# Year 7
# Mathematics
# Unit 5

**Name: _____**

**Class: _____**

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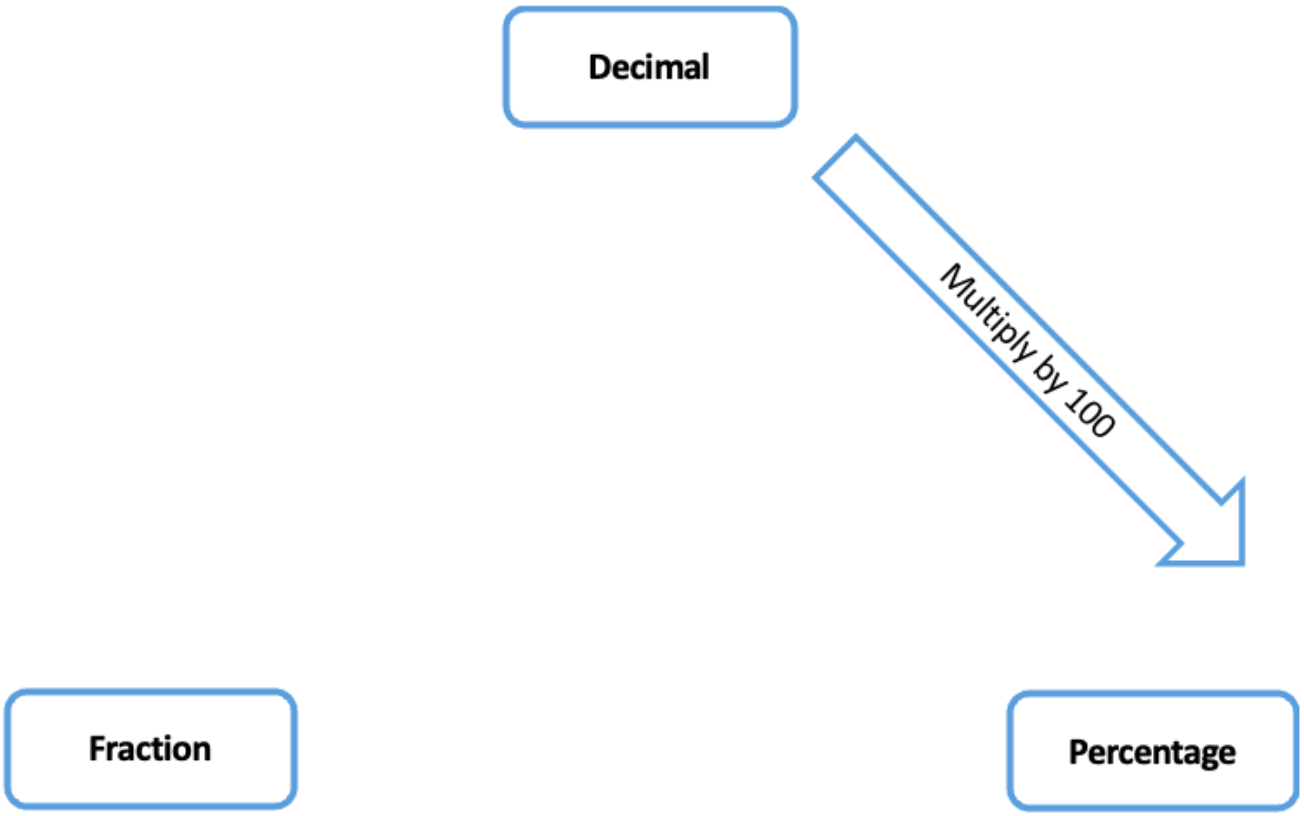
# 1 Fractions, Decimals and Percentages

# 1.1 Decimals to Percentages

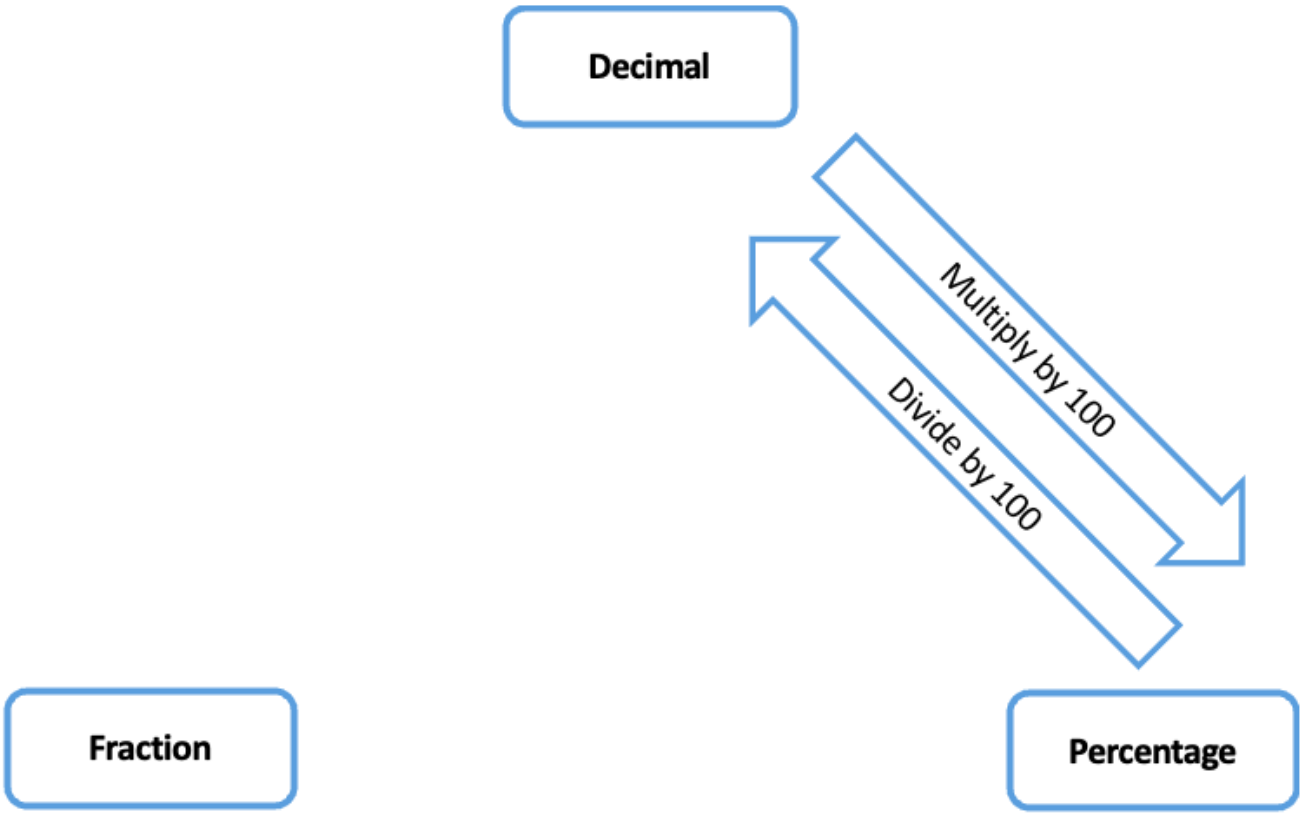
In this section you will look at converting from decimals to percentages.



| Worked Example | Your Turn |
| --- | --- |
| Convert the following decimals into percentages:<br>a) $0.37$<br>b) $0.037$<br>c) $3.7$ | Convert the following decimals into percentages:<br>a) $0.38$<br>b) $0.038$<br>c) $3.8$ |

# 1.2 Percentages to Decimals

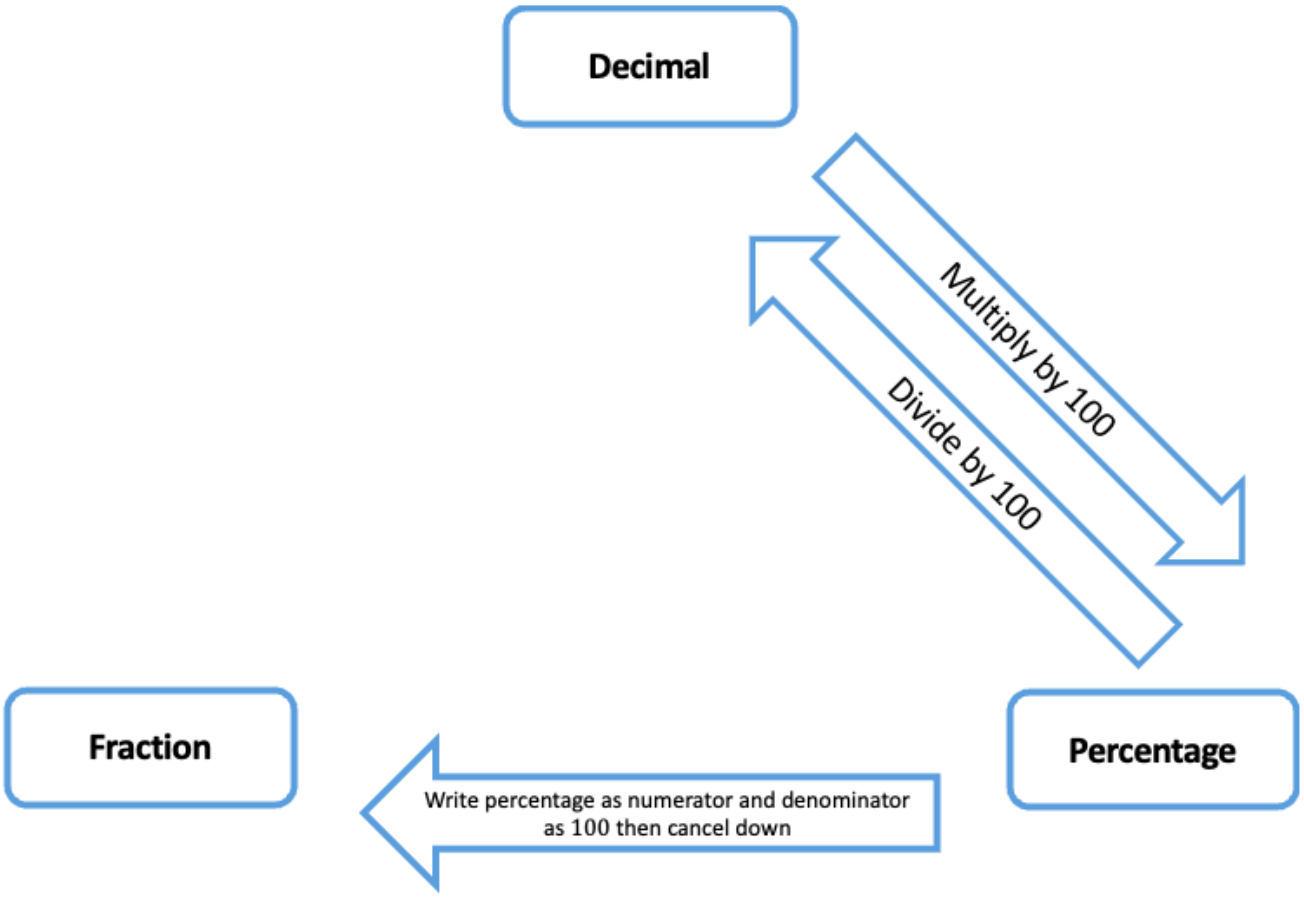
In this section you will look at converting from percentages to decimals.



| Worked Example | Your Turn |
| --- | --- |
| Convert the following percentages into decimals:<br>a) $82\%$<br>b) $8.2\%$<br>c) $820\%$ | Convert the following percentages into decimals:<br>a) $81\%$<br>b) $8.1\%$<br>c) $810\%$ |

# 1.3 Percentages to Fractions

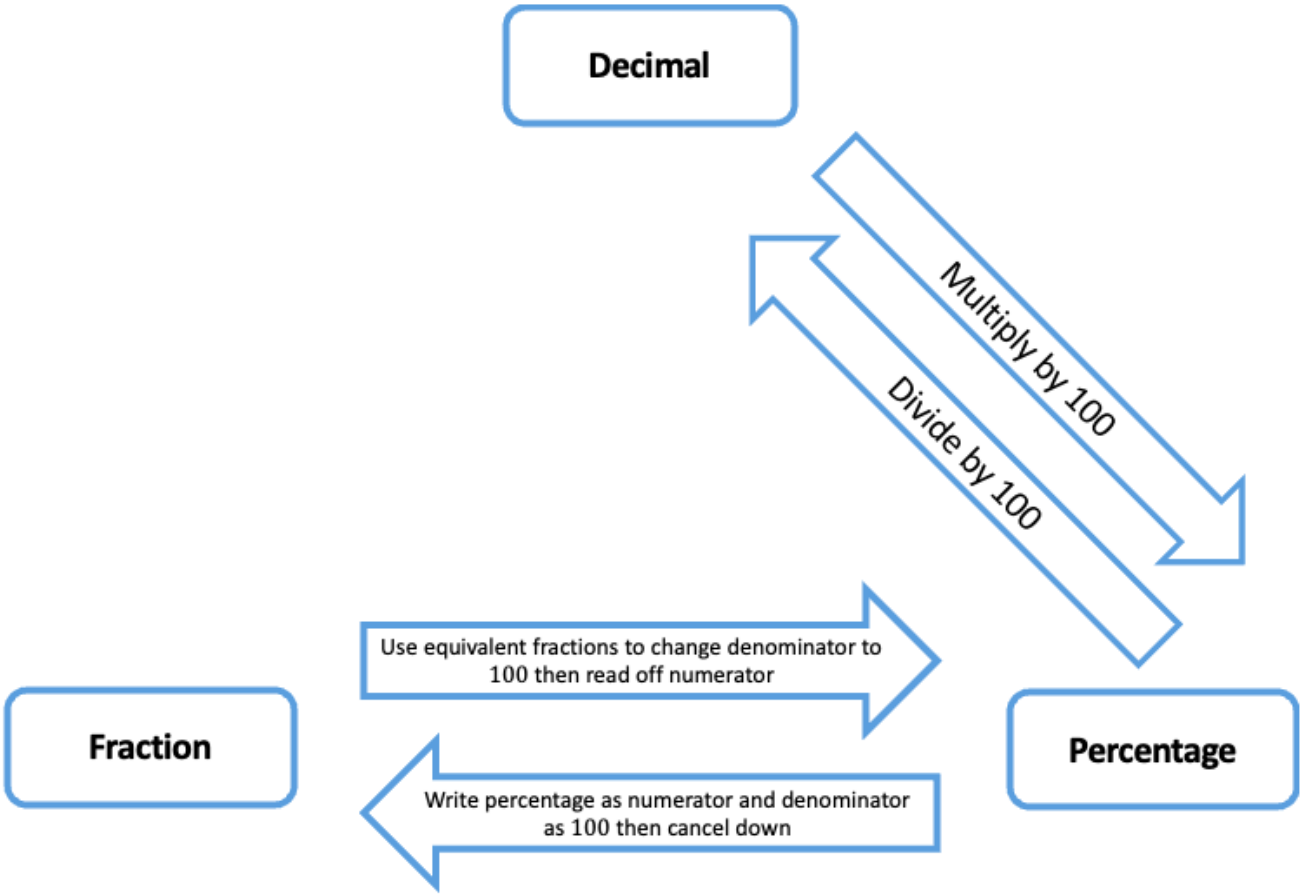
In this section you will look at converting from percentages to fractions.



| Worked Example | Your Turn |
| --- | --- |
| Convert the following percentages into fractions in their simplest form:<br>a) $6\%$<br>b) $66\%$<br>c) $66.6\%$<br>d) $666\%$ | Convert the following percentages into fractions in their simplest form:<br>a) $8\%$<br>b) $88\%$<br>c) $88.8\%$<br>d) $888\%$ |

# 1.4 Fractions to Percentages

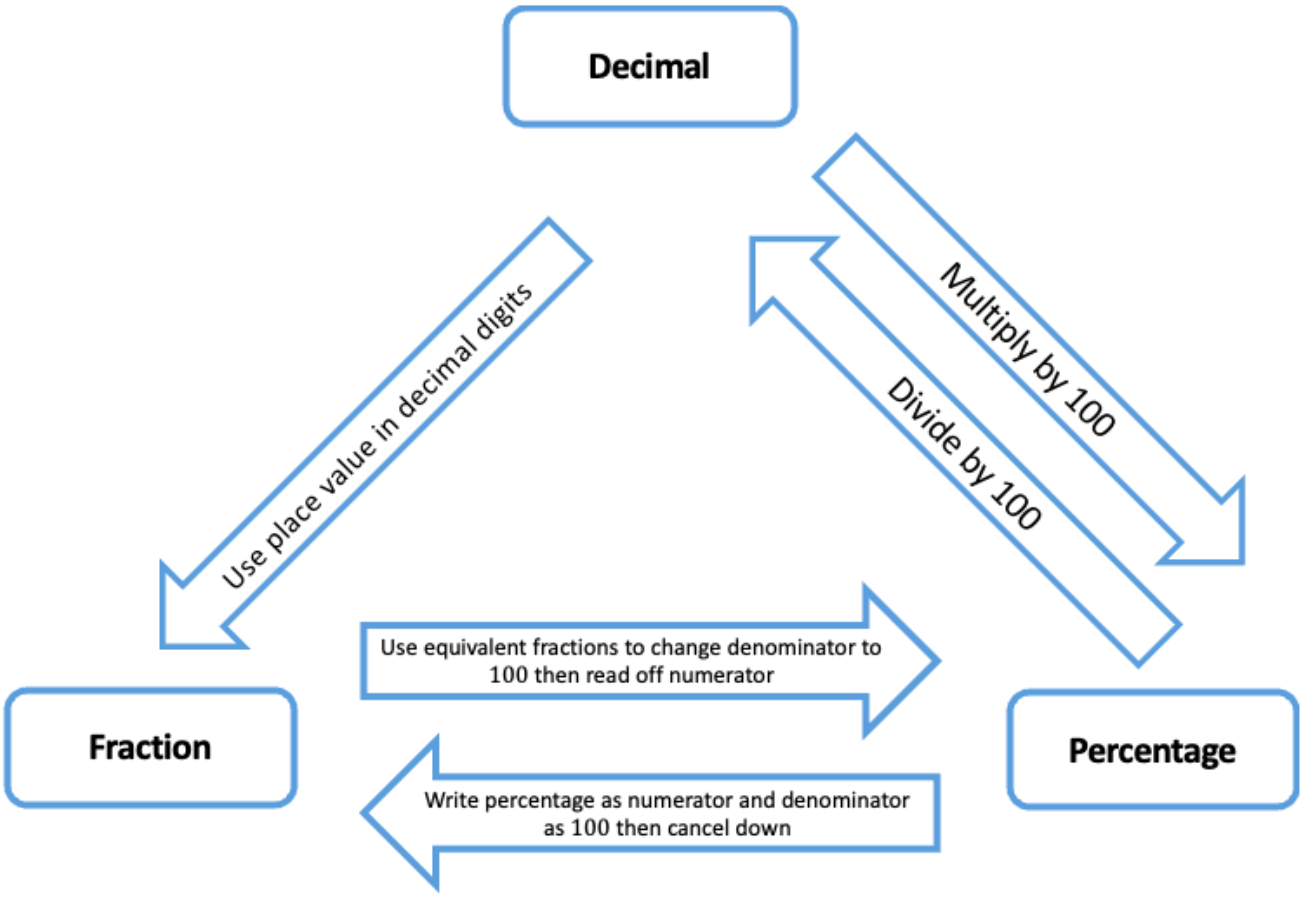
In this section you will look at converting from fractions to percentages.



| Worked Example | Your Turn |
| --- | --- |
| Convert the following fractions into percentages:<br>a) $\frac{6}{10}$<br>b) $\frac{6}{5}$<br>c) $\frac{6}{60}$<br>d) $\frac{6}{600}$ | Convert the following fractions into percentages:<br>a) $\frac{8}{10}$<br>b) $\frac{8}{5}$<br>c) $\frac{8}{40}$<br>d) $\frac{8}{400}$ |

# 1.5 Decimals to Fractions

In this section you will look at converting from decimals to fractions.



# Frayer Model – Terminating Decimal

| **Definition** | **Characteristics** |
| --- | --- |
| **Examples** | **Non-Examples** |

| Worked Example | Your Turn |
| --- | --- |
| Convert the following decimals into fractions in their simplest form:<br>a) $0.8$<br>b) $0.08$<br>c) $0.085$<br>d) $8.5$ | Convert the following decimals into fractions in their simplest form:<br>a) $0.2$<br>b) $0.02$<br>c) $0.025$<br>d) $2.5$ |

# 1.6 Recurring Decimal Notation

In this section you will look at the notation for recurring decimals.

- $0.123\dot{4}$

- $0.\dot{6}$

- $2.\dot{3}\dot{7}$

- $0.\dot{1}42857\dot{}$

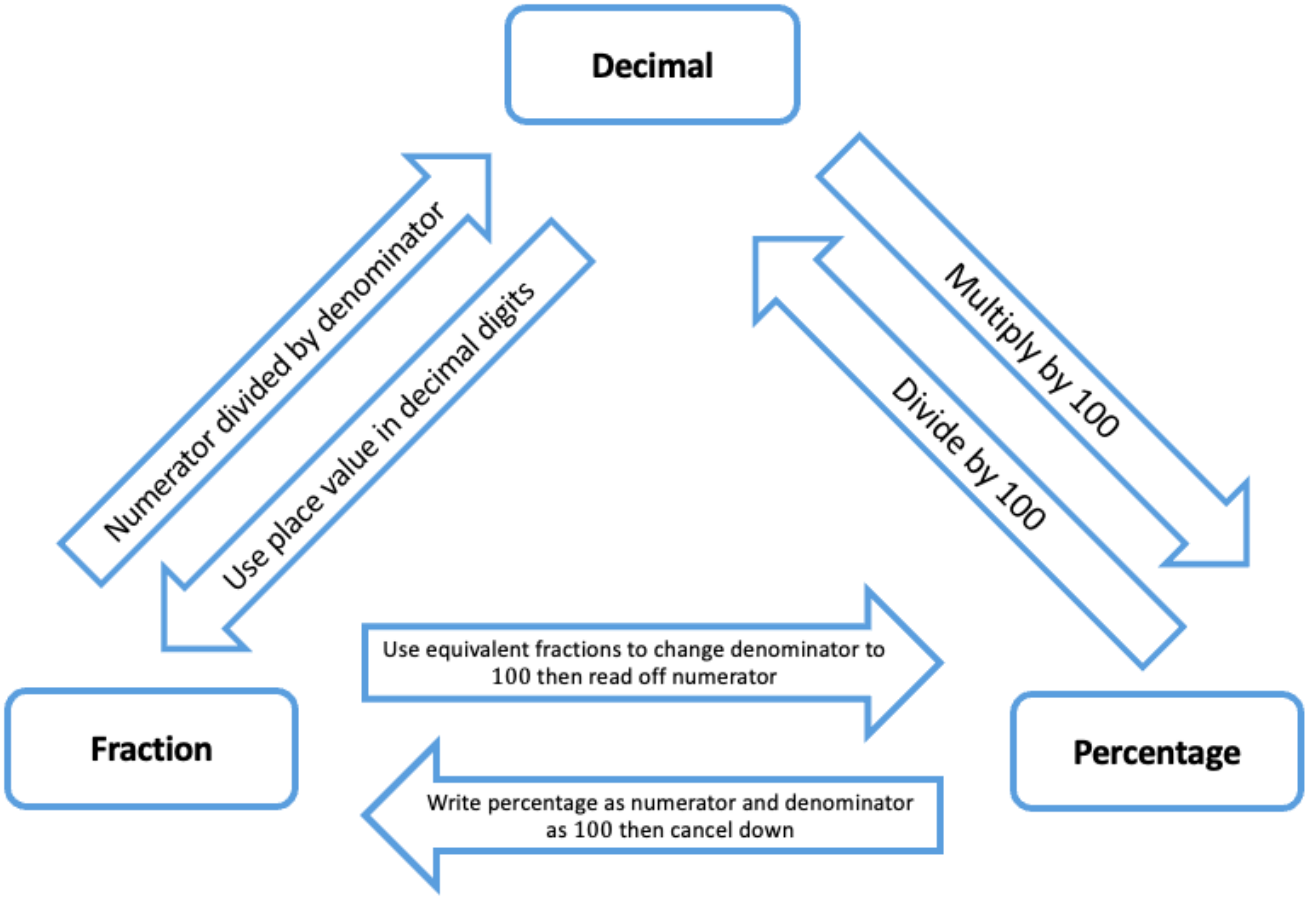
- $7846.1\dot{3}$

# Frayer Model – Recurring Decimal

| **Definition** | **Characteristics** |
| --- | --- |
| **Examples** | **Non-Examples** |

# 1.7 Fractions to Decimals

In this section you will look at converting from fractions to decimals.



| Worked Example | Your Turn |
| --- | --- |
| Convert the following fractions into decimals:<br>a) $\frac{1}{4}$<br><br>b) $\frac{1}{3}$ | Convert the following fractions into decimals:<br>a) $\frac{3}{4}$<br><br>b) $\frac{2}{3}$ |

# 2 Percentages

# 2.1 Expressing as Percentages

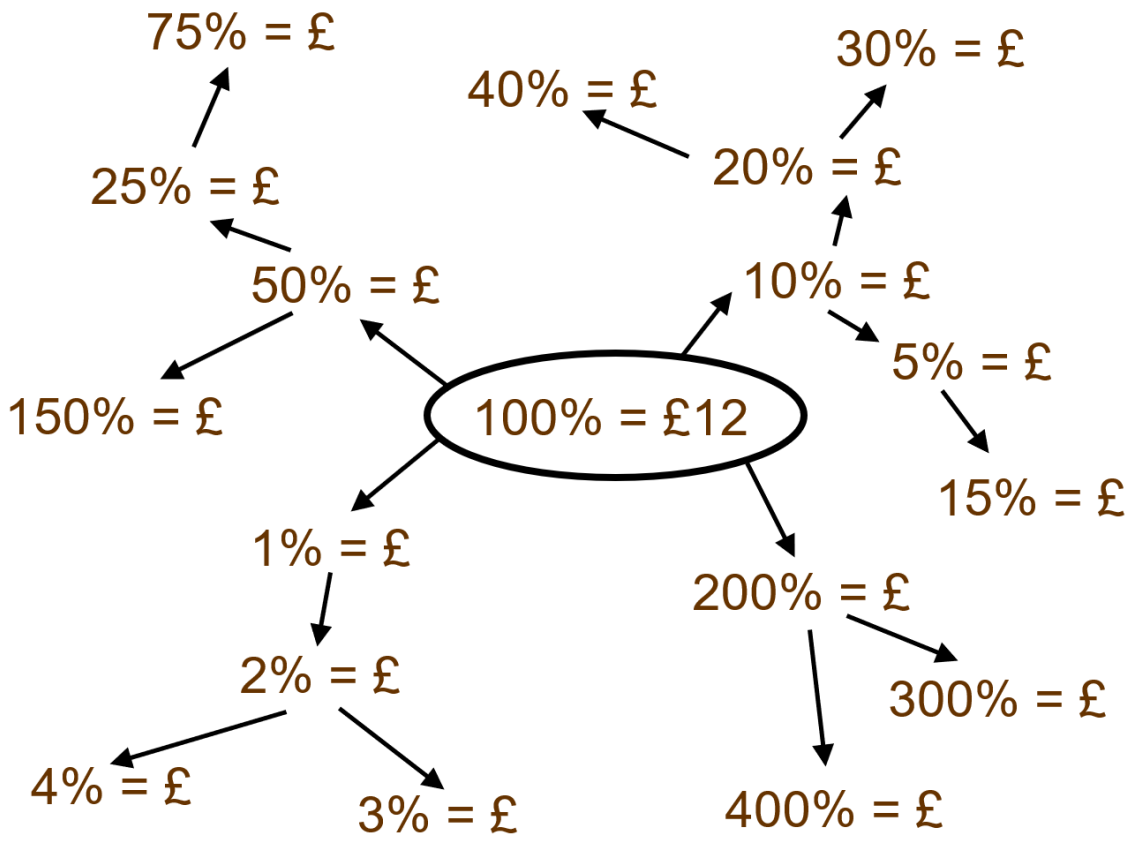
In this section you will look at expressing a number as a percentage of another without a calculator.

| Worked Example | Your Turn |
| --- | --- |
| a) Write $15$ as a percentage of $30$ | a) Write $30$ as a percentage of $60$ |
| b) Write $10$ as a percentage of $25$ | b) Write $20$ as a percentage of $50$ |
| c) Write $15$ as a percentage of $150$ | c) Write $3$ as a percentage of $30$ |
| d) Write $10$ as a percentage of $80$ | d) Write $5$ as a percentage of $40$ |

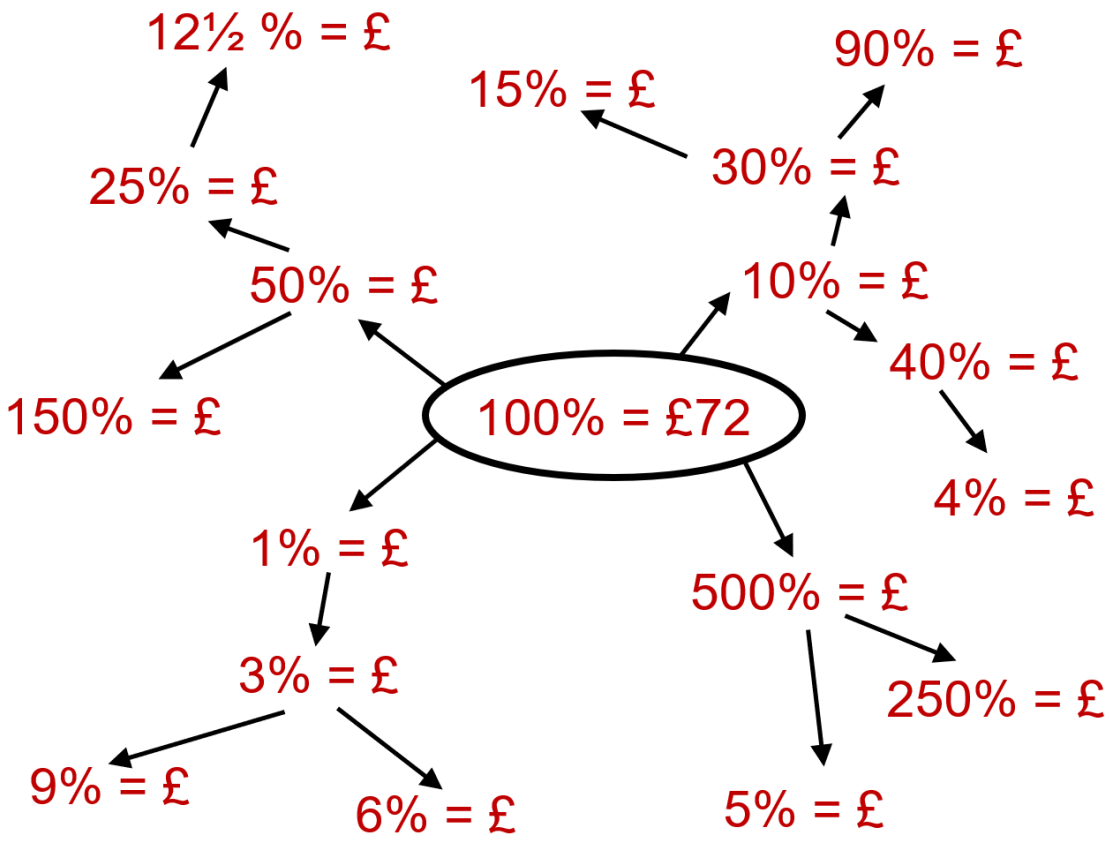
# 2.2 Percentages of Amounts

In this section you will look at calculating percentages of amounts without a calculator.

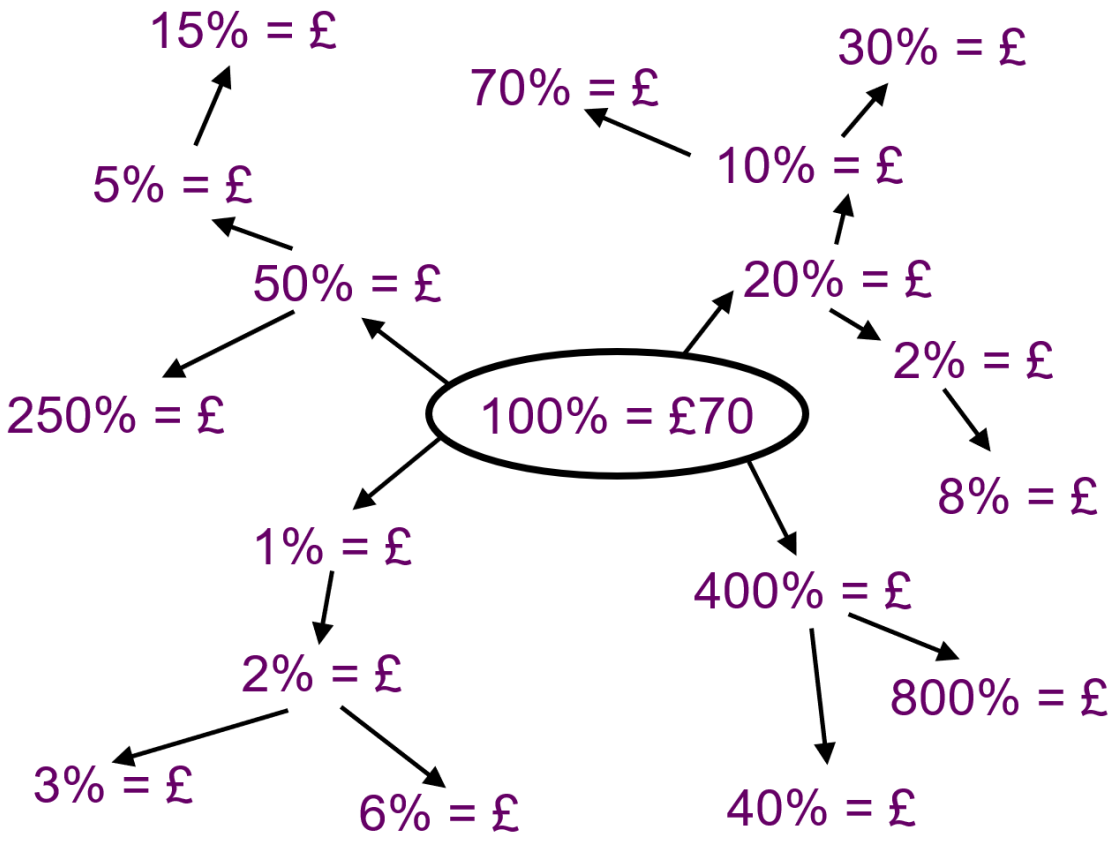
# Worked Example



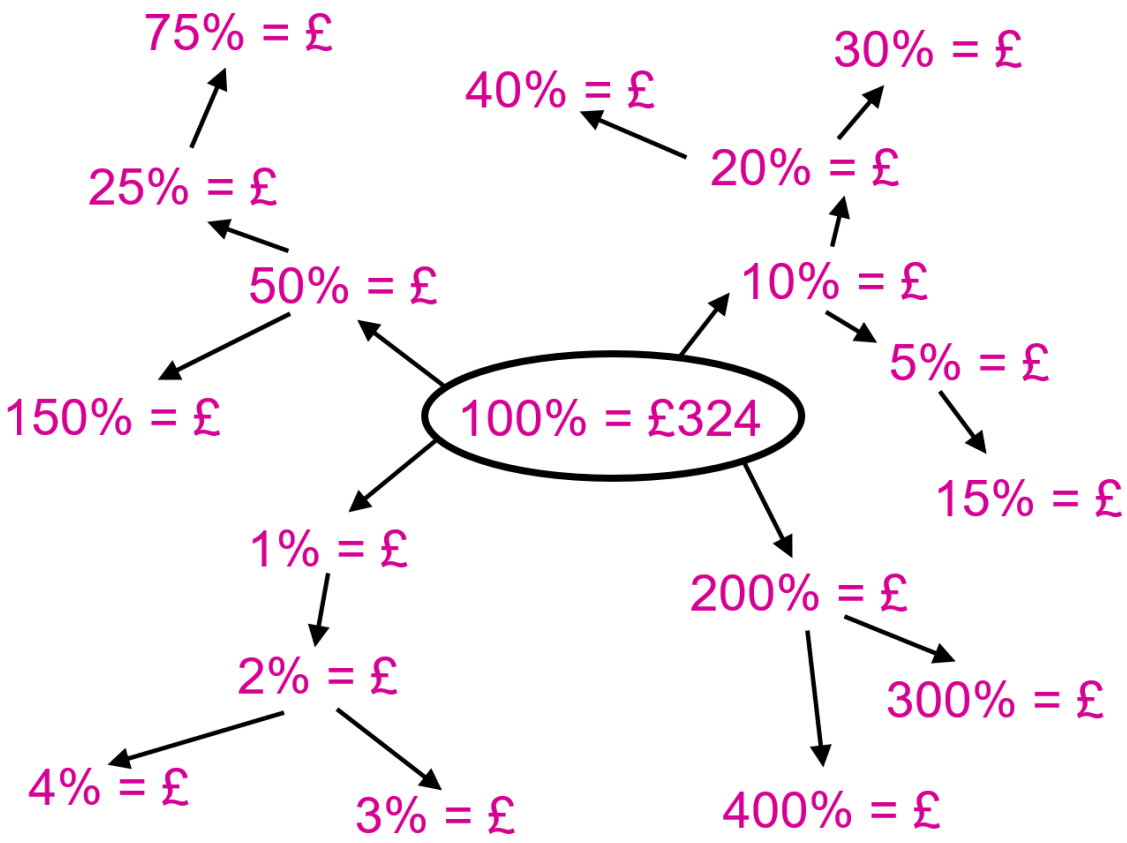
# Your Turn



# Your Turn



# Your Turn



# 2.3 Percentage Increase

In this section you will look at calculating amounts after a percentage increase without a calculator.

| Worked Example | Your Turn |
| --- | --- |
| Increase $40$ by $20\%$ | Increase $90$ by $20\%$ |

# 2.4 Percentage Decrease

In this section you will look at calculating amounts after a percentage decrease without a calculator.

| Worked Example | Your Turn |
| --- | --- |
| Decrease $40$ by $20\%$ | Decrease $90$ by $20\%$ |

# 2.5 Percentage Change

In this section you will look at calculating the percentage change without a calculator.

| Worked Example | Your Turn |
| --- | --- |
| Calculate the percentage change:<br><br>a) Original value: £400<br>New value: £360<br><br>b) Original value: £400<br>New value: £440 | Calculate the percentage change:<br><br>a) Original value: £200<br>New value: £150<br><br>b) Original value: £200<br>New value: £250 |

# 2.6 Reverse Percentages

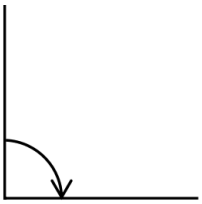
In this section you will look at calculating amounts before a percentage increase/decrease has taken place without a calculator.

| Worked Example | Your Turn |
| --- | --- |
| Calculate the original amount:<br><br>a) Percentage change:<br>$10\%$ decrease<br>New value: £$360$<br><br>b) Percentage change:<br>$10\%$ increase<br>New value: £$440$ | Calculate the original amount:<br><br>a) Percentage change:<br>$25\%$ decrease<br>New value: £$150$<br><br>b) Percentage change:<br>$25\%$ increase<br>New value: £$250$ |

# 3 Angle Basics

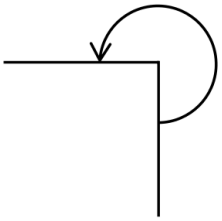
# 3.1 Types of Turns and Angles

In this section you will look at the types of turns and angles.

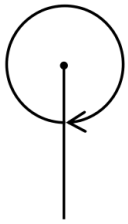


A quarter of a turn clockwise

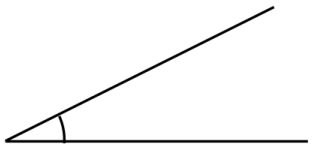
Half a turn anticlockwise



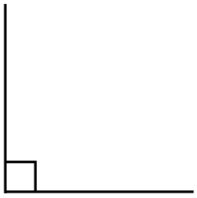
Three quarters of a turn anticlockwise



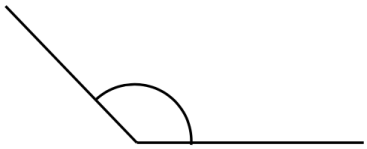
A full turn clockwise



**Acute Angle**
Any angle between 0° and 90°

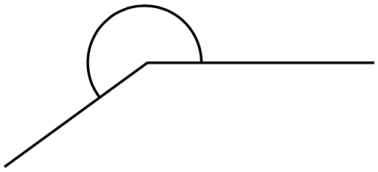


**Right Angle**
An angle that is exactly 90°

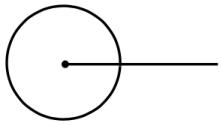


**Obtuse Angle**
Any angle between 90° and 180°

**Straight Line**
An angle that is exactly 180°



**Reflex Angle**
Any angle between 180° and 360°



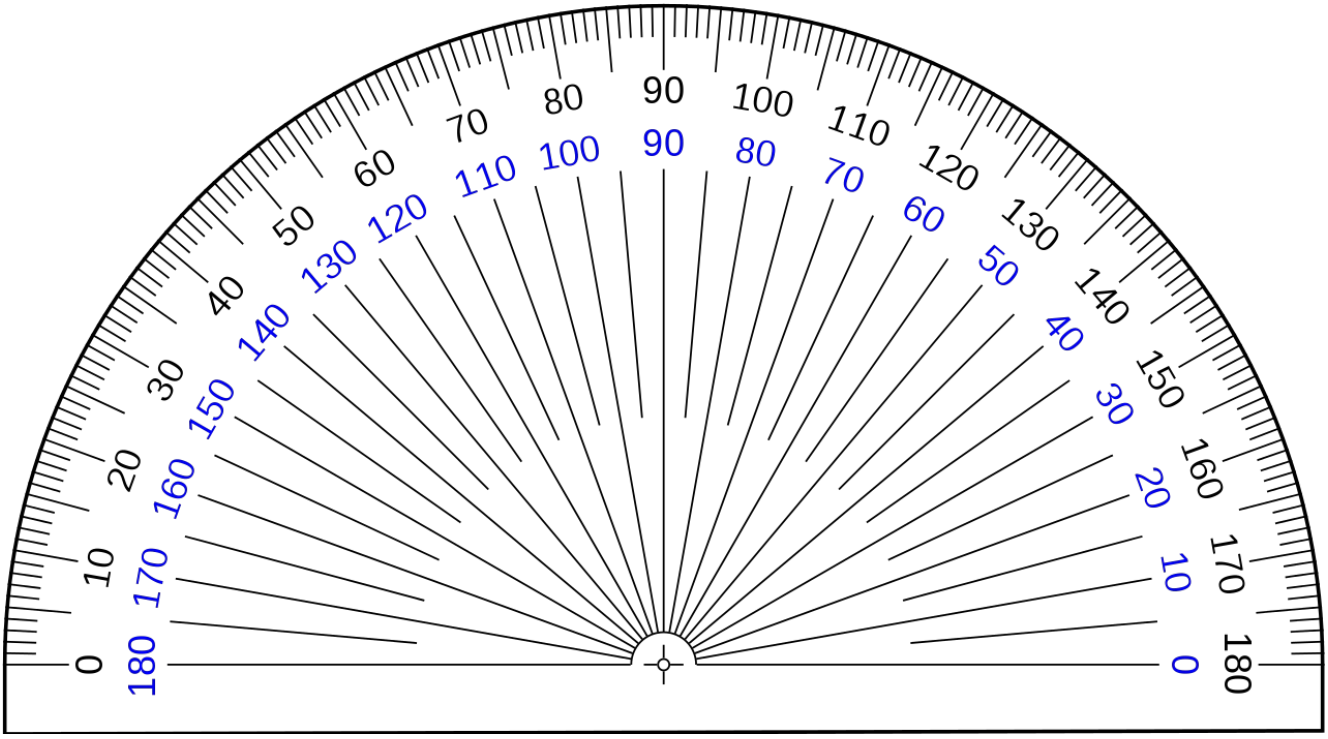
**Full Turn**
An angle that is exactly 360°

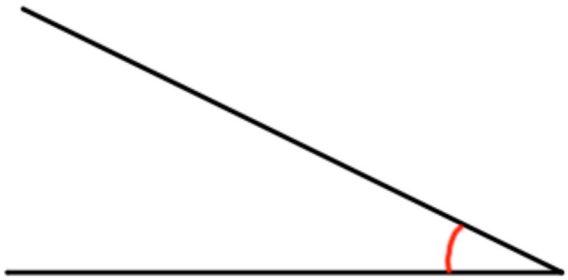
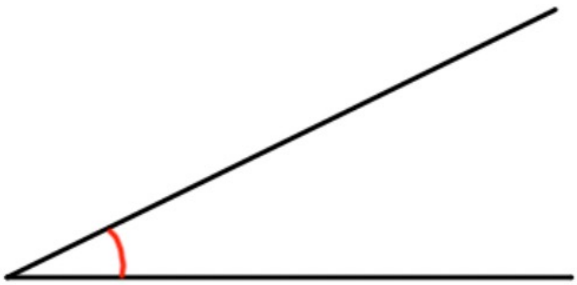
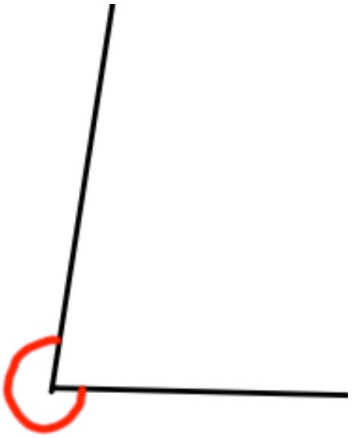
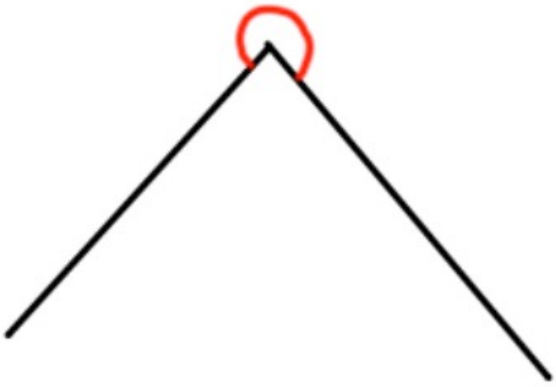
# 3.2 Estimating Angles

In this section you will look at estimating angles.

# 3.3 Measuring Angles

In this section you will look at measuring angles with a protractor.



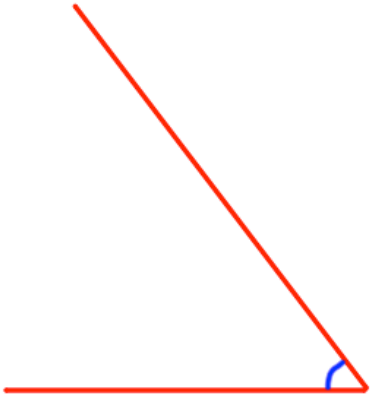
| Worked Example | Your Turn |
| --- | --- |
| Measure the angles below. | Measure the angles below. |
|  |  |
|  |  |

# Fluency Practice

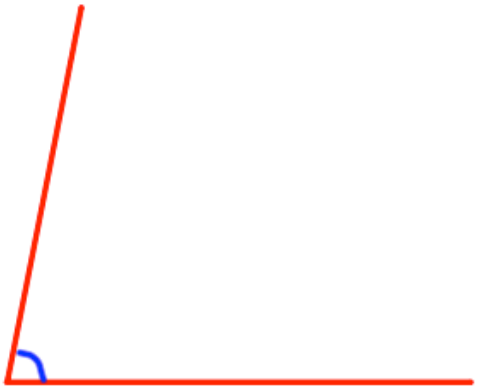
Question 2: Measure each angle below

(a)

(b)



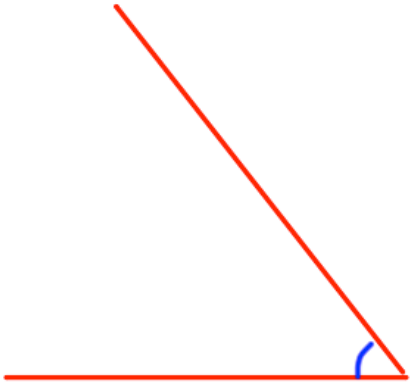
(c)



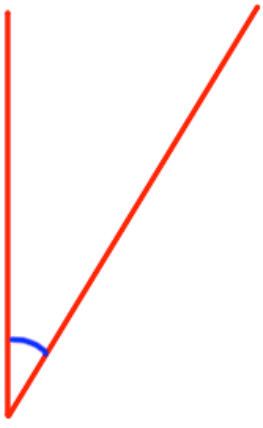
(d)

(e)

(f)



(g)



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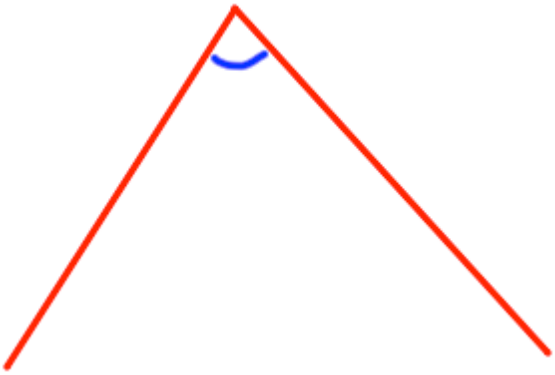
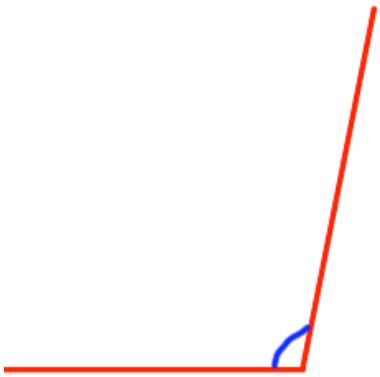


# Fluency Practice

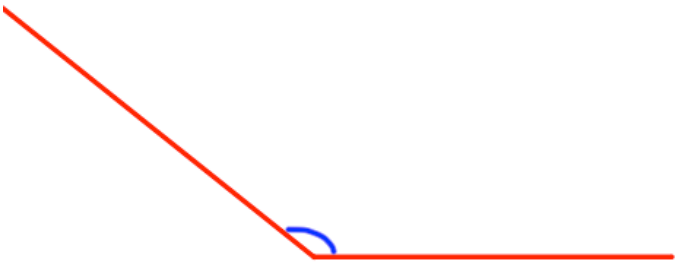
Question 3: Measure each angle below

(a)

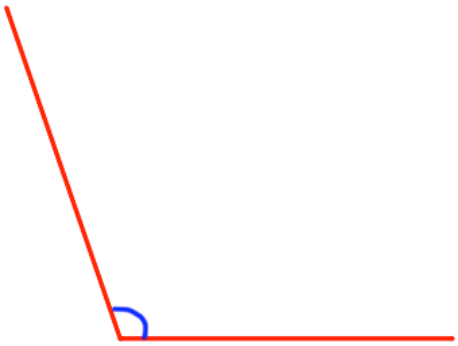


(b)

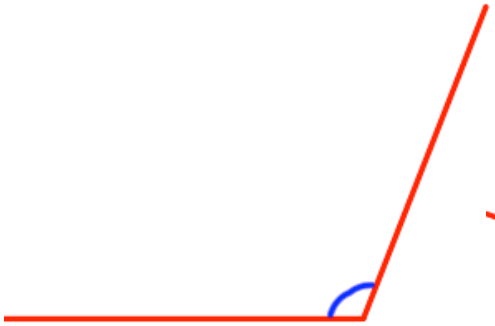
(c)



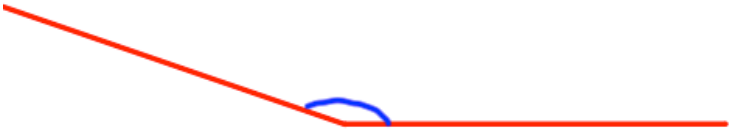
(d)



(e)

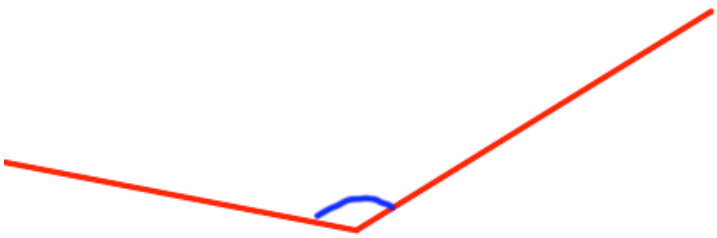


(f)



(g)

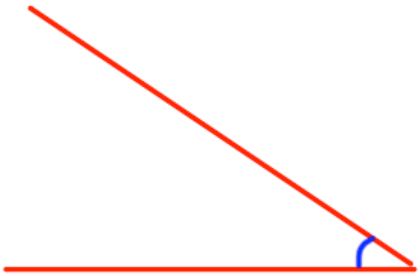
(h)



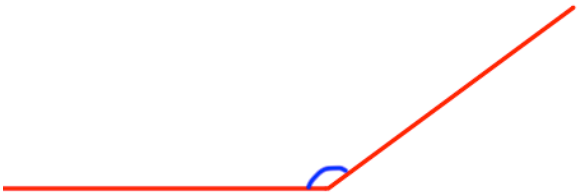
# Fluency Practice

Question 4: Measure each angle below

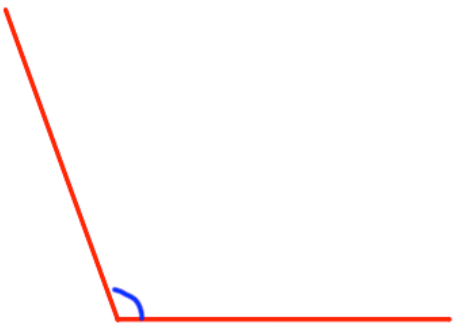
(a)



(b)



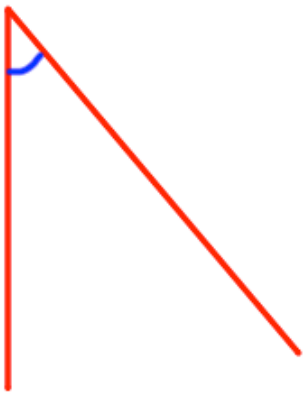
(c)



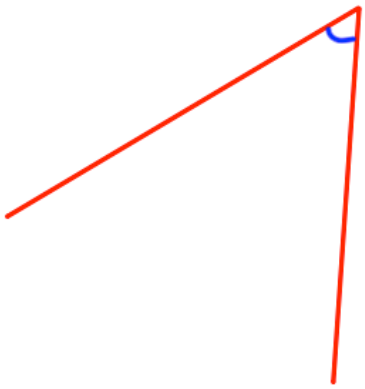
(d)

(e)

(f)



(g)



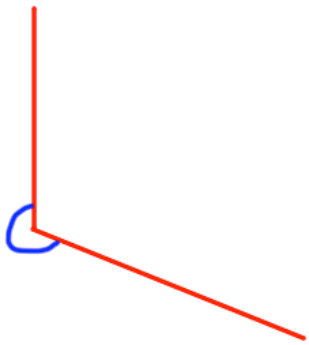
(h)

# Fluency Practice

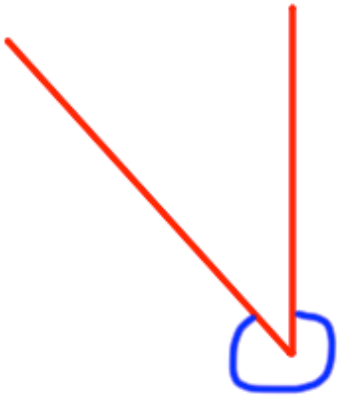
Question 5: Measure each reflex angle below

(a)

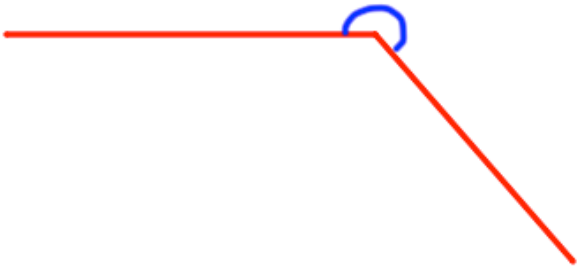
(b)



(c)



(d)



# 3.4 Drawing Angles

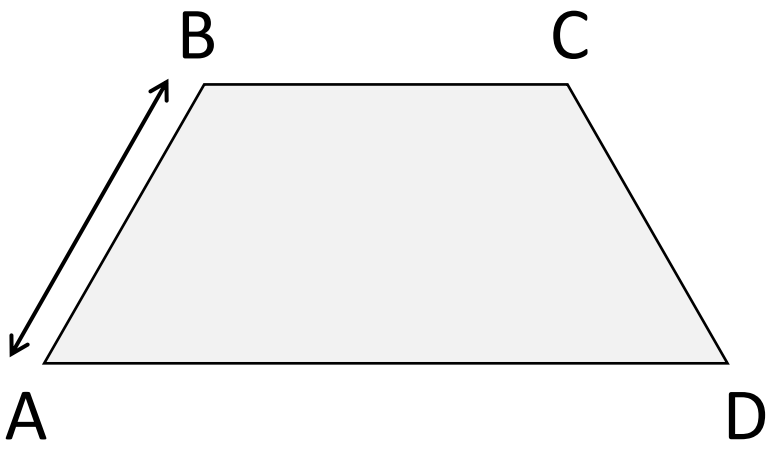
In this section you will look at drawing angles with a protractor, ruler and pencil.

| Worked Example | Your Turn |
| --- | --- |
| Draw an angle of $70°$ | Draw an angle of $80°$ |
| Draw an angle of $215°$ | Draw an angle of $225°$ |

# 3.5 Notation and Labelling

In this section you will look at the notation for lengths and angles and how to label them correctly.

# Labelling Lengths



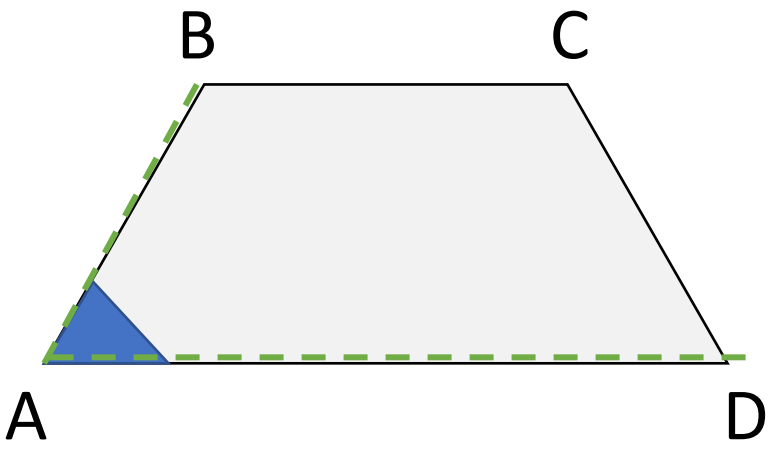

Each point (or corner) of a shape is labelled with a letter.

If we are talking about this distance…

We say we are looking for the length of AB

Because it is the distance between the point labelled A and the point labelled B

# Labelling Angles




Each point (or corner) of a shape is labelled with a letter

If we are talking about this angle…

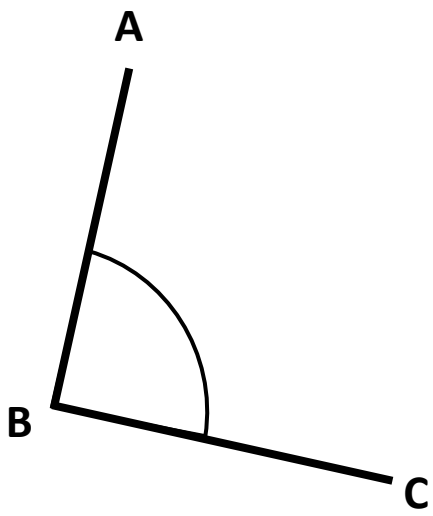
We say we are looking for the angle DAB

Because if we draw a line in order from point D to point A to point B, we draw around the angle

# Angle Notation

We can label angles in multiple ways:

$\angle ABC$ *or* $A\hat{B}C$ *or* *Angle* $ABC$




It can help to see these are instructions rather than labels:

**"The turn from line AB to line BC"**

We don't need to specify direction yet, so:

$A\hat{B}C = C\hat{B}A$

**"The turn from line BC to line AB"**

Note: We use capital letter for points.

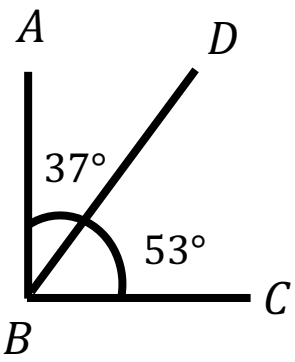
## Worked Example

Write down the values of:

$\angle ABD =$

$\angle DBC =$

$\angle ABC =$



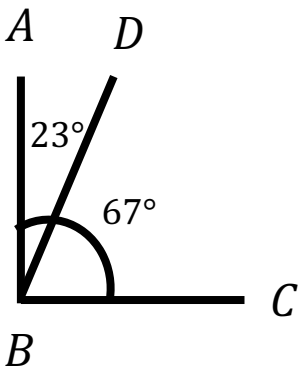

## Your Turn

Write down the values of:

$\angle ABD =$

$\angle DBC =$

$\angle ABC =$



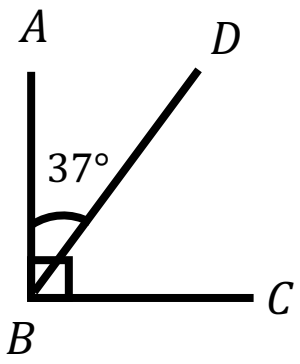
## Worked Example

Write down the values of:

$\angle ABD =$

$\angle ABC =$

$\angle DBC =$



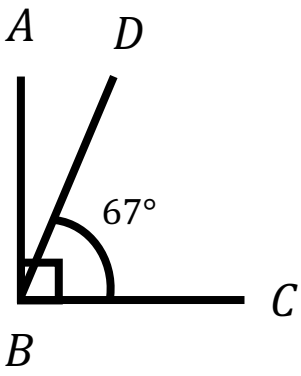

## Your Turn

Write down the values of:

$\angle DBC =$

$\angle ABC =$

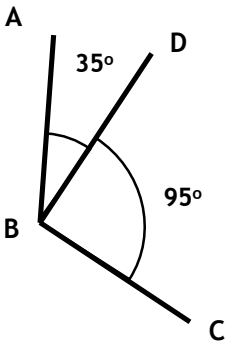
$\angle ABD =$

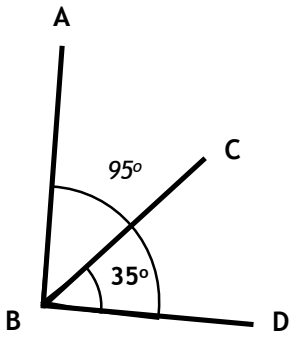


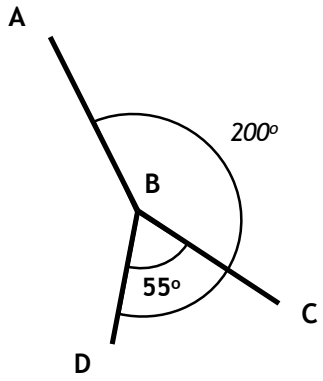
# Fluency Practice

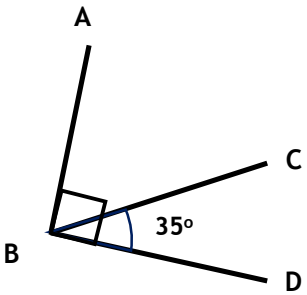
Find the value of ∠ABC (clockwise) in each diagram below

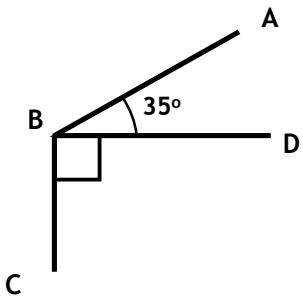
(Angles that intersect another line are labelled in *italics*)

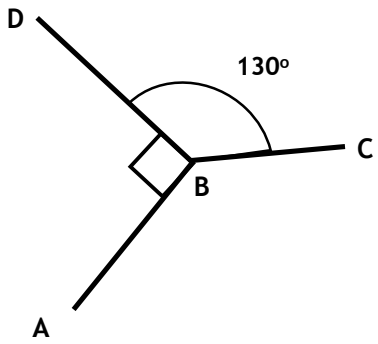


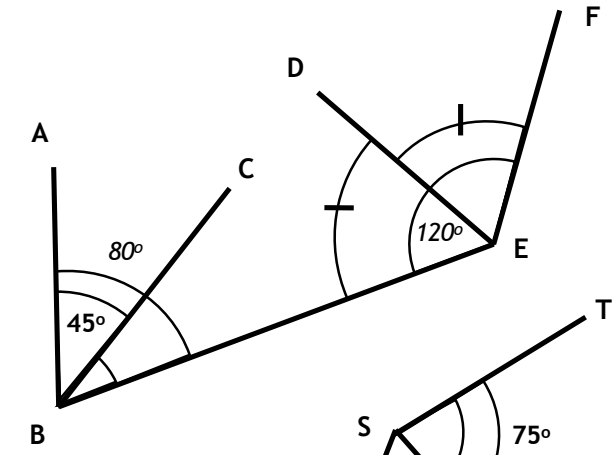



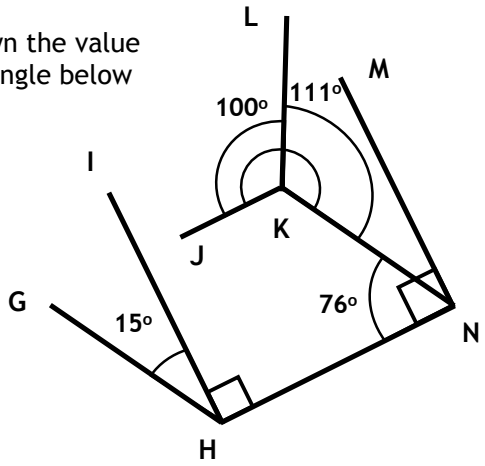



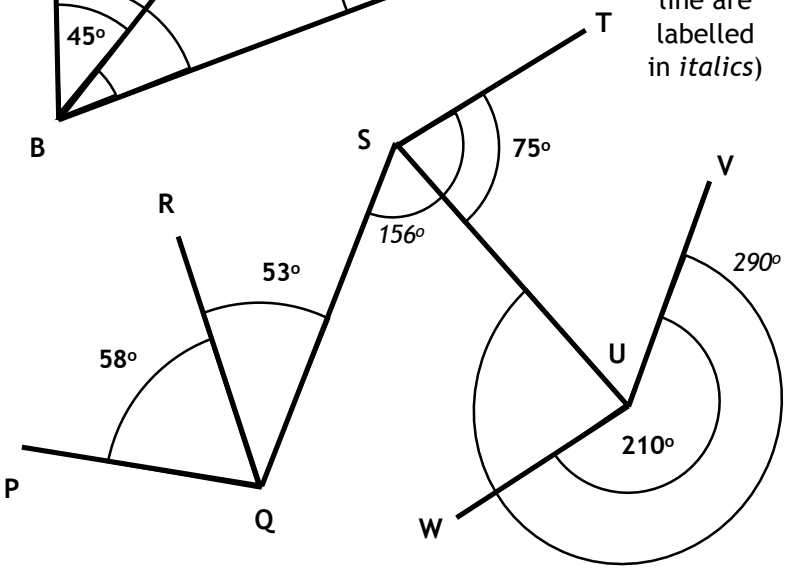
# Fluency Practice




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 = |

# Fluency Practice

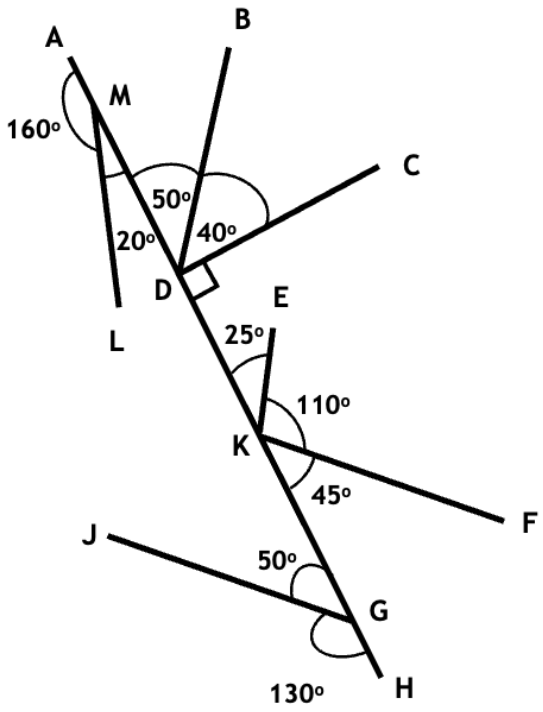



Diagram not to scale

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 = |

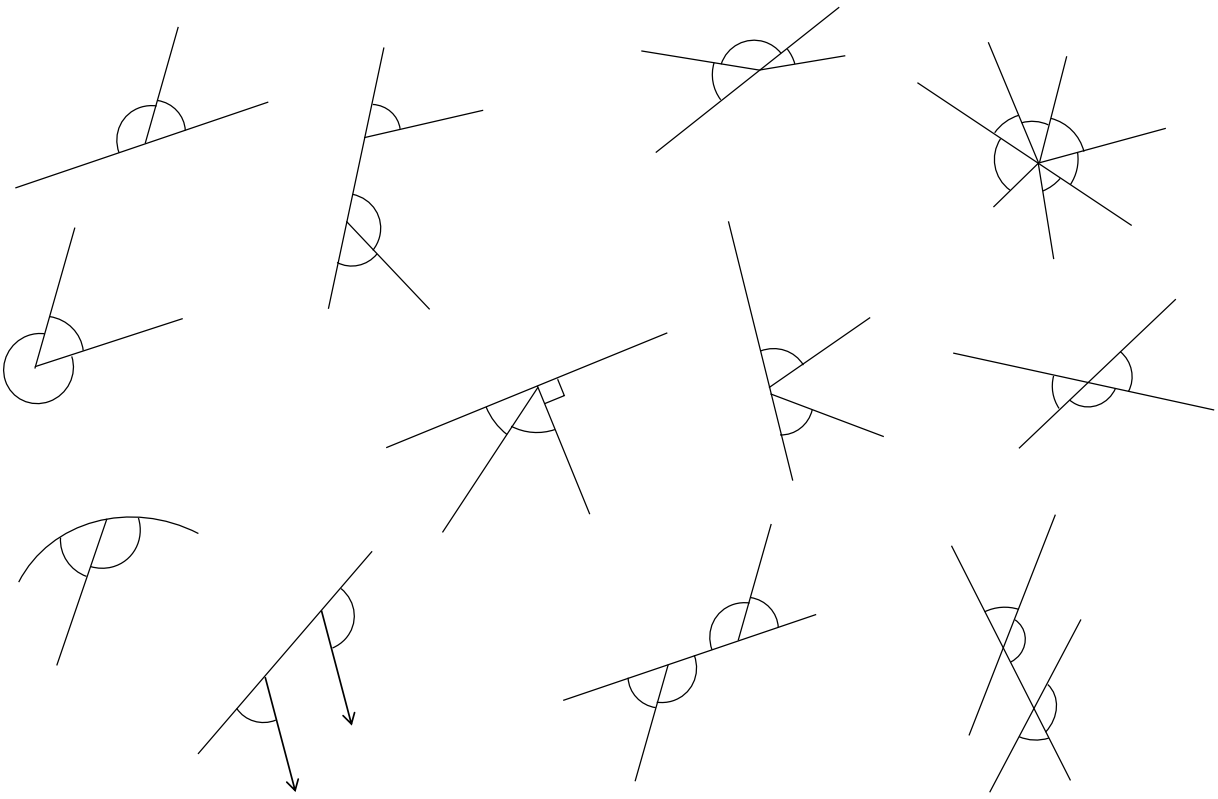
# 3.6 Angles on a Straight Line

In this section you will look at angles on a straight line.

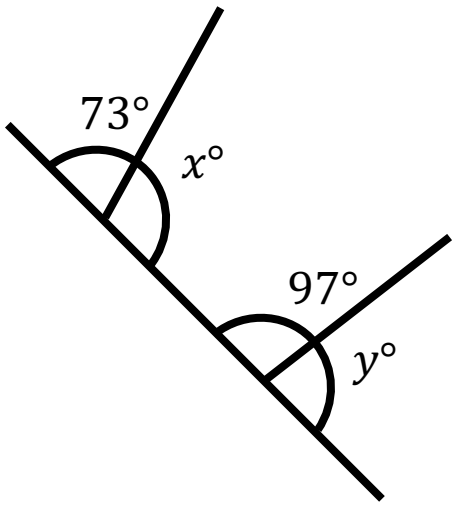
# Fluency Practice

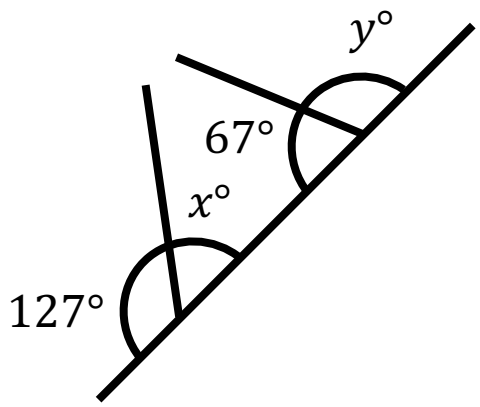
Highlight any angles that would add to 180°

Diagrams not drawn accurately

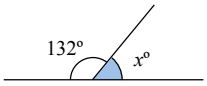
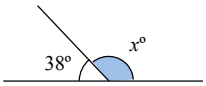
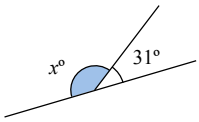
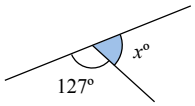
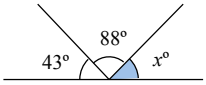
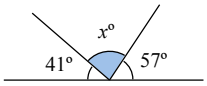
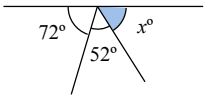
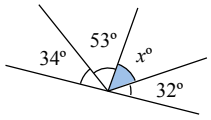
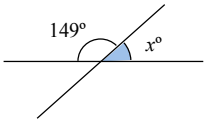
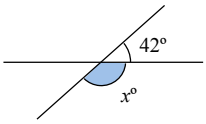
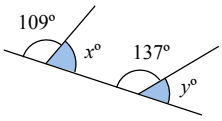
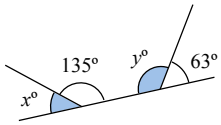


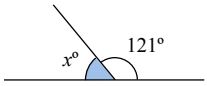
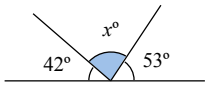
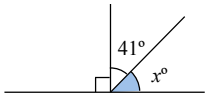
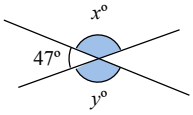
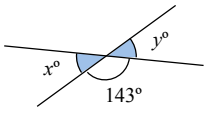
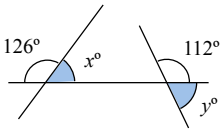
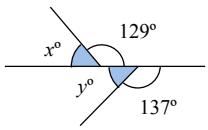
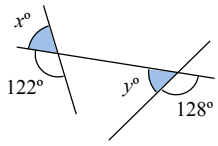
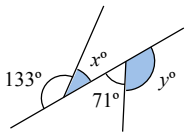
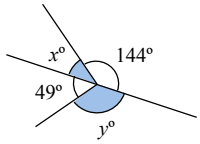
| Worked Example | Your Turn |
| --- | --- |
| Find the values of $x$ and $y$ | Find the values of $x$ and $y$ |



# Fluency Practice

| | | | |
|---|---|---|---|
| **A1** Find the value $x$<br>  | **A2** Find the value $x$<br>  | **A3** Find the value $x$<br>  | **A4** 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 $x$<br>  | **C2** Find the value $x$<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** 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>  |

# 3.7 Angles around a Point

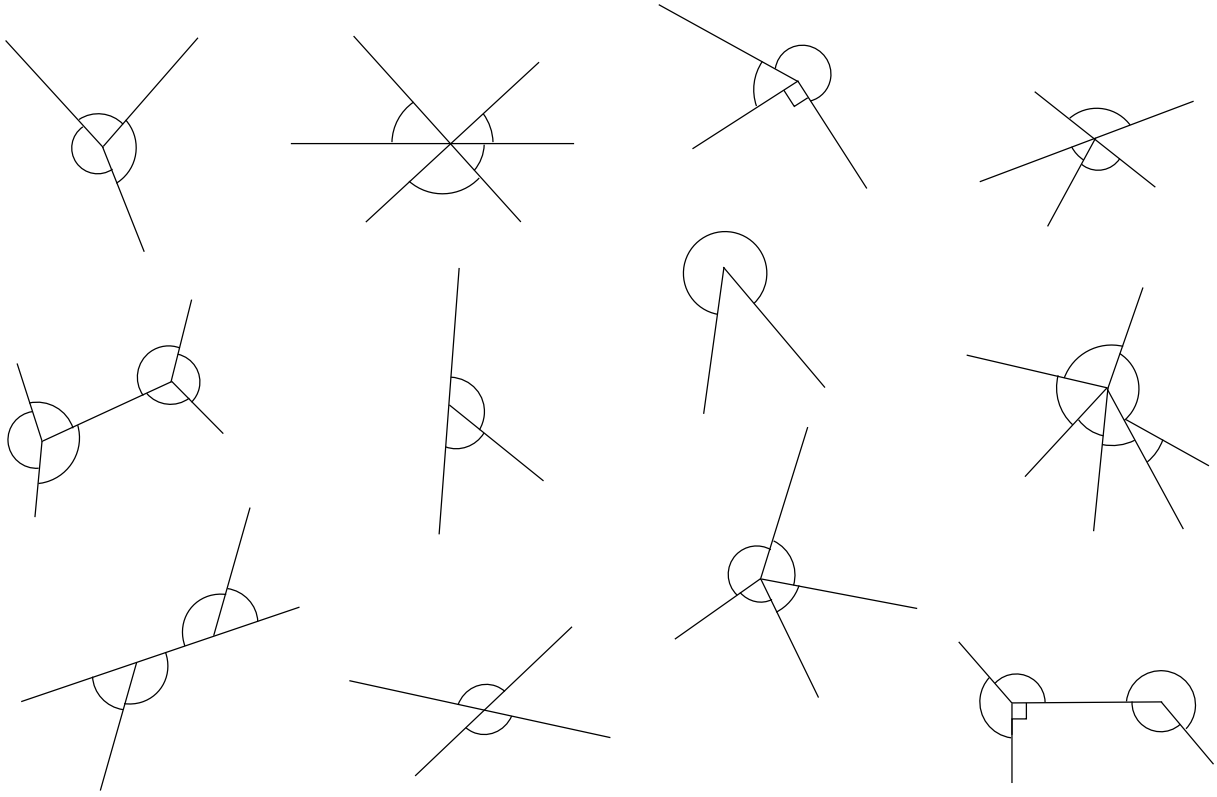
In this section you will look at angles around a point.

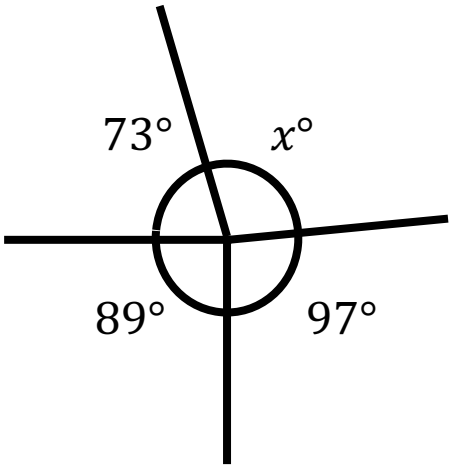
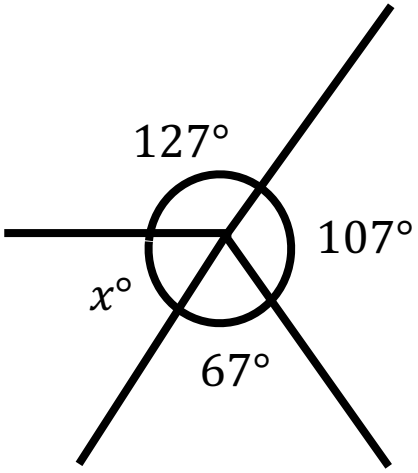
It is thought the number of degrees in a full turn came about due to the Ancient Persians having 360 days in their year.

# Fluency Practice

Highlight any angles that would add to 360°

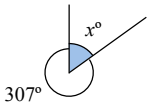
Diagrams not drawn accurately



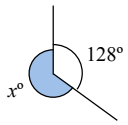
| Worked Example | Your Turn |
| --- | --- |
| Find the value of $x$ | Find the value of $x$ |
|   |   |

# Fluency Practice

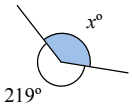
**A1** Find the value $x$



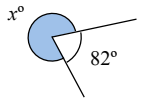

**A2** Find the value $x$



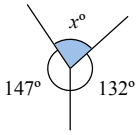

**A3** Find the value $x$



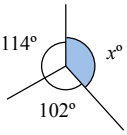

**A4** Find the value $x$



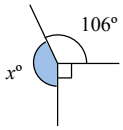

**B1** Find the value $x$



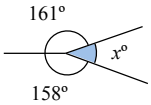

**B2** Find the value $x$



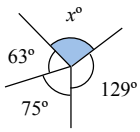

**B3** Find the value $x$



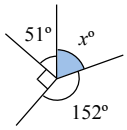

**B4** Find the value $x$



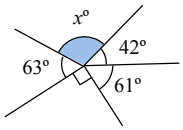

**C1** Find the value of $x$



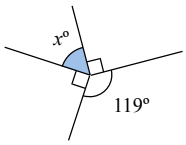

**C2** Find the value of $x$




**C3** Find the value of $x$




**C4** Find the value of $x$

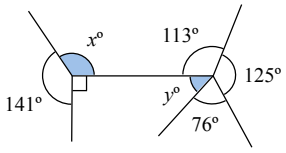



**A1** Three angles measure 97°, 145° and 118°.

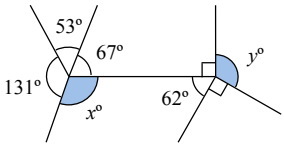
Do these three angles fit exactly around a point?

Explain your answer.

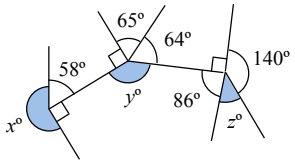
**A2** Find the values of $x$ and $y$



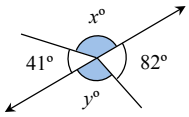

**A3** Find the values of $x$ and $y$



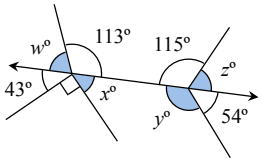

**A4** Find the values of $x$, $y$ and $z$




**B1** Find the values of $x$ and $y$



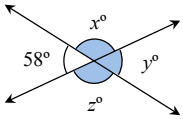

**B2** Find the values of $w$, $x$, $y$ and $z$



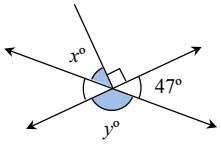

**B3** Five angles measure 78°, 95°, 113°, 162° and 187°.

Which of them can be put together to fit exactly around a point?

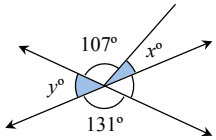
**B4** Find the values of $x$, $y$ and $z$



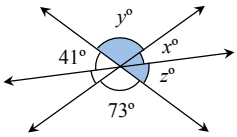

**C1** Find the values of $x$ and $y$



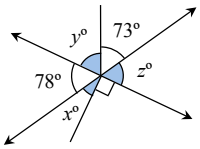

**C2** Find the values of $x$ and $y$




**C3** Find the values of $x$, $y$ and $z$




**C4** Find the values of $x$, $y$ and $z$



# 3.8 Vertically Opposite Angles

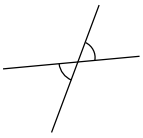
In this section you will look at vertically opposite angles.

Vertically opposite means opposite at a vertex.

# Fluency Practice

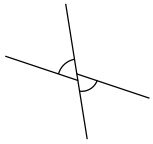
Decide which diagrams show vertically opposite angles

Diagrams not drawn accurately



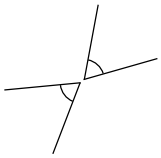
| | |
|---|---|
| Vertically Opposite | |
| Not Vertically Opposite | |
| Cannot Tell | |

Explain your reason



| | |
|---|---|
| Vertically Opposite | |
| Not Vertically Opposite | |
| Cannot Tell | |

Explain your reason

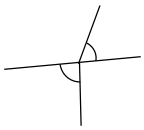


| | |
|---|---|
| Vertically Opposite | |
| Not Vertically Opposite | |
| Cannot Tell | |

Explain your reason

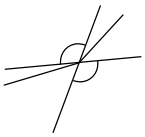
| | |
|---|---|
| Vertically Opposite | |
| Not Vertically Opposite | |
| Cannot Tell | |

Explain your reason



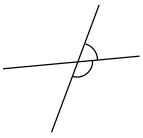
| | |
|---|---|
| Vertically Opposite | |
| Not Vertically Opposite | |
| Cannot Tell | |

Explain your reason



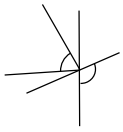
| | |
|---|---|
| Vertically Opposite | |
| Not Vertically Opposite | |
| Cannot Tell | |

Explain your reason



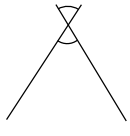
| | |
|---|---|
| Vertically Opposite | |
| Not Vertically Opposite | |
| Cannot Tell | |

Explain your reason



| | |
|---|---|
| Vertically Opposite | |
| Not Vertically Opposite | |
| Cannot Tell | |

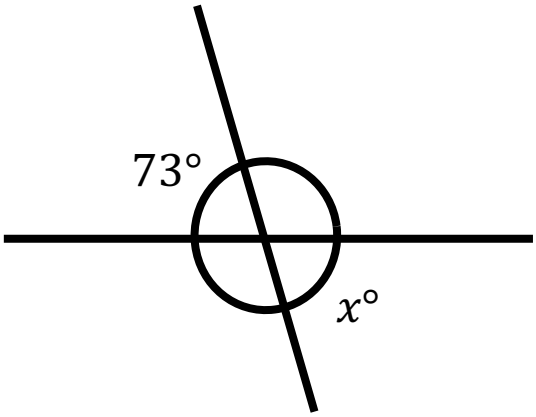
Explain your reason

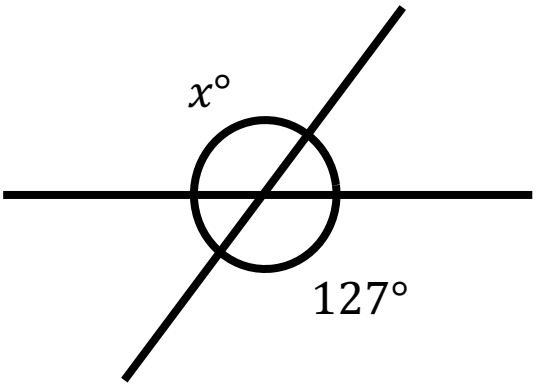


| | |
|---|---|
| Vertically Opposite | |
| Not Vertically Opposite | |
| Cannot Tell | |

Explain your reason

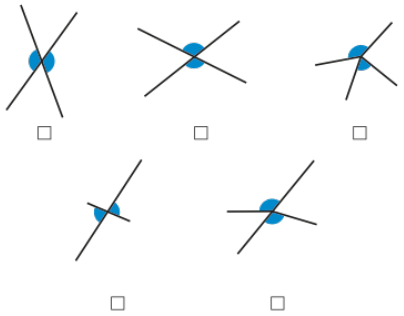
| Worked Example | Your Turn |
| --- | --- |
| Find the value of $x$ | Find the value of $x$ |



# 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.

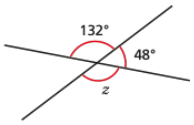
Give reasons for your answers.

**a)**

$y =$ ☐ because _____

_____

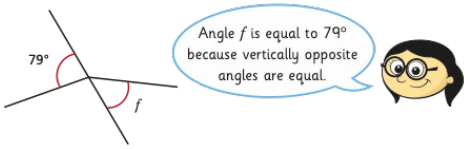
**b)**




$z =$ ☐ because _____

_____

**4** Annie is working out the size of angle $f$.




Do you agree with Annie? _____

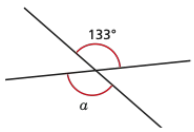
Explain your answer.

_____

_____

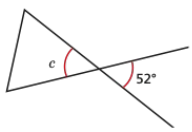
**5** Work out the unknown angles.

**a)**



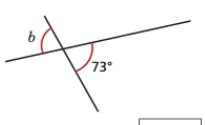

$a =$ ☐

**c)**



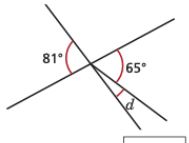

$c =$ ☐

**b)**



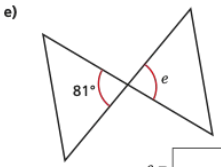

$b =$ ☐

**d)**



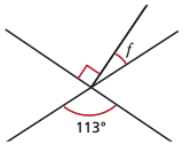

$d =$ ☐

**e)**




$e =$ ☐

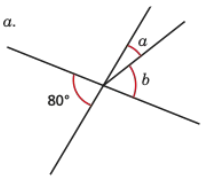
**f)**




$f =$ ☐

Talk about your reasons with a partner.

**6** Angle $b$ is three times the size of angle $a$.

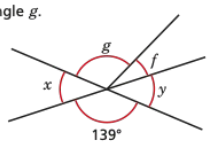



Work out the sizes of angles $a$ and $b$.

$a =$ ☐ $b =$ ☐

**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.

_____

_____

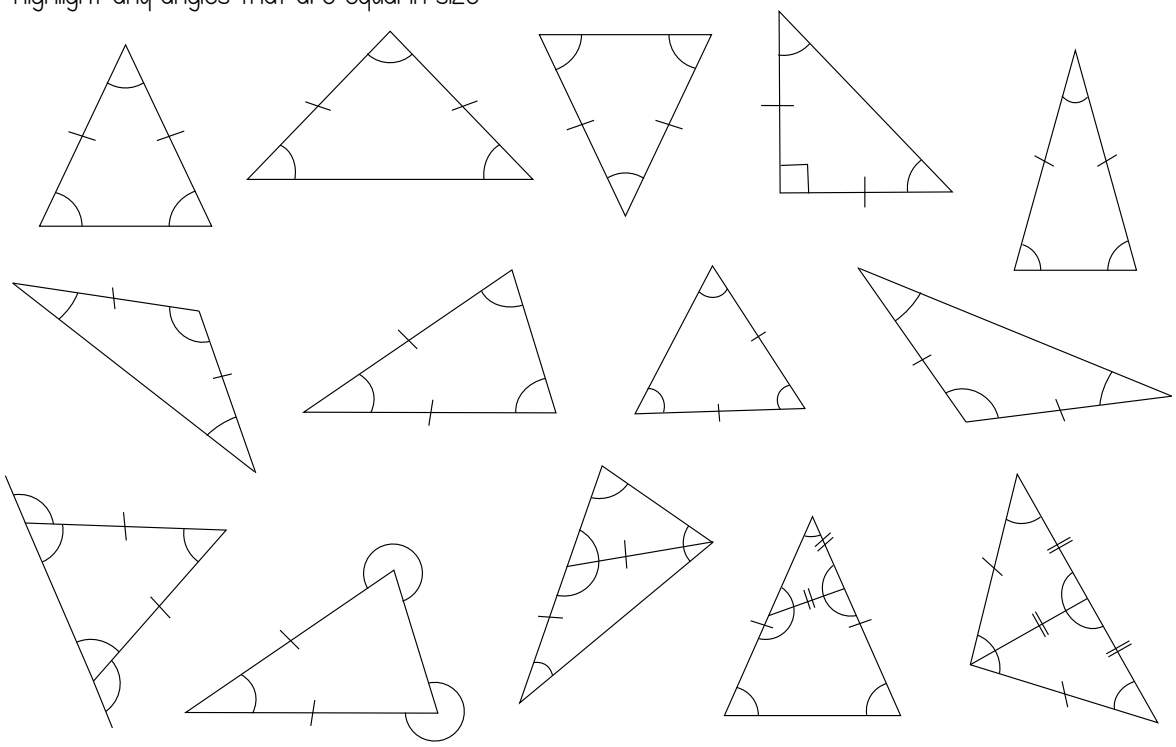
# 3.9 Angles in Triangles

In this section you will look at angles in triangles.

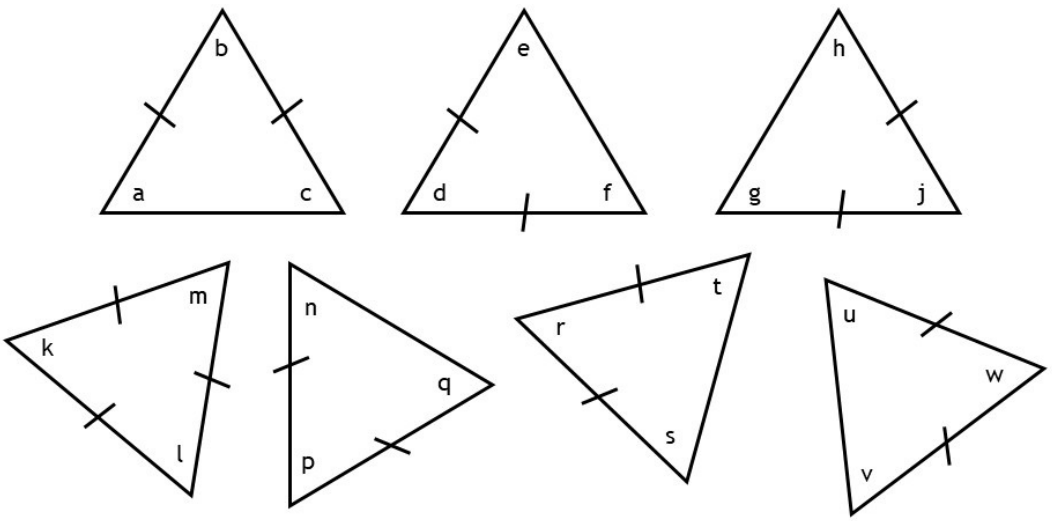
# Fluency Practice

Highlight any angles that are equal in size

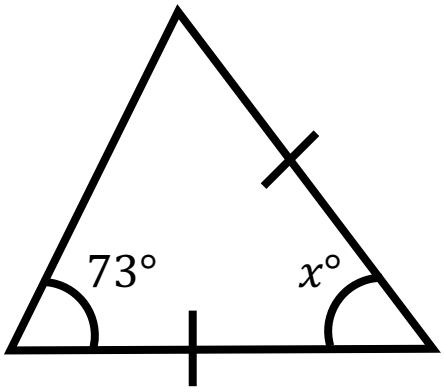
Diagrams are not drawn accurately

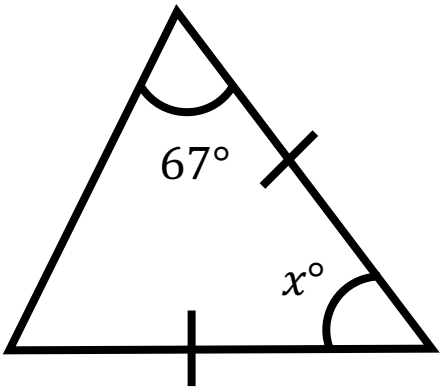


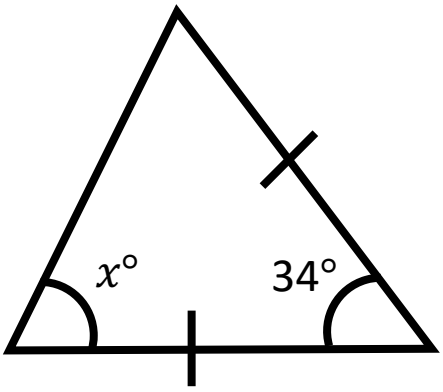
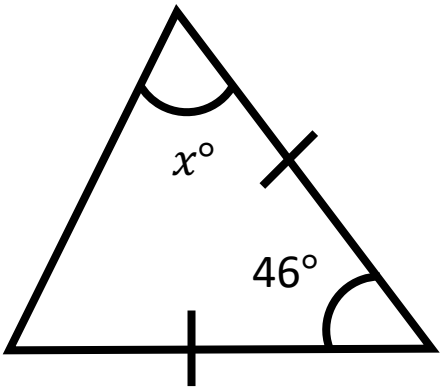
For each triangle, write down the letters of the angles with equal value.

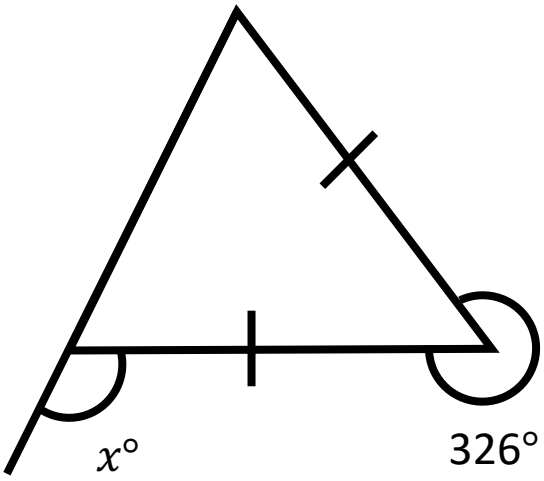
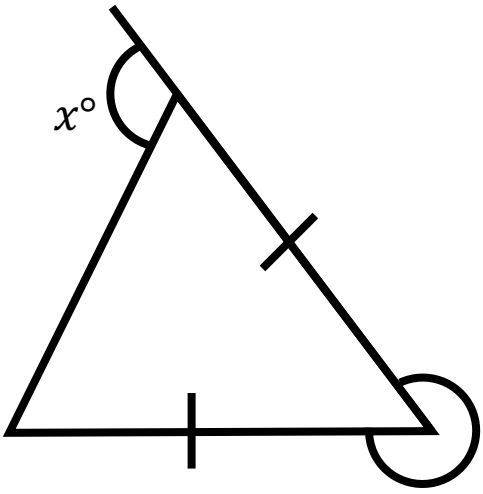


| Worked Example | Your Turn |
| --- | --- |
| Find the value of $x$ | Find the value of $x$ |



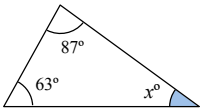



| Worked Example | Your Turn |
| --- | --- |
| Find the value of $x$ | Find the value of $x$ |
|   |   |

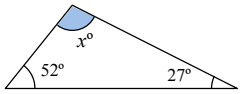
| Worked Example | Your Turn |
| --- | --- |
| Find the value of $x$   | Find the value of $x$   |

# Fluency Practice

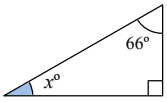
**A1** Work out the value of $x$.



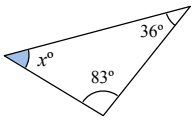

**A2** Work out the value of $x$.



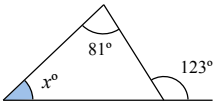

**A3** Work out the value of $x$.



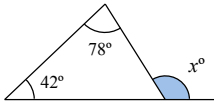

**A4** Work out the value of $x$.



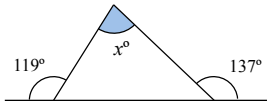

**B1** Work out the value of $x$.



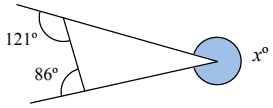

**B2** Work out the value of $x$.



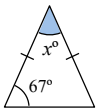

**B3** Work out the value of $x$.



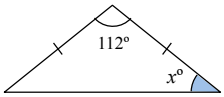

**B4** Work out the value of $x$.



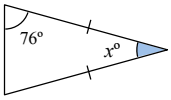

**C1** Work out the value of $x$.



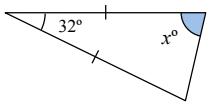

**C2** Work out the value of $x$.



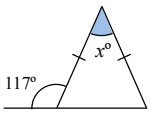

**C3** Work out the value of $x$.



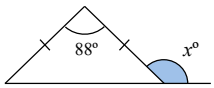

**C4** Work out the value of $x$.



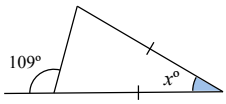

**D1** Work out the value of $x$.



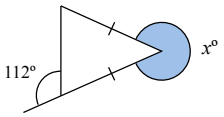

**D2** Work out the value of $x$.



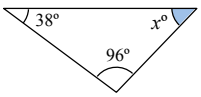

**D3** Work out the value of $x$.



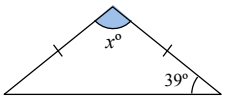

**D4** Work out the value of $x$.



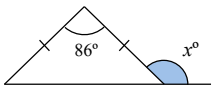

**A1** Work out the value of $x$.



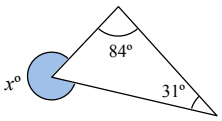

**A2** Work out the value of $x$.



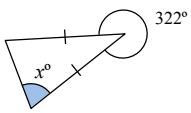

**A3** Work out the value of $x$.



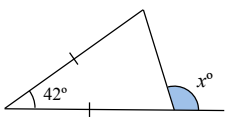

**A4** Work out the value of $x$.



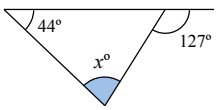

**B1** Work out the value of $x$.



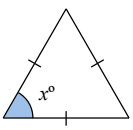

**B2** Work out the value of $x$.



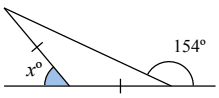

**B3** Work out the value of $x$.



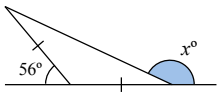

**B4** Work out the value of $x$.



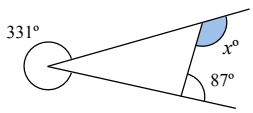

**C1** Work out the value of $x$.



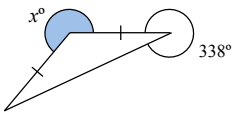

**C2** Work out the value of $x$



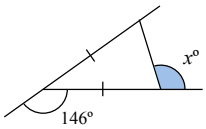

**C3** Work out the value of $x$.



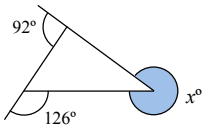

**C4** Work out the value of $x$.



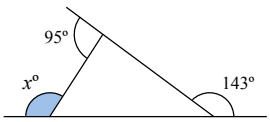

**D1** Work out the value of $x$.



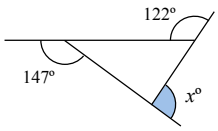

**D2** Work out the value of $x$.



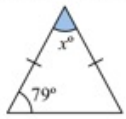
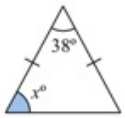
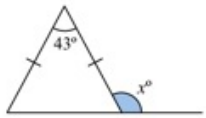
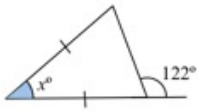
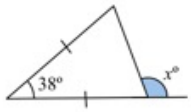
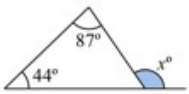
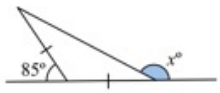
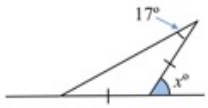
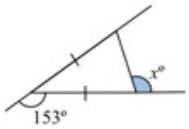
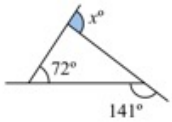

**D3** Work out the value of $x$.




**D4** Work out the value of $x$.

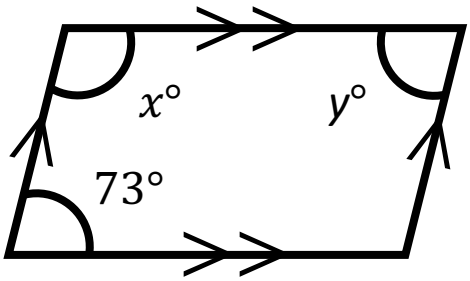
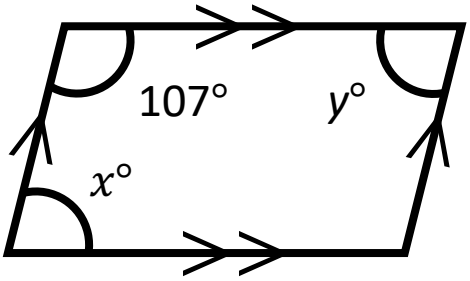


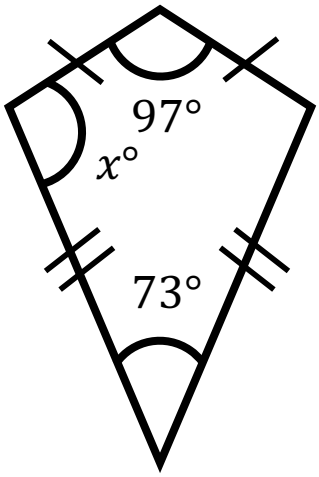
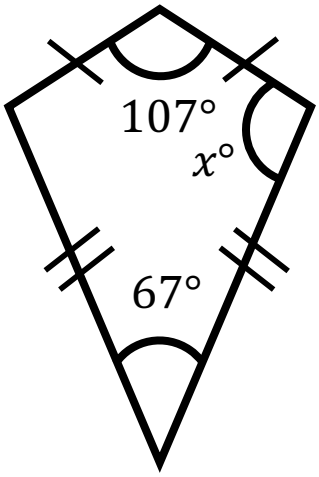
# Fluency Practice

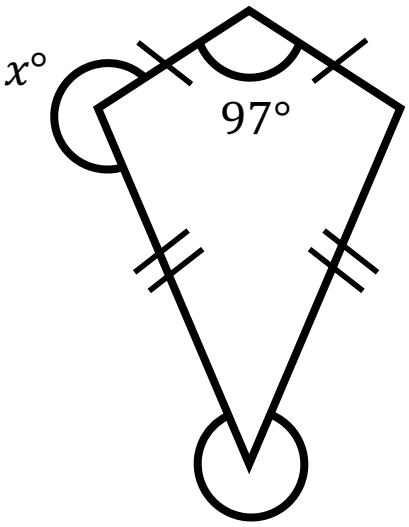
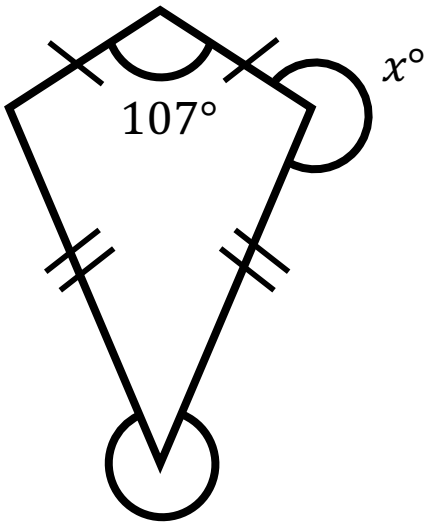
| | | | |
|---|---|---|---|
| **A1** Work out the value of $x$.<br>  | **A2** Work out the value of $x$.<br>  | **A3** Work out the value of $x$.<br> | **A4** Work out the value of $x$.<br>  |
| **B1** Work out the value of $x$.<br>  | **B2** Work out the value of $x$.<br>  | **B3** Work out the value 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> |

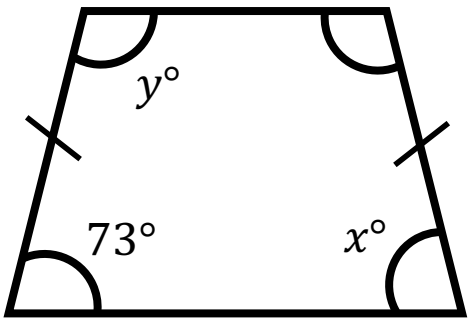
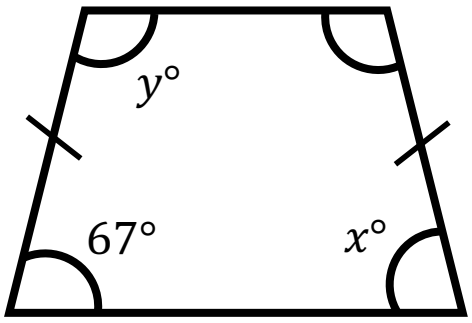
# 3.10 Angles in Quadrilaterals

In this section you will look at angles in quadrilaterals.

| Worked Example | Your Turn |
| --- | --- |
| Find the values of $x$ and $y$ | Find the values of $x$ and $y$ |
|   |   |

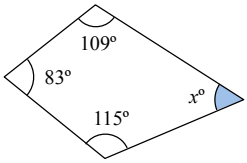
| Worked Example | Your Turn |
| --- | --- |
| Find the value of $x$ | Find the value of $x$ |
|   |   |

| Worked Example | Your Turn |
| --- | --- |
| Find the value of $x$ | Find the value of $x$ |
|  |  |

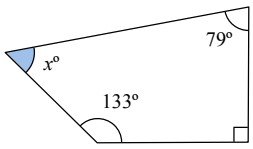
| Worked Example | Your Turn |
| --- | --- |
| Find the values of $x$ and $y$ | Find the values of $x$ and $y$ |
|   |   |

# Fluency Practice

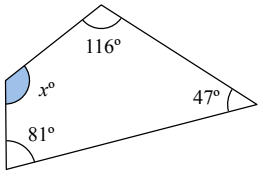
**A1** Work out the value of $x$



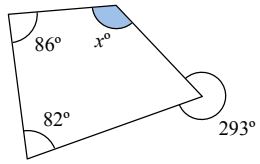

**A2** Work out the value of $x$



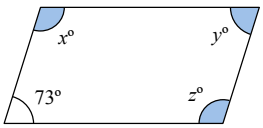

**A3** Work out the value of $x$




**A4** Work out the value of $x$

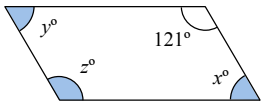



**B1** This is a parallelogram.



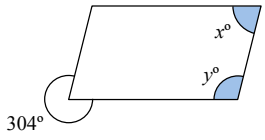

Work out the values of $x$, $y$ and $z$

**B2** This is a parallelogram.



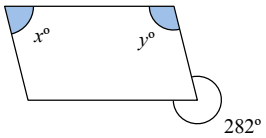

Work out the values of $x$, $y$ and $z$

**B3** This is a parallelogram.



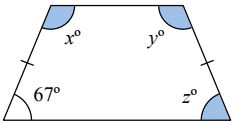

Work out the values of $x$ and $y$

**B4** This is a parallelogram.



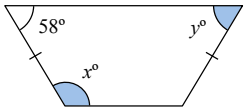

Work out the values of $x$ and $y$

**C1** This is an isosceles trapezium.



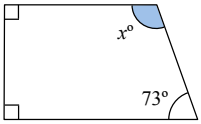

Work out the values of $x$, $y$ and $z$

**C2** This is an isosceles trapezium.



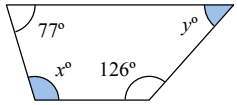

Work out the values of $x$ and $y$

**C3** This is a trapezium.



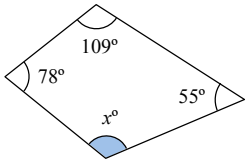

Work out the value of $x$

**C4** This is a trapezium.



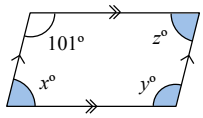

Work out the values of $x$ and $y$

**A1** This quadrilateral is irregular



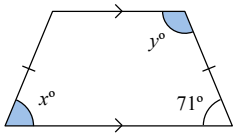

Work out the value of $x$

**A2** This is a parallelogram.



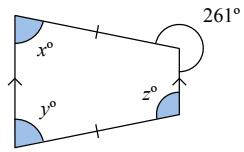

Work out the values of $x$, $y$ and $z$

**A3** This is an isosceles trapezium.



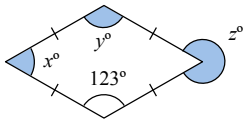

Work out the values of $x$ and $y$

**A4** This is an isosceles trapezium.



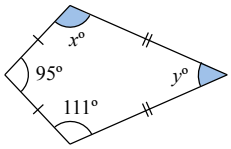

Work out the values of $x$, $y$ and $z$

**B1** This is a rhombus.



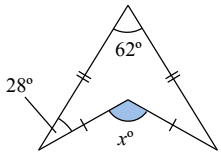

Work out the values of $x$, $y$ and $z$

**B2** This is a kite.



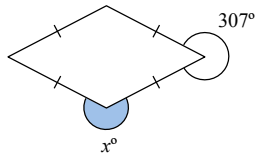

Work out the values of $x$ and $y$

**B3** This is an arrowhead (delta).



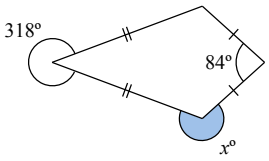

Work out the value of $x$

**B4** This is a rhombus.



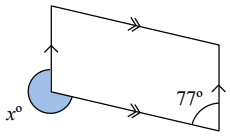

Work out the value of $x$

**C1** This is a kite.



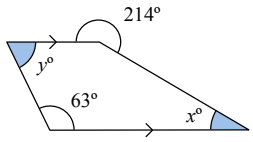

Work out the value of $x$

**C2** This is a parallelogram.



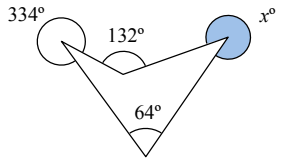

Work out the value of $x$

**C3** This is a trapezium.




Work out the values of $x$ and $y$

**C4** This quadrilateral is irregular.




Work out the value of $x$