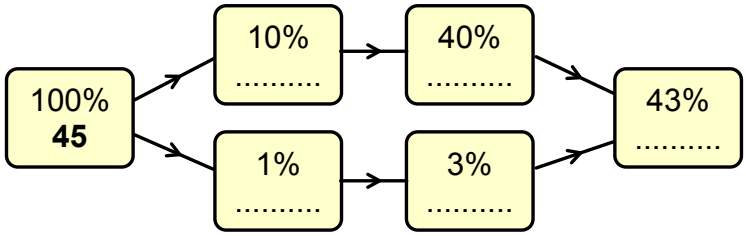

b)




c)




d)



# Fluency Practice

3. Work out:

a) 51% of 120 b) 12% of 42 c) 15% of 84

d) 26% of 30 e) 24% of 60 f) 53% of 46

g) 34% of 180 h) 48% of 300 i) 35% of 90

4. Use the cards (once each) to complete these statements.

a) 55% of £18 = _____ b) 31% of £30 = _____

c) 13% of £7 = _____ d) 19% of £48 = _____

e) 24% of £4 = _____ f) 74% of £1.50 = _____

| | | | | | |
|---|---|---|---|---|---|
| 96p | £1.11 | £9.90 | £9.12 | 91p | £9.30 |

5. Jasmine, Mark and Hailey each think of a number.

a) 10% of Jasmine's number is 28. Work out 15% of Jasmine's number.

b) 12% of Mark's number is 30. Work out 18% of Mark's number.

c) 14% of Hailey's number is 84. Work out 35% of Hailey's number.

## matching activity

Match the percentages to a number on the right.
Record your answers in the table below.

| | | |
|---|---|---|
| A 51% of 120 | B 15% of 400 | C 6% of 1050 |
| D 11% of 72 | E 60% of 110 | F 20% of 41 |
| G 25% of 34 | H 23% of 35 | I 35% of 160 |
| J 64% of 12.5 | K 61% of 120 | L 5% of 1520 |

| | | | | | |
|---|---|---|---|---|---|
| A | B | C | D | E | F |
| G | H | I | J | K | L |

| | |
|---|---|
| 56 | 66 |
| 8 | 61.2 |
| 7.92 | 73.2 |
| 60 | 8.2 |
| 76 | 63 |
| 8.5 | 8.05 |

# Fluency Practice

Question 1: A primary school has 212 students.
50% of the students are boys.
How many of the students are boys?

Question 2: There are 800 fans at a rugby match between Armagh and Malone.
30% of the fans support Malone.
How many fans support Malone?

Question 3: Hannah is paid £280.
She spends 30% on her rent, 25% on food and bills and saves the rest.

(a) How much does Hannah spend on rent?
(b) How much does Hannah spend on food and bills?
(c) How much does Hannah save?

Question 4: There are 220 students in Year 7.
15% cycle to school.
60% are driven to school.
The rest walk to school.

(a) How many students cycle to school?
(b) How many students are driven to school?
(c) How many students walk to school?

Question 5: Fredrick is an estate agent in New York and earns 5% commission on every property sold. How much will he receive is he sells a flat for $830,000?

Question 6: A cake weighs 750g.
40% of the cake is sugar.
Work out how many grams of sugar are in the cake.

Question 7: There are 600 members of a running club.
45% of these members are male.
Work out 45% of 600.

Question 8: Martin gives 40% of £75 to his sister.
How much money does Martin give to his sister?

# Fluency Practice

Question 9: Emma is paid £24,000 each year.
She is given a pay rise of 12%.
Work out 12% of £24,000.

Question 10: Mrs Jones donates 4% of her salary each year to charity.
She is paid £32,400.
Work out how much money she donates to charity.

Question 11: 13% of the people on an island are left handed.
The population of the island is 0.7million.
Work out how many people are left handed.

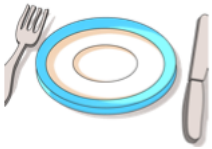
Question 12: Frank organised a raffle.
He sells 300 tickets for £5 each.
The prizes cost £400.
He gives 55% of the profit to Charity A and 45% of the profit to Charity B.
Work out how much each charity receives.

Question 13: Michael is going to buy a car.
The car costs £2400.
He pays a deposit of 20%.
Michael pays the rest of the money over 20 monthly payments.
Work out the cost of each monthly payment.

Question 14: An adult ticket for a museum is £15.00
A child ticket costs 60% of the price of an adult ticket.
Mrs Jenkins and her three children go to the museum.
Mrs Jenkins pays with three £20 notes.
How much change will she receive?

Question 15: Frances and her family go for a meal while on holiday in Florida.
They are told it is normal to tip 15%.

The meal costs $128
Frances tips $16, is this enough?

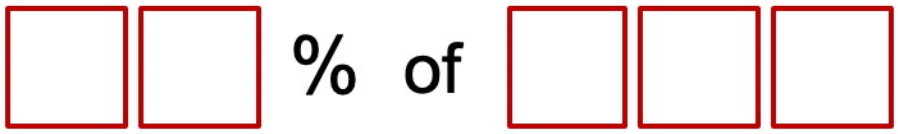


percentage ‘of’ patterns

| | | |
|---|---|---|
| 10% of 10 = | 25% of 4 = | 2% of 50 = |
| 20% of 15 = | 50% of 6 = | 4% of 75 = |
| 30% of 20 = | 75% of 8 = | 6% of 100 = |
| 40% of 25 = | 100% of 10 = | 8% of 125 = |
| 50% of 30 = | 125% of 12 = | 10% of 150 = |
| … | … | … |

close to ….

use any of the digits: 1 , 2 , 3 , 4, 5 , 6 , 7 , 8
but you can't use a digit more than once in:




try to get as close as you can to:

(a) 400
(b) 650
(c) 100
(d) 500
(e) 300

Put <, > or = into the circles to make the statements true

$30\%\ of\ 50$ ◯ $20\%\ of\ 90$

$25\%\ of\ 40$ ◯ $60\%\ of\ 20$

$5\%\ of\ 200$ ◯ $30\%\ of\ 30$

$1\%\ of\ 400$ ◯ $2\%\ of\ 200$

$12\%\ of\ 800$ ◯ $19\%\ of\ 500$

$\square\%\ of\ \square = 240$ ← How many ways could you fill the boxes to make the statement true?

# Fluency Practice

## Expressing the Percentage of a Quantity

1) 100% of $x$ = 50% of

2) 100% of $x$ = 25% of

3) 50% of = 100% of $2x$

4) 50% of $x$ = 100% of

5) 30% of $10x$ = 50% of

6) 150% of $4x$ = 50% of

7) 200% of $x$ = of $\frac{x}{3}$

8) 50% of $\frac{x}{2}$ = of $x$

9) 20% of $10x$ = 25% of

10) 5% of $5x$ = 250% of

# Maths Venns


...% of 30 is less than 12
If you think a region is impossible to fill, convince me why!
...% of 60 is more than 16
...% of 150 is between 50 and 80
Think of a percentage that could belong in each of the regions
A
B
C
D
E
F
G
H

# Intelligent Practice

1) Increase $30$ by $10\%$
2) Increase $30$ by $20\%$
3) Increase $60$ by $20\%$
4) Increase $60$ by $10\%$
5) Increase $74$ by $10\%$
6) Increase $74$ by $50\%$
7) Increase $84$ by $50\%$
8) Increase $84$ by $10\%$
9) Increase $84$ by $5\%$
10) Increase $84$ by $100\%$

1) Increase $44$ by $5\%$
2) Increase $44$ by $10\%$
3) Increase $44$ by $20\%$
4) Increase $44$ by $50\%$
5) Increase $44$ by $60\%$
6) Increase $88$ by $60\%$
7) Increase $88$ by $30\%$
8) Increase $88$ by $15\%$
9) Increase $88$ by $10\%$
10) Increase $88$ by $110\%$

Question 1

(a) Increase 20 by 50%

(b) Increase 60p by 10%

(c) Increase 12g by 25%

(d) Increase 400 litres by 20%

(e) Increase 32ml by 75%

(f) Increase 70m by 40%

(g) Increase 9000 by 5%

(h) Increase £7 by 20%

(i) Increase 9kg by 100%

# Intelligent Practice

1) Decrease $30$ by $10\%$
2) Decrease $30$ by $20\%$
3) Decrease $60$ by $20\%$
4) Decrease $60$ by $10\%$
5) Decrease $74$ by $10\%$
6) Decrease $74$ by $50\%$
7) Decrease $104$ by $50\%$
8) Decrease $104$ by $10\%$
9) Decrease $104$ by $5\%$
10) Decrease $104$ by $100\%$

1) Decrease $68$ by $5\%$
2) Decrease $68$ by $10\%$
3) Decrease $68$ by $20\%$
4) Decrease $48$ by $50\%$
5) Decrease $48$ by $60\%$
6) Decrease $96$ by $60\%$
7) Decrease $96$ by $30\%$
8) Decrease $96$ by $15\%$
9) Decrease $96$ by $10\%$
10) Decrease $96$ by $110\%$

Question 2

(a) Decrease 40 by 10%

(b) Decrease 30 hours by 50%

(c) Decrease 8kg by 25%

(d) Decrease 55cm by 40%

(e) Decrease 64 by 75%

(f) Decrease £3 by 10%

(g) Decrease 1400 by 30%

(h) Decrease 500g by 3%

(i) Decrease 6kg by 5%

Question 1: Last year, there were 20 students in a class.
This year, there are 30% more students.
How many students are in the class this year?

Question 2: A TV normally costs £520.
In a sale, all prices are reduced by 10%
Calculate the sale price of the TV

Question 3: Over the past 10 years, the population of a town has increased by 25%
The population of the town 10 years ago was 18000
What is the population of the town now?

Question 4: A standard bag of flour contains 600g of flour.
A special edition bag contains 35% more flour.
How much flour is in the special edition bag?

Question 5: Richard owns a coffee shop.
In February, 4500 hot chocolates were sold.
The number of hot chocolates sold in March was 3% less.
How many hot chocolates are sold in March?

**practice makes perfect: percentage changes**

find the result, without using a calculator

| | | | | | |
|---|---|---|---|---|---|
| 1) increase £50 by 20% | 2) decrease £50 by 40% | 3) decrease £60 by 10% | 4) increase £60 by 25% | 5) decrease £50 by 25% | 6) increase £50 by 2% |
| 7) increase £20 by 50% | 8) decrease £30 by 50% | 9) decrease £38 by 50% | 10) increase £800 by 25% | 11) decrease £1000 by 25% | 12) increase £55 by 20% |
| 13) decrease £70 by 10% | 14) increase £40 by 30% | 15) increase £30 by 40% | 16) decrease £120 by 30% | 17) increase £250 by 40% | 18) decrease £360 by 20% |
| 19) decrease £72 by 75% | 20) decrease £480 by 20% | 21) increase £650 by 60% | 22) decrease £320 by 12½ % | 23) decrease £250 by 3% | 24) decrease £360 by 15% |

Fluency Practice

# Fluency Practice

Increase £42 by 3%

100% of 42
3% of 42 +
103% of 42

42 × 1.03
= £43.26

Decrease £42 by 3%

100% of 42
3% of 42 −
97% of 42

42 × 0.97
= £40.74

1. Write the decimal multiplier for each of these percentage changes:

   a) 3% increase  b) 19% increase  c) 60% increase

   d) 34% increase  e) 90% increase  f) 45% increase

2. Work out the following percentage changes.

   a) £35 increased by 22%  b) £160 increased by 60%

   c) 124 increased by 8%  d) 91,000 increased by 29%

   e) £1.30 increased by 20%  f) £3.20 increased by 2.5%

3. Write the decimal multiplier for each of these percentage changes:

   a) 6% decrease  b) 14% reduction  c) 37% decrease

   d) 59% decrease  e) 30% decrease  f) 91% reduction

4. Work out the following percentage changes.

   a) £80 decreased by 18%  b) £114 decreased by 20%

   c) 68 reduced by 5%  d) 8240 decreased by 35%

   e) £2.60 decreased by 70%  f) £16 reduced by 4.5%

5. Match each question to one of the answers.

   **A** 78% of £120
   **B** £100 reduced by 8%
   **C** £60 increased by 24%
   **D** £190 decreased by 90%
   **E** £30 inceased by 120%
   **F** 95% of £110

| | |
|---|---|
| **P** £92 | **S** £93.60 |
| **Q** £74.40 | **T** £104.50 |
| **R** £66 | **U** £19 |

# Fluency Practice

6. Bottles of lemonade usually contain 500ml.
A bottle with a special offer states **20% extra free**.
Work out the amount of lemonade in bottle with the special offer.

7. An exhibition was open for one weekend only.
On the Saturday, there were 360 visitors to the exhibition.
There were 15% fewer visitors on the Sunday than there were on Saturday.
Work out how many visitors there were on the Sunday.

8. The total number of people who voted in an election was 4,250.
The Green Party candidate received 14% of all the votes.
Work out how many people voted for the Green Party candidate.

9. In a sale, all items are to be sold at 35% off the marked price.
Work out the sale price of each of these items.

a) Calculator £8

b) Stationary Set £6

c) Notebook £2.80

d) Glue Stick £1.40

10. John's rate of pay is £8.50 per hour. He is going to receive a pay rise of 12%.
Work out what John's rate of pay we be after the rise.

11. Hannah is booking a holiday with a total cost of £1260. She is required to pay a deposit of 15% of the total cost.

a) Work out how much Hannah must pay for the deposit.
b) Work out how much of the total cost will need to be paid after the deposit is deducted.

12. Jack sees a special offer at a clothing store.

Jack wants to buy 6 T-shirts.
Work out how much this will cost.

T-shirts: £6.50 each

Buy 4 or more T-shirts,
Get 15% off the total price.

13. Tom makes packs of greetings cards and sells them online.
In January, he sold 25 packs for £8.50 each. In February, he reduces the price by 22%.

How many packs must Tom sell in February to have the same income as for January?

14. The governing body of a school always has 15 members.
In 2010, 40% of the members were men and in 2015, this had risen to 60%.

Penny says "The number of men increased by 20% between 2010 and 2015."
Penny is wrong. By what percentage did the number of men increase?

# Problem Solving

Use these 12 numbers, once each, in the gaps below.

**10, 20, 25, 35, 40, 50, 60, 70, 75, 80, 90, 100**

£ _____ increased by _____ % = £ _____

£ _____ increased by _____ % = £ _____

£ _____ decreased by _____ % = £ _____

£ _____ decreased by _____ % = £ _____

# Intelligent Practice

1) Original value: £20
   New value: £18

2) Original value: £20
   New value: £16

3) Original value: £20
   New value: £10

4) Original value: £200
   New value: £100

5) Original value: £100
   New value: £200

6) Original value: £125
   New value: £225

7) Original value: £88
   New value: £66

8) Original value: £88
   New value: £22

9) Original value: £880
   New value: £220

10) Original value: £88
    New value: £220

11) Original value: £176
    New value: £440

12) Original value: £440
    New value: £176

# Fluency Practice

Question 1: In January, a puppy weighed 4kg.
Three months later, the same puppy weighed 5kg.
What was the percentage increase in the puppy's weight?

Question 2: The number of TVs sold increased from 50 to 60.
Work out the percentage increase.

Question 3: Peter's weight decreases from 80kg to 72kg
Calculate the percentage decrease in Peter's weight.

Question 4: A car is travelling at 40 kilometres per hour.
The car increases its speed to 56 kilometres per hour.
Calculate the percentage increase in the speed of the car.

Question 5: Keira buys a coffee table for £120 and sells it for £204.
Work out her percentage profit.

Question 6: Daisy bought a car for £20,000.
She sold the car for £15,000.
Work out the percentage loss.

Question 7: The population of an island in 2017 was 30,000.
In 2018, the population was 31,500.
Calculate the percentage increase.

Question 8: Rebecca bought a dress for £80.
She later sold it for £116.
Find the percentage profit.

Question 9: In a sale the price of a football shirt decreases from £50 to £37
Work out the percentage decrease in price.

Question 2: ABCD is a rectangle with length 40cm and width 10cm.
The length of the rectangle is decreased by 40%.
The width of the rectangle is decreased by 20%
Find the percentage decrease in the area of the rectangle.

# Fluency Practice

(a) In a school of 400 pupils, 260 are girls. What percentage of the pupils are girls?

(b) The captain of a football team scored 17 out of the 85 goals scored that season. What percentage of the goals did he score?

(c) A boy gets 29 out of 60 in his maths exam. What percentage did he score?

(d) In September it rained for 14 days. What percentage of days did it rain for?

(e) One day, 132 trains arrive at a railway station and 99 of them are late. What percentage of trains are on time?

(f) A farmer has 120 sheep and 180 cows. What percentage of his animals are cows?

(g) A painting is bought for £40 and sold for £50. What is the percentage profit?

(h) A shop buys a shirt for £25, but it is damaged, and they have to sell it for £18. What is the percentage loss on the shirt?

(i) In 2012 a house costs £210 000. In 2015 it is sold for £225 000. What is the percentage change in its price?

(j) A man buys a car for £18000. After one year the car is worth £15500. What is the percentage change in value?

(k) Currys buy TVs for £260 and sell them for £290. What is their percentage profit?

(l) A painting was sold at auction for £15000. It originally cost 50p. What was the percentage profit?

# Fluency Practice

1. Work out the percentage change in each case:

   a) From 140 to 189

   b) From 60 to 97.2

   c) From 320 to 288

   d) From 45 to 18.9

   e) From £48 to £49.92

   f) From £24.50 to £17.15

2. In a sale, a dinner set is reduced from £40 to £24. Calculate the percentage reduction.

3. Anita invests £300 in a savings account. At the end of the year she has £342.
   Calculate the percentage increase in her savings.

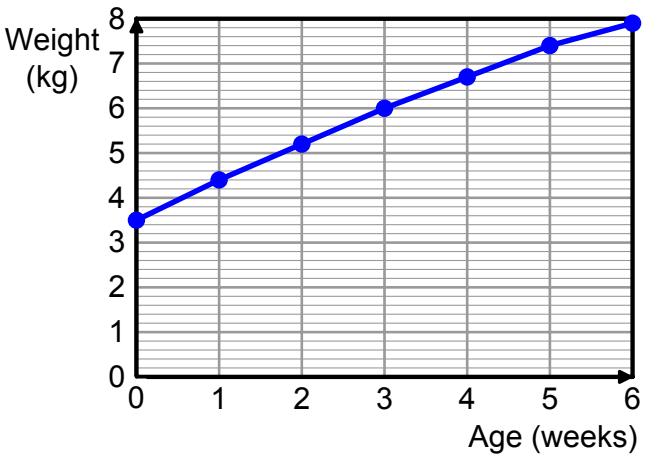
4. A car depreciates in value from £9,200 to £8,400.
   Calculate the percentage reduction in price correct to 1 decimal place.

5. In February, the cost of a flight from London to Rome is £600.
   In June, the cost of the same flight is £960.
   Calculate the percentage increase from February to June.

6. The graph shows the weight of a baby from birth to 6 weeks old.

   a) Work out the percentage increase in weight from 0 weeks to 3 weeks.

   b) Work out the percentage increase in weight from 3 weeks to 6 weeks.

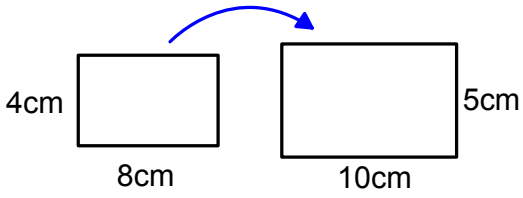



7. The price of a pair of running shoes is reduced from £45 to £32.40.
   The price of a tennis raquet is reduced from £18 to £12.60.
   Which item has the larger percentage reduction?

8. The population of a town increased from 30,000 to 75,000. Work out the percentage increase.

9. A rectangle is enlarged as shown in the diagram.

   Work out the percentage increase in the **area** of the rectangle as a result of the enlargement.



# Fluency Practice

1. Craig buys 10kg of sweets for £19.50.
   He puts the sweets into bags, each containing 400g.
   Craig sells all of the bags of sweets for £1.50 each.
   Work out the percentage profit.

2. Jenny buys individual items of stationary and makes them into sets to sell.

   Each set contains:
   - 1 pencil case
   - 2 pens
   - 1 pencil
   - 1 ruler

| **Item** | **Cost** |
|---|---|
| Pencil Cases | £1.20 *each* |
| Pens | 90p *for a pack of 6* |
| Pencils | £2.80 *for a pack of 10* |
| Rulers | 72p *each* |

   She buys enough items to make 30 stationery sets and sells them all for £3 each.
   Work out Jenny's percentage profit.

3. Callum is running a *hook-the-duck* game stall at a funfair.
   Players pay £3.50 for each turn and may win prizes of £10 or £50.

   On one day, 134 people pay to play. 17 of the players win £10 and 2 players win £50.
   Work out the percentage of the takings for the day that are left after the prizes are deducted.

4. Simran makes fruit punch to sell. The ingredients cost a total of £24, on which she receives a 15% discount.

   Simran makes a total of 15 litres of the punch, and sells it in 300ml portions for 50p each. Work out the percentage profit.

5. William buys a multipack of 24 drinks for £15 and a mutipack of 18 ice lollies for £22.50.

   William sells the drinks individually for 75p each. He wants to make the **same** percentage profit on the ice lollies as he does on the drinks.

   How much should William charge for each individual ice lolly?

6. Thomas is selling bicycles. His best-selling bike is currently priced at £89, which gives him a profit of £32 per bike.

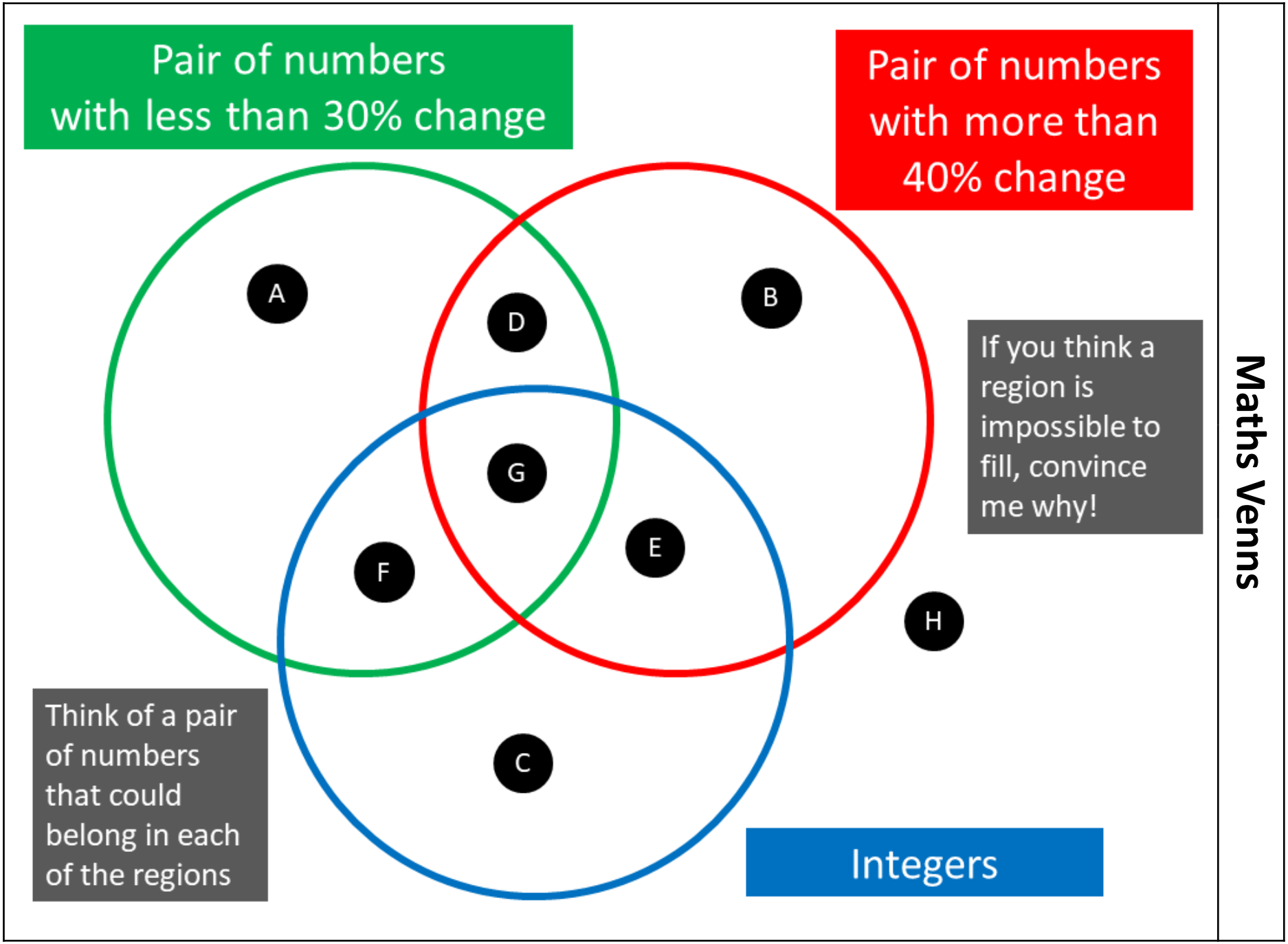
   a) Explain why £32 gives Thomas a 56% profit margin.

   b) If Thomas wants to make a 60% profit on each bike, how much should he sell them for?

# Fill in the Gaps

Round your answers to 1 decimal place where necessary.

| Question | Actual Change | Original Amount | Calculation | Percentage Change |
|---|---|---|---|---|
| A population of butterflies grows from 500 to 562. What is the percentage change? | 62 | 500 | $\frac{62}{500} \times 100$ | |
| Ayesha buys a bike for £3000 and sells it for £3200. What is her percentage profit? | £200 | £3000 | | |
| Hassan's savings increased from £150 to £167.50. Find the percentage increase. | £17.50 | | | |
| Leia buys a painting for $700 and sells it for $642. Work out her percentage loss. | $58 | | | |
| Tony's wages increase from £14.25 per hour to £15.85 per hour. What is the percentage increase? | | | | |
| Eric buys a laptop for £550 and after 1 year it is worth £325. What is the percentage loss in its value? | | | | |
| The population of a town increases from 56500 to 58900. What is the percentage growth? | | | | |
| The price of a book is reduced from £7.99 to £6.49. Find the percentage decrease. | | | | |
| Noah buys an antique clock for £45 and sells it for £150. Find his percentage profit. | | | | |
| | | | $\frac{1.65}{7.50} \times 100$ | |
| | | | $\frac{4}{30} \times 100$ | |


Pair of numbers with less than 30% change
Pair of numbers with more than 40% change
A
D
B
G
E
F
H
C
If you think a region is impossible to fill, convince me why!
Think of a pair of numbers that could belong in each of the regions
Integers
Maths Venns

**practice makes perfect: from one percentage to another**

| | | | | | |
|---|---|---|---|---|---|
| 1)<br>25% is £17<br>50% is ? | 2)<br>50% is £350<br>10% is ? | 3)<br>5% is £15<br>20% is ? | 4)<br>75% is £900<br>25% is ? | 5)<br>10% is £60<br>25% is ? | 6)<br>5% is £45<br>? % is £900 |
| 7)<br>20% is £12<br>50% is ? | 8)<br>15% is £90<br>? % is £60 | 9)<br>10% is £60<br>? % is £150 | 10)<br>25% is £45<br>10% is ? | 11)<br>40% is £600<br>? % is £450 | 12)<br>48% is £600<br>? % is £1000 |
| 13)<br>45% is £360<br>? % is £800 | 14)<br>33⅓% is £20<br>30% is ? | 15)<br>80% is £48<br>? % is £15 | 16)<br>40% is £36<br>? % is £4.50 | 17)<br>90% is £150<br>? % is £120 | 18)<br>40% is £90<br>? % is £67.50 |
| 19)<br>35% is £112<br>25% is ? | 20)<br>66⅔% is £120<br>15% is ? | 21)<br>80% is £128<br>? % is £40 | 22)<br>72% is £120<br>? % is £55 | 23)<br>70% is £840<br>? % is £660 | 24)<br>15% is £1200<br>? % is £2880 |

Fluency Practice

# Fluency Practice

| | | | | |
|---|---|---|---|---|
| 20% = £80<br>15% = £…. | 100% = £44<br>….% = £11 | 4% = 24<br>7% = £…. | 25% = £75<br>33% = £…. | 50% = £120<br>….% = £60 |
| 50% = £55<br>10% = £…. | 100% = £70<br>90% = £…. | 10% = £50<br>7% = £…. | 3% = £7<br>12% = £…. | 100% = £28<br>….% = £7 |
| 40% = £80<br>….% = £18 | 2% = £2.50<br>3% = £…. | 100% = 24<br>250% = £…. | 100% = £900<br>….% = £893 | 100% = £44<br>….% = £11 |
| 100% = £40<br>….% = £8 | 1% = £6<br>0.5% = £…. | 8% = £56<br>7% = £…. | 13% = £52<br>….% = £26 | ….% = £8<br>2.5% = £2 |
| ….% = £13<br>5% = £65 | 10% = £60<br>15% = …. | 7% = £42<br>8% = £…. | 88% = £22<br>12% = …. | 30% = £24<br>….% = £4 |

# Fluency Practice

Complete the missing numbers. The answers are in the grid below, mixed up. Tick them off as you find them.

| 100% | 10% | 1% | 5% | 15% | 30% | 86% |
|---|---|---|---|---|---|---|
| 90 | | | | | | |
| 25 | | | | | | |
| | 8 | | | | | |
| | | 6 | | | | |
| | | | 12 | | | |
| | | | | 6 | | |
| | | | | | 9 | |

## Mixed Up Answers

| | | | | | | |
|---|---|---|---|---|---|---|
| 3.75 | 13.5 | 1.25 | 4 | 0.9 | 4.5 | 30 |
| 36 | 206.4 | 24 | 0.4 | 1.5 | 72 | 9 |
| 7.5 | 516 | 2.4 | 77.4 | 4 | 12 | 600 |
| 12 | 25.8 | 60 | 40 | 240 | 4.5 | 30 |
| 0.8 | 180 | 21.5 | 34.4 | 0.25 | 80 | 68.8 |
| 24 | 2 | 0.3 | 27 | 3 | 2.5 | 90 |

## Percentage of a Quantity

Use the given quantity to complete each table.

What other percentages would be useful to complete each table?

A

| % | Quantity |
|---|---|
| 10% | |
| 20% | |
| 40% | |
| 100% | **80** |
| 200% | |

B

| % | Quantity |
|---|---|
| 10% | |
| 30% | **21** |
| 60% | |
| 100% | |
| 300% | |

C

| % | Quantity |
|---|---|
| 5% | |
| 10% | |
| 50% | **60** |
| 100% | |
| 150% | |

D

| % | Quantity |
|---|---|
| 20% | **12** |
| 40% | |
| 80% | |
| 100% | |
| 120% | |

E

| % | Quantity |
|---|---|
| 1% | |
| 5% | |
| 10% | **30** |
| 15% | |
| 100% | |
| 106% | |

F

| % | Quantity |
|---|---|
| 1% | |
| 7% | **42** |
| 10% | |
| 22% | |
| 100% | |
| 117% | |

G

| % | Quantity |
|---|---|
| 0.5% | **4** |
| 1% | |
| 1.5% | |
| 52% | |
| 100% | |
| 153% | |

H

| % | Quantity |
|---|---|
| 0.1% | |
| 0.3% | |
| 2% | **30** |
| 16% | |
| 100% | |
| 201.1% | |

I

| % | Quantity |
|---|---|
| 0.5% | |
| 5% | **45** |
| 55% | |
| 65% | |
| 100% | |
| 170% | |

J

| % | Quantity |
|---|---|
| 0.7% | **28** |
| 1% | |
| 12% | |
| 18% | |
| 100% | |
| 100.2% | |

K

| % | Quantity |
|---|---|
| 0.3% | **1.8** |
| 0.8% | |
| 1% | |
| 16% | |
| 100% | |
| 200.4% | |

L

| % | Quantity |
|---|---|
| 0.01% | |
| 0.2% | **7** |
| 1.6% | |
| 73% | |
| 100% | |
| 217% | |

**Finding a Whole from a Percentage** Use the given percentage to complete each table.

What other percentages would be useful to complete each table?

A

| % | Quantity |
|---|---|
| 10% | **8** |
| 20% | |
| 50% | |
| 100% | |

B

| % | Quantity |
|---|---|
| 20% | **10** |
| 40% | |
| 50% | |
| 100% | |

C

| % | Quantity |
|---|---|
| 5% | **6** |
| 10% | |
| 30% | |
| 100% | |

D

| % | Quantity |
|---|---|
| 5% | 1.8 |
| 50% | |
| 75% | |
| 100% | |

E

| % | Quantity |
|---|---|
| 1% | **4** |
| 12% | |
| 40% | |
| 100% | |
| 200% | |

F

| % | Quantity |
|---|---|
| 2% | **9** |
| 6% | |
| 60% | |
| 100% | |
| 250% | |

G

| % | Quantity |
|---|---|
| 0.5% | |
| 1% | |
| 7% | **35** |
| 100% | |
| 350% | |

H

| % | Quantity |
|---|---|
| 0.1% | |
| 1% | |
| 8% | **56** |
| 100% | |
| 120% | |

I

| % | Quantity |
|---|---|
| 2% | |
| 12% | **72** |
| 70% | |
| 100% | |
| 220% | |
| 232% | |

J

| % | Quantity |
|---|---|
| 0. 5% | **4** |
| 50% | |
| 65% | |
| 100% | |
| 105% | |
| 255% | |

K

| % | Quantity |
|---|---|
| 0.1% | **0.3** |
| 0.5% | |
| 11% | |
| 52% | |
| 100% | |
| 320% | |

L

| % | Quantity |
|---|---|
| 0.03% | |
| 0.4% | **3.6** |
| 3% | |
| 13% | |
| 91% | |
| 100% | |

Calculate the missing percentages and complete the grid.

| 100% | 50% | 25% | 75% | 10% | 20% | 5% | 2.5% | 15% | 17.5% | 85% | 150% | 115% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **$80** | | $20 | | | | | | | | | | |
| | | | | 18Kg | | | | | | | | |
| | | | | | | 100ml | | | | | | |
| | | | | | | | £3.50 | | | | | |
| **3Km** | | | | | | | | | | | | |
| | | | | | | | $3.75 | | | | | |
| | | | | | | | | | | | 4.5m | |
| | | | | | | 300mg | | | | | | |
| | | | | | | | | | $1.40 | | | |
| | | | | | | | | | | 1.36Kg | | |

## REVERSE Percentages

**a**

| | Percentage | Quantity |
|---|---|---|
| × 2 | 50% | 13 |
| | 100% | |

**b**

| | Percentage | Quantity |
|---|---|---|
| × 4 | 25% | 8 |
| | 100% | |

**c**

| | % | Quant. |
|---|---|---|
| × 5 | 20% | 8 |
| | 100% | |

**d**

| | % | Quant. |
|---|---|---|
| × 10 | 10% | 15 |
| | 100% | |

**e**

| | % | Quant. |
|---|---|---|
| ÷ 4 | 40% | 20 |
| | 10% | |
| | 100% | |

**f**

| | % | Quant. |
|---|---|---|
| ÷ 3 | 75% | 36 |
| | 25% | |
| | 100% | |

**g**

| | % | Quant. |
|---|---|---|
| ÷ 4 | 80% | 36 |
| | 20% | |
| | 100% | |

**h**

| | % | Quant. |
|---|---|---|
| ÷ 7 | 70% | 49 |
| | 10% | |
| | 100% | |

**i**

| | |
|---|---|
| 60% | 12 |
| 20% | |
| 100% | |

**j**

| | |
|---|---|
| 15% | 9 |
| 5% | |
| 100% | |

**k**

| | | |
|---|---|---|
| ÷ 3 | 150% | 39 |
| | 50% | |
| | 100% | |

**l**

| | | |
|---|---|---|
| ÷ 5 | 125% | 40 |
| | 25% | |
| | 100% | |

**m**

| | | |
|---|---|---|
| ÷ 6 | 120% | 18 |
| | 20% | |
| | 100% | |

**n**

| | | |
|---|---|---|
| ÷ 11 | 110% | 55 |
| | 10% | |
| | 100% | |

**o**

| | | |
|---|---|---|
| | 130% | 52 |
| | 10% | |
| | 100% | |

**p**

| | | |
|---|---|---|
| ÷ 21 | 105% | 63 |
| | 5% | |
| | 100% | |

**q**

| | | |
|---|---|---|
| | 175% | 35 |
| | 25% | |
| | 100% | |

**r**

| | |
|---|---|
| 180% | 63 |
| | |
| 100% | |

**s**

| | |
|---|---|
| 170% | 85 |
| | |
| 100% | |

**t**

| | |
|---|---|
| 115% | 92 |
| | |
| 100% | |

**u** **After** a 25% decrease, a dress costs £42. What was its original price?

| | |
|---|---|
| 75% | |
| | |
| | |

**v** **After** a 20% discount, a jumper costs £64. What was its original price?

| | |
|---|---|
| | |
| | |
| | |

**w** **After** a 20% **increase**, a TV costs £300. What was its original price?

| | |
|---|---|
| 120% | |
| | |
| | |

**x** **After** a 30% raise, Lee earns £780 per week. How much did they originally earn per week?

# Intelligent Practice

1) % change: 10% decrease
   New value: £36

2) % change: 20% decrease
   New value: £32

3) % change: 10% decrease
   New value: £18

4) % change: 10% decrease
   New value: £180

5) % change: 5% decrease
   New value: £190

6) % change: 5% decrease
   New value: £19

7) % change: 10% increase
   New value: £44

8) % change: 10% increase
   New value: £88

9) % change: 20% increase
   New value: £960

10) % change: 5% increase
    New value: £84

11) % change: 1% increase
    New value: £808

12) % change: 5% increase
    New value: £840

# Fluency Practice

1) The price of a phone is decreased by $10\%$ and now is $\$144.90$. Find the original price.

2) In a $38\%$ sale, the price of a jacket reduced by $\$128.44$. Find the original price.

3) The price of an online Maths website subscription is decreased by $29\%$ and now is $\$28.40$. Find the original price.

4) In a $14\%$ sale, the price of a phone reduced by $\$69.58$. Find the original price of the phone.

5) The price of a wardrobe is decreased by $36\%$ and now is $\$136.32$. Find the original price.

6) The cost of a season train ticket is reduced by $\$104.79$ which corresponds to a $21\%$ reduction. Find the original cost of the season ticket.

7) The price of a wardrobe is increased by $99\%$ and now is $\$670.63$. Find the original price.

8) The cost of a season train ticket is reduced by $\$40.47$ which corresponds to a $19\%$ reduction. Find the original cost of the season ticket.

9) The price of a jumper is decreased by $82\%$ and now is $\$63.72$. Find the original price.

10) In a $28\%$ sale, the price of a shirt reduced by $\$77.28$. Find the original price of the shirt.

# Fluency Practice

Question 1: 20% of all the children in a class are left handed.

4 children are left handed.
How many children are there in the class altogether?

Question 2: 30% of the members of a tennis club are pensioners.

36 members are pensioners.

(a) How many members are there in total?
(b) How many members are not pensioners?

Question 3: A group of people sit their driving theory test and 24 people passed.

80% of the people passed the driving theory test.
How many people sat the test altogether?

Question 6: Heather invested money into a savers bank account.

Each year the money in the account earns 10% interest.
After one year, the total amount of money in the account was £2200
How much did Heather invest?

Question 8: The population of an island has decreased by 40% over 50 years.

The population in 2018 was 360
What was the population in 1968?

Question 9: Sinead buys a watch.

20% VAT is added to the price of the watch.
Sinead then has to pay a total of £60
What is the price of the watch with no VAT added?

# Fluency Practice

Find 100% when:

(a) 50% is 26 (b) 20% is 61

(c) 17% is 40.8 (d) 6% is 1.5

(e) 120% is 66 (f) 155% is 145.7

(a) Paul spends 28% of his monthly income on rent, which is £700. What is his total monthly income?

(b) 35% of Year 10 students take GCSE Spanish. If there are 63 Year 10 students who study Spanish, how many students are there in Year 10?

(c) A dress is reduced in a sale by 25%, which is £14. What is the original price of the dress? What is the sale price?

(d) A laptop costs £420 with 20% included. How much is the laptop excluding tax?

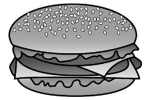
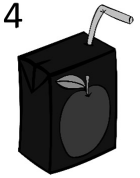
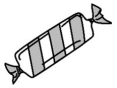
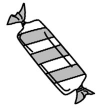
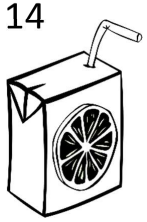
(e) In a sale, the price of a TV is reduced by 7% to £348.75. What was the original price of the TV?

(f) The population of a small village has fallen by 6% to 658. What was the population of the village before the decrease?

(g) An office worker receives a 6% pay increase, followed by an 8% pay increase. If her new salary is £1774.44, what was her original salary?

(h) The value of a house increases by 0.35% to £291015. What was the original value of the house?

# Fluency Practice

| | | | |
|---|---|---|---|
| 1 **50% Bigger! Now 60g!** Original size = _____ | 2  **50% Larger! Now 180g!** Original size = _____ | 3 **25% Extra Free! Now 200g!** Original size = _____ | 4  **25% More! Now 150ml!** Original size = _____ |
| 5 **20% More! Now 72cl!** Original size = _____ | 6 **20% Extra Free! Now 168g!** Original size = _____ | 7 **10% Bigger! Now 176g!** Original size = _____ | 8 **10% Larger! Now 264g!** Original size = _____ |
| 9 **30% Extra Free! Now 195g!** Original size = _____ | 10 **40% Larger! Now 350ml!** Original size = _____ | 11   **60% Extra Free! Now 112 sweets!** Original amount = _____ | 12 **70% More! Now 136g!** Original size = _____ |
| 13 **5% Extra Free! Now 42g!** Original size = _____ | 14  **15% More! Now 161ml!** Original size = _____ | 15 **35% Increase! Now 243g!** Original size = _____ | 16 **45% Larger! Now 101.5g!** Original size = _____ |

# Fill in the Gaps

| Original Amount | Percentage | As a fraction | Percentage of… | Increased by… | Decreased by…. |
|---|---|---|---|---|---|
| 60 | 20% | | | | |
| 60 | | $\frac{3}{10}$ | | | |
| 60 | | $\frac{1}{4}$ | | | |
| | 25% | | 7.5 | | |
| | | $\frac{1}{40}$ | | 30.75 | 29.25 |
| 30 | | | 6.75 | | |
| | | $\frac{9}{40}$ | 67.5 | | |
| 300 | | $\frac{41}{200}$ | | | |
| 60 | | | | 72.3 | 47.7 |
| | | $\frac{41}{40}$ | 61.5 | | |
| 60 | | $\frac{9}{8}$ | | | |
| 6 | | | 0.675 | | |
| 6 | | | | 24.675 | |
| 6 | | | | | $-31.35$ |

# Fill in the Gaps

| Q | Original amount | Percentage change | Increase / decrease | New amount | Change |
|---|---|---|---|---|---|
| 1 | £50 | 20% | Increase | | |
| 2 | £60 | 20% | Increase | | |
| 3 | £72 | 20% | Decrease | | |
| 4 | £72 | | | £54 | |
| 5 | | 50% | Increase | £54 | |
| 6 | | 50% | Decrease | £54 | |
| 7 | £54 | | | | + £54 |
| 8 | | | | £108 | − £27 |
| 9 | £96 | | | £108 | |
| 10 | £96 | 1.25% | Increase | | |
| 11 | | 25% | Increase | £98.40 | |
| 12 | £98.40 | | | | − £19.68 |
| 13 | £98.40 | 100% | Increase | | |
| 14 | £196.80 | 100% | Decrease | | |

# Fill in the Gaps

| Original Amount | Increase / decrease | Percentage | Result |
|---|---|---|---|
| ¥400 | Increase | 40% | |
| ¥400 | Decrease | 40% | |
| ¥800 | Decrease | 40% | |
| ¥800 | Decrease | 80% | |
| ¥800 | | | ¥880 |
| | Increase | 10% | ¥440 |
| ¥400 | | | ¥360 |
| ¥400 | | | ¥480 |
| ¥100 | | | ¥130 |

# Fill in the Gaps

| Original Amount | New Amount | Percentage Change |
|---|---|---|
| $200 | $150 | |
| $200 | $100 | |
| $100 | $200 | |
| $200 | $400 | |
| $400 | $200 | |
| $400 | $300 | |
| $400 | $30 | |
| $400 | $3 | |
| $500 | | 50% |
| $400 | | 30% |
| $400 | | 20% |

# Fill in the Gaps

| Original Price ($) | Discount (%) | Sale Price ($) |
|---|---|---|
| | 10 | 180 |
| | 20 | 160 |
| | 15 | 170 |
| | 15 | 127.50 |
| | 15 | 137.70 |
| 190 | | 133 |
| 190 | 2.5 | |
| | 2.5 | 536.25 |
| 88 | | 83.60 |

# Fluency Practice

**Section A: Percentage Change**

1. The population of a village increased from 234 to 275 during one year. Find the percentage increase.

2. When a beaker of sand is dried in a hot oven its mass reduces from 1.2kg to 870g. Find the percentage reduction in its mass.

3. A battery was tested and found to power a camera for 12 hours before it needed recharging. An improved version of the battery powered the camera for an extra 30 minutes. Find the percentage increase in the life of the batteries.

4. The average cost of a local telephone call dropped by 8p to 27p. Find the percentage reduction in the average cost of a local call.

**Section B: Increasing and Decreasing**

1. In a sale, all the prices are reduced by 30%. Calculate the sale price of the following items:
   a. a bike that cost £250
   b. a pair of gloves that cost £3.20

2. In 2004, 180 parents applied to a school for a place for their child. The following year saw an increase of 35% in the number of applications. Find the number of applications in 2005.

3. Following the opening of a new supermarket nearby, the number of customers using a small store decreased by 21%. If 2,400 customers used to use the store each week, find the number of customers after the store opened.

4. A car costs £9,999.90 before VAT (value added tax). Work out the cost including VAT if it is charged at 20%.

5. Sally's investment of £450 has gone up by 30%, while Susie's investment of £650 has gone down by 10%. Who now has the larger amount of money, Sally or Susie?

6. A train company increases its rail fares by 4% one year and by 6.5% the following year. Find the percentage increase in cost over the two years.

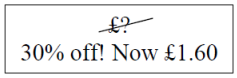
**Section C: Reverse Percentage Problems**

1. A jacket is reduced by 12% to £66 in a sale. Find the original price.

2. A baby's weight increases by 8% over a month from birth to 4.05kg, what wasthe weight at birth?

3. Which product has the greatest original price? Show your working.

A



B

4. The air pressure increases by 1.2% to 1,214.4 mbar. What was the original air pressure?

5. A dress in a sale is reduced by 7% to £60.45. What is the original price?

6. A stereo system is sold for £1,998 and an 11% profit is made. Find the original cost of the stereo.

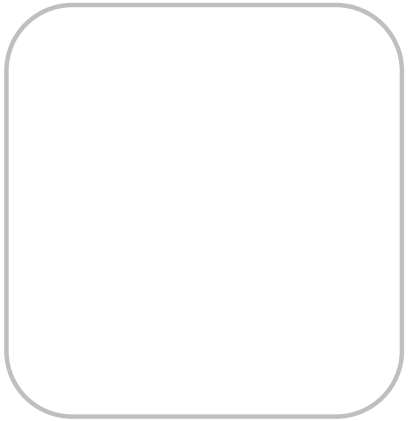
7. A shop sells a television to a man and makes a 15% profit. The man sells it to another man for £414 at a loss of 10%. Find the original price of the television.

# 4 Angle Basics

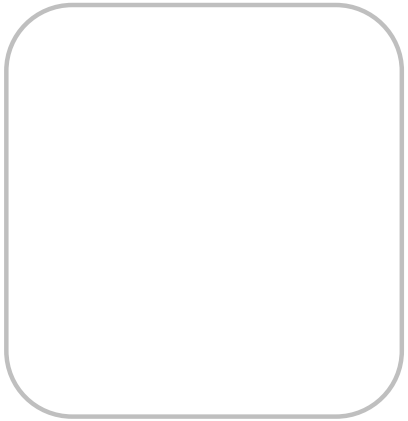
**Angle Word Fill**: Complete each sentence & draw an example for each type.

acute obtuse exactly 360° reflex 90° 180° right

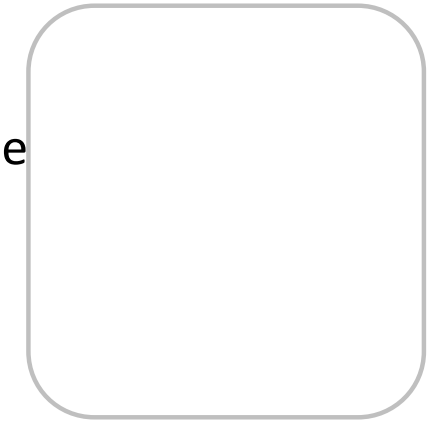
An _____ angle between 0° & _____.



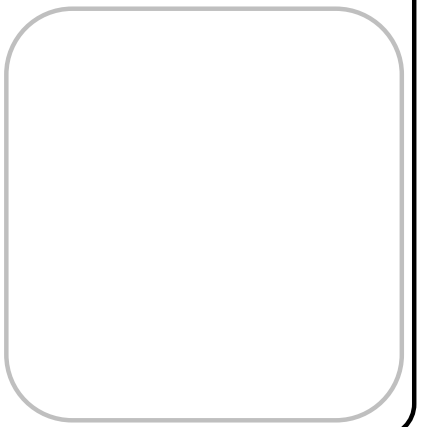
A _____ angle is _____ 90°.



An _____ angle between 90° & _____.



A _____ angle is between 180° & _____.



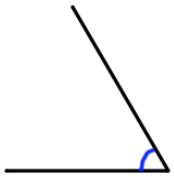
# Fluency Practice

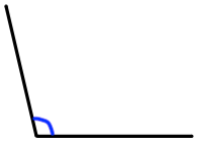
| Acute | Properties of acute angles | Right Angle | Properties of right angles | Obtuse | Properties of obtuse angles | Reflex | Properties of reflex angles |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

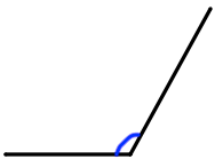
Place the angles into the correct categories

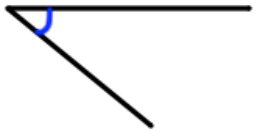
# Fluency Practice

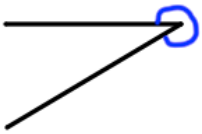
Question 1: Write down if each angle below is acute, obtuse or reflex.

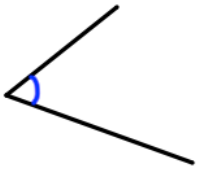
(a) 

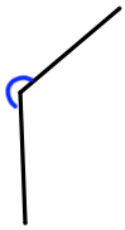
(b) 

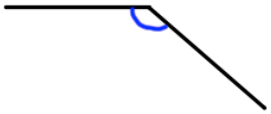
(c) 

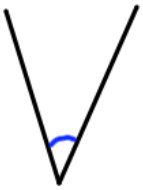
(d) 

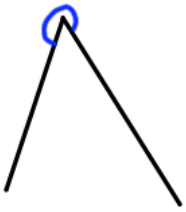
(e) 

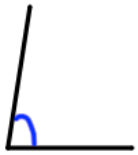
(f) 

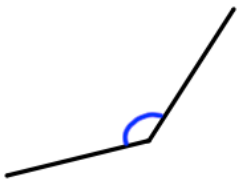
(g) 

(h) 

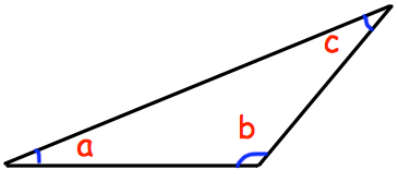
(i) 

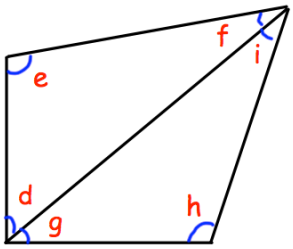
(j) 

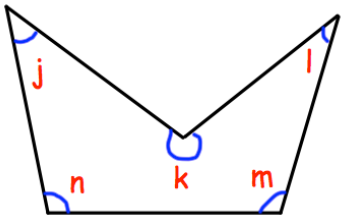
(k) 

(l) 

Question 6: For the shapes below, write down the type of each angle labelled.




Question 7: State the type of each angle below

(a) 45° (b) 105° (c) 200° (d) 19°

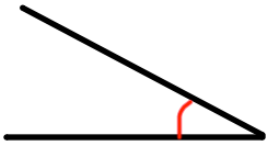
(e) 90° (f) 179° (g) 318° (h) 1°

(i) 93° (j) 82° (k) 89° (l) 183°

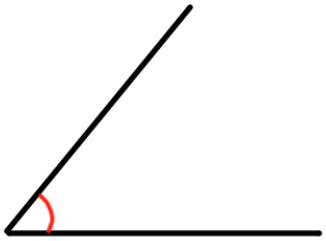
# Fluency Practice

Question 1: Estimate the size of each of these angles

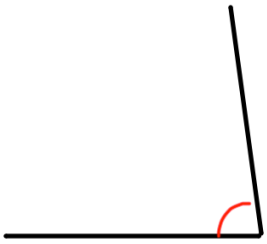
(a)



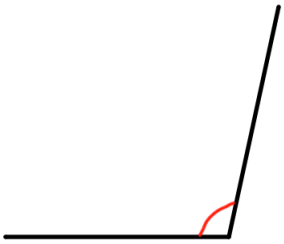
(b)



(c)

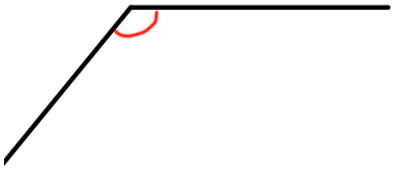


(d)



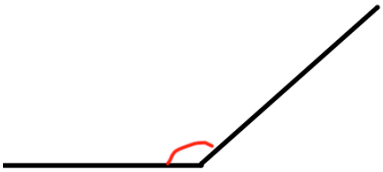
(e)

(f)

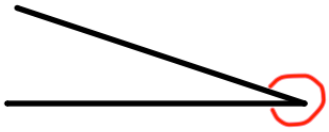


(g)

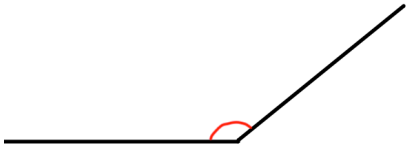
(h)



(i)

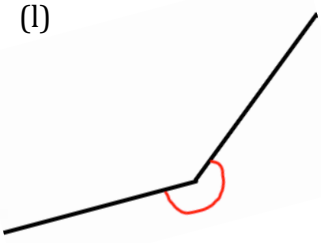


(j)



(k)

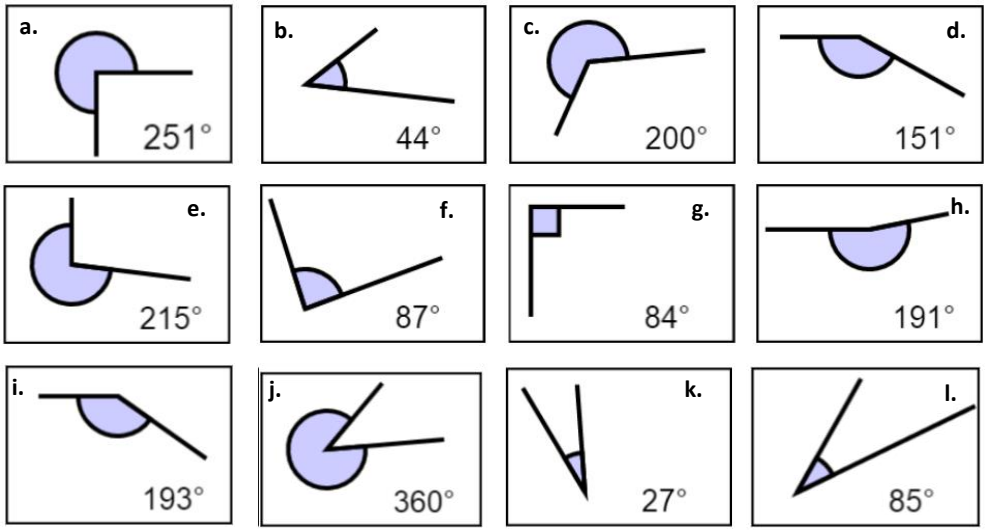
(l)



# Fluency Practice

## incorrectly estimated?

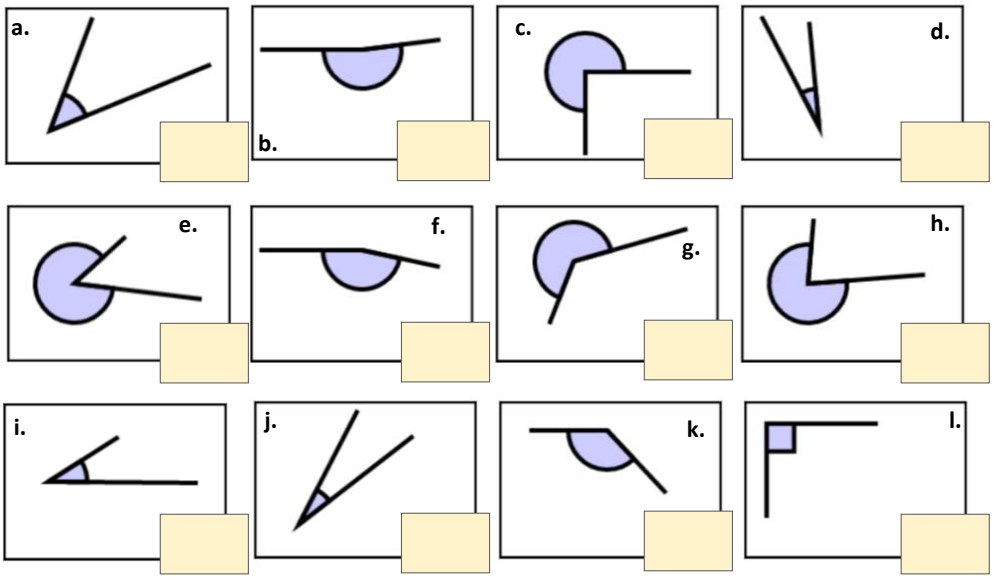
Which of these angles have been incorrectly estimated?




Write the incorrect estimations here: _____ _____ _____ _____ _____ _____

## estimate & match

Estimate the size of each of these angles and match them to the answers below.




27° 90° 32° 280° 230° 311°

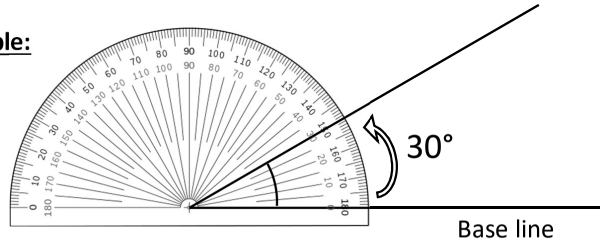
270° 159° 48° 19° 135° 189°

***angles not drawn exactly to scale**

## Estimating & Measuring Angles

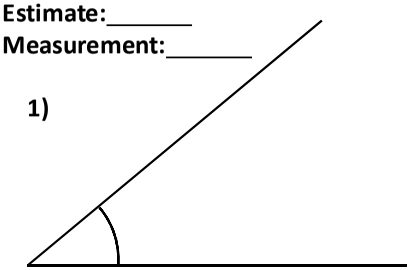
1) **Estimate** the angle before you measure.
2) **Center the protractor** on the vertex (corner).
3) **Line up** 0 with the base line.
4) **Count up** from 0 until you reach the second line.

**Example:**



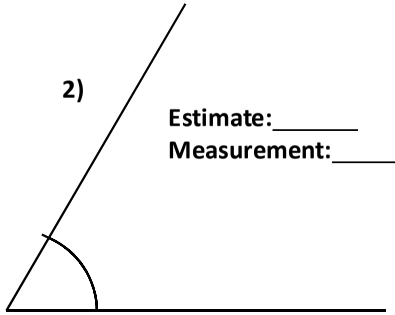

**Estimate:**_____
**Measurement:**_____

**1)**

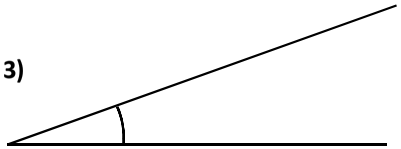



**2)**

**Estimate:**_____
**Measurement:**_____



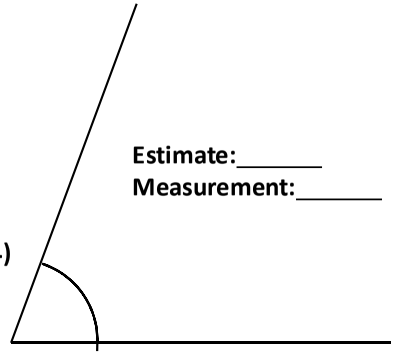

**3)**



**Estimate:**_____
**Measurement:**_____

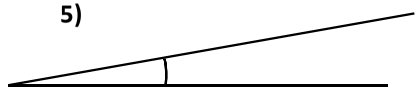
**4)**

**Estimate:**_____
**Measurement:**_____



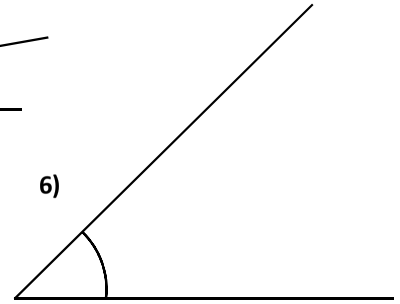
**Estimate:**_____
**Measurement:**_____

**5)**



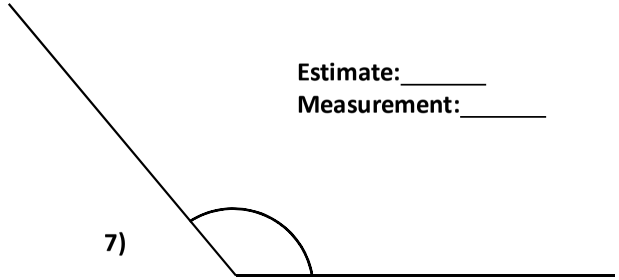
**6)**

**Estimate:**_____
**Measurement:** 45°



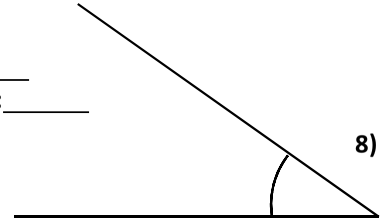
**7)**

**Estimate:**_____
**Measurement:**_____



**8)**

**Estimate:**_____
**Measurement:**_____



**9)**

**Estimate:**_____
**Measurement:**_____

# Fluency Practice

2

Estimating & Measuring Angles

1)

Estimate:_____
Measurement:_____

2)

Estimate:_____
Measurement:_____

3)

Estimate:_____
Measurement:_____

4)

Estimate:_____
Measurement:_____

5)

Estimate:_____
Measurement:_____

6)

Estimate:_____
Measurement:_____

7)

Estimate:_____
Measurement:_____

8)

Estimate:_____
Measurement:_____

9)

Estimate:_____
Measurement:_____

10)

Estimate:_____
Measurement:_____

11)

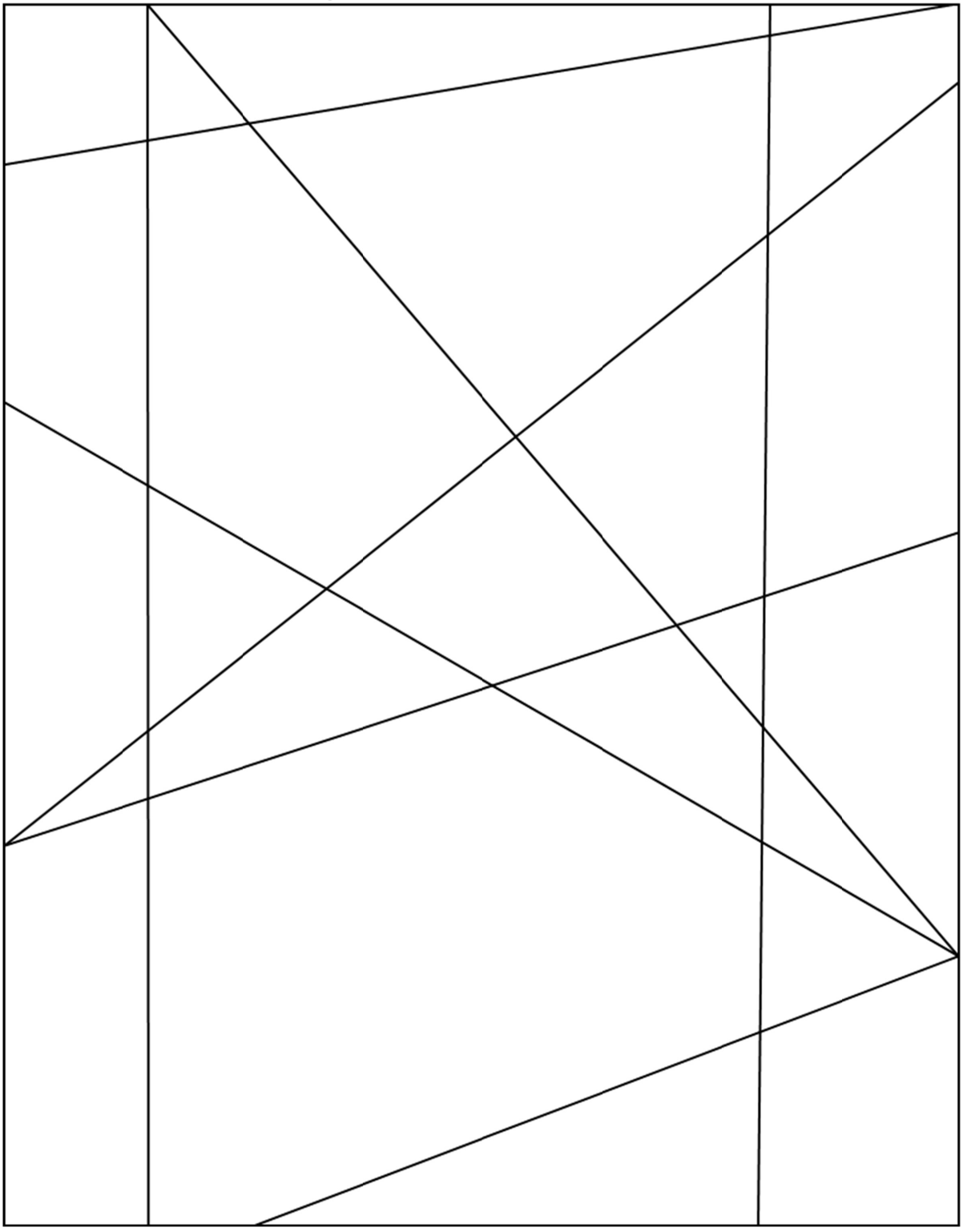
Estimate:_____
Measurement:_____

# Fluency Practice

How many angles can you see?

How many angles can you accurately measure?

Give your answers to the nearest 5°



# Fluency Practice

Question 1: Draw angles of the following size

(a) 20° (b) 60° (c) 80° (d) 40°

(e) 10° (f) 70° (g) 50° (h) 45°

(i) 25° (j) 85° (k) 75° (l) 15°

(m) 12° (n) 62° (o) 38° (p) 71°

(q) 56° (r) 23° (s) 28° (t) 19°

Question 2: Draw angles of the following size

(a) 100° (b) 150° (c) 160° (d) 120°

(e) 170° (f) 130° (g) 110° (h) 125°

(i) 145° (j) 165° (k) 105° (l) 95°

(m) 153° (n) 107° (o) 98° (p) 133°

(q) 121° (r) 149° (s) 167° (t) 108°

Question 3: Draw angles of the following size

(a) 200° (b) 240° (c) 270° (d) 300°

(e) 320° (f) 350° (g) 215° (h) 255°

(i) 345° (j) 195° (k) 233° (l) 268°

(m) 307° (n) 321° (o) 206° (p) 199°

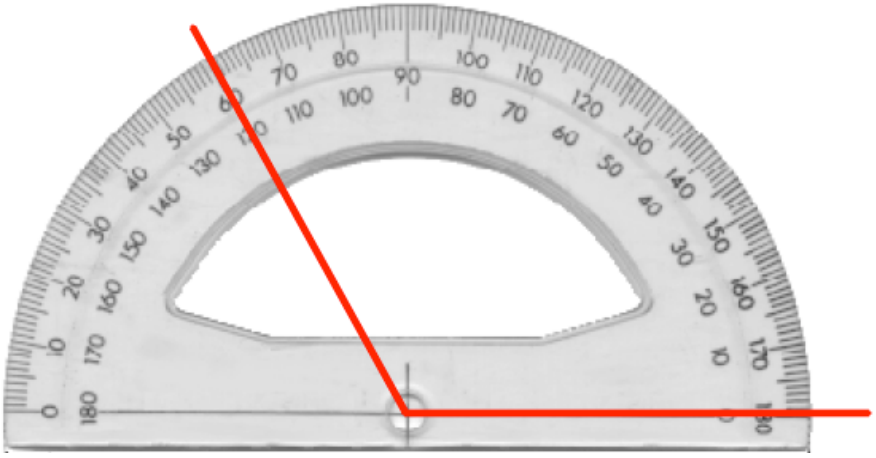
Question 4: Draw angles of the following size

(a) 30° (b) 225° (c) 175° (d) 98°

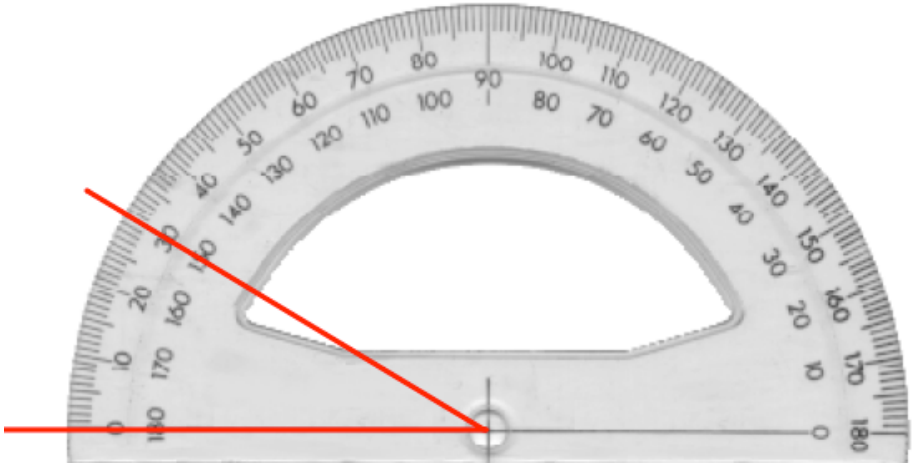
(e) 340° (f) 15° (g) 63° (h) 59°

# Fluency Practice

Question 1: Sophie has been asked to draw a 60° angle.
She has made a mistake. Explain what she has done wrong.



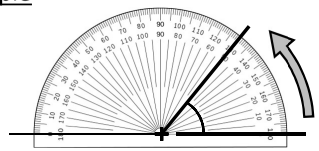
Question 2: Jonathan has been asked to draw a 150° angle.
He has made a mistake. Explain what he has done wrong.



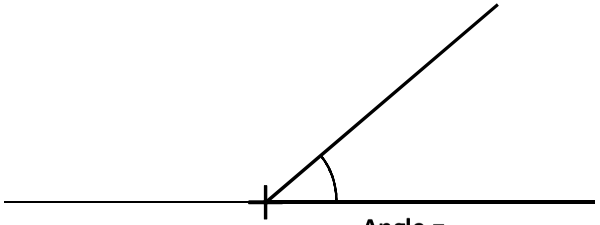
## Measuring Angles

①

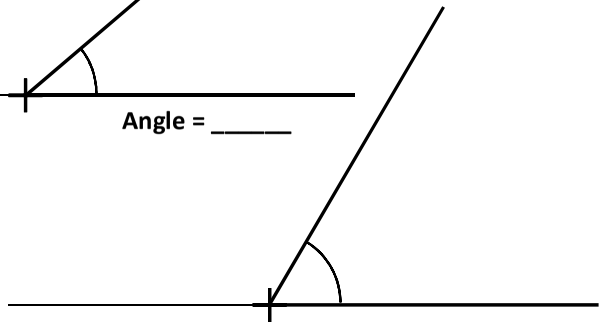
Example



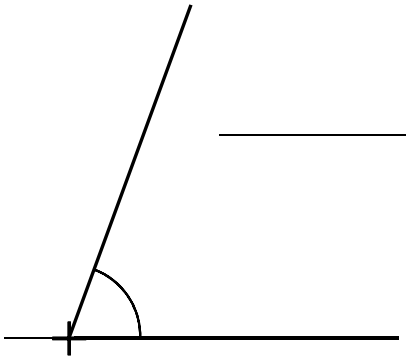
Angle = 50°



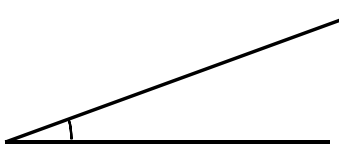
Angle = _____



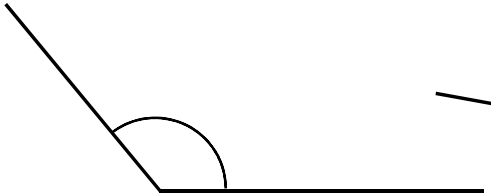
Angle = _____



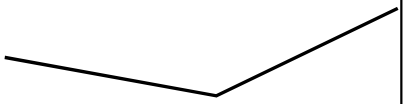
Angle = _____



Angle = _____



Angle = _____



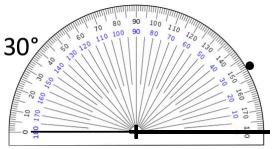
Angle = _____

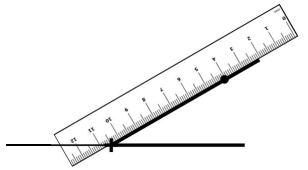
## Drawing Angles

①

Example

Angle = 30°





Angle = 60°

Angle = 50°

Angle = 70°

Angle = 30°

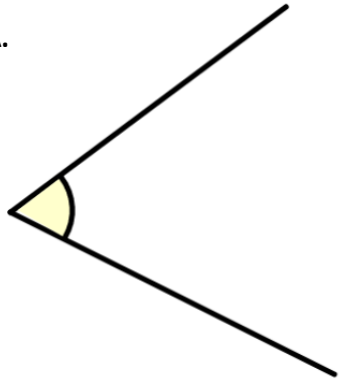
Angle = 120°

Angle = 45°

# Fluency Practice

First estimate, then measure each of these angles:

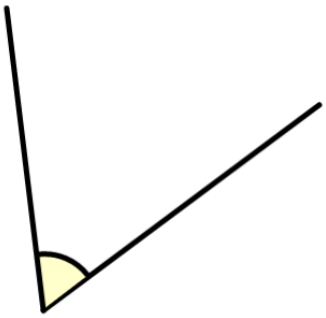
A.



estimate: ☐

measure: ☐

B.



estimate: ☐

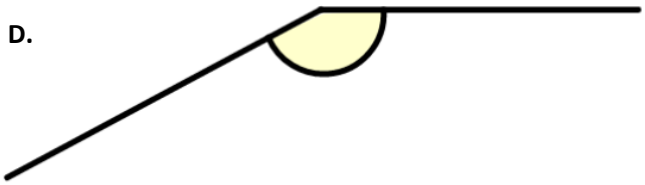
measure: ☐

C.

estimate: ☐

measure: ☐

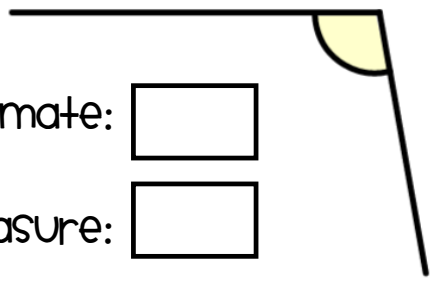
D.



estimate: ☐

measure: ☐

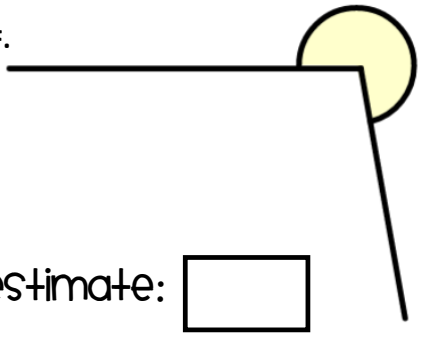
E.



estimate: ☐

measure: ☐

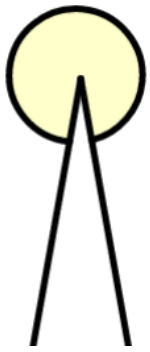
F.



estimate: ☐

measure: ☐

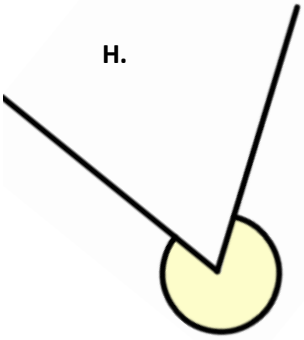
G.



estimate: ☐

measure: ☐

H.



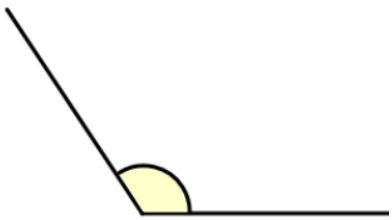
estimate: ☐

measure: ☐

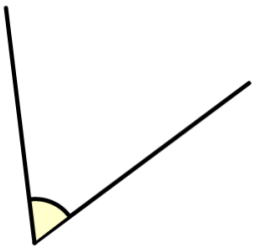
# Fluency Practice

1. Are these angles acute, obtuse or reflex?

A.

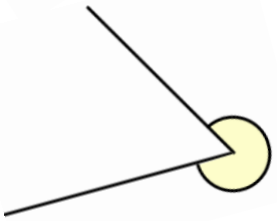


B.

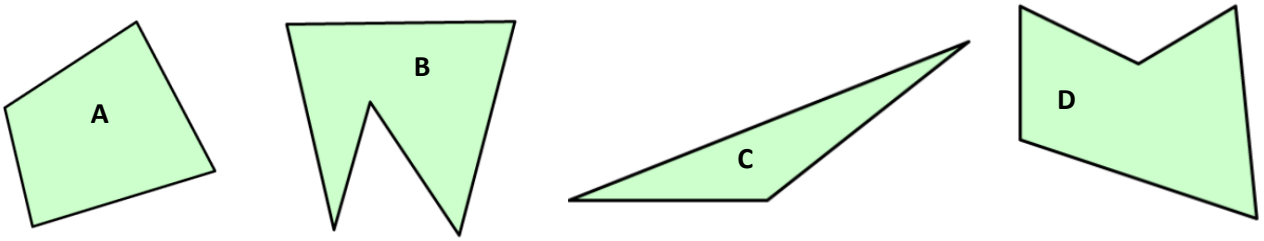


C.

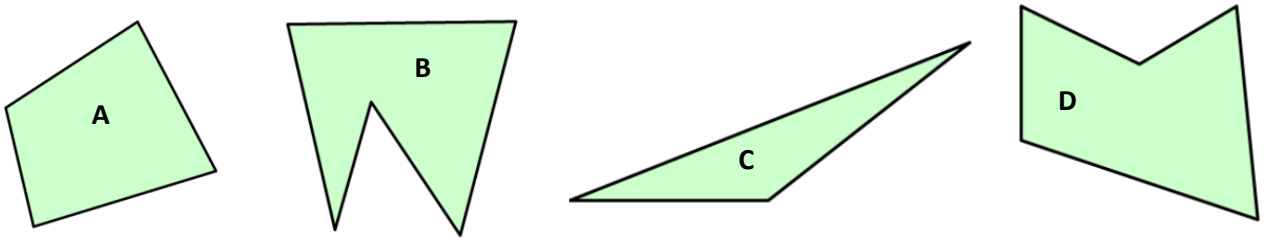
D.



2. Which of these shapes contain an obtuse angle?




3. Which of these shapes contain a reflex angle?




4. Draw an angle of:

A) 52°

B) 125°

C) 38°

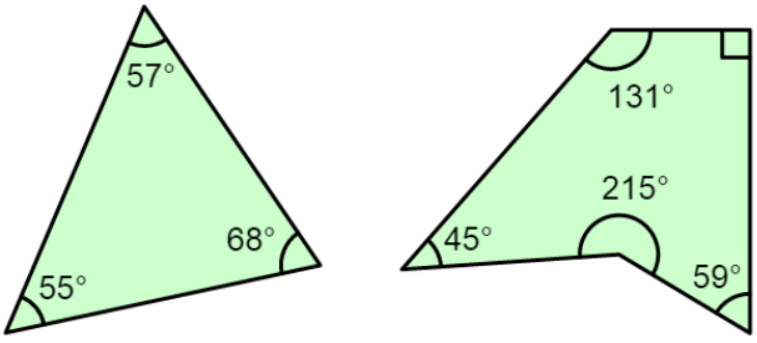
D) 160°

E) 210°

F) 250°

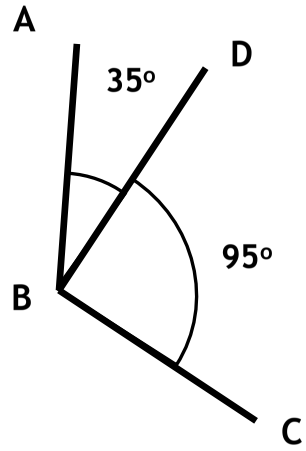
G) 325°

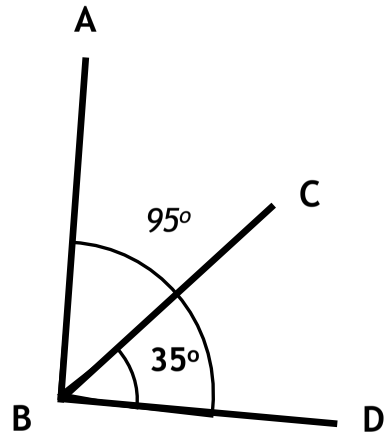
5. Use a protractor and a ruler to construct each of these shapes:

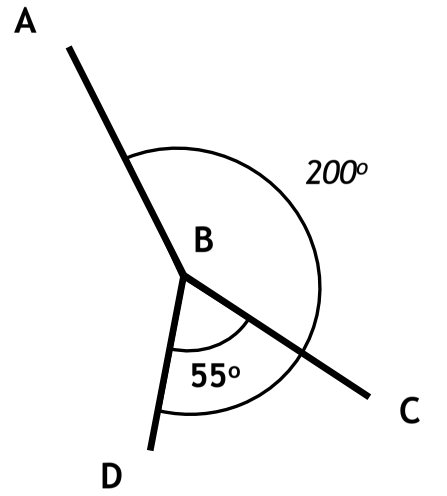


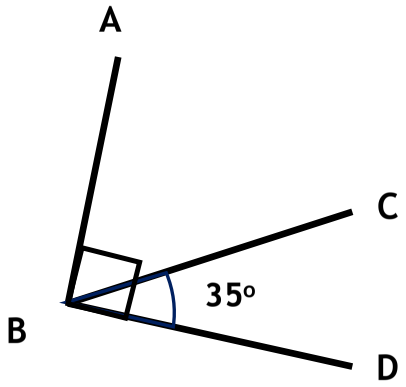
Find the value of ∠ABC (clockwise) in each diagram below

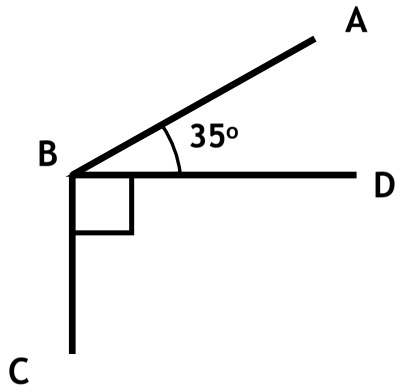
(Angles that intersect another line are labelled in *italics*)

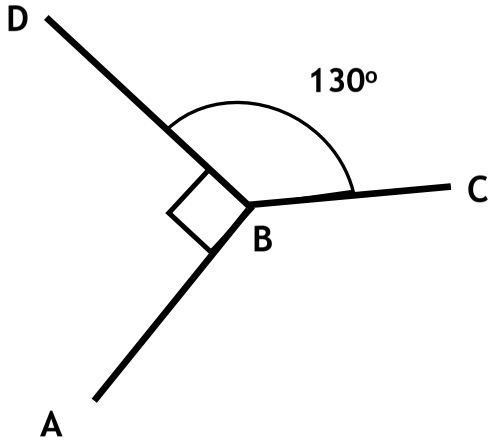


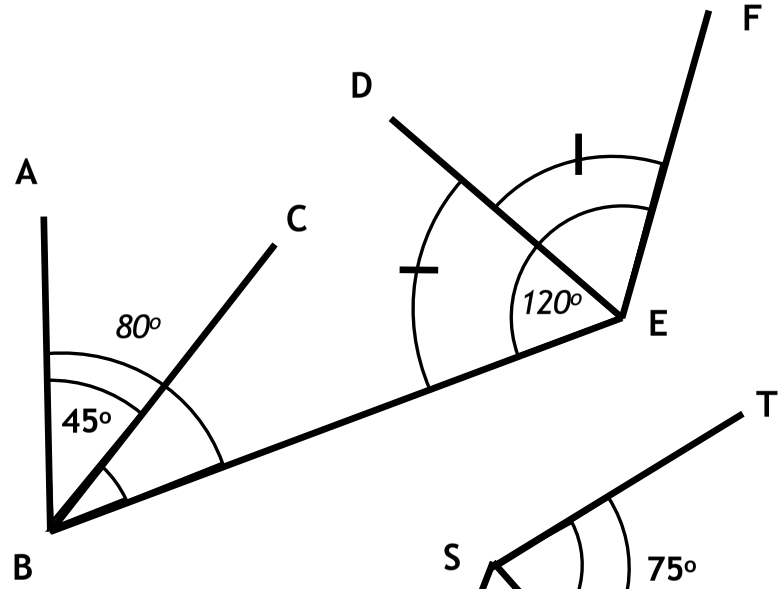



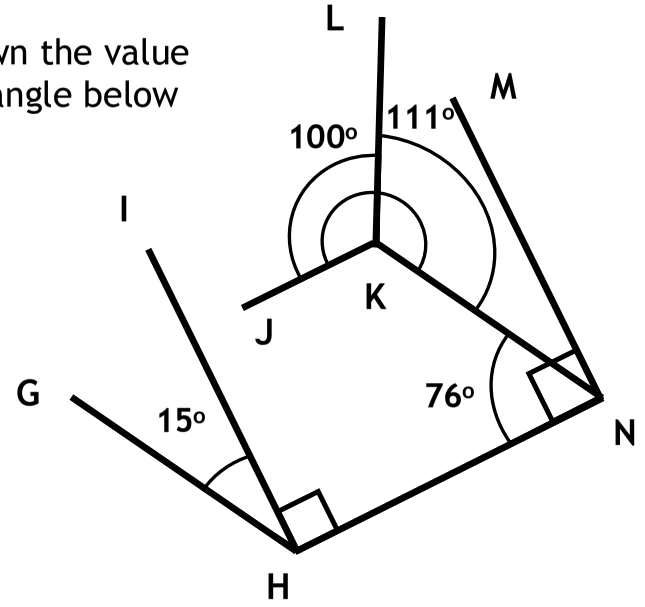



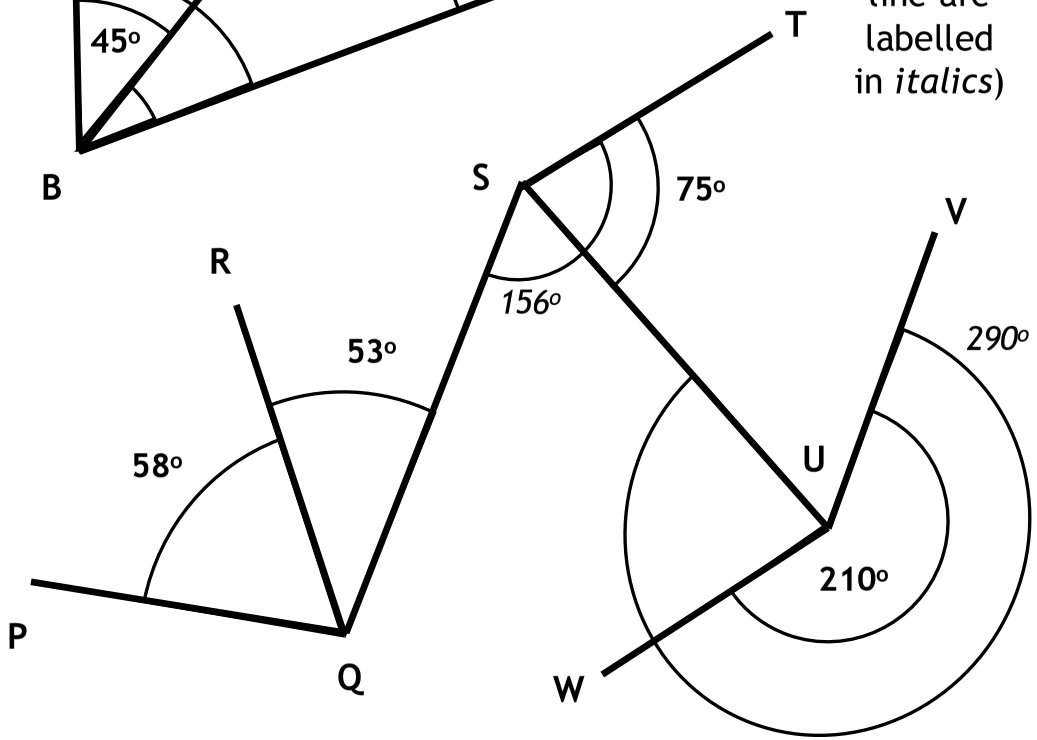
# Fluency Practice

Write down the value of each angle below

(Angles that intersect another line are labelled in *italics*)




All angles are measured clockwise

| | |
|---|---|
| ∠PQS = | ∠KNM = |
| ∠USQ = | ∠JKN = |
| ∠WUS = | ∠CBE = |
| ∠GHN = | ∠DEF = |

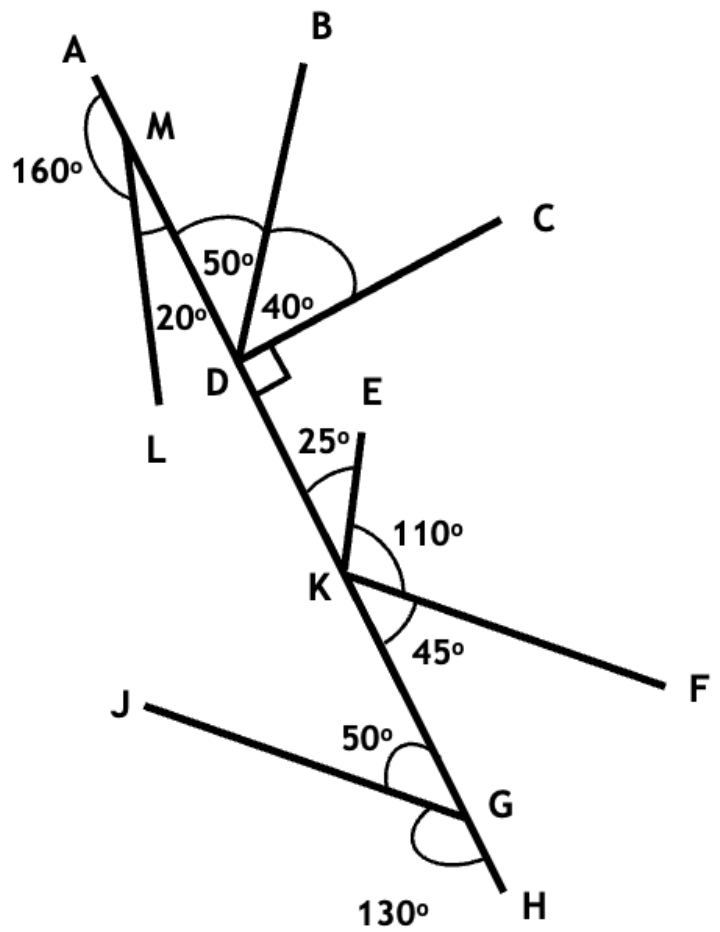



Diagram not to scale

1) Write down the value of each angle below

∠JGH = ∠AML =

∠DKE = ∠ADB =

∠BDC = ∠KGJ =

∠CDK = ∠LMD =

∠FKG = ∠EKF =

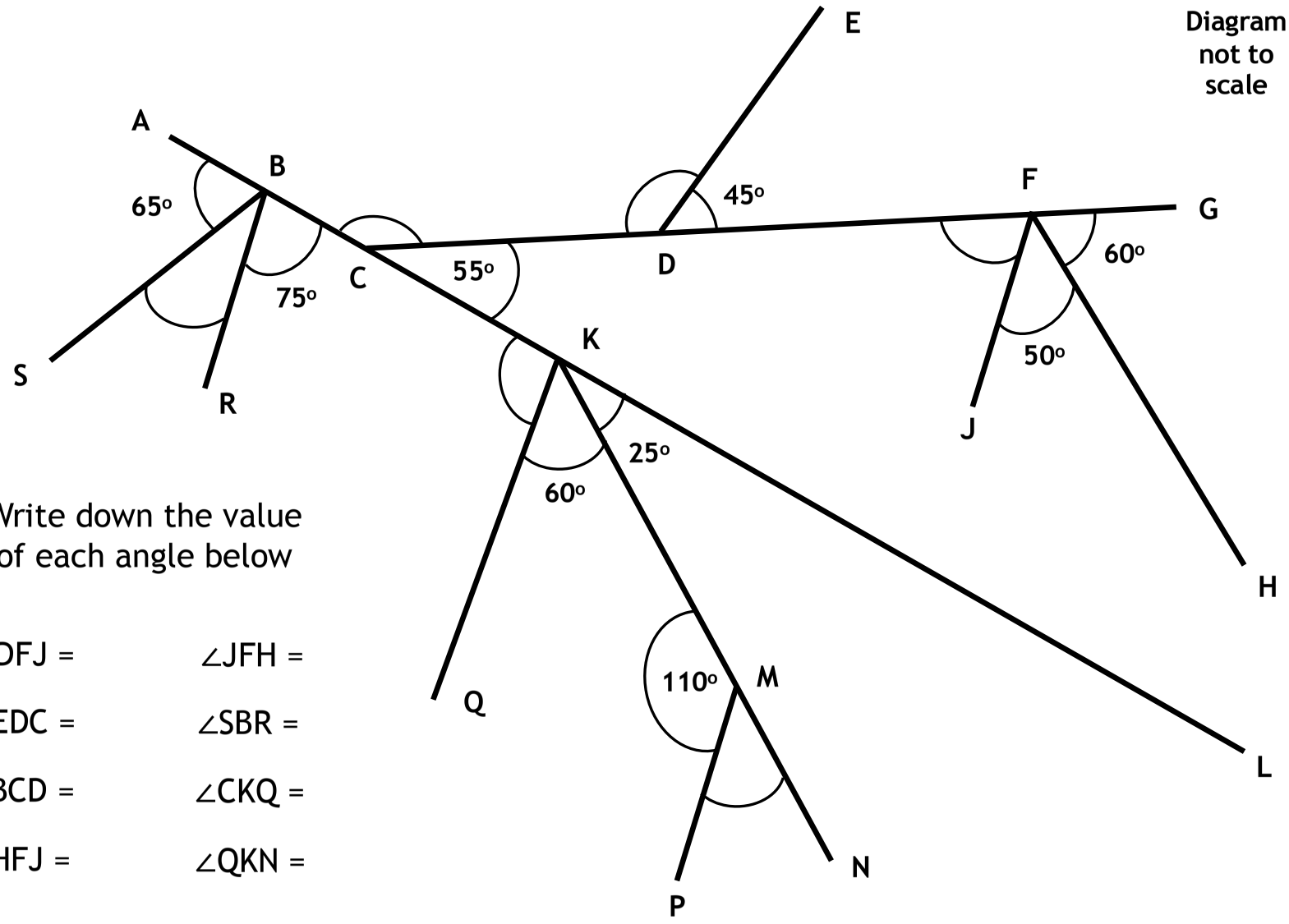
2) Group the angles above into half turns

3) Write down the value of each angle below

∠EKG = ∠GKD =

∠FKD = ∠FKM =

Diagram not to scale




Write down the value of each angle below

∠DFJ =

∠JFH =

∠EDC =

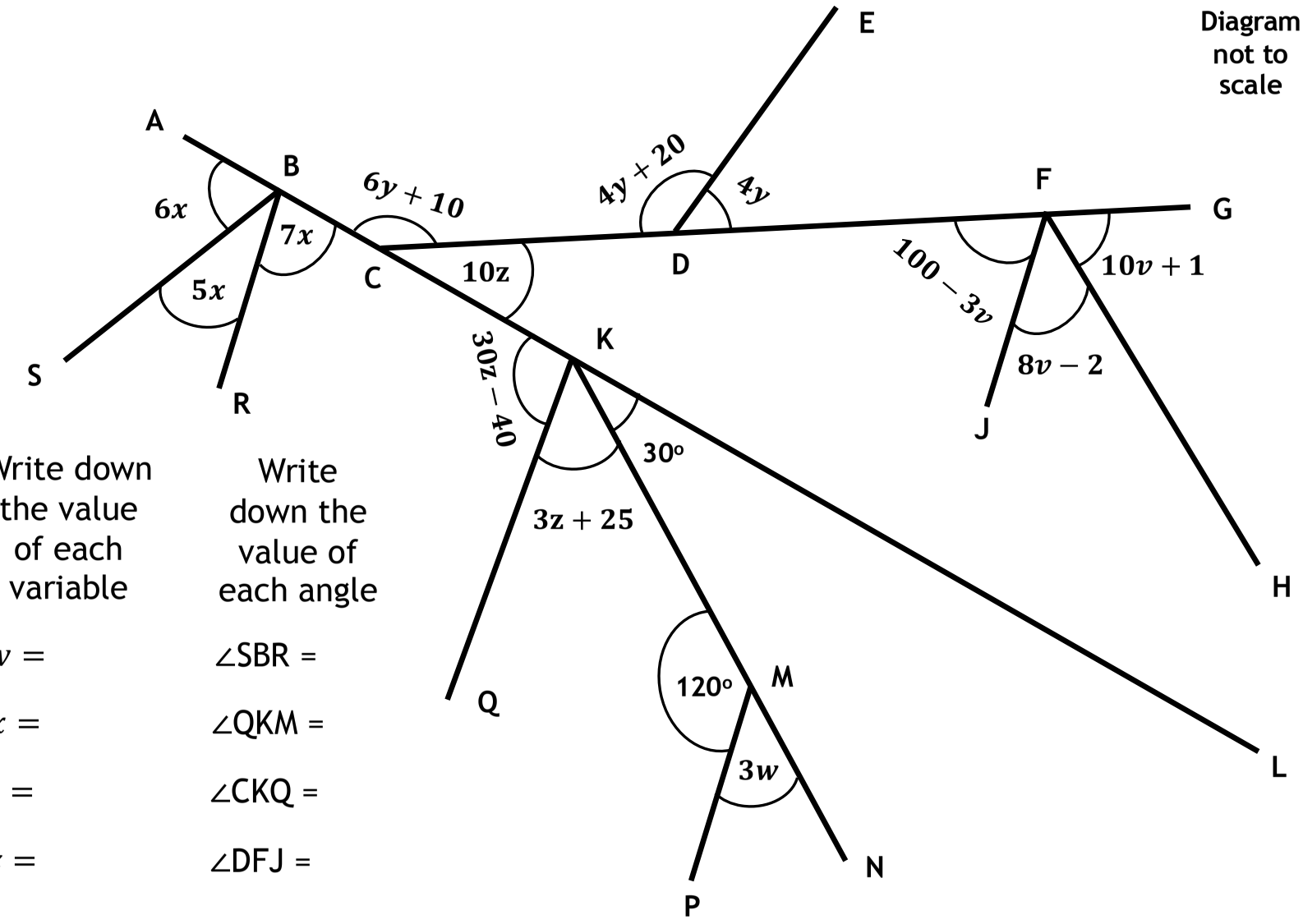
∠SBR =

∠BCD =

∠CKQ =

∠HFJ =

∠QKN =




Write down the value of each variable

$w =$

$x =$

$y =$

$z =$

Write down the value of each angle

∠SBR =

∠QKM =

∠CKQ =

∠DFJ =

# Fluency Practice

**A1** Find the value $x$




**A2** Find the value $x$




**A3** Find the value $x$




**A4** Find the value $x$




**B1** Find the value $x$




**B2** Find the value $x$




**B3** Find the value $x$




**B4** Find the value $x$




**C1** Find the value $x$




**C2** Find the value $x$

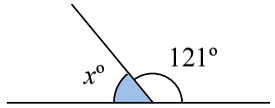
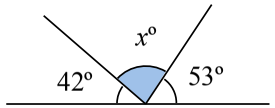
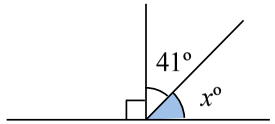
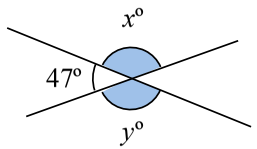
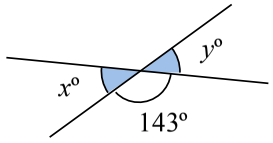
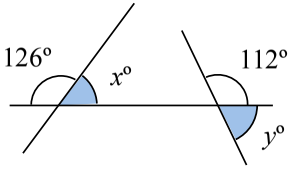
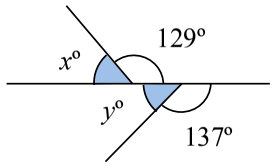
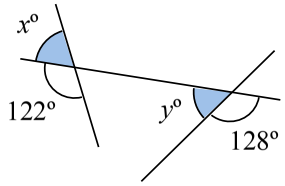
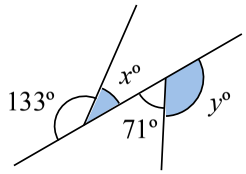
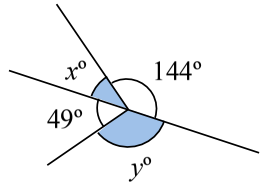


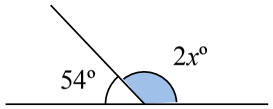
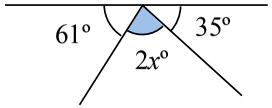
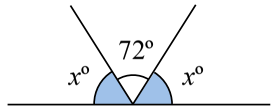
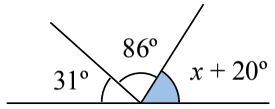
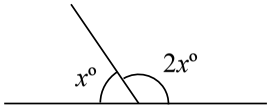
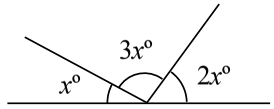
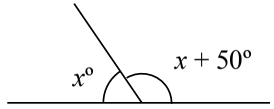
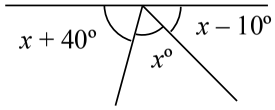
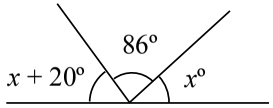
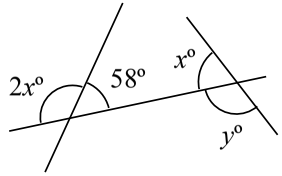
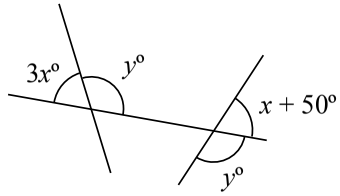

**C3** Find the values of $x$ and $y$




**C4** Find the values of $x$ and $y$

# Fluency Practice

| | | | |
|---|---|---|---|
| **A1** Find the value $x$<br>  | **A2** Find the value $x$<br>  | **A3** Find the value $x$<br>  | **A4** Three angles measure 77°, 41° and 52°.<br>Do they form a straight line?<br>Explain your answer. |
| **B1** Find the values of $x$ and $y$<br>  | **B2** Four angles measure 53°, 61°, 56° and 71°.<br>Which **three** can be put together to form a straight line? | **B3** Find the values of $x$ and $y$<br>  | **B4** Find the values of $x$ and $y$<br>  |
| **C1** Find the values of $x$ and $y$<br>  | **C2** Find the values of $x$ and $y$<br>  | **C3** Find the values of $x$ and $y$<br>  | **C4** Find the values of $x$ and $y$<br>  |

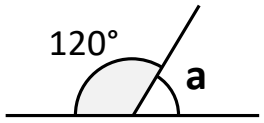
| | | | |
|---|---|---|---|
| **A1** Find the value $x$<br>  | **A2** Find the value $x$<br>  | **A3** Find the value $x$<br>  | **A4** Find the value $x$<br>  |
| **B1** Find the size of both angles<br>  | **B2** Find the size of all three angles<br>  | **B3** Find the size of both angles<br>  | **B4** Find the size of all three angles<br>  |
| **C1**<br>Three angles form a straight line.<br>The second angle is twice the first angle.<br>The third angle is five degrees more than the second angle.<br>Find the size of each of the three angles. | **C2** Find the value $x$<br>  | **C3** Find the values of $x$ and $y$<br>  | **C4** Find the values of $x$ and $y$<br>  |

# Fluency Practice

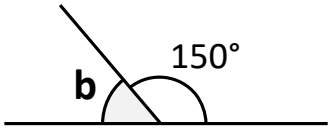
## Angles on Straight Lines

"Angles on a straight line total _____ ."

Calculate the missing angles. All the answers are at the bottom.

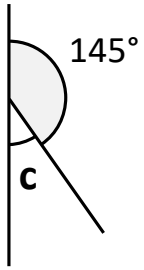



**a =**

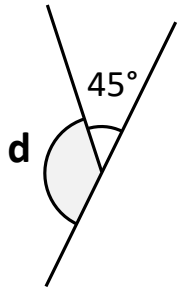


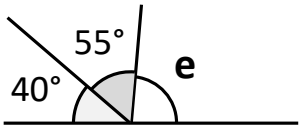

**b =**

**c =**



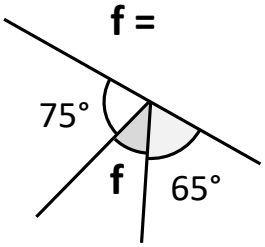

**d =**

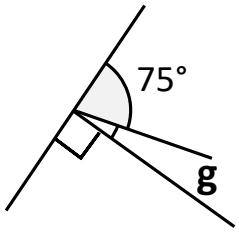



**e =**

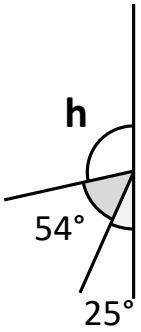
**f =**

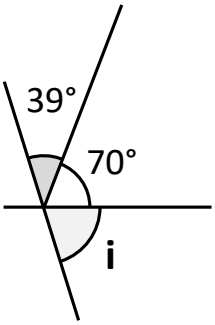


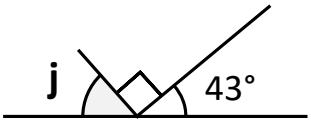

**g =**

**h =**

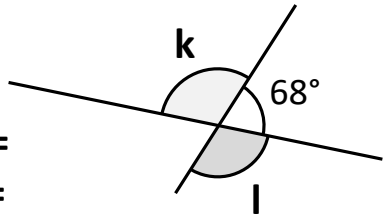



**i =**

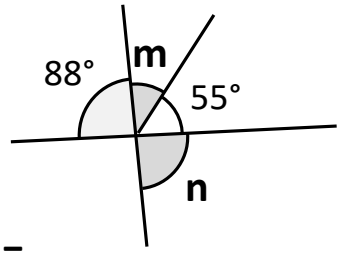



**j =**



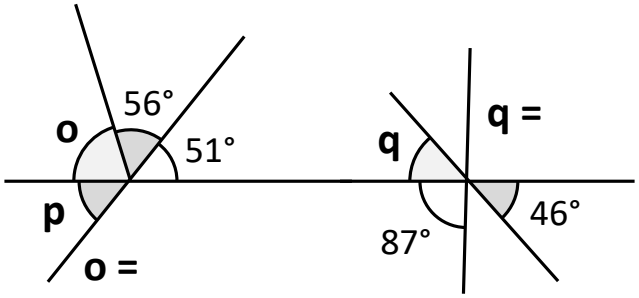

**k =**

**l =**




**m =**

**n =**




**o =**

**p =**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 112° | 47° | 101° | 40° | 41° | 112° | 15° | 155° | 49° | 60° | 73° |
| 62° | 30° | 35° | 71° | 37° | 88° | 51° | 46° | 85° | 135° | 77° |

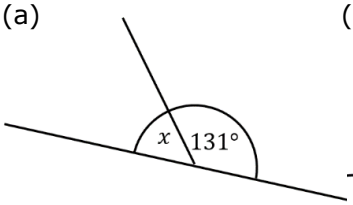
From the answers you have **not used**…

which **three angles** can you put together to form a straight line?

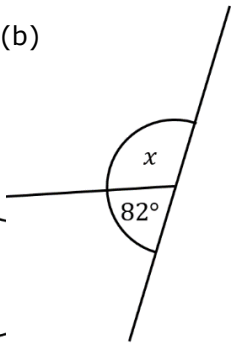
# Fluency Practice

Find the missing angle $x$

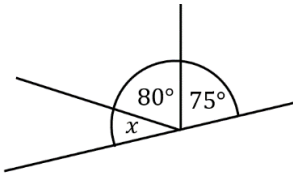
(a)




(b)

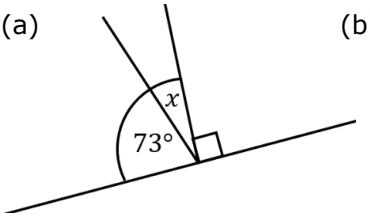



(c)

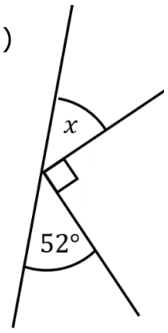



Find the missing angle $x$

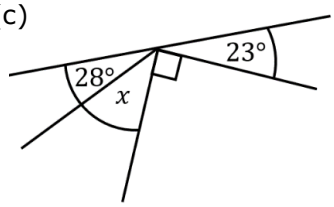
(a)




(b)

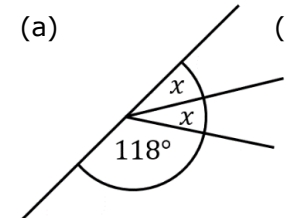



(c)

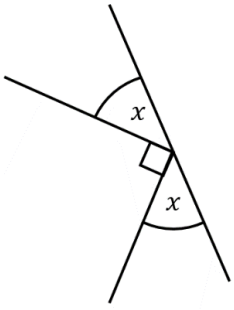



Find the missing angle $x$

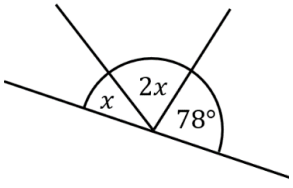
(a)



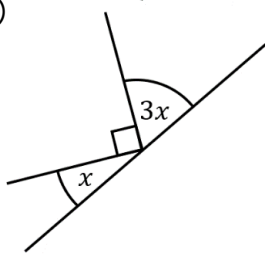

(b)




(c)

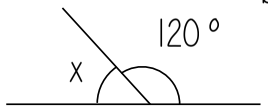


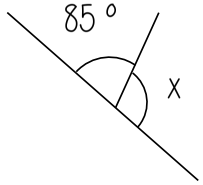

(d)

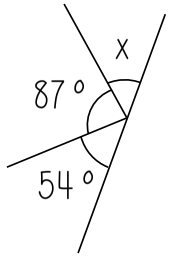


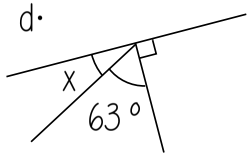
The diagrams are not drawn accurately

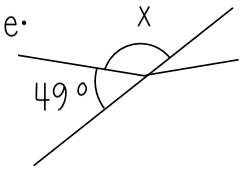
1. Find the value of the missing angle

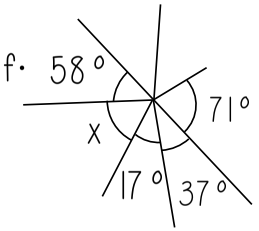
a. 


b. 

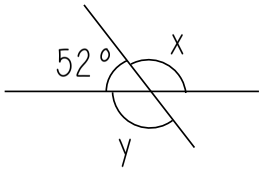

c. 

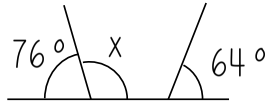

d. 

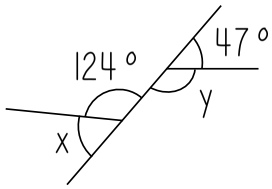

e. 

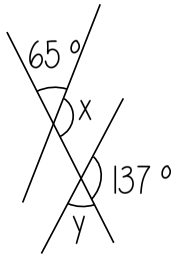

f. 

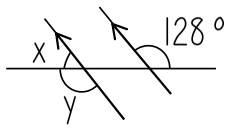

2. Find the value of the missing angle(s)

a. 

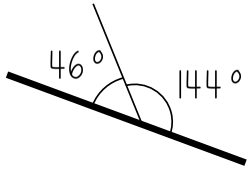

b. 

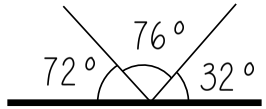

c. 

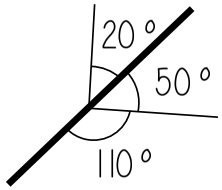

d. 

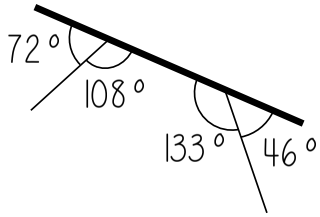

e. 

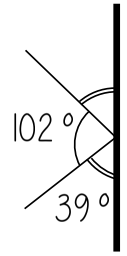

3. Is the bold line straight? Provide a reason for your answer.

a. 

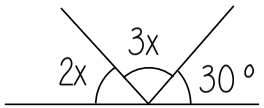

b. 

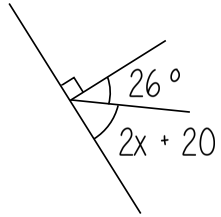

c. 

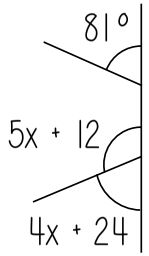

d. 

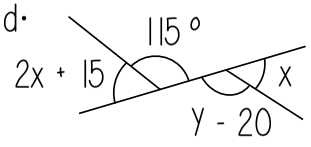

e. 

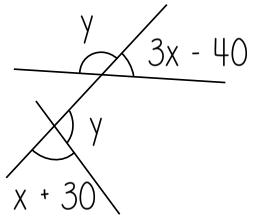

4. Find the value of x and y.

a. 


b. 

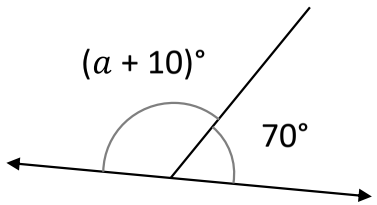

c. 

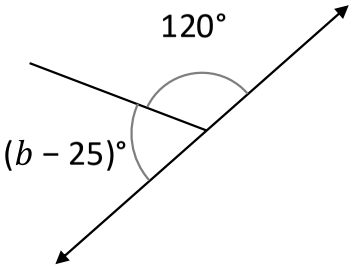

d. 

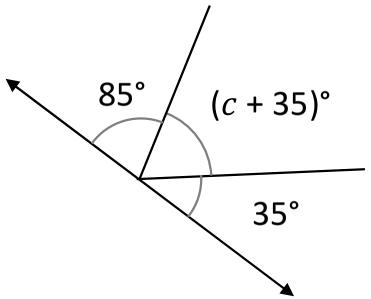

e. 

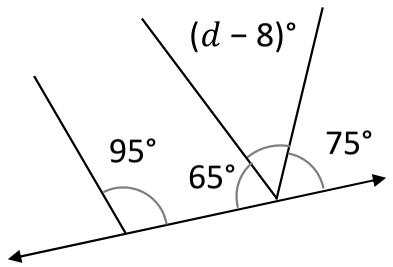
## Angles on One Side of a Straight line

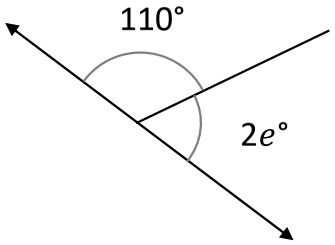
not drawn accurately

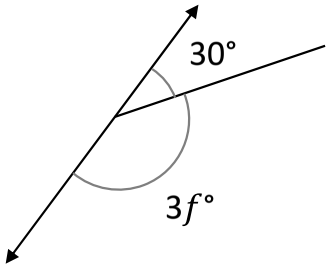
① 

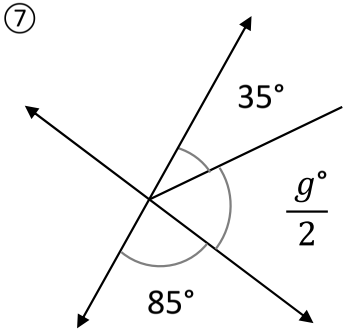

② 

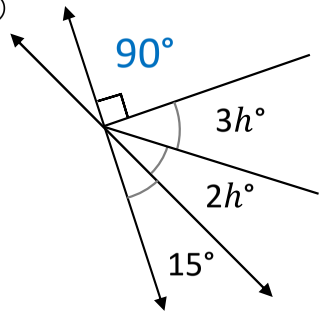

③ 

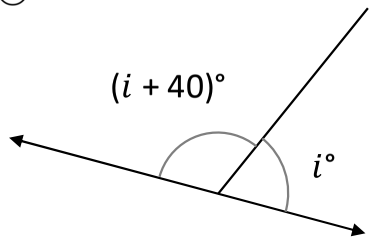

④ 

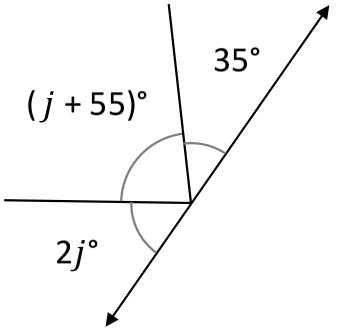

⑤ 

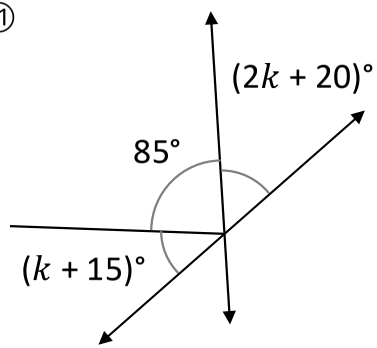

⑥ 

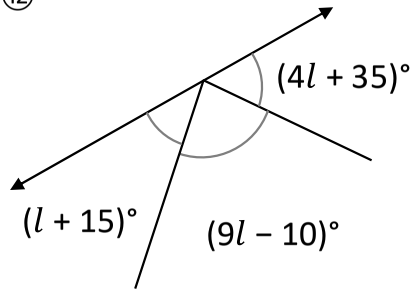

⑦ 


⑧ 

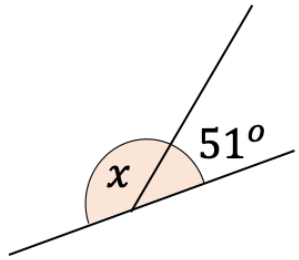

⑨ 


⑩ 

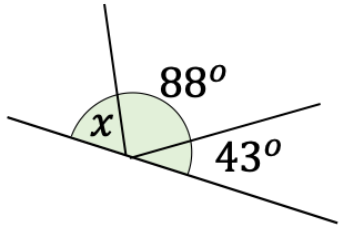

⑪ 


⑫ 


| 11 Answers | 85 | 15 | 100 | 70 | 50 | 25 |
|---|---|---|---|---|---|---|
| | 30 | 48 | 20 | 35 | 120 | |



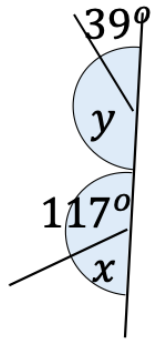

$x =$ … …

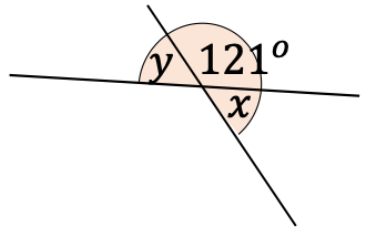



$x =$ … …

$x =$ … …

$y =$ … …

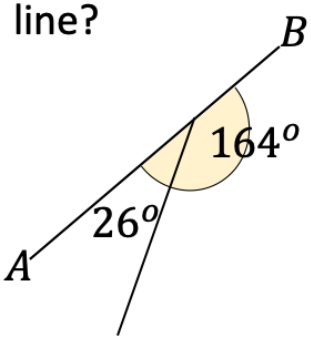


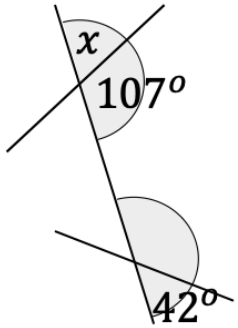




$x =$ … …

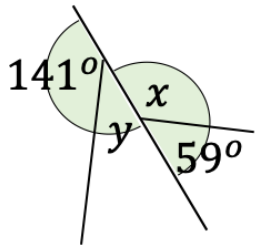
$y =$ … …

Is length AB a straight line?



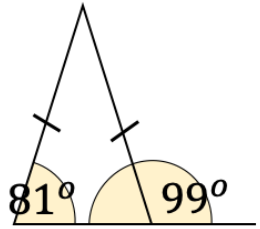




$x =$ … …



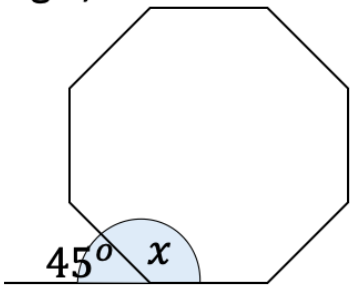

$x =$ … …

$y =$ … …

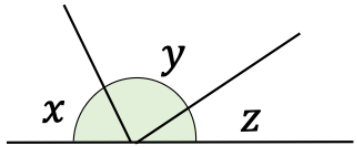



Is the triangle above; an Isosceles triangle?

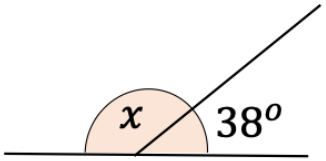
Find the interior angle, $x$




Which 3 of 4 angles; $78^o$, $88^o$, $37^o$, $65^o$ would make AB a straight line?

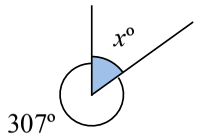
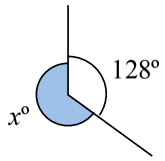
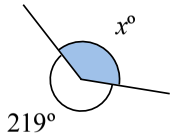
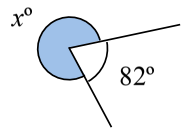
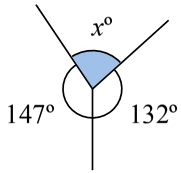
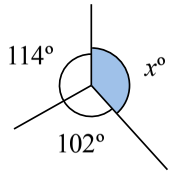
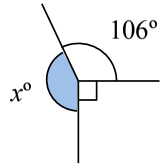
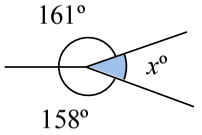
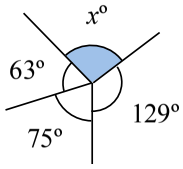
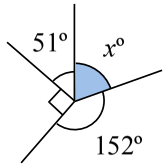
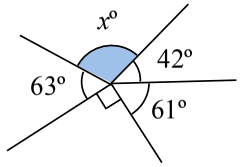
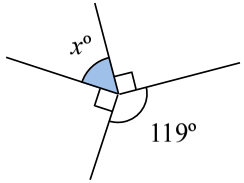



If I double the size of the 38° angle. What happens to $x$?



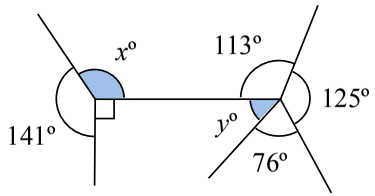

If I am facing North and I turn 056°
How much more do I need to turn so I am now facing South?

# Fluency Practice

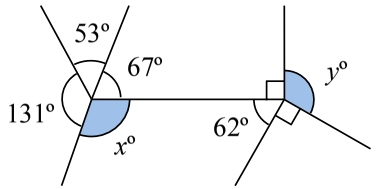
| | | | |
|---|---|---|---|
| **A1** Find the value $x$<br>  | **A2** Find the value $x$<br>  | **A3** Find the value $x$<br>  | **A4** Find the value $x$<br>  |
| **B1** Find the value $x$<br>  | **B2** Find the value $x$<br>  | **B3** Find the value $x$<br>  | **B4** Find the value $x$<br>  |
| **C1** Find the value of $x$<br>  | **C2** Find the value of $x$<br>  | **C3** Find the value of $x$<br>  | **C4** Find the value of $x$<br>  |

**A1** Three angles measure 97°, 145° and 118°.
Do these three angles fit exactly around a point?
Explain your answer.

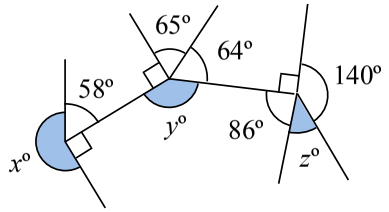
**A2** Find the values of $x$ and $y$



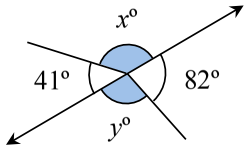

**A3** Find the values of $x$ and $y$



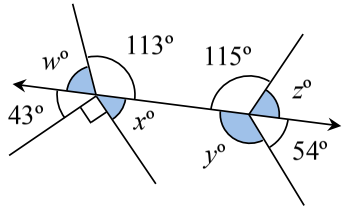

**A4** Find the values of $x$, $y$ and $z$




**B1** Find the values of $x$ and $y$

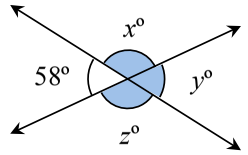



**B2** Find the values of $w$, $x$, $y$ and $z$

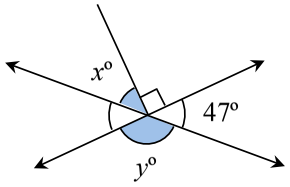



**B3** Five angles measure 78°, 95°, 113°, 162° and 187°.
Which of them can be put together to fit exactly around a point?

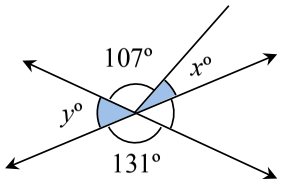
**B4** Find the values of $x$, $y$ and $z$



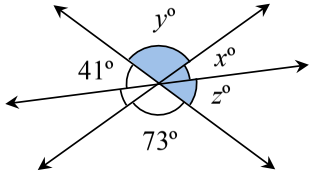

**C1** Find the values of $x$ and $y$



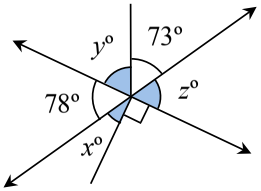

**C2** Find the values of $x$ and $y$



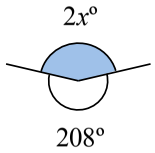

**C3** Find the values of $x$, $y$ and $z$



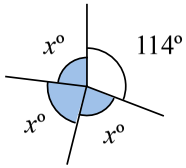

**C4** Find the values of $x$, $y$ and $z$



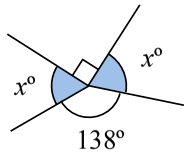
**A1** Find the value of $x$



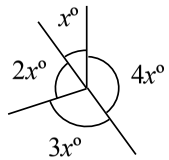

**A2** Find the value of $x$



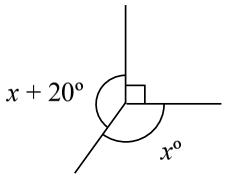

**A3** Find the value of $x$




**A4** Find the size of each of the four angles

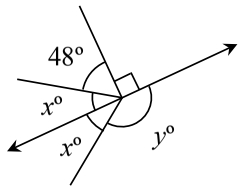



**B1** Find the value of $x$

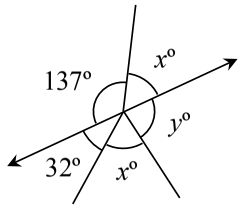



**B2** Three angles fit exactly around a point.
The second angle is 20° more than the first angle.
The third angle is twice the size of the second angle.
Find the size of each of the three angles.

**B3** Find the values of $x$ and $y$

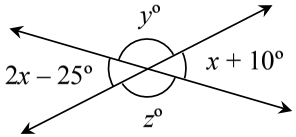



**B4** Find the values of $x$ and $y$

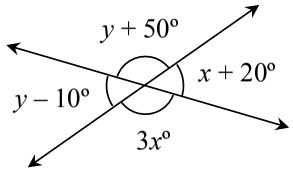



**C1** Three angles fit exactly around a point.
Two of the angles are equal.
The difference between the largest and smallest angle is 30°
Find the size of each of the three angles.

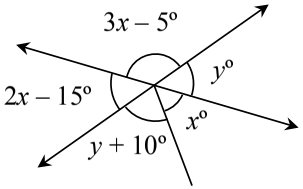
**C2** Find the values of $x$, $y$ and $z$




**C3** Find the values of $x$ and $y$




**C4** Find the values of $x$, $y$ and $z$



# Fluency Practice

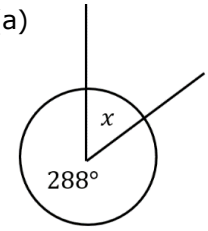
**Angles Around a Point**

**Calculate** the size of each angle (**a**, **b**, **c**...).
Check your answers by **measuring**!

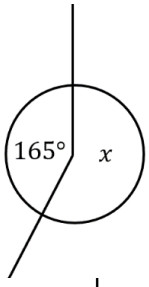
# Fluency Practice

Find the missing angle $x$.

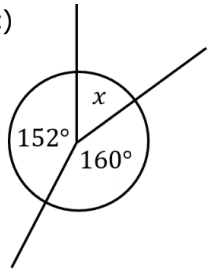
(a)



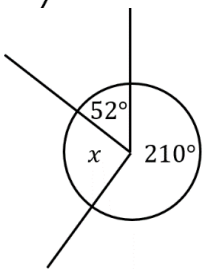

(b)




(c)

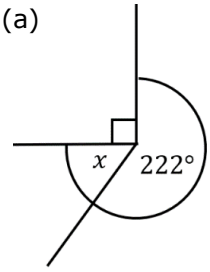



(d)

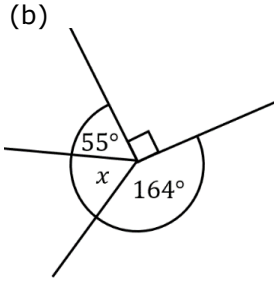



Find the missing angle $x$.

(a)

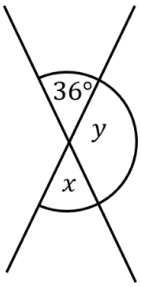



(b)

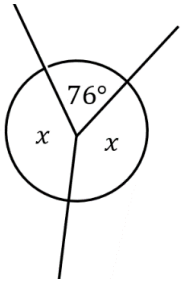



Find the missing angles, $x$ and $y$.

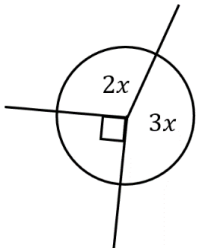
(a)



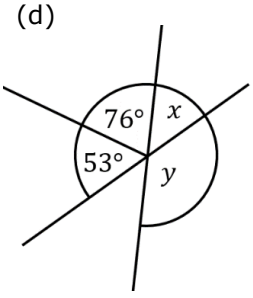

(b)




(c)

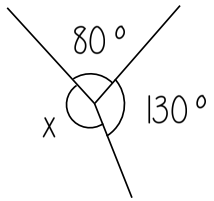


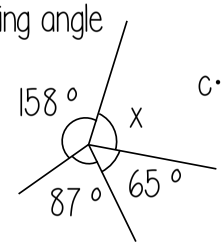

(d)

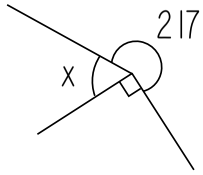


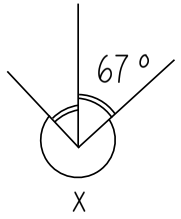
The diagrams are not drawn accurately

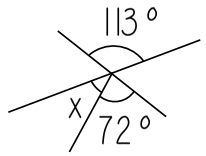
1. Find the value of the missing angle

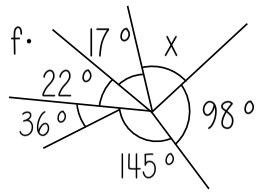
a. 


b. 

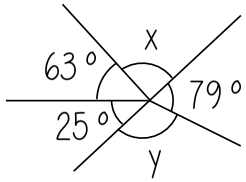

c. 

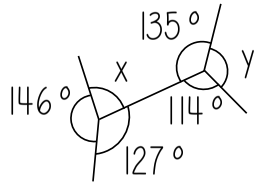

d. 

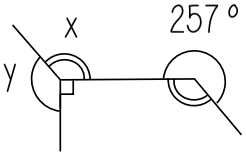

e. 

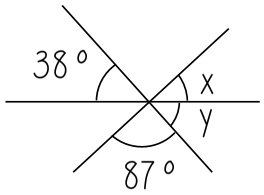

f. 

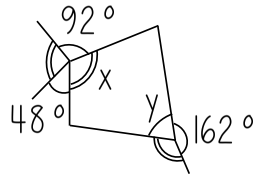

2. Find the value of the missing angles

a. 

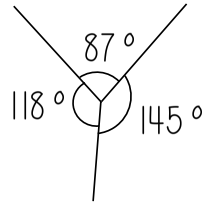

b. 

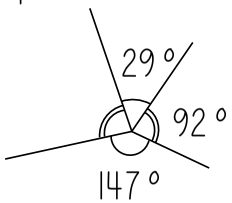

c. 

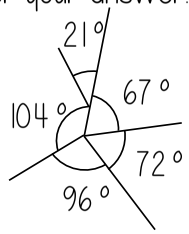

d. 


e. 


3. Do the angles form a point? Give a reason for your answer.

a. 

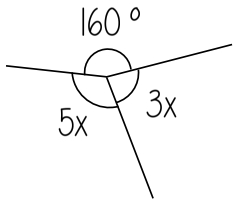

b. 

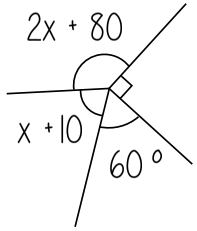

c. 

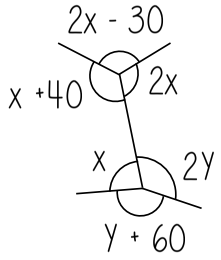

4.

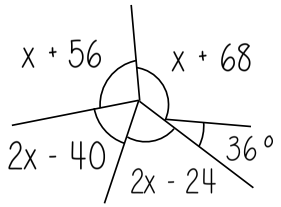
Three angles form a point.
Kevin says the three angles have to be a mix of acute and obtuse angles.
Is Kevin correct? Explain your answer.

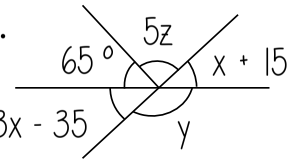
5. Find the value of x, Y and z

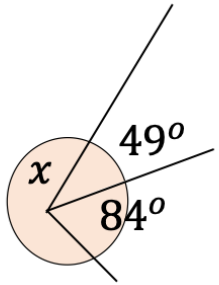
a. 


b. 


c. 

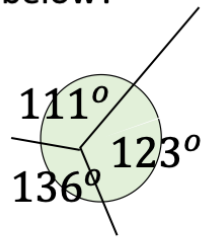

d. 


e. 




$x =$ … …

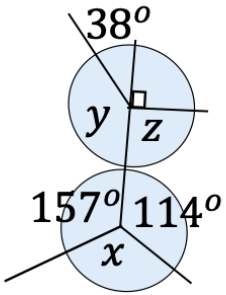
What is wrong with the diagram below?

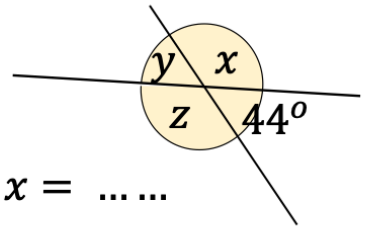



$x =$ … …

$y =$ … …

$z =$ … …



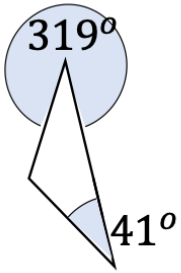




$x =$ … …

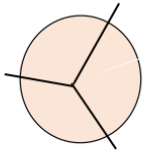
$y =$ … …

$z =$ … …

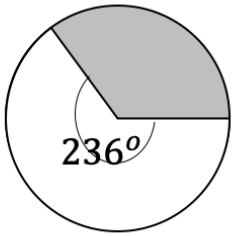
Is the triangle Isosceles?



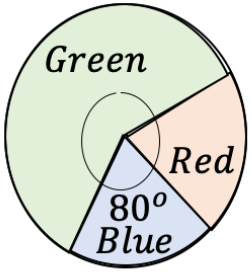

Which 3 of 4 angles; $131^o$, $141^o$, $106^o$, $123^o$ make a full turn?



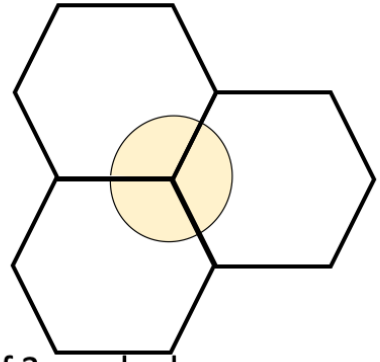
If I face North and turn clockwise so I am facing South East. How many more degrees clockwise do I need to turn so I'm facing North again?




What fraction of the circle is shaded grey?



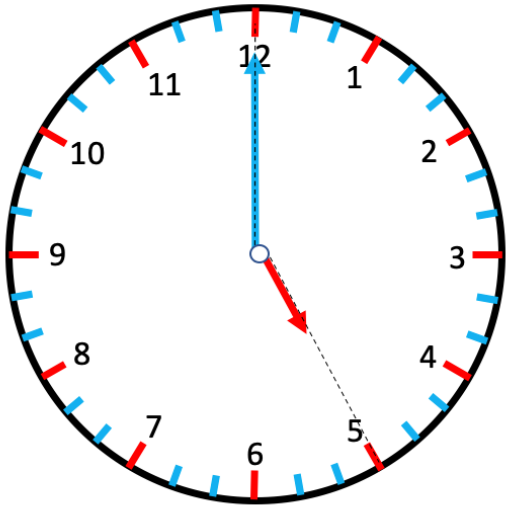

The pie chart shows a classes favorite colour. If the same number liked Red and Blue, what angle on the pie chart is green?



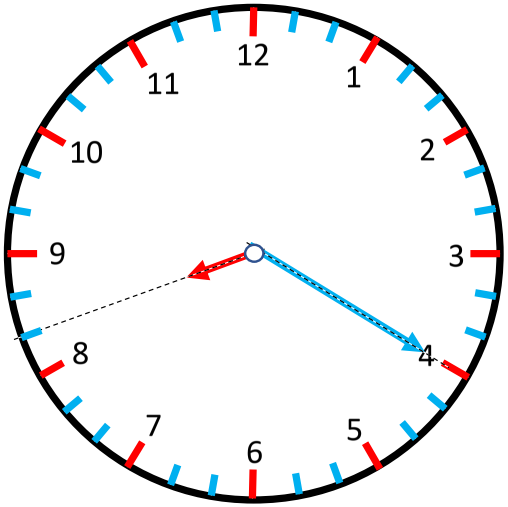
If 3 regular hexagons tessellate, what is the interior angle of a regular hexagon?

Find the obtuse angle between the hour and minute hands

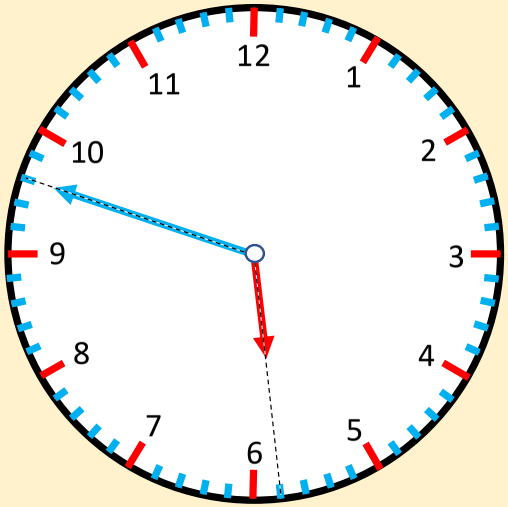
Find the reflex angle between the hour and minute hands



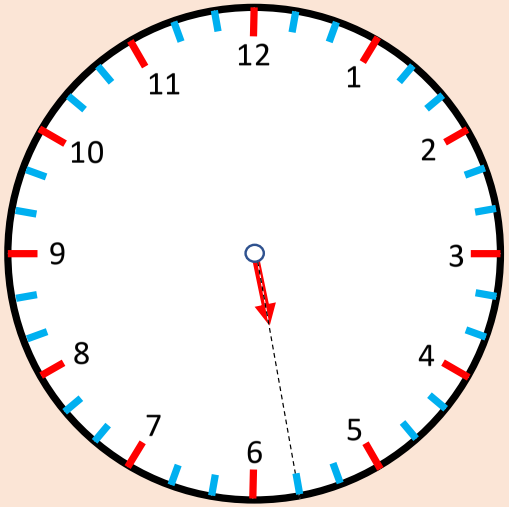
Find the obtuse angle between the Hour and Minute hand on the clock



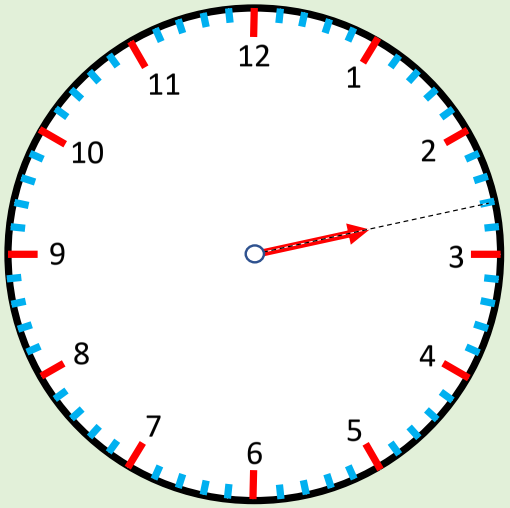

Find the obtuse angle between the Hour and Minute hand on the clock




The hour hand has been drawn on the clock. Draw in the minute hand

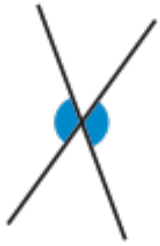



The hour hand has been drawn on the clock. Draw in the minute hand



# Fluency Practice

**2** Tick the pairs of angles that are vertically opposite.



☐

☐

☐

☐

☐

Compare answers with a partner.

**3** Work out the sizes of the unknown angles.

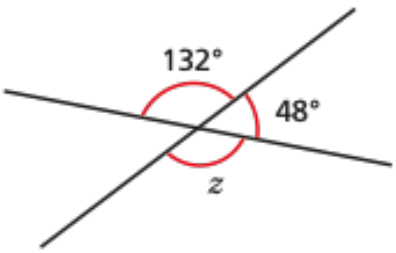
Give reasons for your answers.

**a)**

$y =$ ☐ because _____

_____

**b)**

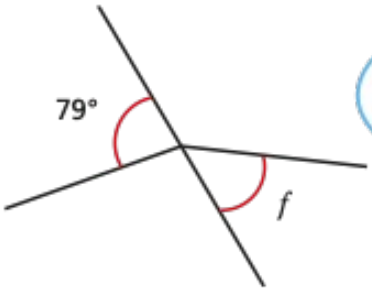


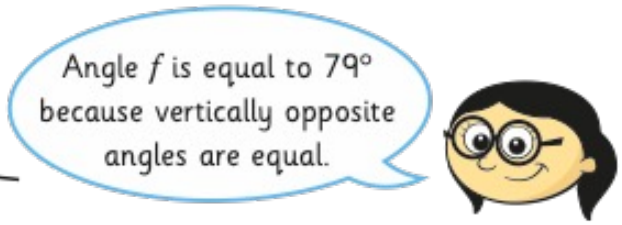

$z =$ ☐ because _____

_____

# Fluency Practice

**4** Annie is working out the size of angle $f$.




Do you agree with Annie? _____

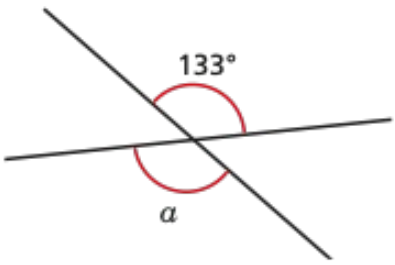
Explain your answer.

_____

_____

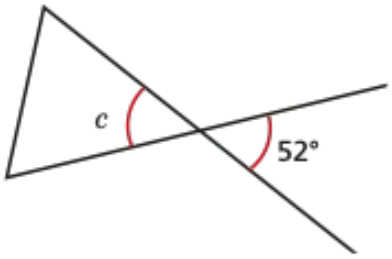
**5** Work out the unknown angles.

**a)**



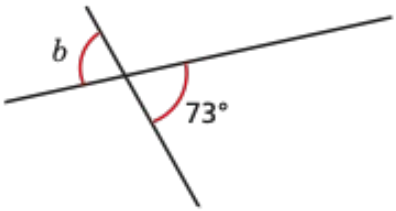

$a =$ ☐

**c)**



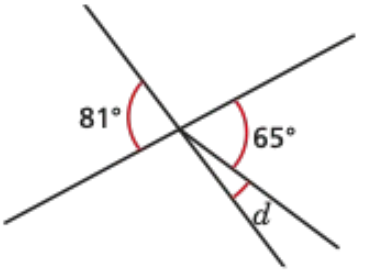

$c =$ ☐

**b)**




$b =$ ☐

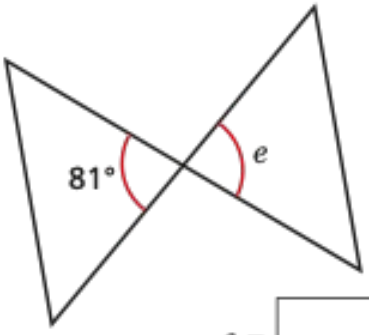
**d)**




$d =$ ☐

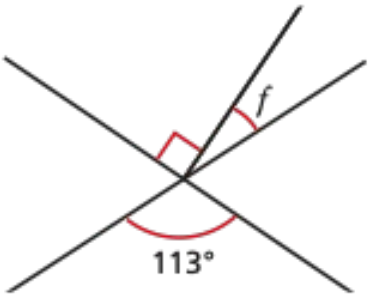
# Fluency Practice

e)




$e =$ ☐

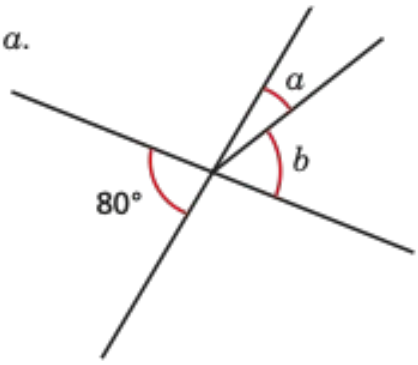
f)




$f =$ ☐

Talk about your reasons with a partner.

**6** Angle $b$ is three times the size of angle $a$.

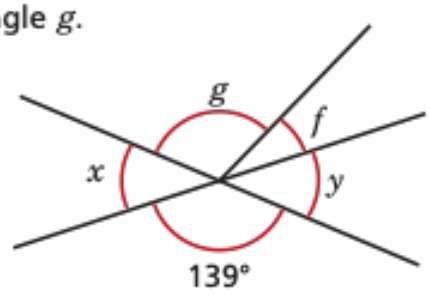



Work out the sizes of angles $a$ and $b$.

$a =$ ☐ $b =$ ☐

**7** Angle $f$ is one quarter of the size of angle $g$.

Angle $f$ is 28°.




Are angles $x$ and $y$ vertically opposite? _____

Explain your answer.

_____

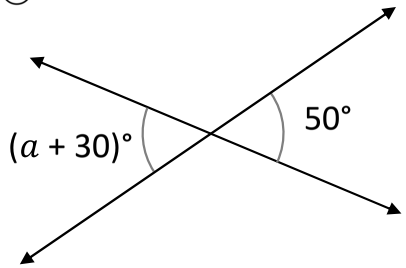
_____

**Vertically Opposite Angles: Forming Equations**

Find the value of each variable.

not drawn accurately

①

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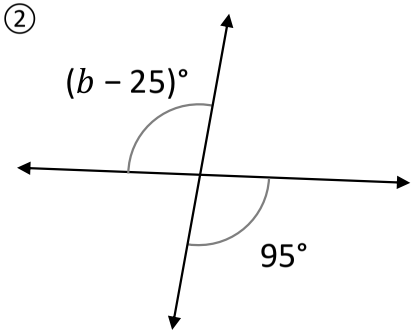


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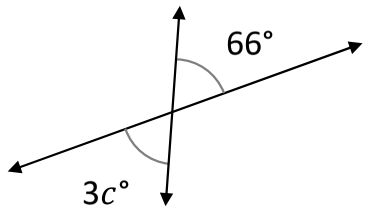


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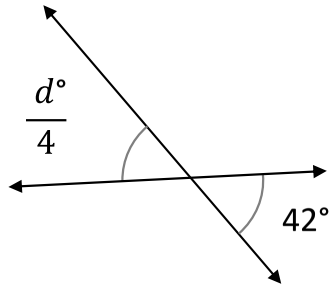


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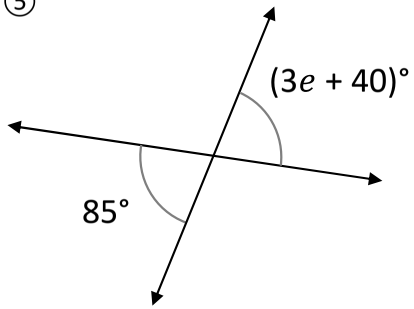


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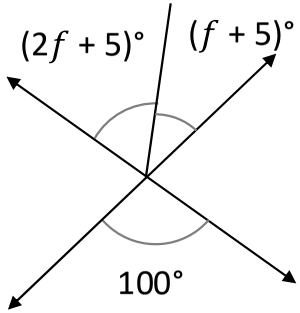


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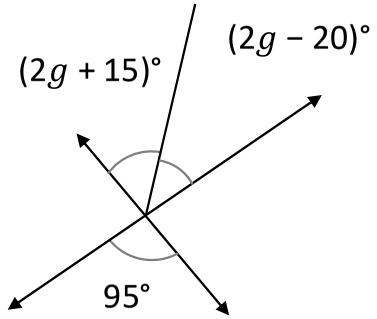


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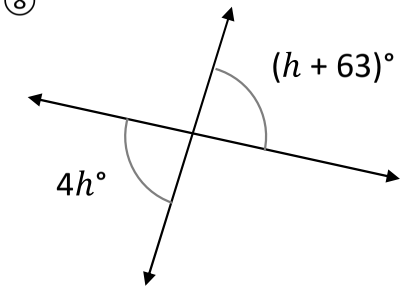


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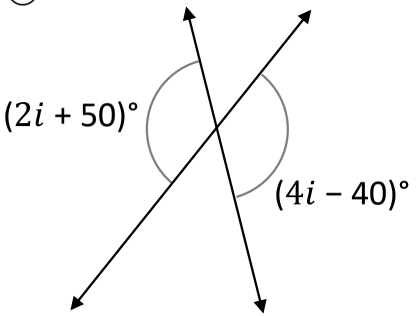


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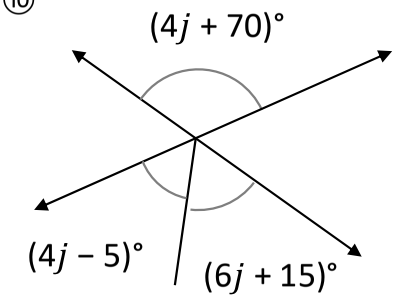


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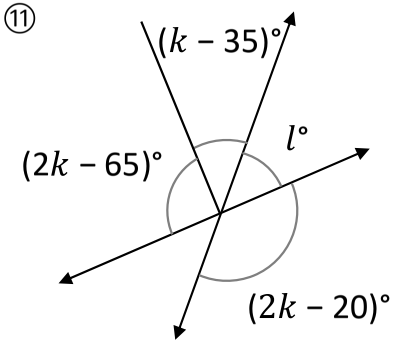


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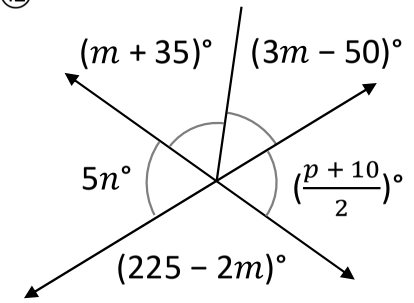



| 12 Answers | 25 | 15 | 45 | 20 | 80 | 22 |
|---|---|---|---|---|---|---|
| | 120 | 10 | 168 | 40 | 30 | 21 |

# Fluency Practice

**A1** Work out the value of $x$.




**A2** Work out the value of $x$.




**A3** Work out the value of $x$.




**A4** Work out the value of $x$.




**B1** Work out the value of $x$.




**B2** Work out the value of $x$.




**B3** Work out the value of $x$.




**B4** Work out the value of $x$.




**C1** Work out the value of $x$.




**C2** Work out the value of $x$.




**C3** Work out the value of $x$.




**C4** Work out the value of $x$.




**D1** Work out the value of $x$.




**D2** Work out the value of $x$.

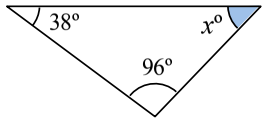
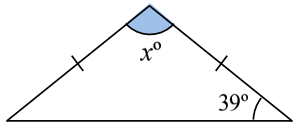
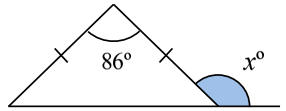
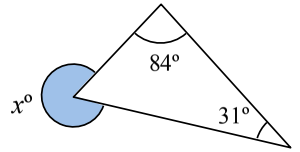
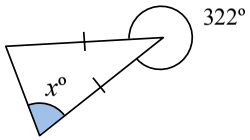
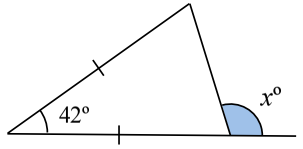
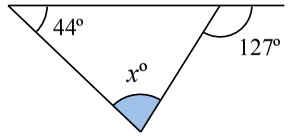
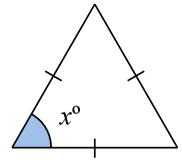
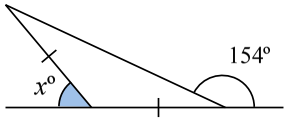
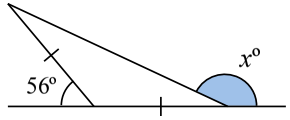
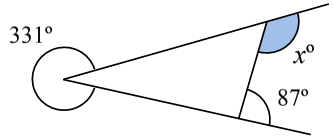
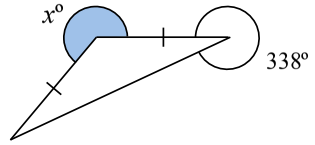
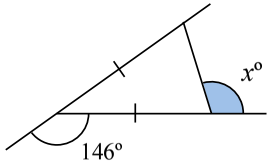
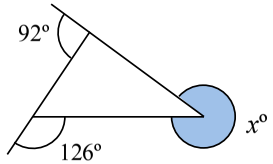
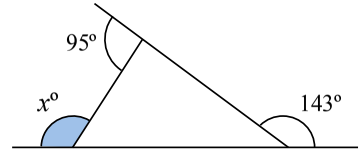
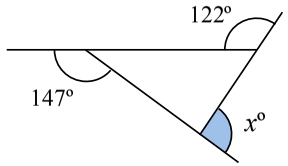



**D3** Work out the value of $x$.



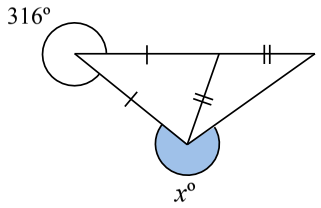

**D4** Work out the value of $x$.

# Fluency Practice

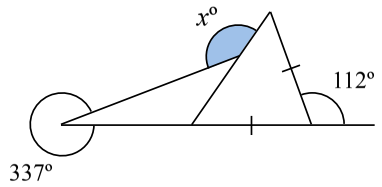
| | | | |
|---|---|---|---|
| **A1** Work out the value of $x$.<br>  | **A2** Work out the value of $x$.<br>  | **A3** Work out the value of $x$.<br>  | **A4** Work out the value of $x$.<br>  |
| **B1** Work out the value of $x$.<br>  | **B2** Work out the value of $x$.<br>  | **B3** Work out the value of $x$.<br>  | **B4** Work out the value of $x$.<br>  |
| **C1** Work out the value of $x$.<br>  | **C2** Work out the value of $x$<br>  | **C3** Work out the value of $x$.<br>  | **C4** Work out the value of $x$.<br>  |
| **D1** Work out the value of $x$.<br>  | **D2** Work out the value of $x$.<br>  | **D3** Work out the value of $x$.<br>  | **D4** Work out the value of $x$.<br>  |

# Fluency Practice

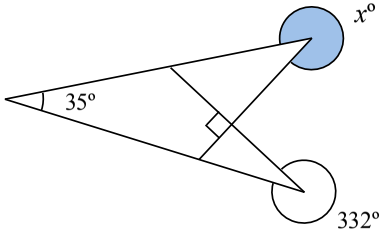
**A1** Find the value of $x$



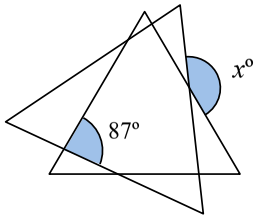

**A2** Find the value of $x$



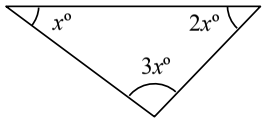

**A3** Find the value of $x$



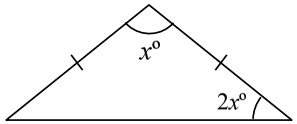

**A4** The triangles are equilateral. Find the value of $x$



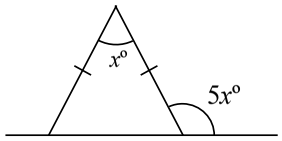

**B1** Find the value of $x$



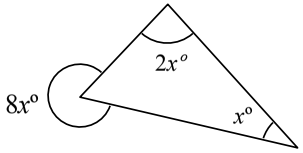

**B2** Find the value of $x$



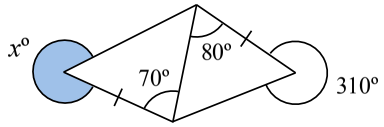

**B3** Find the value of $x$



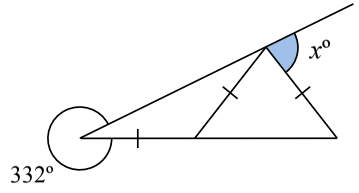

**B4** Find the value of $x$



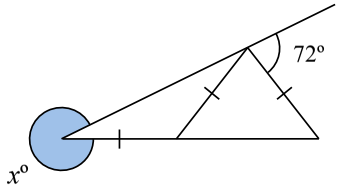

**C1** Find the value of $x$



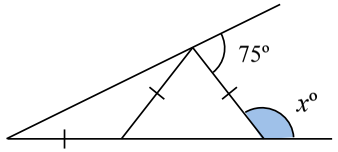

**C2** Find the value of $x$




**C3** Find the value of $x$




**C4** Find the value of $x$



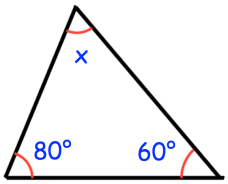
# Fluency Practice

| | | | |
|---|---|---|---|
| **A1** Work out the value of $x$.   | **A2** Work out the value of $x$.   | **A3** Work out the value of $x$.   | **A4** Work out the value of $x$.   |
| **B1** Work out the value of $x$.   | **B2** Work out the value of $x$.   | **B3** Work out the value of $x$.   | **B4** Work out the value of $x$.   |
| **C1** Work out the value of $x$.   | **C2** Work out the value of $x$.   | **C3** Work out the value of $x$.   | **C4** Work out the value of $x$.   |
| **D1** Work out the value of $x$.   | **D2** Work out the value of $x$.   | **D3** Work out the value of $x$.   | **D4** Work out the value of $x$.   |

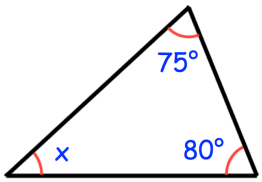
# Fluency Practice

Question 1: Find the size of each missing angle.

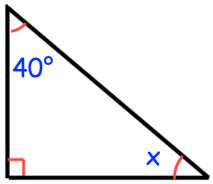
(a)



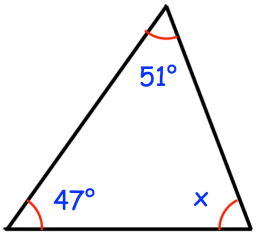

(b)



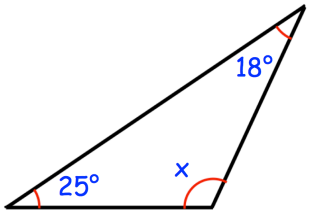

(c)



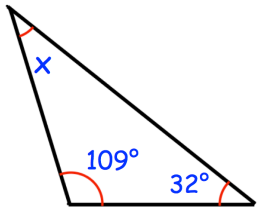

(d)



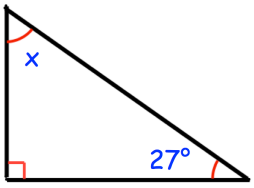

(e)



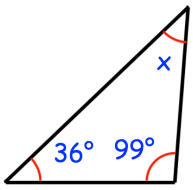

(f)



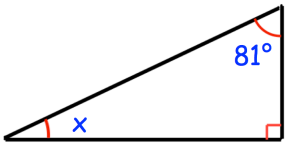

(g)




(h)

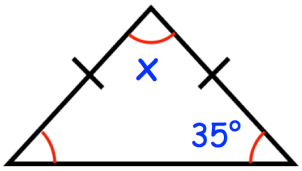



(i)

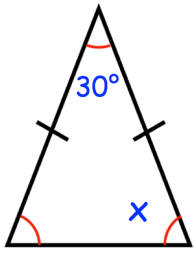



Question 2: Find the size of each missing angle.

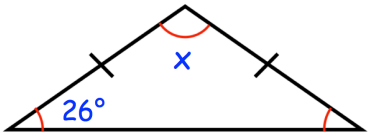
(a)



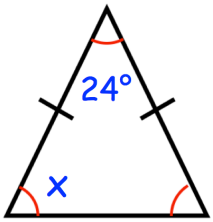

(b)



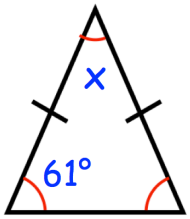

(c)



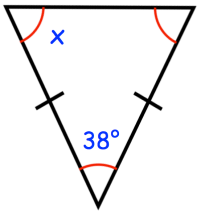

(d)




(e)

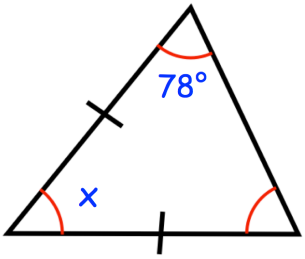



(f)

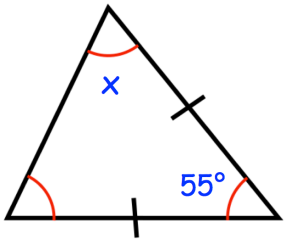


# Fluency Practice

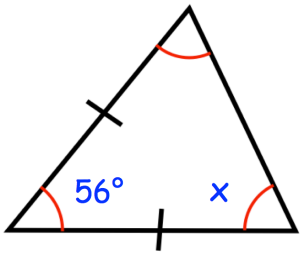
(g)



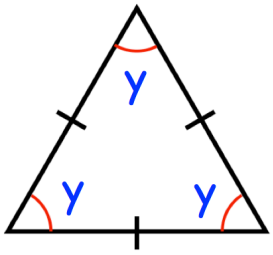

(h)




(i)

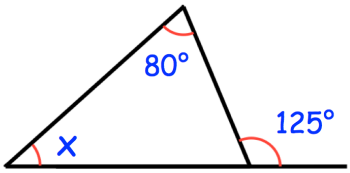



Question 3: Shown is an equilateral triangle.
Find the size y.

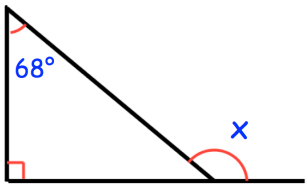



Question 4: Find the size of each missing angle.

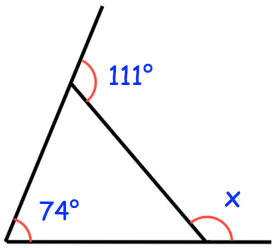
(a)



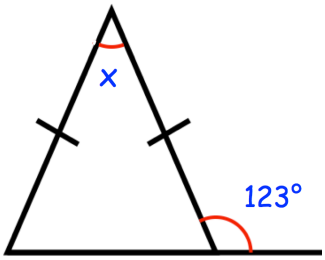

(b)



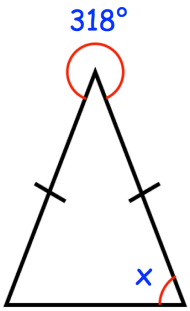

(c)



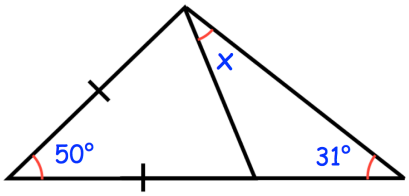

(d)



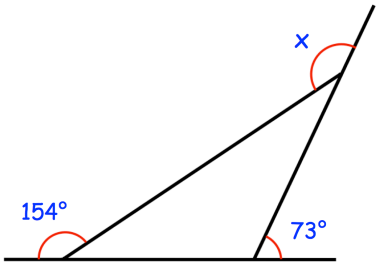

(e)



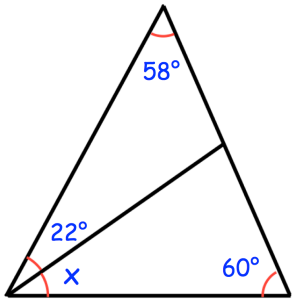

(f)



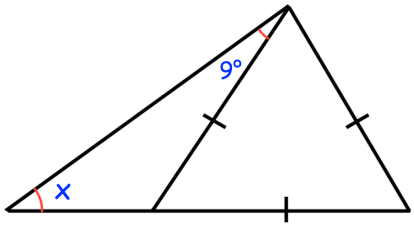

(g)




(h)




(i)



# Fluency Practice

Question 1: Jacob has measured the three angles in a triangle.
Two of his measurements are 45°and 70°
What is the third measurement?

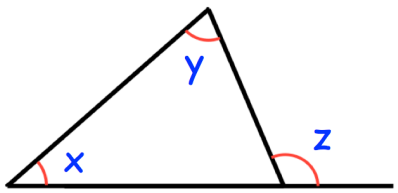
Question 2: James says that a triangle is right angled.
Olivia says that the same triangle is isosceles.
They are both correct.
Explain how.

Question 3: The ratio of three angles in a triangle are 1:2:3.
Work out the size of each angle.

Question 4: An isosceles triangle has one angle of 52°.
Write down the possible sizes of the other two angles in the triangle.

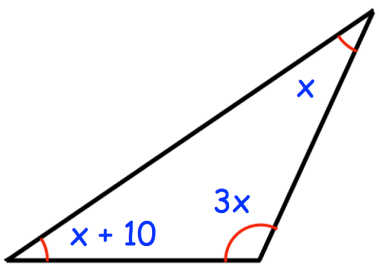
Pair 1 ..... and .....
Pair 2 ..... and .....

Question 5: Show the sum of angles x and y is always equal to angle z




Question 6: The ratio of angles in a triangle is 2:3:5
Find the size of the smallest angle.

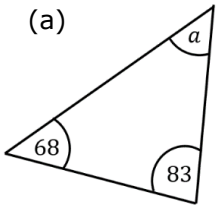
Question 7: Find the size of each angle



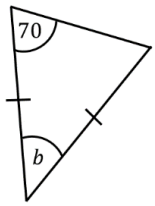
# Fluency Practice

Find the missing angles.

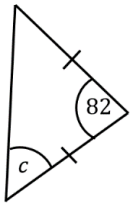
(a)



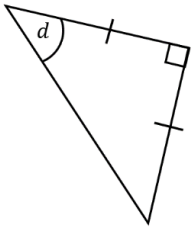

(b)




(c)

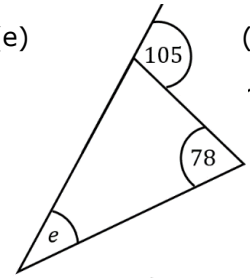



(d)

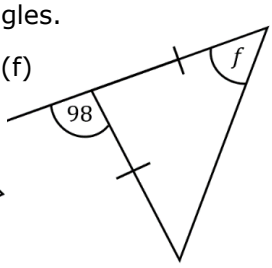



Find the missing angles.

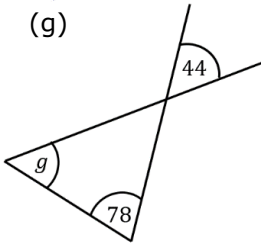
(e)



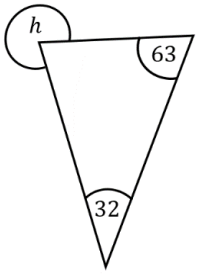

(f)




(g)

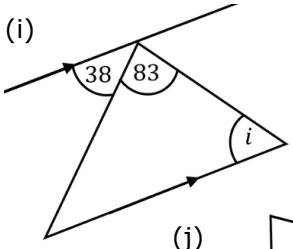



(h)

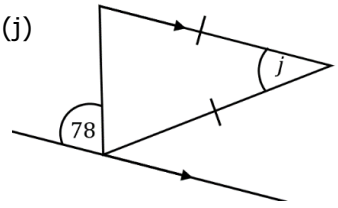



Find the missing angles.

(i)




(j)



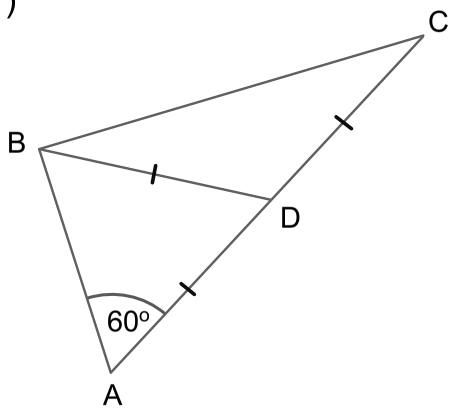
# Fluency Practice

find the missing angles in these isosceles triangles

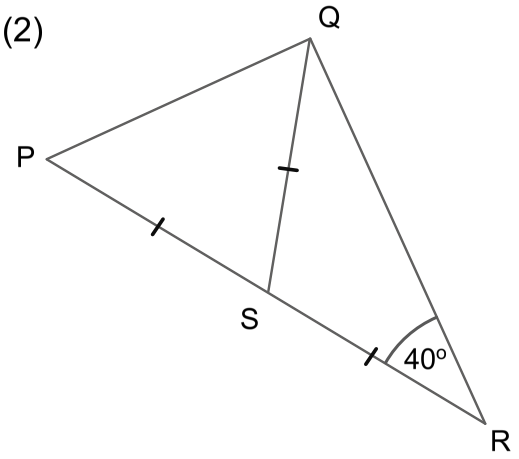
two isosceles triangles (i)

find the missing angles

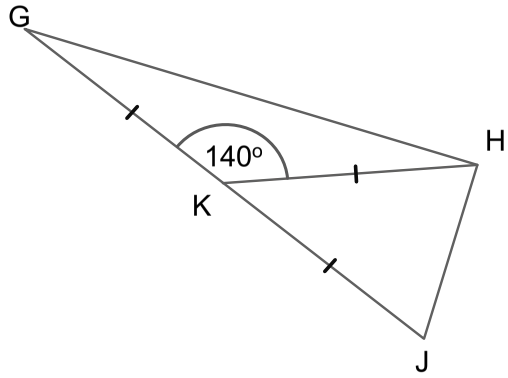
(1)



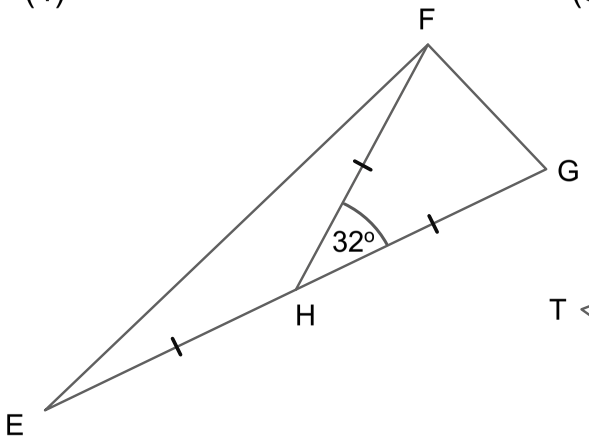

(2)



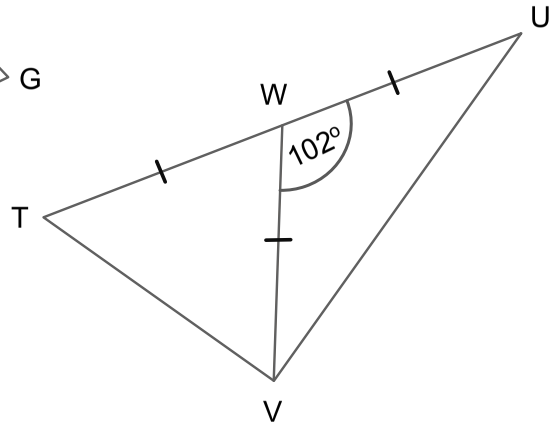

(3)



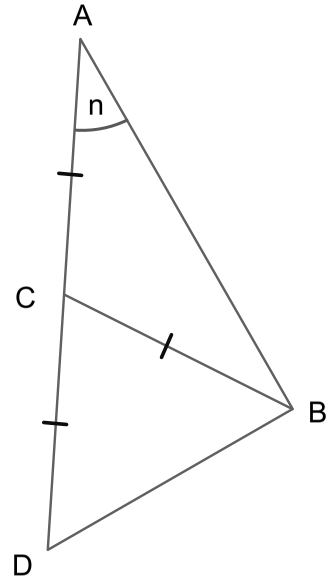

(4)




(5)



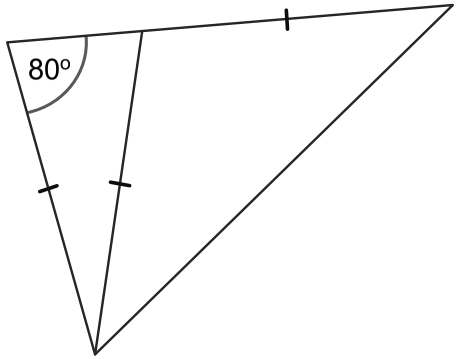

(6)



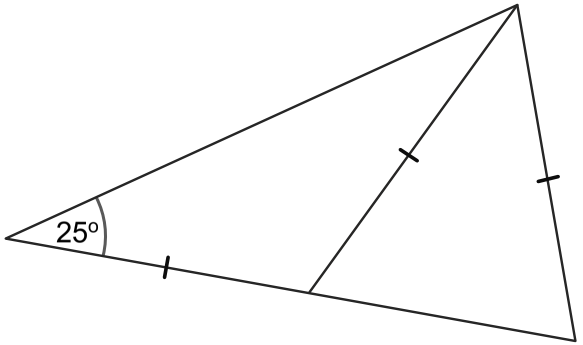
two isosceles triangles (ii)

find the missing angles

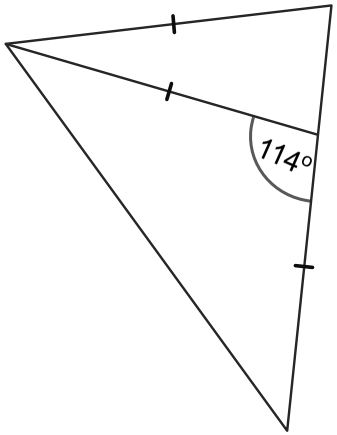
(1)



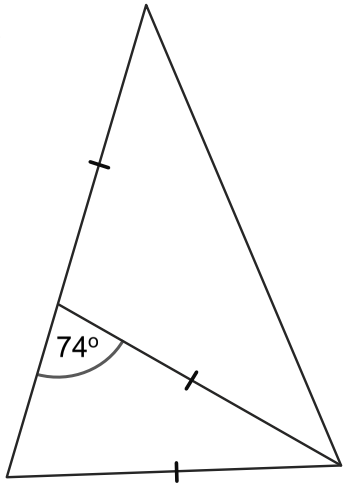

(2)



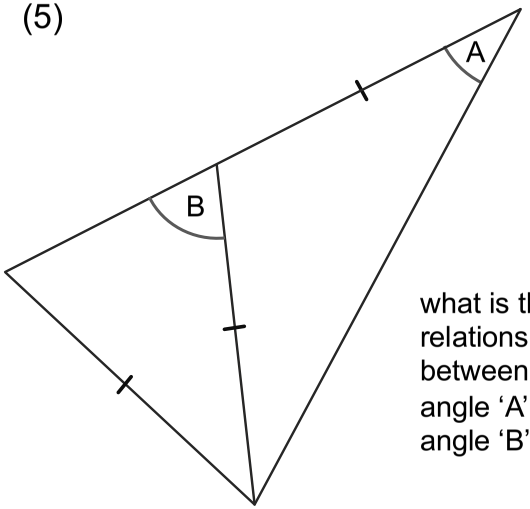

(3)




(4)



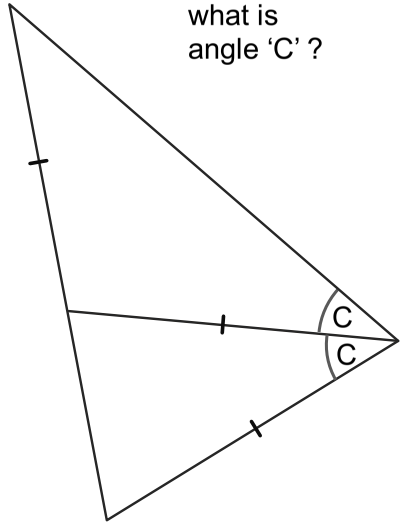

(5)




what is the relationship between angle ‘A’ and angle ‘B’ ?

(6)

what is angle ‘C’ ?

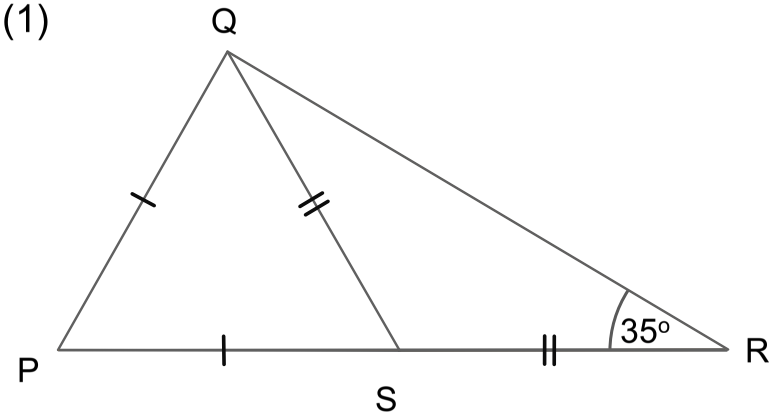



Fluency Practice

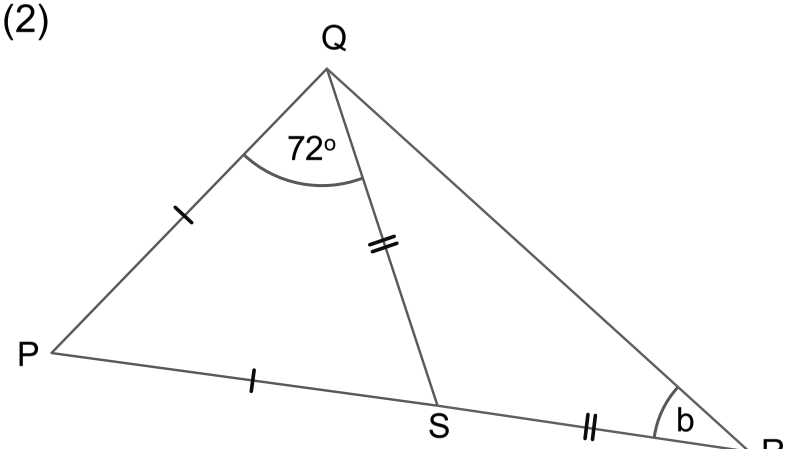
isosceles triangle questions (iii)

find the missing angles in these triangles

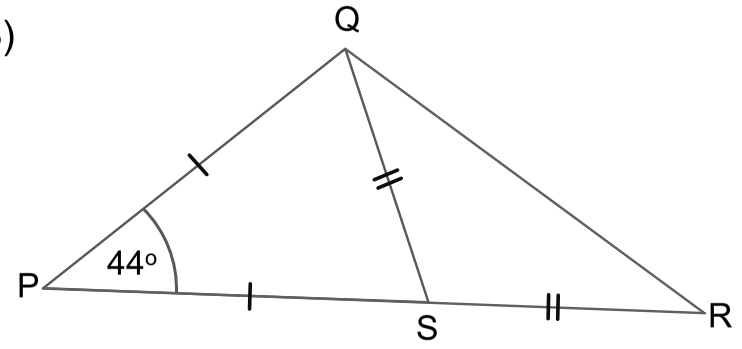
(1)



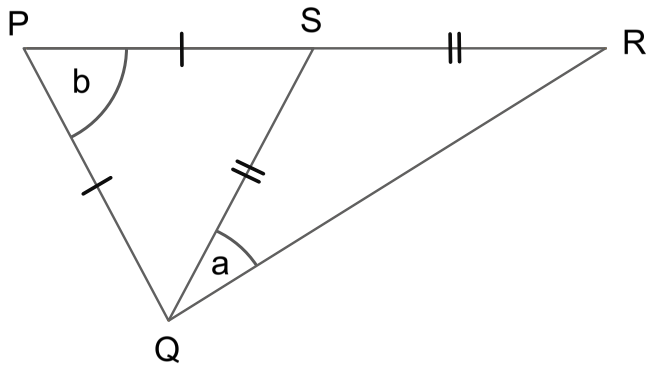

(2)




(3)



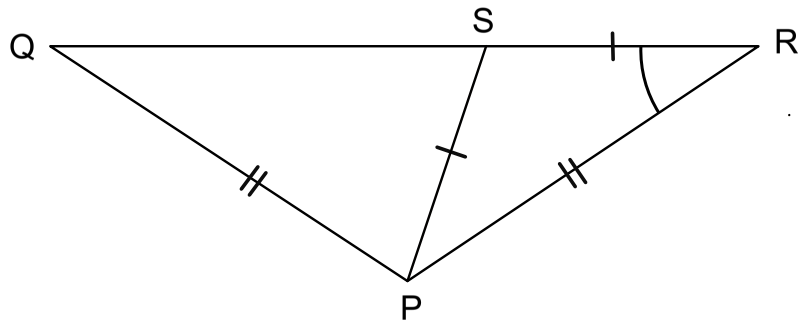

(4)



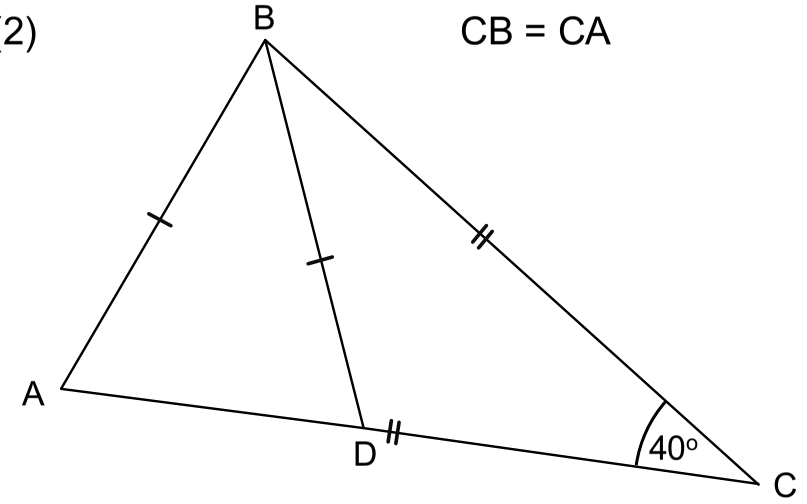
an isosceles triangle with another inside it

find the missing angles in these triangles

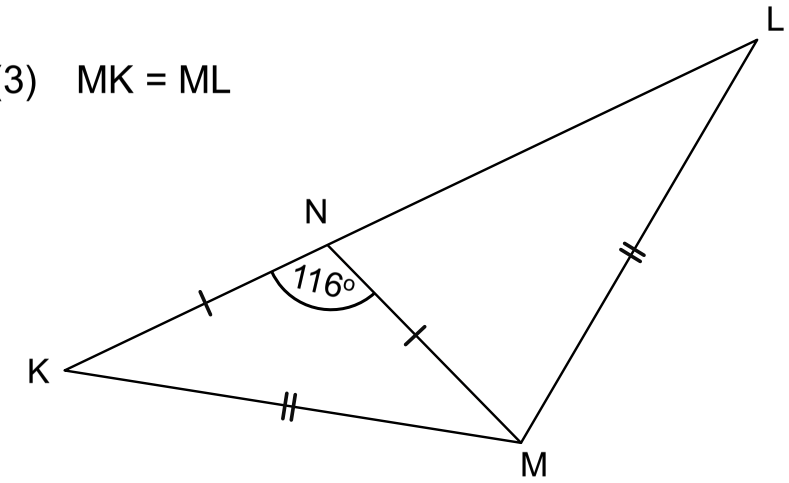
(1) PQ = PR



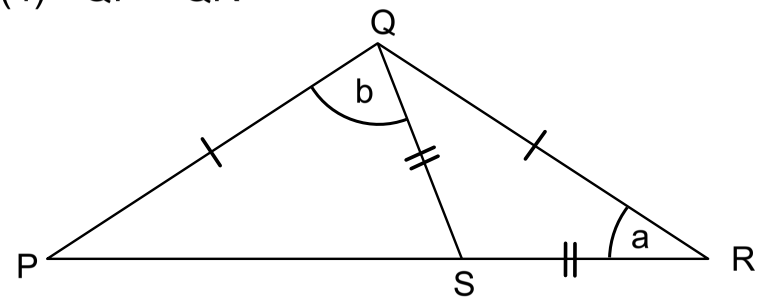

(2) CB = CA




(3) MK = ML



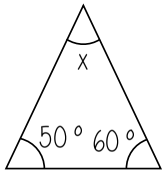

(4) QP = QR

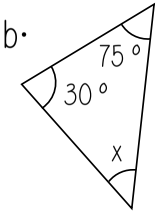


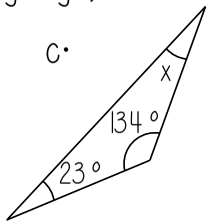

prove that
$b = 180^o - 3a$

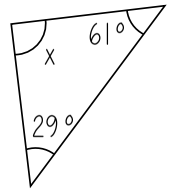
The diagrams are not drawn accurately

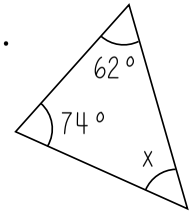
1. Find the value of the missing angle, and state what type of triangle is shown.

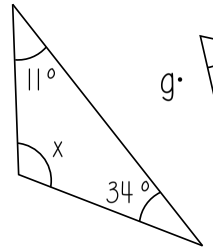
a. 

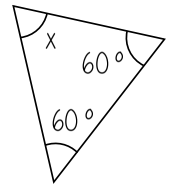

b. 

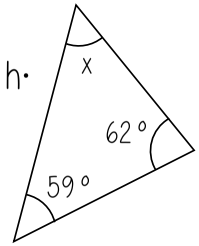

c. 


d. 

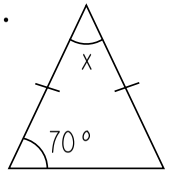

e. 

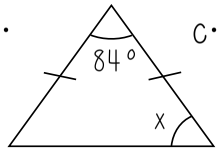

f. 

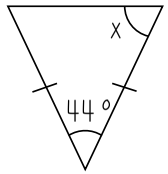

g. 

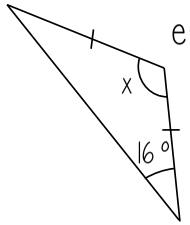

h. 

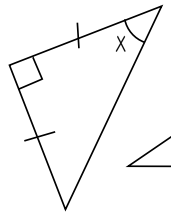

2. Find the value of the missing angle in each isosceles triangle.

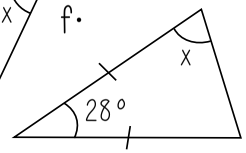
a. 


b. 


c. 


d. 

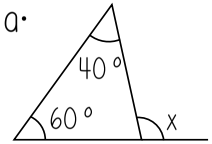

e. 

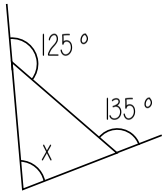

f. 

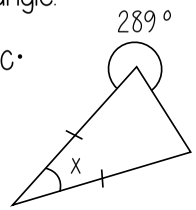

3.

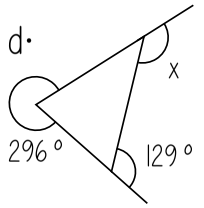
One of the angles in an isosceles triangle is 80°
Find the possible values of the other two angles.

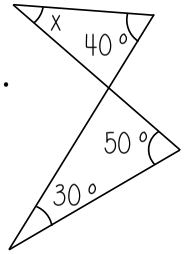
4. Find the value of the missing angle.

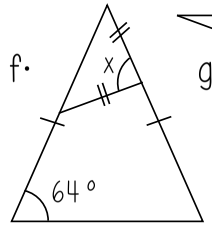
a. 

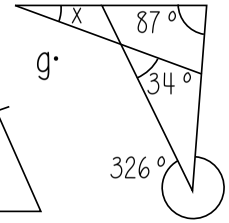

b. 

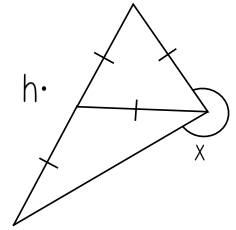

c. 


d. 

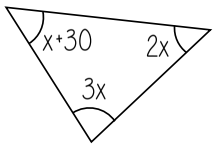

e. 

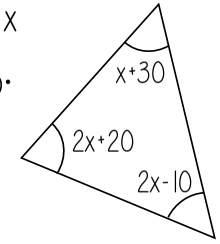

f. 

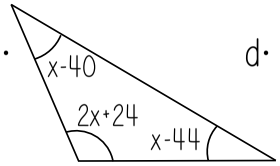

g. 

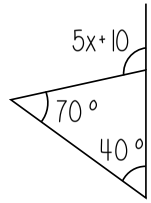

h. 

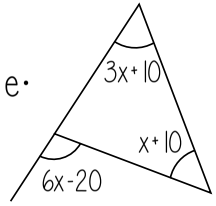

5. Find the value of x

a. 


b. 


c. 

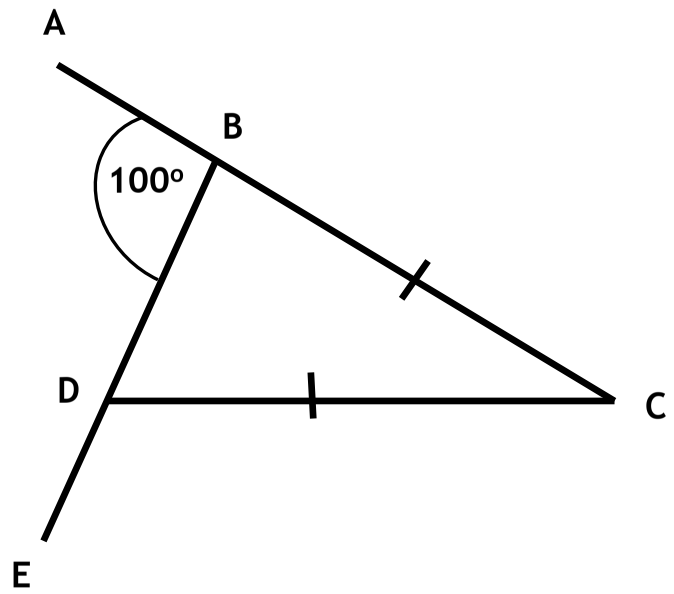

d. 


e. 


6.

The three angles in a triangle are:
x+25 2x+30 and 3x-55

Show that this is a right-angled triangle.



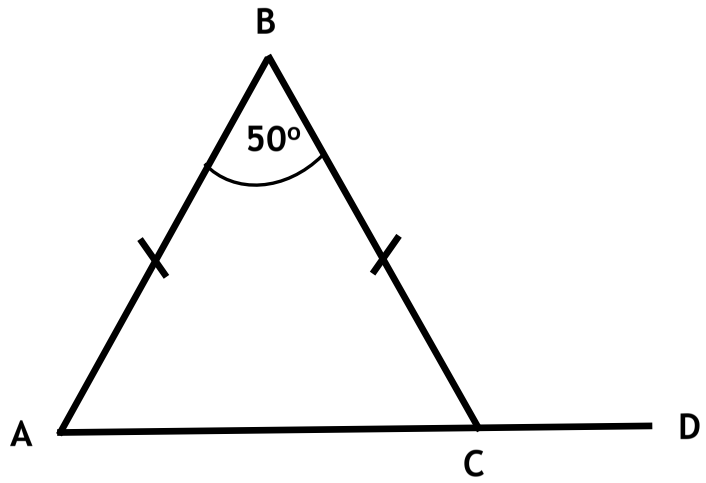

Write down the value of each angle

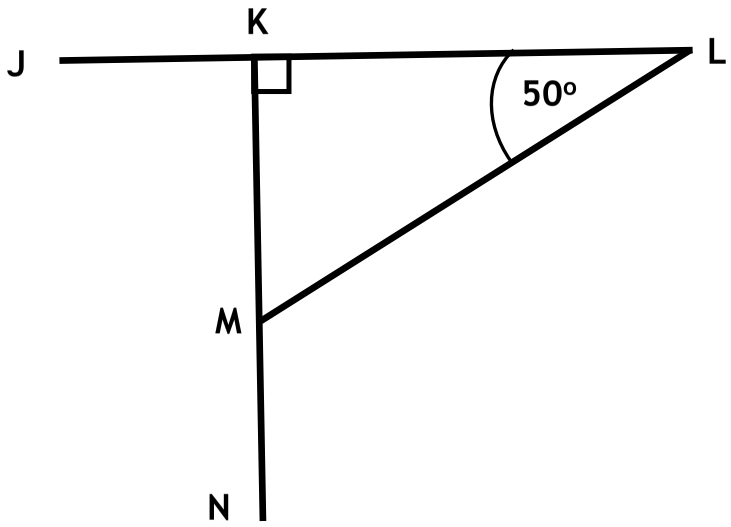
∠EDC =

∠BCD =

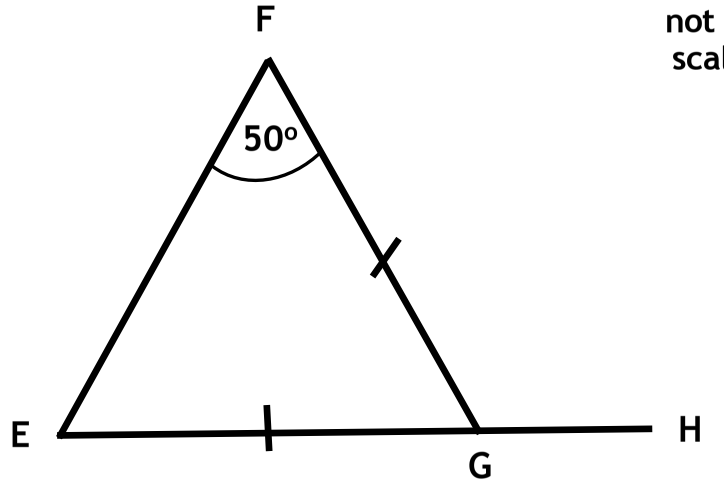
∠DBC =

∠EBC =



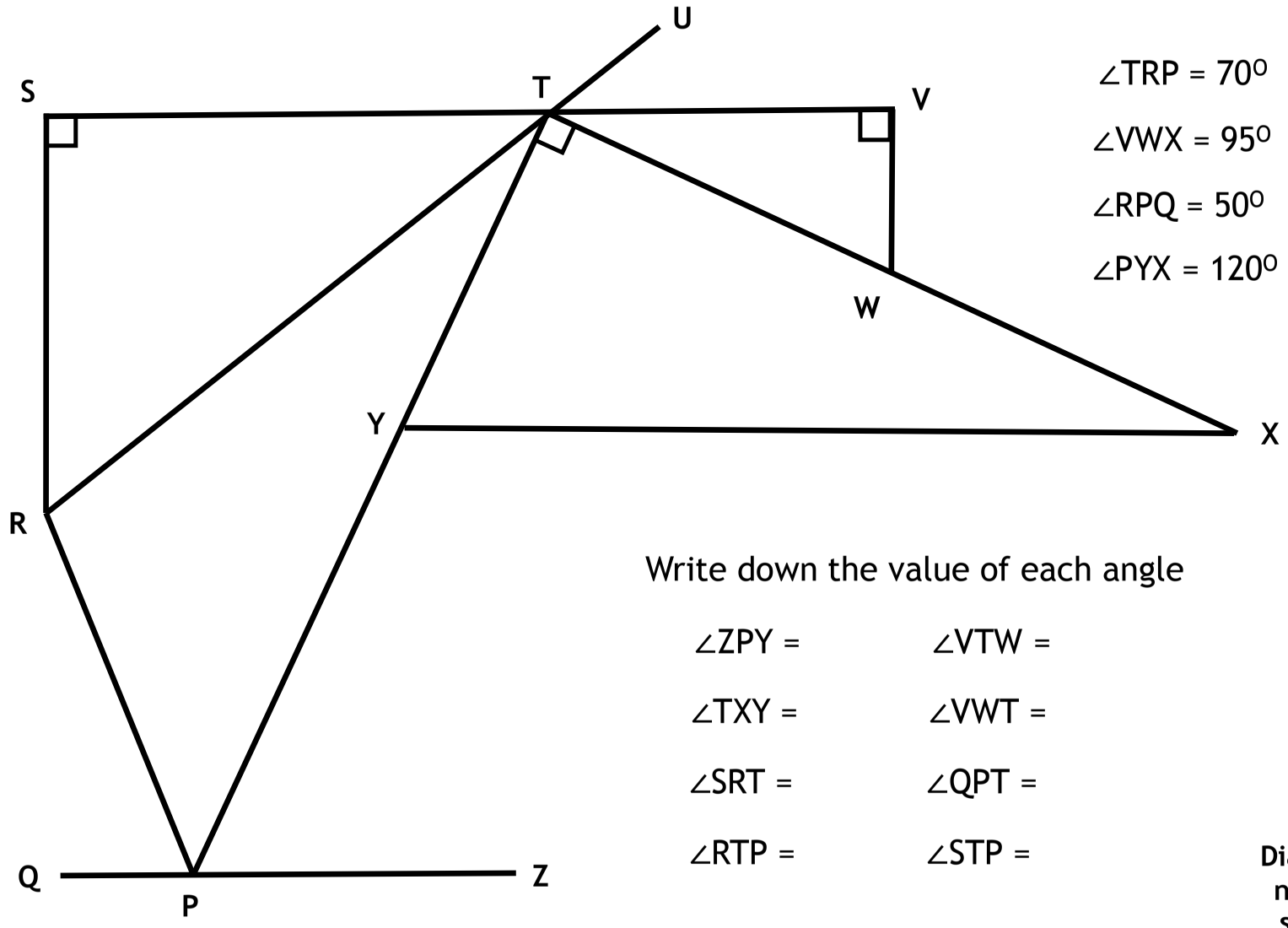




Diagrams not to scale




Write down the value of each angle

| | | |
|---|---|---|
| ∠BCD = | ∠ABC = | ∠JKL = |
| ∠NML = | ∠ACB = | ∠JKM = |
| ∠EFG = | ∠FEG = | ∠KML = |
| ∠FGH = | ∠BAC = | ∠FGE = |




$\angle TRP = 70^{O}$

$\angle VWX = 95^{O}$

$\angle RPQ = 50^{O}$

$\angle PYX = 120^{O}$

Write down the value of each angle

$\angle ZPY =$ $\angle VTW =$

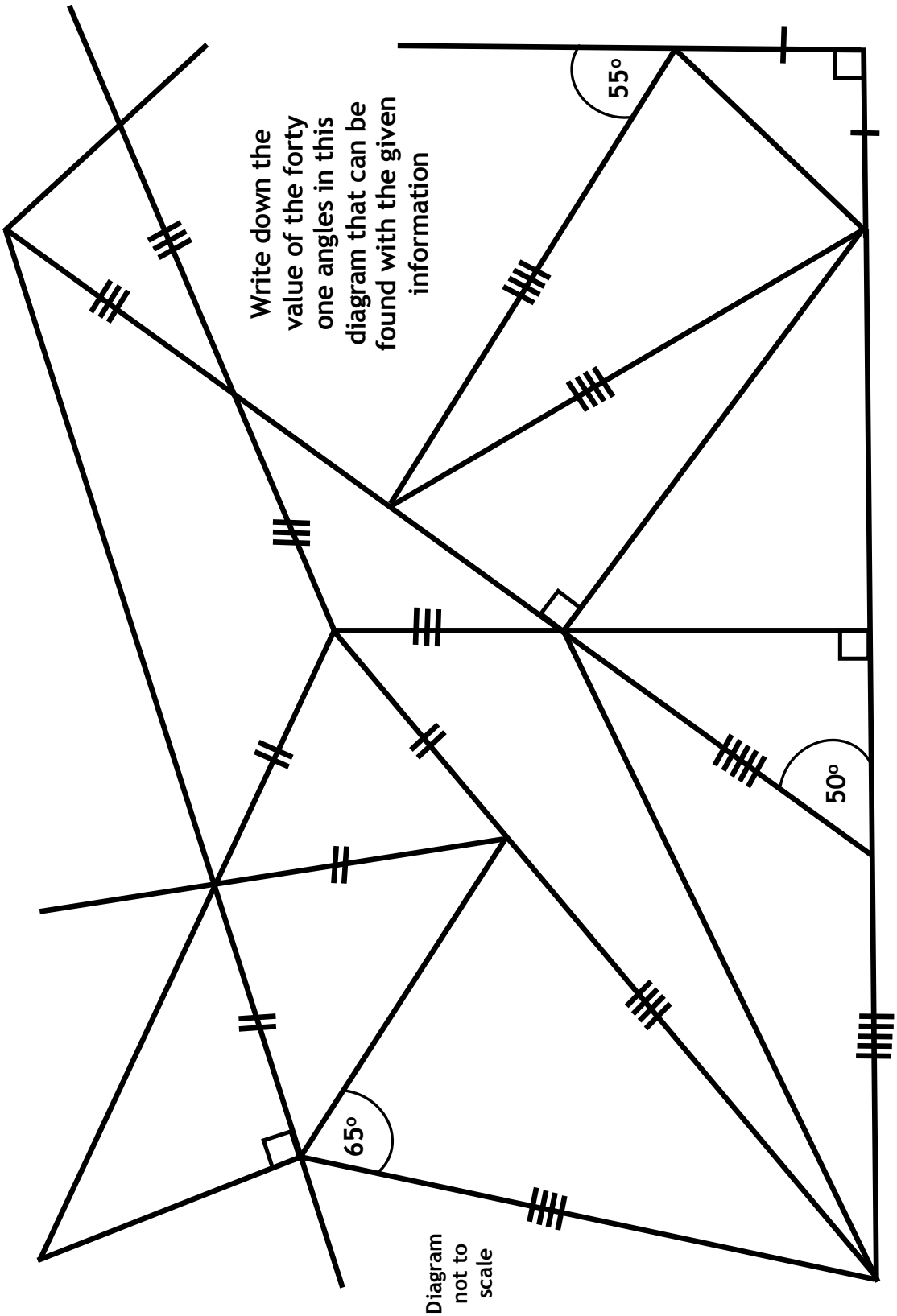
$\angle TXY =$ $\angle VWT =$

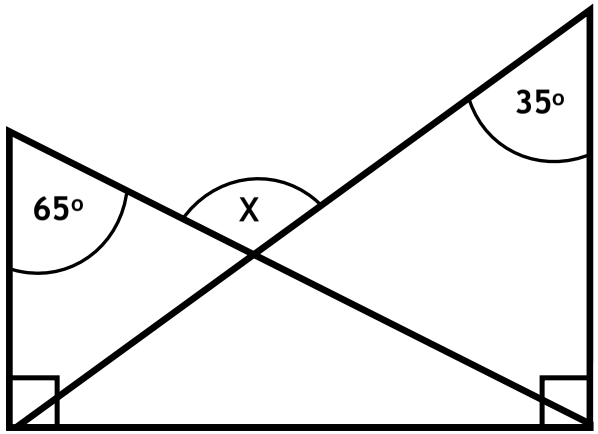
$\angle SRT =$ $\angle QPT =$

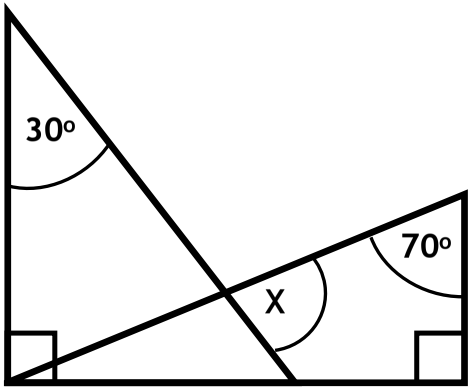
$\angle RTP =$ $\angle STP =$

**Diagram not to scale**

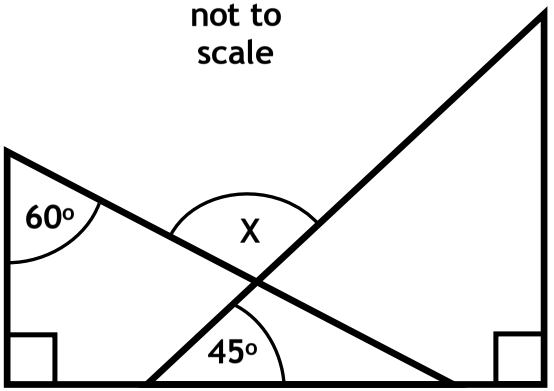
# Fluency Practice



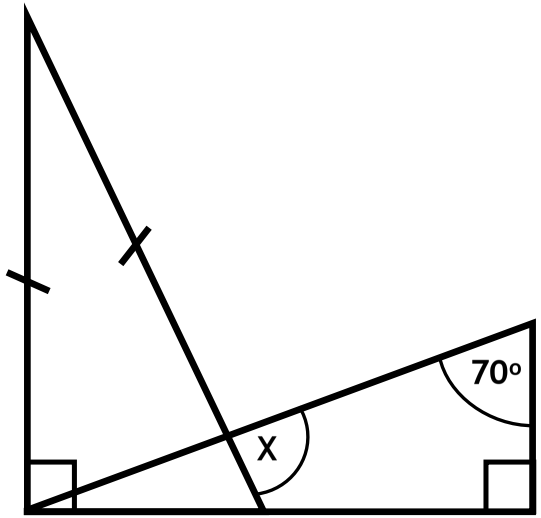


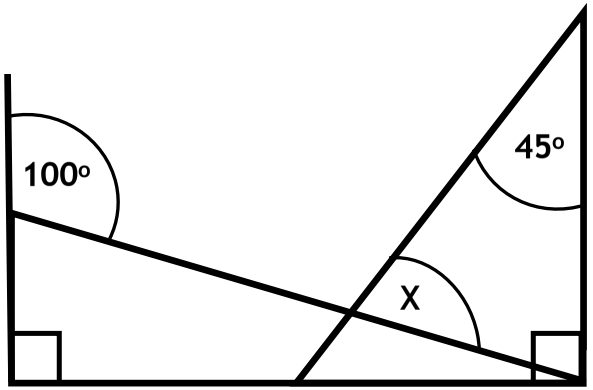



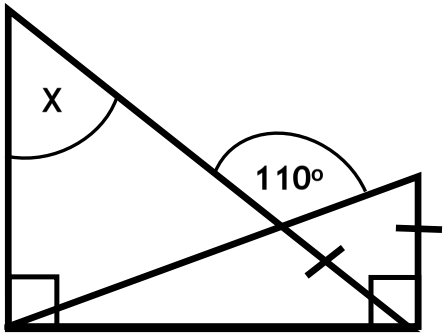

Diagrams not to scale




Find the angle marked x in each diagram.

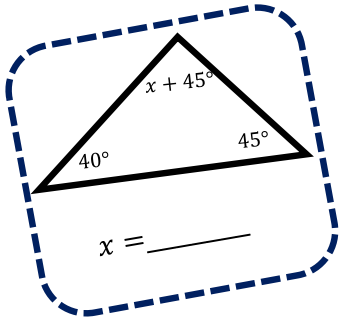


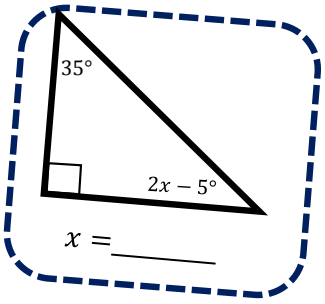



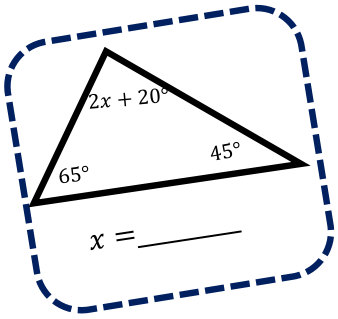



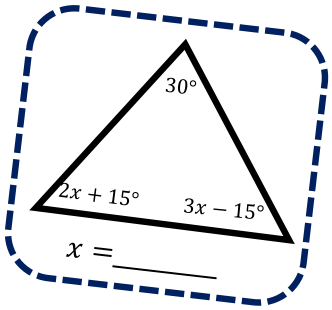
# Angles in Triangles

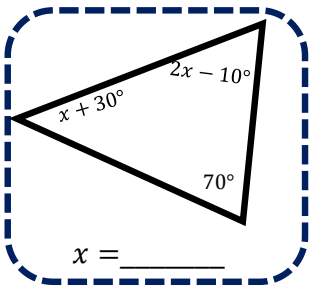
**Work out the value of $x$ in each of these triangles. Match each question with the answers below.**

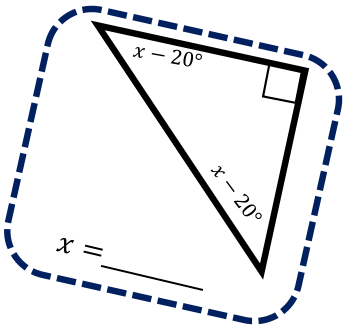


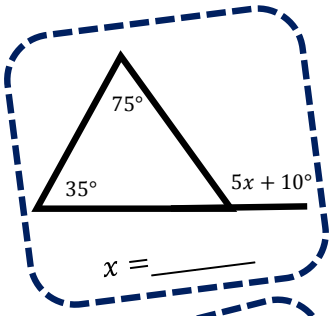



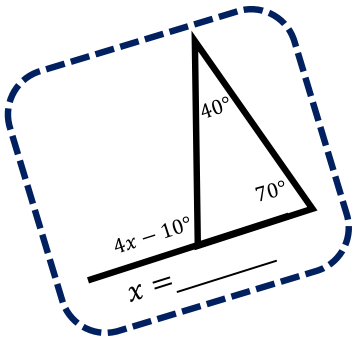



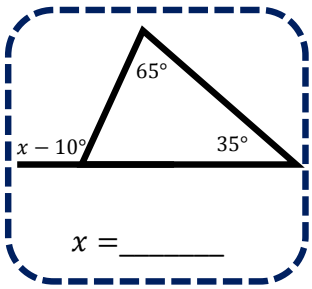



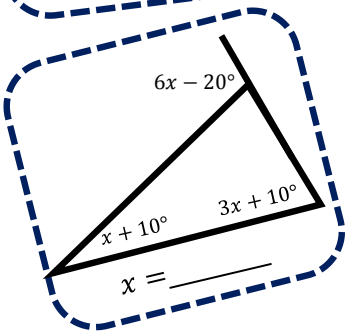



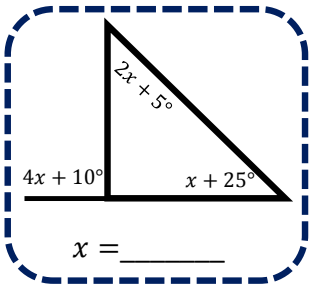



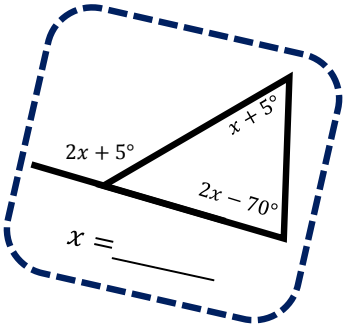



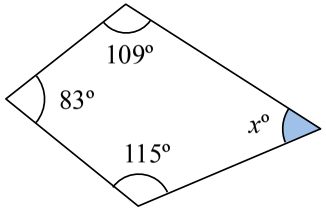



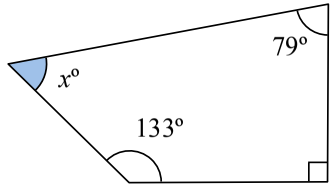

20 20 20 25 30 30 30 30 50 65 70 110

# Always, Sometimes or Never

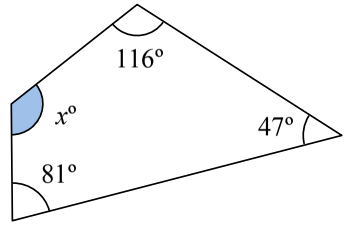
**A1** Work out the value of $x$



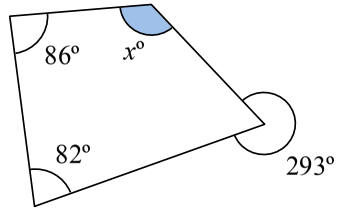

**A2** Work out the value of $x$



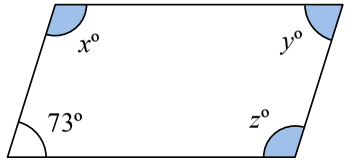

**A3** Work out the value of $x$




**A4** Work out the value of $x$

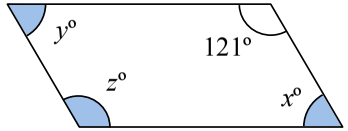



**B1** This is a parallelogram.



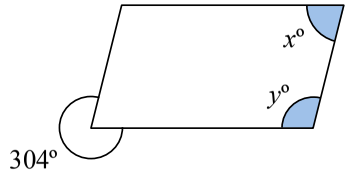

Work out the values of $x$, $y$ and $z$

**B2** This is a parallelogram.



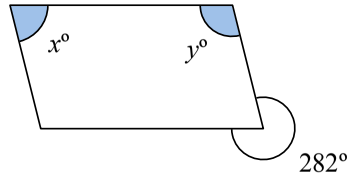

Work out the values of $x$, $y$ and $z$

**B3** This is a parallelogram.



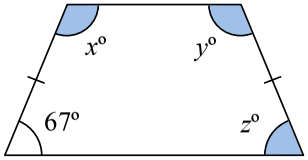

Work out the values of $x$ and $y$

**B4** This is a parallelogram.



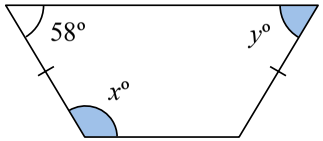

Work out the values of $x$ and $y$

**C1** This is an isosceles trapezium.



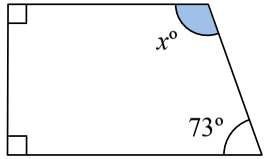

Work out the values of $x$, $y$ and $z$

**C2** This is an isosceles trapezium.



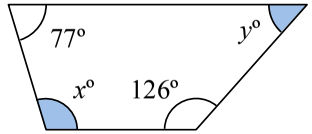

Work out the values of $x$ and $y$

**C3** This is a trapezium.



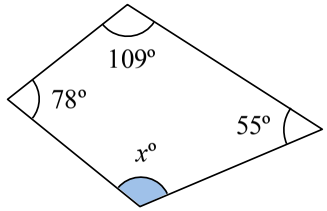

Work out the value of $x$

**C4** This is a trapezium.



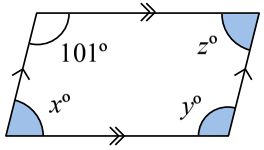

Work out the values of $x$ and $y$

**A1** This quadrilateral is irregular



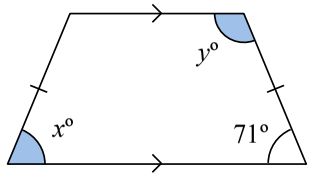

Work out the value of $x$

**A2** This is a parallelogram.



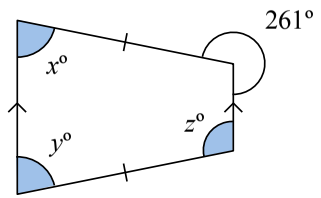

Work out the values of $x$, $y$ and $z$

**A3** This is an isosceles trapezium.



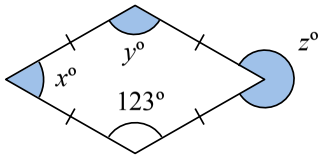

Work out the values of $x$ and $y$

**A4** This is an isosceles trapezium.



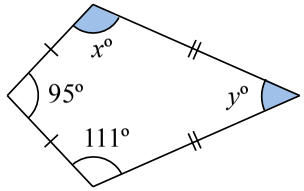

Work out the values of $x$, $y$ and $z$

**B1** This is a rhombus.



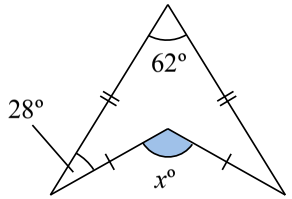

Work out the values of $x$, $y$ and $z$

**B2** This is a kite.



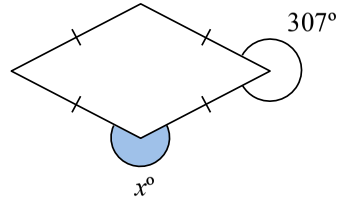

Work out the values of $x$ and $y$

**B3** This is an arrowhead (delta).



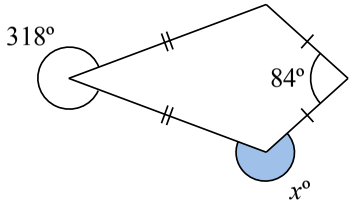

Work out the value of $x$

**B4** This is a rhombus.



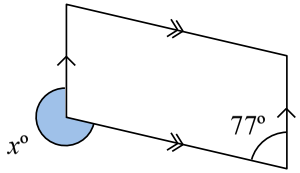

Work out the value of $x$

**C1** This is a kite.



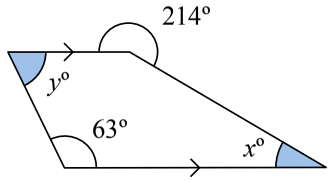

Work out the value of $x$

**C2** This is a parallelogram.



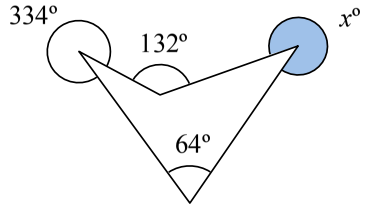

Work out the value of $x$

**C3** This is a trapezium.




Work out the values of $x$ and $y$

**C4** This quadrilateral is irregular.

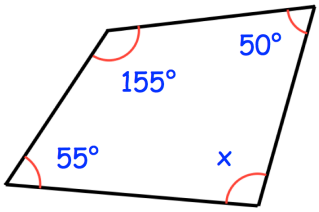



Work out the value of $x$

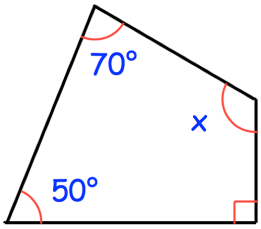
# Fluency Practice

Question 1: Find the size of each missing angle.

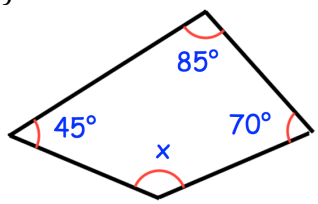
(a)



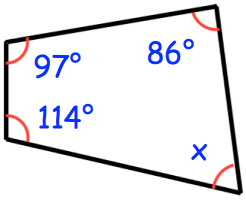

(b)



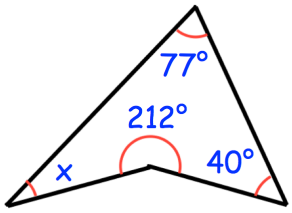

(c)



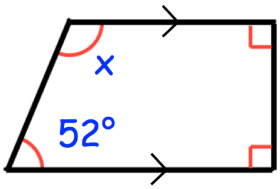

(d)



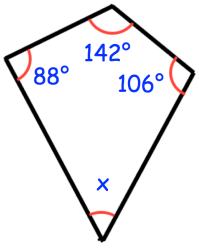

(e)



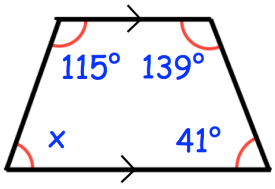

(f)



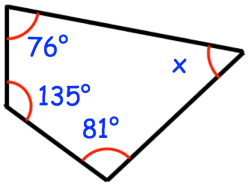

(g)




(h)

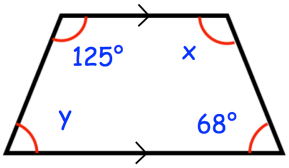



(i)

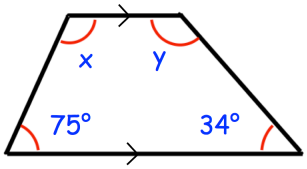



Question 2: Shown below are three trapezia.
Find the size of each missing angle.

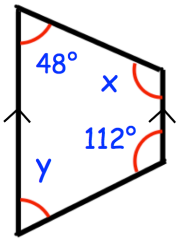
(a)




(b)

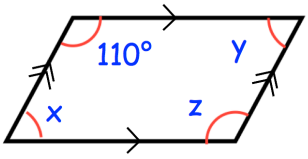



(c)

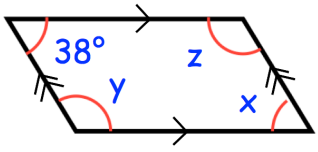



Question 3: Shown below are three parallelograms.
Find the size of each missing angle.

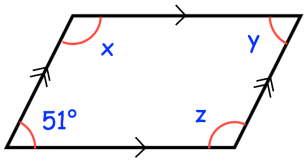
(a)




(b)



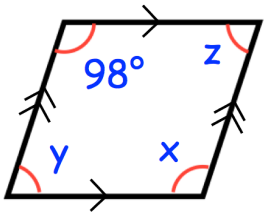

(c)



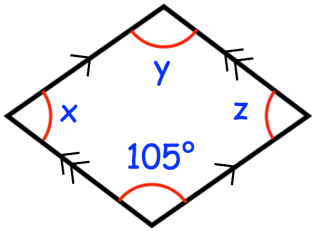
# Fluency Practice

Question 4: Shown below are three rhombuses.
Find the size of each missing angle.

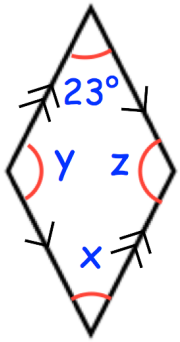
(a)




(b)

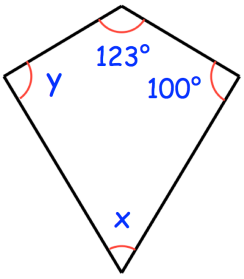



(c)

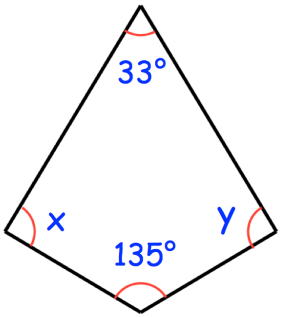



Question 5: Shown below are three kites.
Find the size of each missing angle.

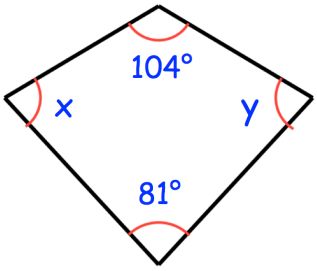
(a)




(b)

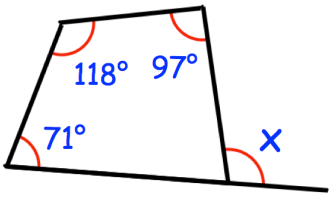



(c)

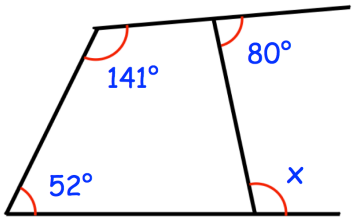



Question 6: Find the size of each missing angle.

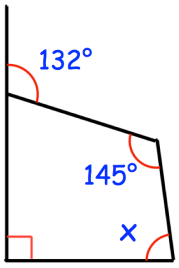
(a)



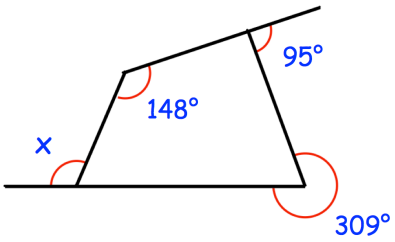

(b)



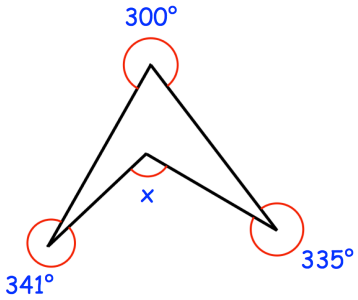

(c)




(d)



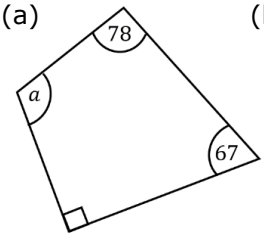

(e)



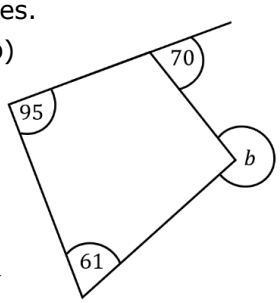
# Fluency Practice

Find the missing angles.

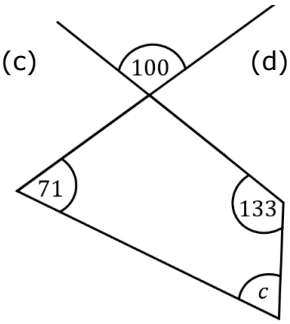
(a)



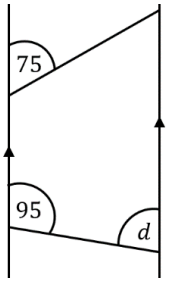

(b)




(c)

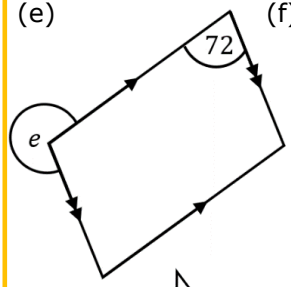



(d)

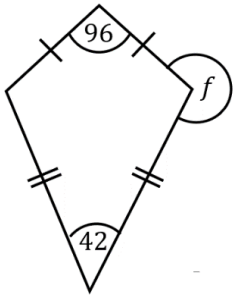



Find the missing angles in these special quadrilaterals.

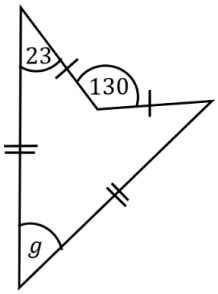
(e)




(f)

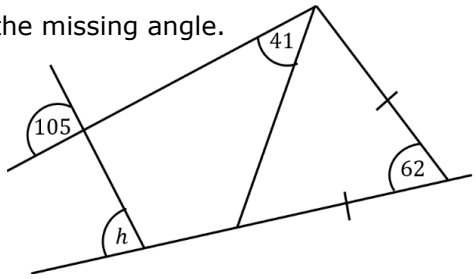



(g)



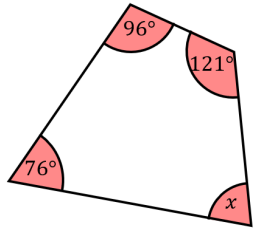

Find the missing angle.

(h)

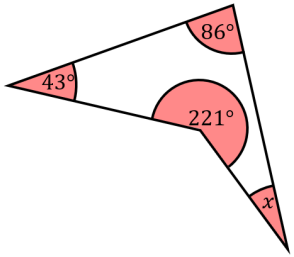


Find the value of $x$ in each of these diagrams, stating any angle rules you use.

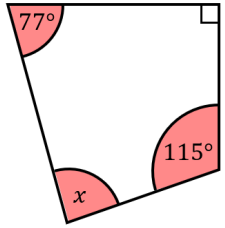
**(a)**



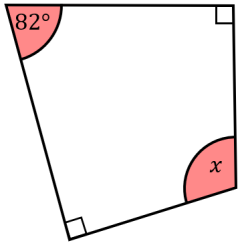

**(b)**



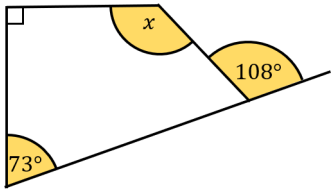

**(c)**



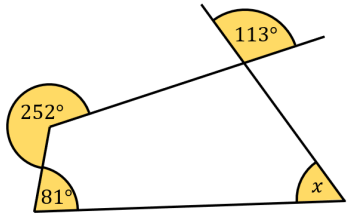

**(d)**



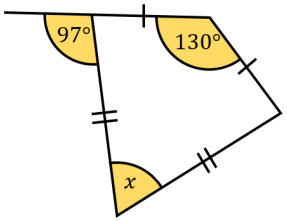

**(e)**



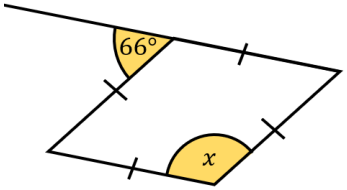

**(f)**



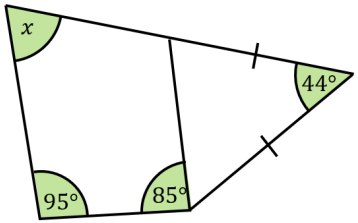

**(g)**



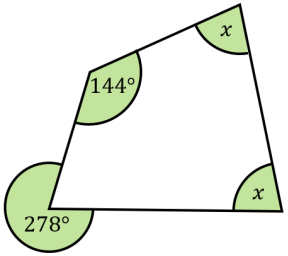

**(h)**



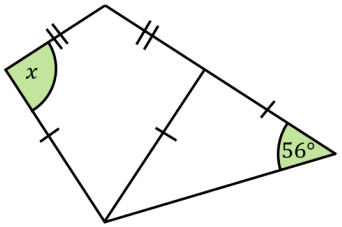

**(i)**



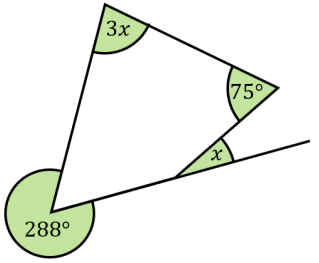

**(j)**




**(k)**

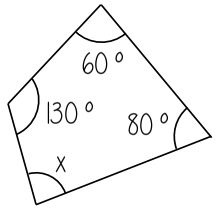


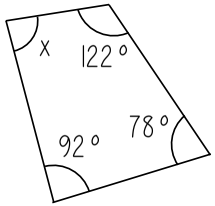

**(l)**

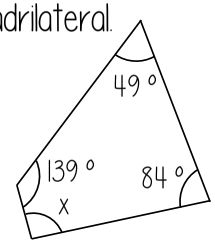


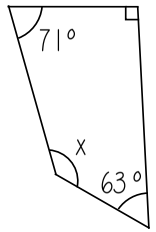
The diagrams are not drawn accurately

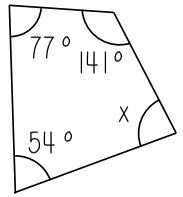
1. Find the value of the missing angle in each quadrilateral.

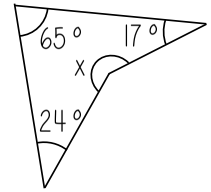
a. 


b. 

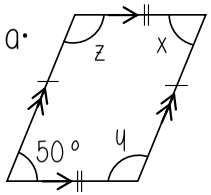

c. 

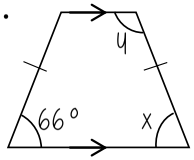

d. 

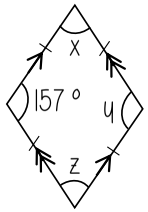

e. 

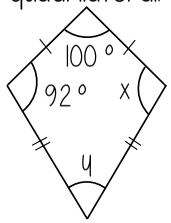

f. 

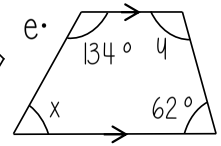

2. Find the value of the missing angle in each special quadrilateral.

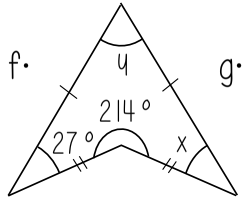
a. 

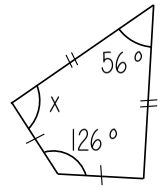

b. 

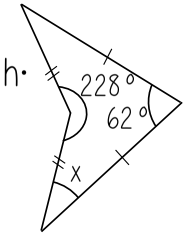

c. 


d. 

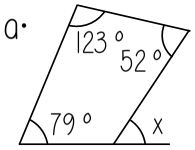

e. 

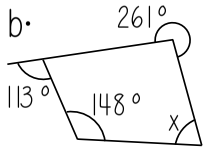

f. 

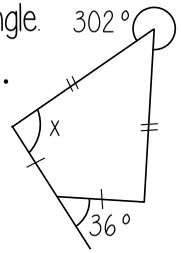

g. 

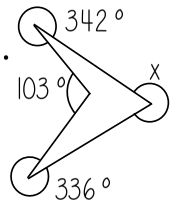

h. 

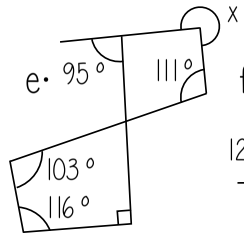

3. Find the value of the missing angle.

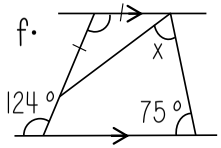
a. 

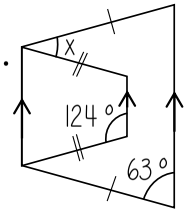

b. 

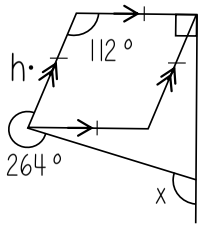

c. 


d. 

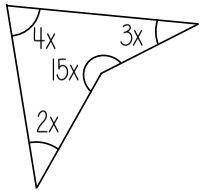

e. 

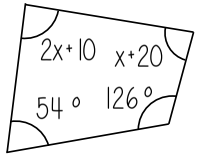

f. 

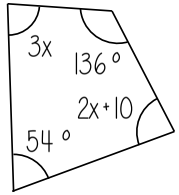

g. 

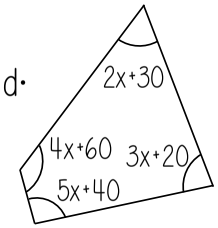

h. 


4. Find the value of x

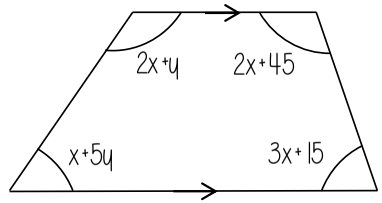
a. 


b. 


c. 

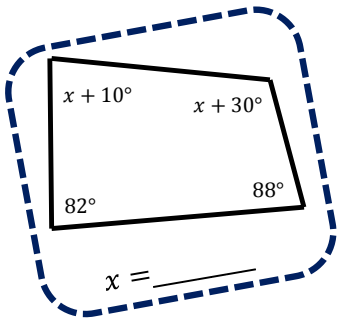

d. 

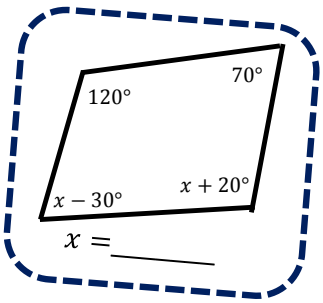

5. Find the value of x and y

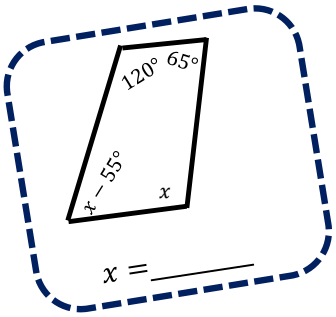


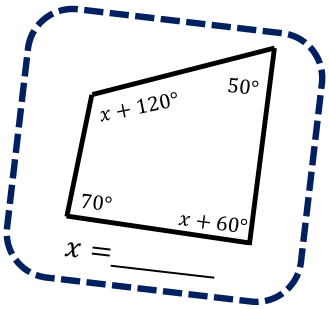
# Angles in Quadrilaterals

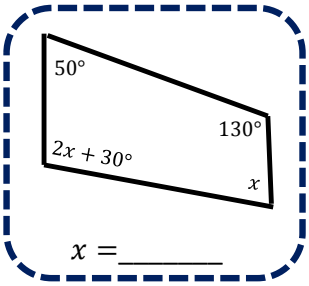
**Work out the value of $x$ in each of these quadrilaterals. Match each question with the answers below.**

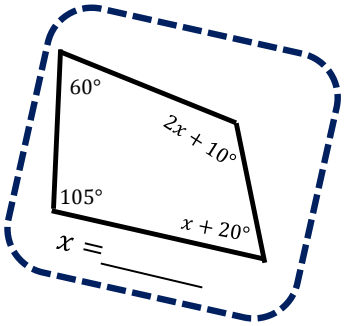


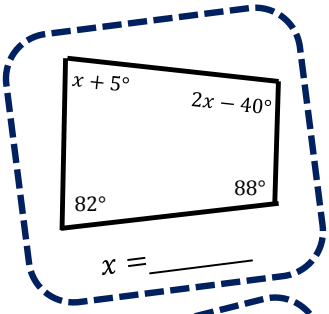



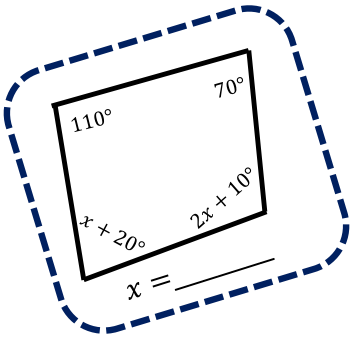



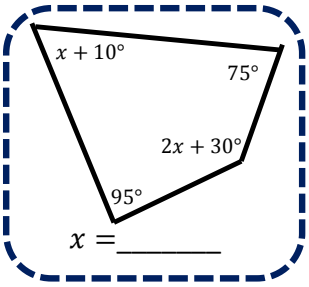



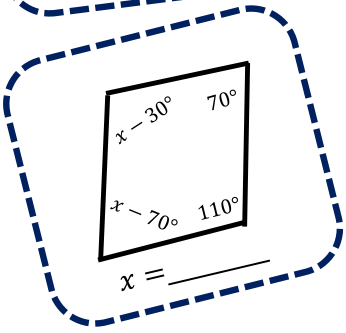



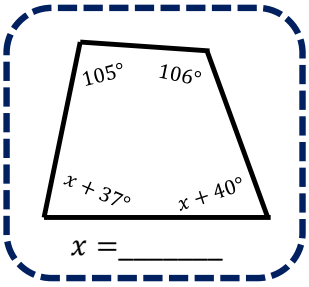



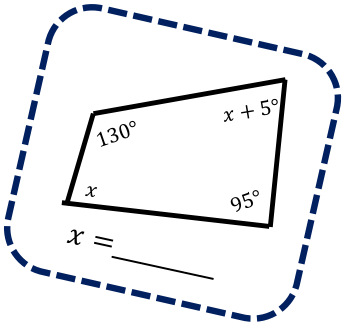



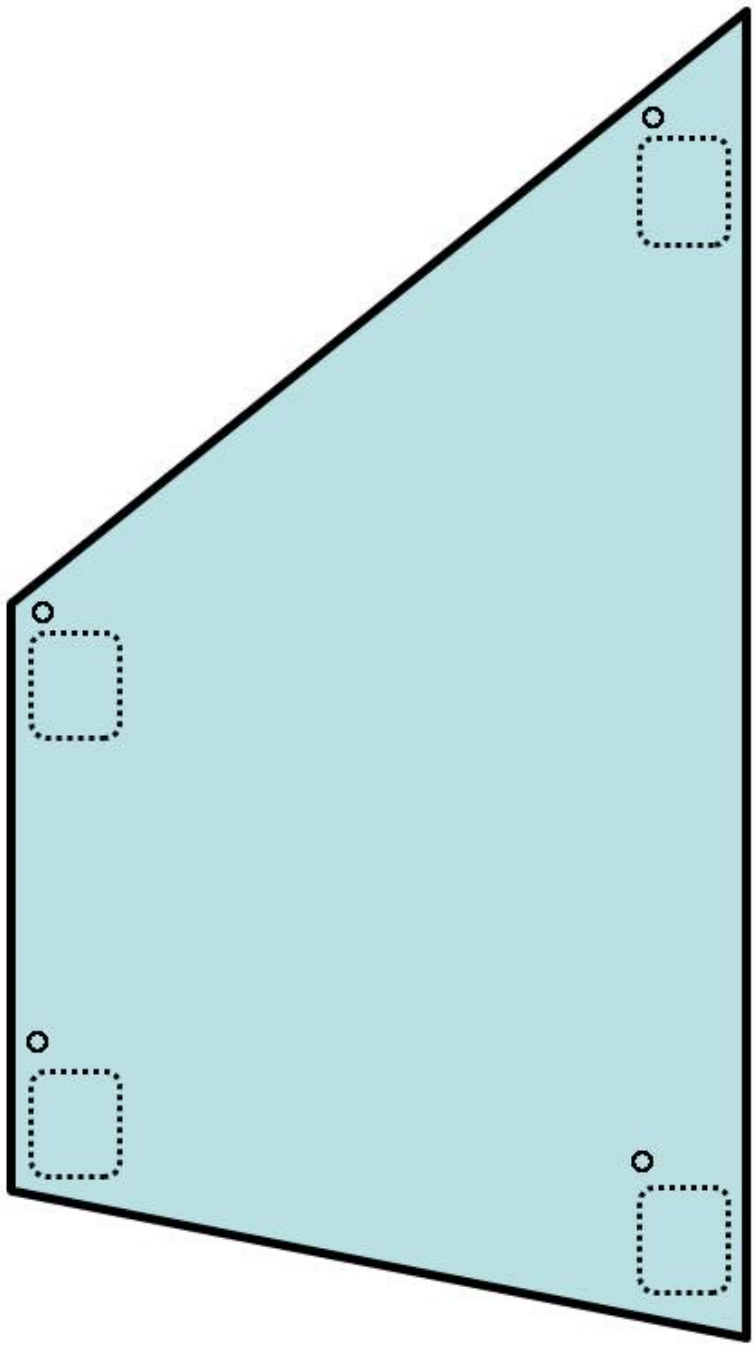




30, 36, 50, 50, 50, 55, 65, 75, 75, 90, 115, 140

Use the digits 1 to 9 to fill the blanks
so that the resulting shape is a trapezium



Draw a rectangle (make it at least 6cm tall and wide).

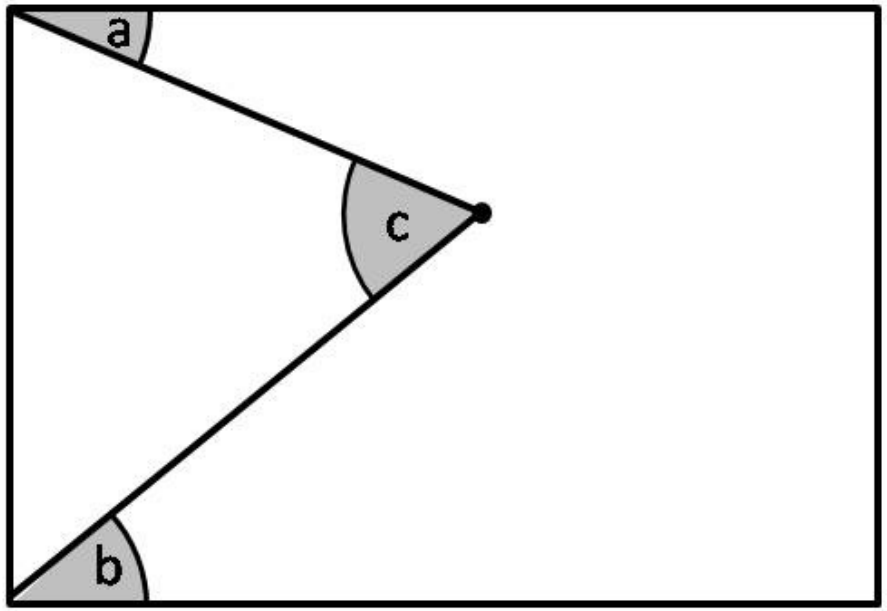
Mark a point within it.

Draw lines from the top & bottom left of the rectangle to the point.

Measure angles a, b and c and write these down.

Repeat for different points and rectangles.

What do you notice? Can you prove it?

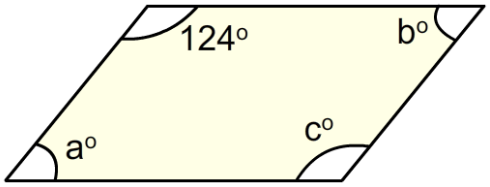



| a | b | c |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

Problem Solving

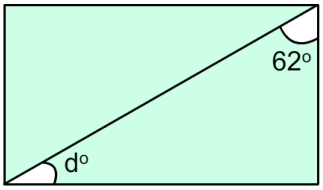
# Angle Problems

1. The diagram shows a parallelogram.
Calculate the missing angles:



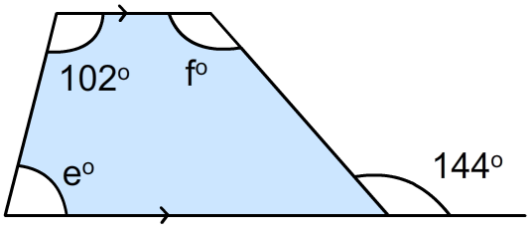

a° = ☐ b° = ☐ c° = ☐

2. The diagram shows a rectangle.
Calculate angle d°.



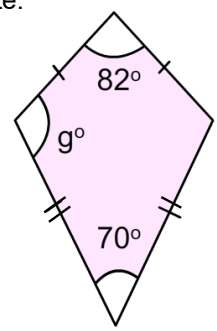

d° = ☐

3. The diagram shows a trapezium.
Calculate the missing angles.



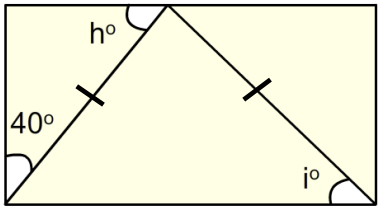

e° = ☐ f° = ☐

4. The diagram shows a kite.
Calculate angle g°.



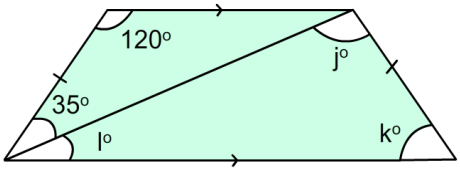

g° = ☐

5. The diagram shows a rectangle.
Calculate the missing angles.



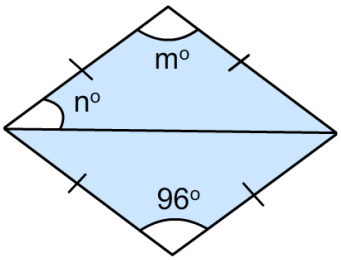

h° = ☐ i° = ☐

6. The diagram shows a trapezium.
Calculate the missing angles:




j° = ☐ k° = ☐ l° = ☐

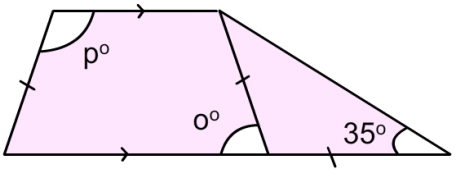
7. The diagram shows a rhombus.
Calculate the missing angles.




m° = ☐

n° = ☐

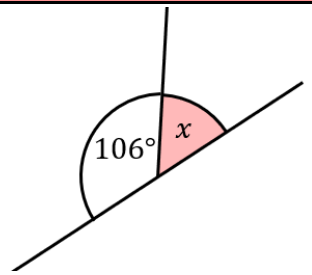
8. Calculate the missing angles in this diagram:



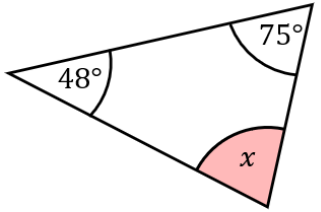

o° = ☐ p° = ☐

Find the value of $x$ in each of these diagrams, stating any angle rules you use.

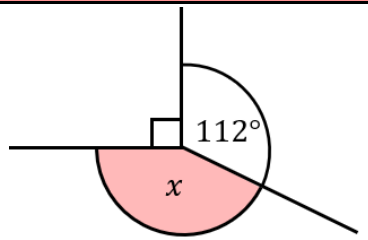
**(a)**



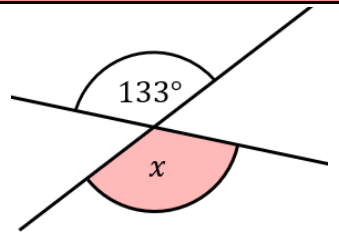

**(b)**



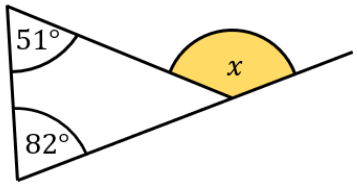

**(c)**



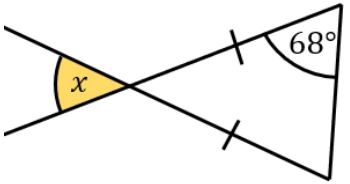

**(d)**




**(e)**




**(f)**

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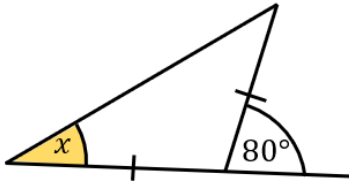
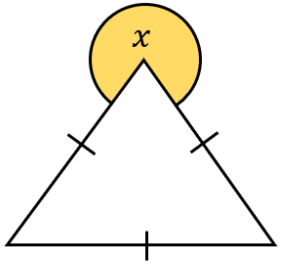
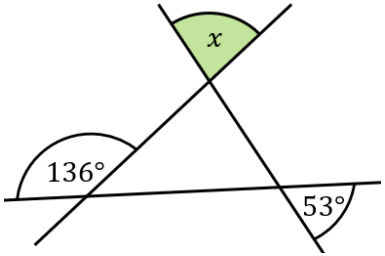


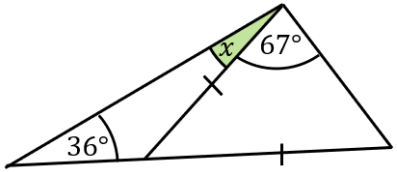

**(h)**



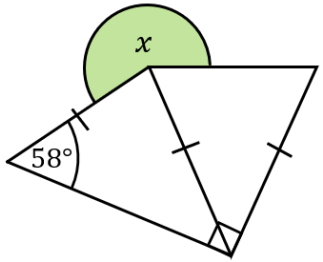

**(i)**



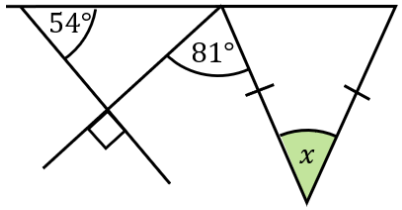

**(j)**




**(k)**



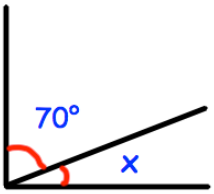

**(l)**



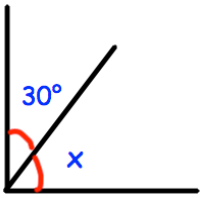
# Fluency Practice

Question 1: Calculate the size of the missing angles

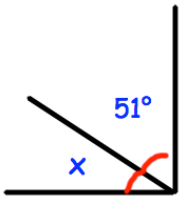
(a)



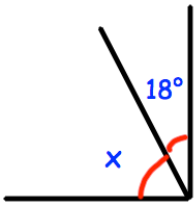

(b)



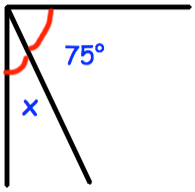

(c)



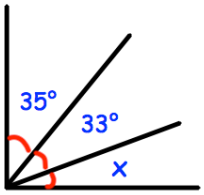

(d)



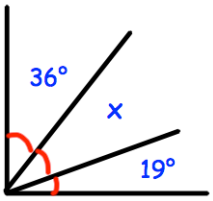

(e)



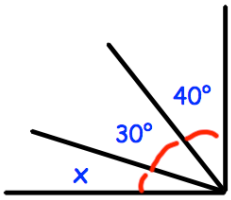

(f)



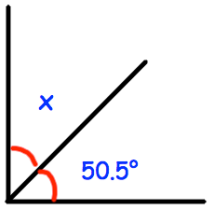

(g)




(h)

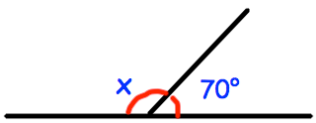



(i)

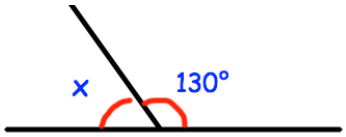



Question 2: Calculate the size of the missing angles

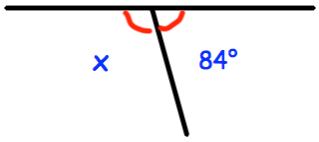
(a)



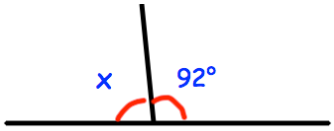

(b)



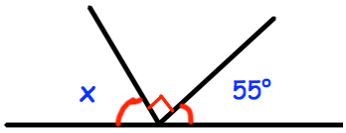

(c)



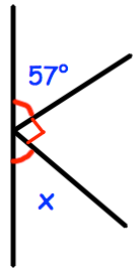

(d)




(e)

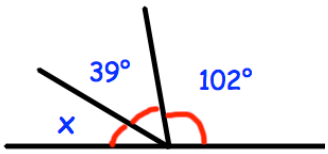



(f)

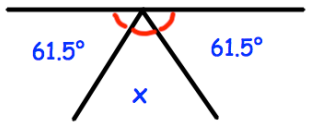


# Fluency Practice

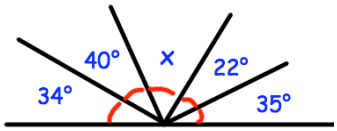
(g)




(h)

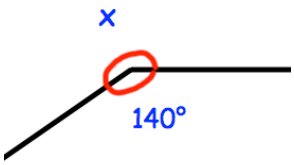



(i)

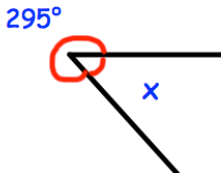



Question 3: Calculate the size of the missing angles

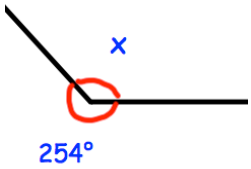
(a)



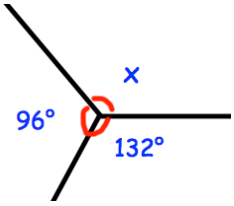

(b)



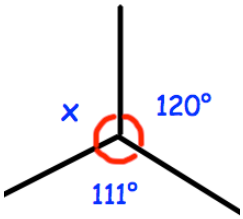

(c)



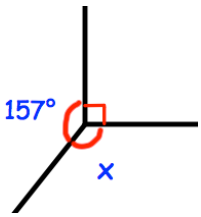

(d)



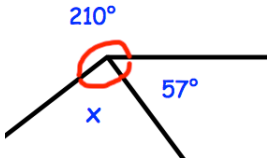

(e)



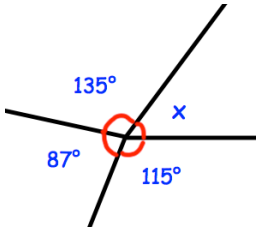

(f)



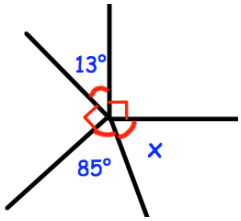

(g)




(h)

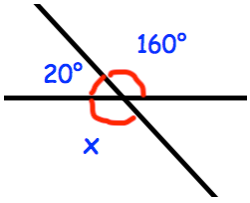



(i)

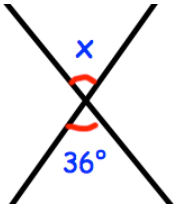



Question 4: Shown below are two straight lines that cross.
Calculate the size of the missing angles

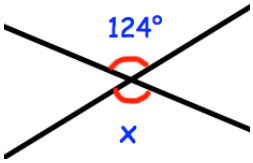
(a)



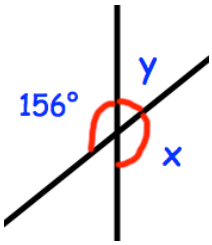

(b)



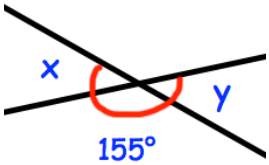

(c)



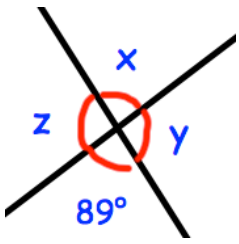

(d)




(e)



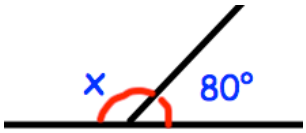

(f)



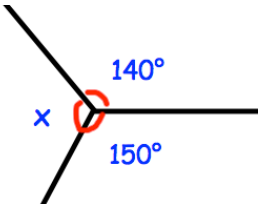
# Fluency Practice

Question 5: Calculate the size of the missing angles

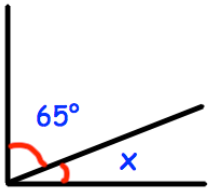
(a)



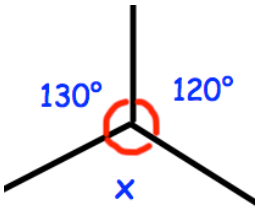

(b)



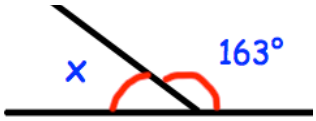

(c)



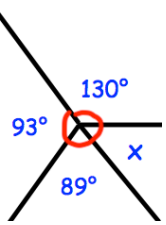

(d)



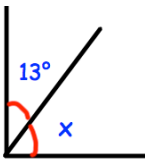

(e)



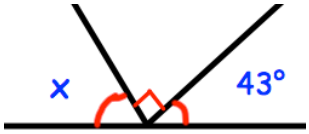

(f)



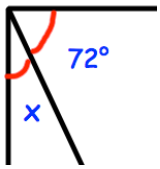

(g)



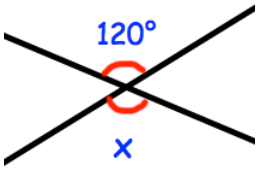

(h)



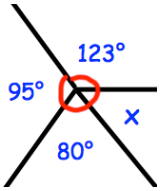

(i)



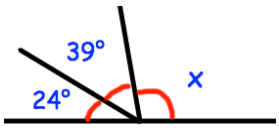

(j)



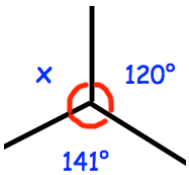

(k)



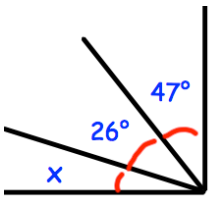

(l)



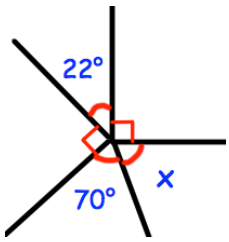

(m)



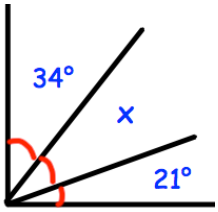

(n)



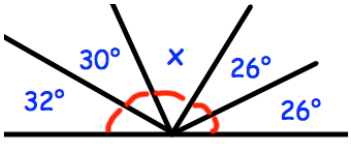

(o)



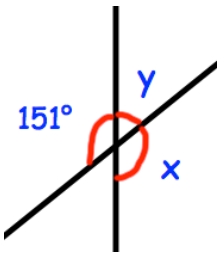

(p)




(q)

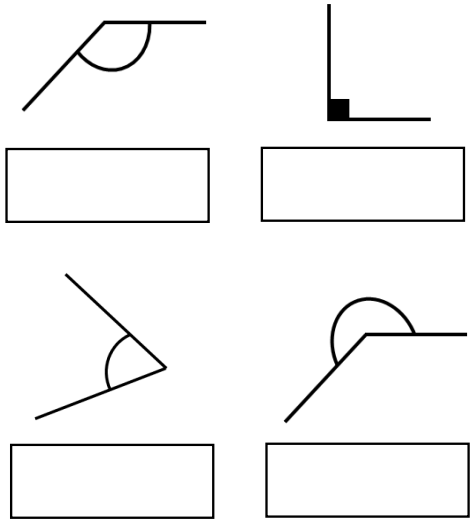



(r)

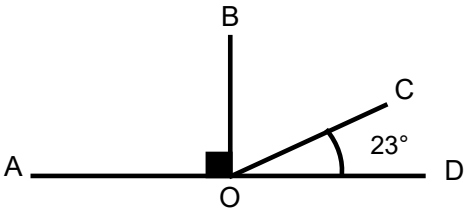


# Fluency Practice

1. Label these angles as acute, right, obtuse or reflex:

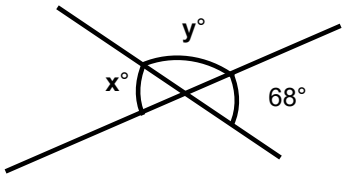


2. Calculate the acute angle BOC:



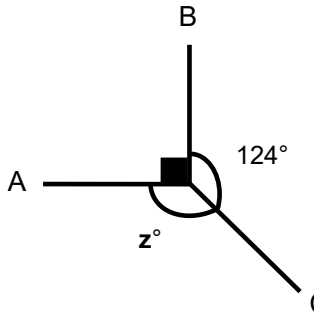

angle BOC = ☐

3. Calculate the size of angles **x** and **y**.



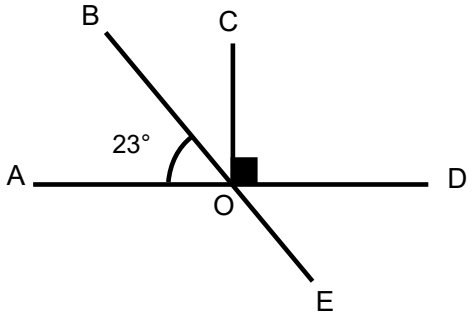

**x**° = ☐ **y**° = ☐

4. Calculate the missing angle labelled **z**:




**y**° = ☐

5. Given that AOD and BOE are straight lines, find the size of the acute angle **BOC** and the obtuse angle **AOE**.




**BOC** = ☐ **AOE** = ☐

6. Three of these angles together make a straight line. Which three?

24° 36° 42° 58° 60° 120° 175°

7. Which of these are impossible?

a. acute + acute = right angle

b. obtuse + obtuse = reflex angle

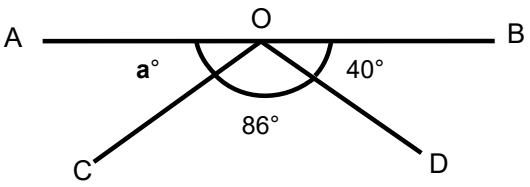
c. obtuse + obtuse = straight line

d. acute + obtuse = full turn

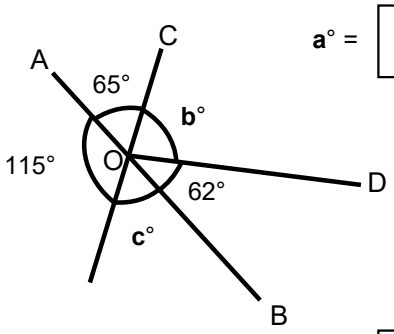
e. acute + right = obtuse angle

# Fluency Practice

7. Given that AOB is a straight line, find the missing angles in these diagrams:

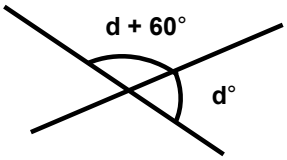



**a°** = ☐

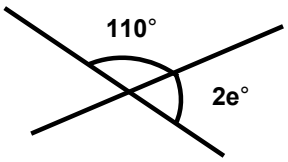



**b°** = ☐ **c°** = ☐

8. Use the diagrams to work out the values of d and e:



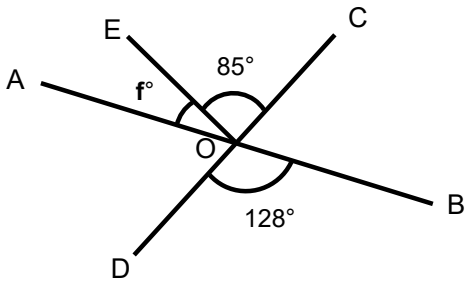

**d°** = ☐




**e°** = ☐

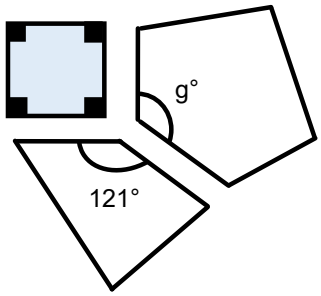
9. Explain why it is impossible for an acute angle to be half of a reflex angle.

10. Given that AOB and COD are straight lines, find the value of the angle marked **f**.



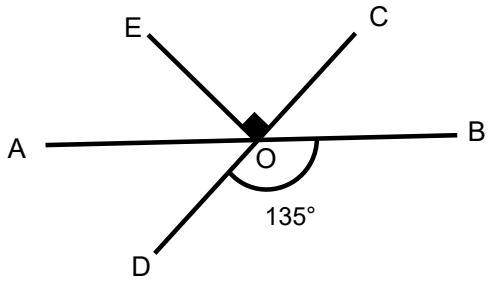

**f°** = ☐

11. These three shapes fit together without any gaps. Calculate the size of the angle labelled **g**.




**g°** = ☐

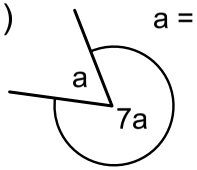
12. Given that AOB and COD are straight lines. Work out the size of acute angle AOE.




**AOE** = ☐

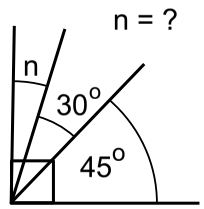
**practice makes perfect: angles in fractions of a whole turn and in triangles**

1) a = ?

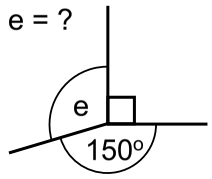



2) write down any two angles that are obtuse and add up to 270°:

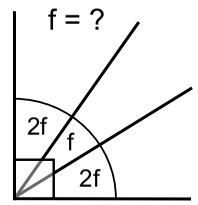
3) n = ?



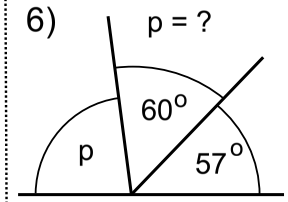

4) e = ?



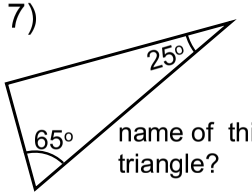

5) f = ?




6) p = ?

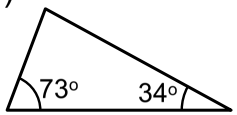



7)



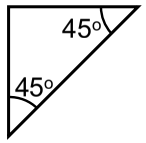

name of this triangle?

8)



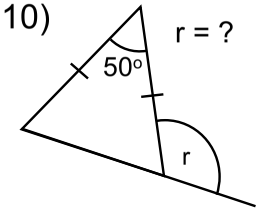

name of this triangle?

9)

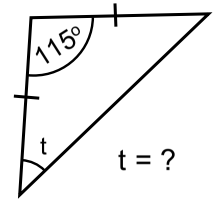



name of this triangle?

10) r = ?

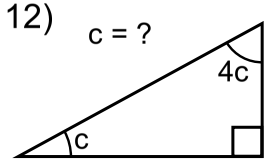



11)

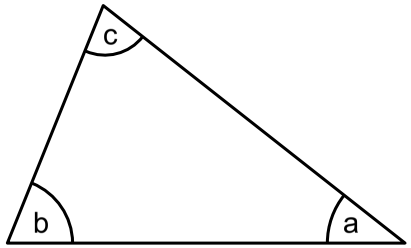



t = ?

12) c = ?



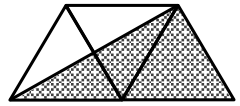

13) three angles in a triangle



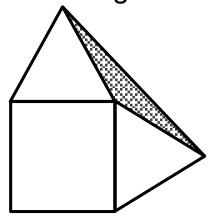

i. if a + b = c, show that c = 90°
ii. if a + b = 2c, show that c = 60°
iii. if a + c = 180° – a prove that the triangle is isosceles
iv. if b = 2a and c = 3a show that the triangle is right angled

14) squares and equilateral triangles

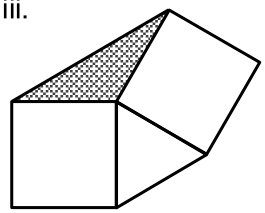
i.



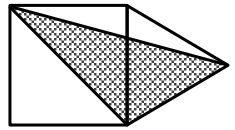
ii.



iii.

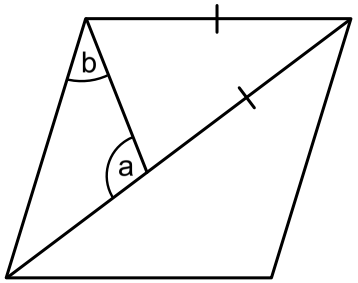


iv.



what are the three angles in each of the shaded triangles?

15) rhombus with an isosceles triangle



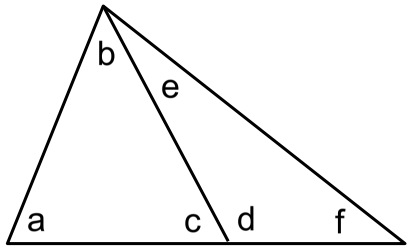

find a relationship between ‘a’ and ‘b’

**Fluency Practice**

**practice makes perfect: triangle angle explorations**

i) **angles in a triangle**

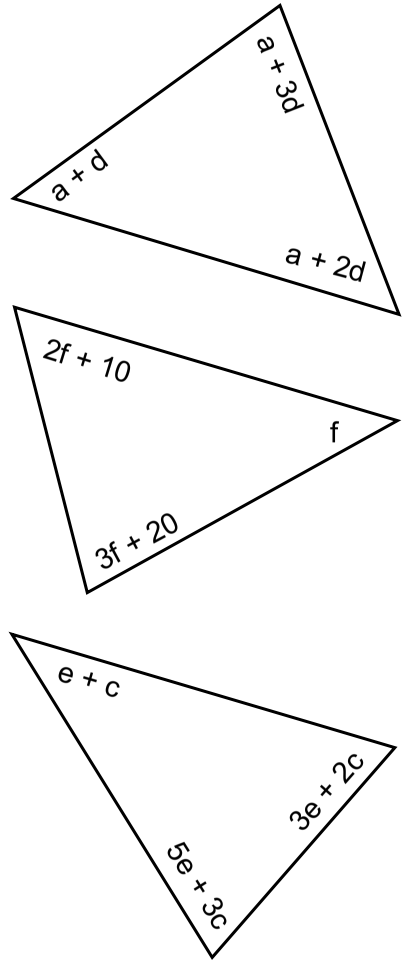
pretend you do not know that the angles in a triangle add up to 180° but you do know they add up to a constant amount, k°




use the three triangles to establish that the angle sum in a triangle ('k') must be 180

attempt a similar argument to show that the angle sum in a quadrilateral is 360°

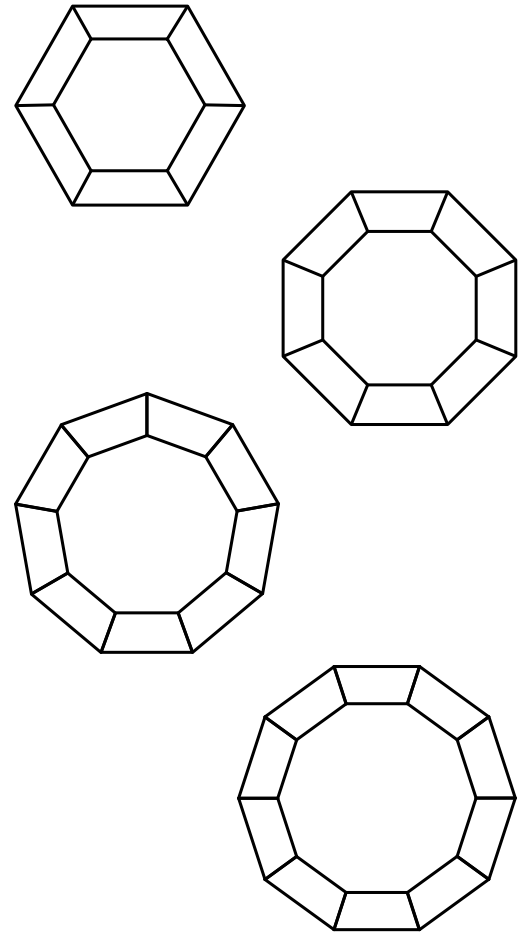
ii) **triangles with angles that increase by a regular amount**




show that one of the angles must be 60°

iii) **trapezium loops**

what must the angles be in each of the isosceles trapeziums?

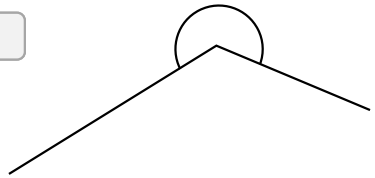


$x°$

# Create a Question

Draw an angle question that needs knowledge of ... to solve.

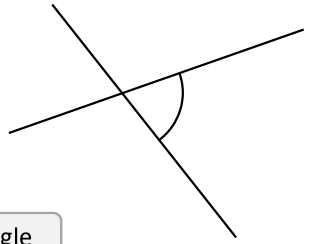
angles around a point



angles on one side of a straight line

vertically opposite angles

interior angles of a triangle



isosceles triangles

equilateral triangles

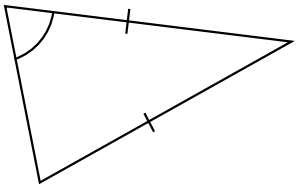
interior angles of a rectangle

solving equations

isosceles triangles & vertically opposite angles

interior angles of a rectangle & interior angles of a triangle

equilateral triangles & angles on one side of a straight line



interior angles of a triangle & angles around a point

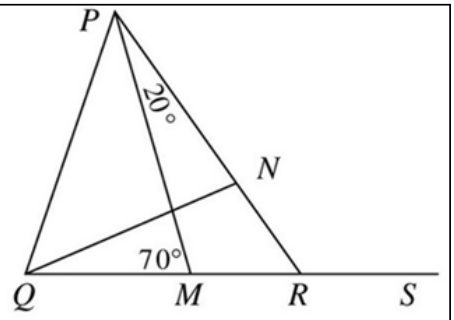
isosceles triangles & interior angles of a square

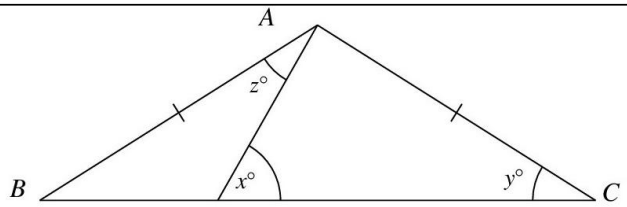
Diagrams don't need to be drawn accurately!

Make a problem that **can't** be solved!

# Problem Solving

In the diagram $\angle RPM = 20°$ and $\angle QMP = 70°$. What is $\angle PRS$ ?



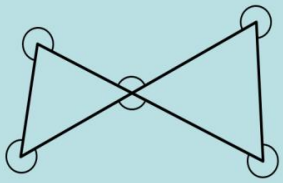




Given that $AB = AC$ and $z < 90$, which of the following expressions must equal $z$?

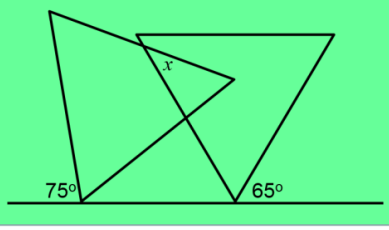
A $x - y$ B $x + y$ C $x + y - 180$

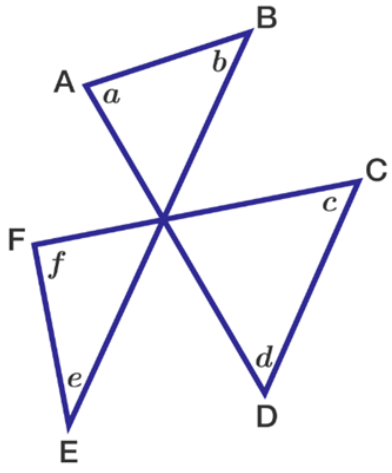
D $180 - x + y$

What is the sum of the six marked angles?



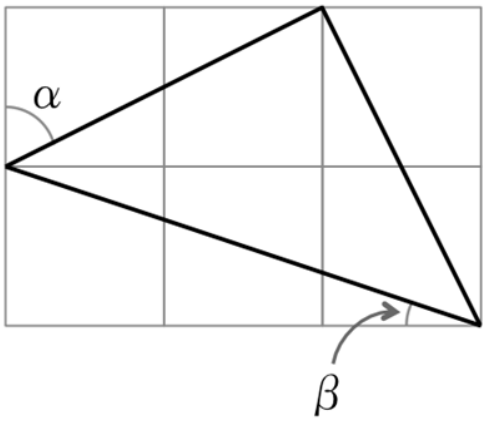
The diagram shows two equilateral triangles. Find the size of angle x



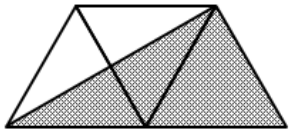

**Find the sum of the angles**
**a + b + c + d + e + f**

what is $\alpha - \beta$ ?

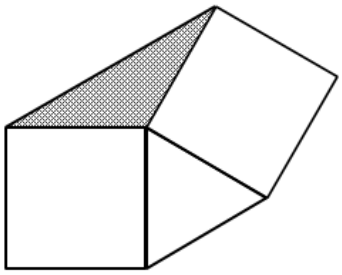


# Problem Solving

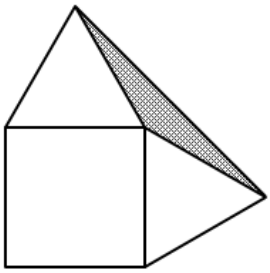
**squares with equilateral triangles**



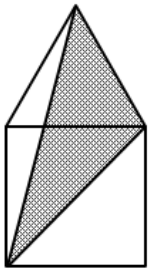
three equilateral triangles
what are the angles in the triangle shown?



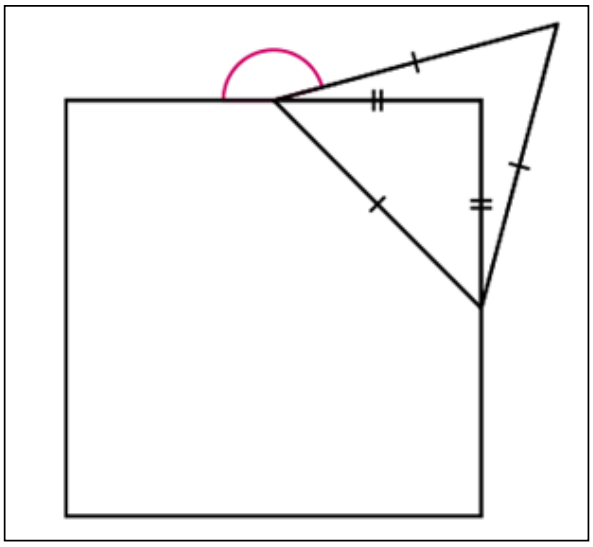
two squares and an equilateral triangle
what are the angles in the triangle shown?

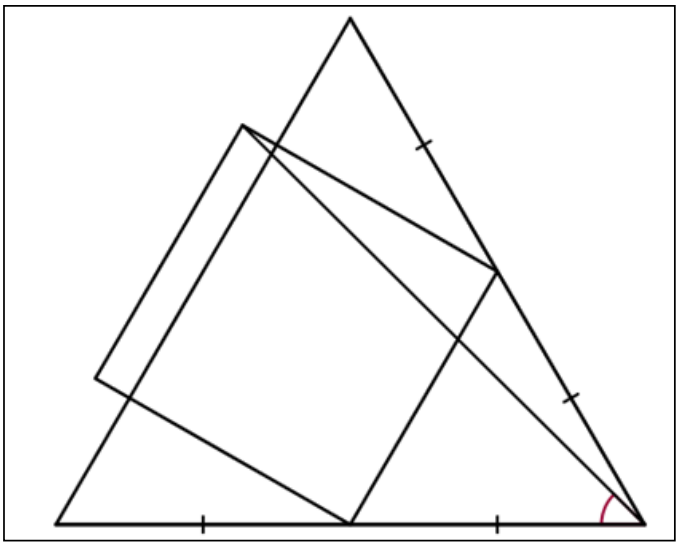


a square with two equilateral triangles
what are the angles in the triangle shown?



a square with an equilateral triangle
what are the angles in the triangle shown?





# Maths Venns


At least two angles are equal
If you think a region is impossible to fill, convince me why!
2 acute angles, 1 obtuse
a
b
c
A
B
C
D
E
F
G
H
Give a set of three whole number angles (a,b and c) that could belong in each of the regions