Year 7
Mathematics
Unit 3 – Student

Name: _____

Class: _____

Contents

1 Rounding and Approximation

An approximation is anything that is similar, but not exactly equal, to something else. A number can be approximated by rounding.

- Numbers are said to “round up” or “round down” depending on whether they get bigger or smaller.

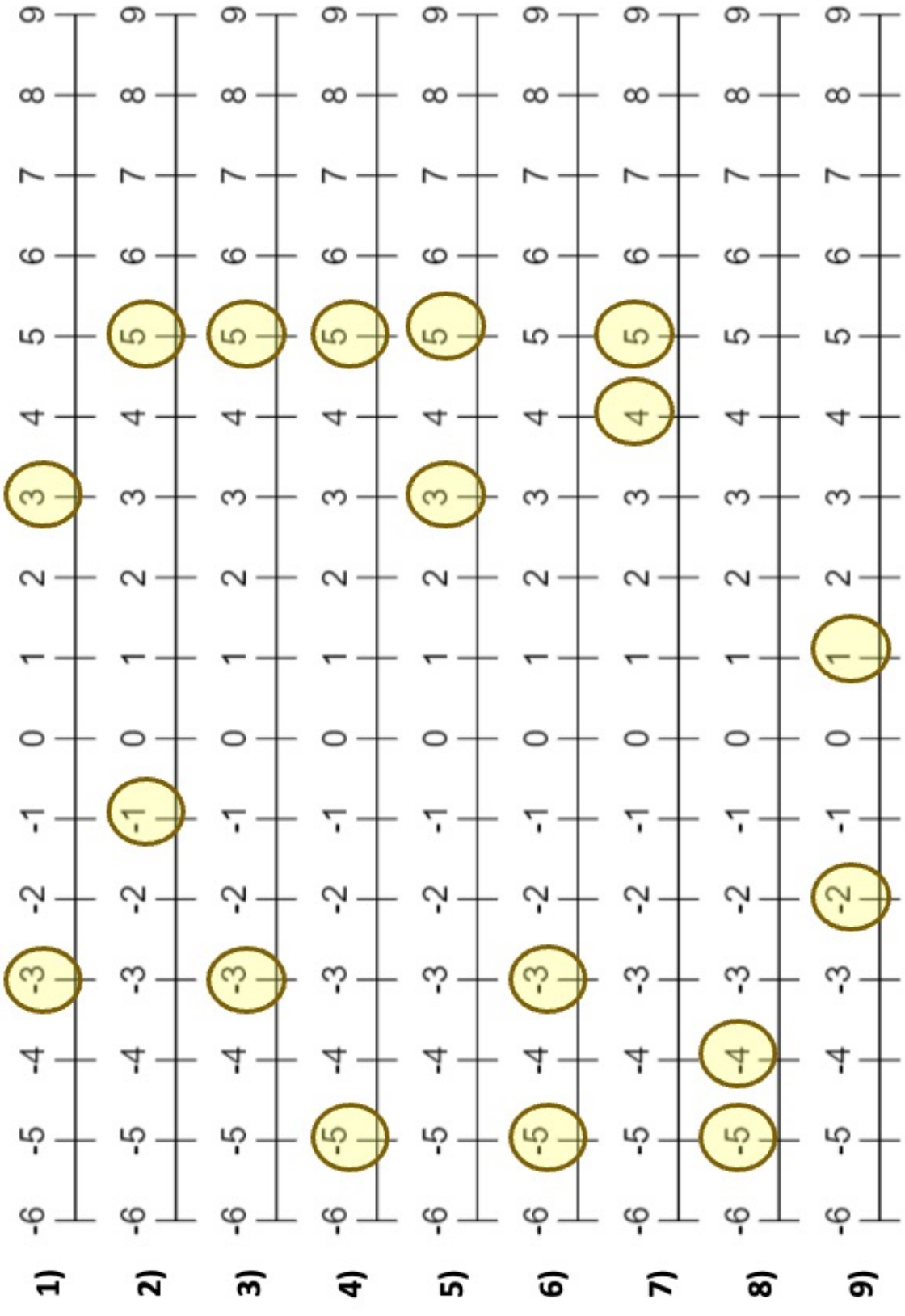
- By convention, numbers halfway between two values are rounded up.

1.1 Midpoint of Two Numbers

In case of numbers, a midpoint is a number that is exactly in between the two numbers. You can find the midpoint by adding both the numbers and dividing it by two, i.e., the average of the two numbers.

Intelligent Practice

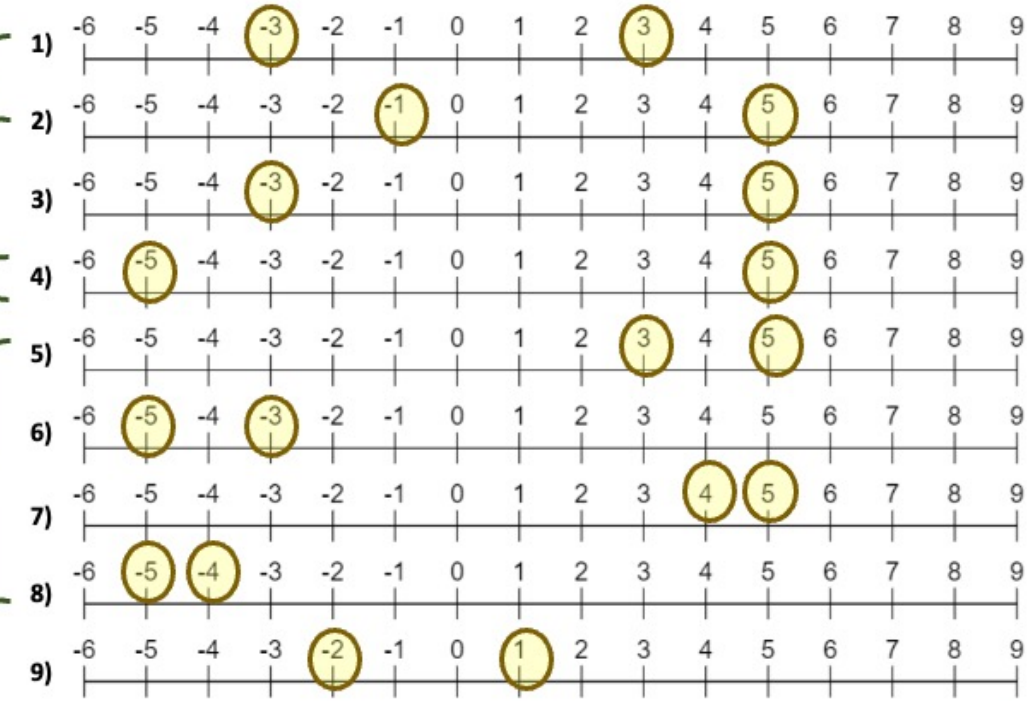
Find the midpoints of the circled numbers on each number line.



If I add two to each number, I'll add two to their midpoint – What about if I double each number?

Why is there a difference of 1 in the answers to 2 and 3 even though one of the numbers has been decreased by 2? Why is the answer to question 3 itself a midpoint of the answers to questions 1 and 2?

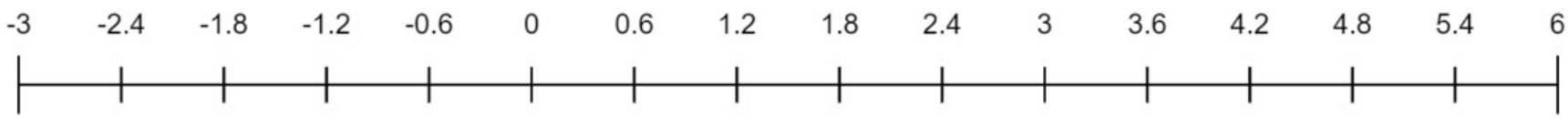
How does question 4 relate to question 1?



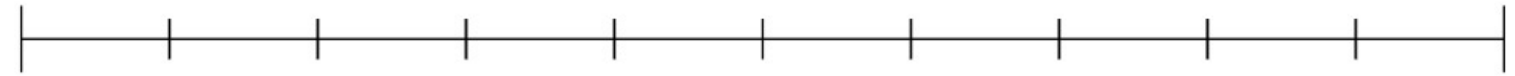
Why is the answer to number 8 -4.5 when the midpoint is 0.5 further on that 4? How do questions 7 and 8 relate to questions 5 and 6??

Do you think this question is easier than finding the midpoint of 3 and 6? If so, why? If not, why not?

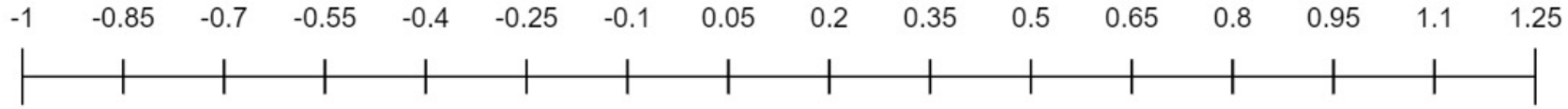
A



B



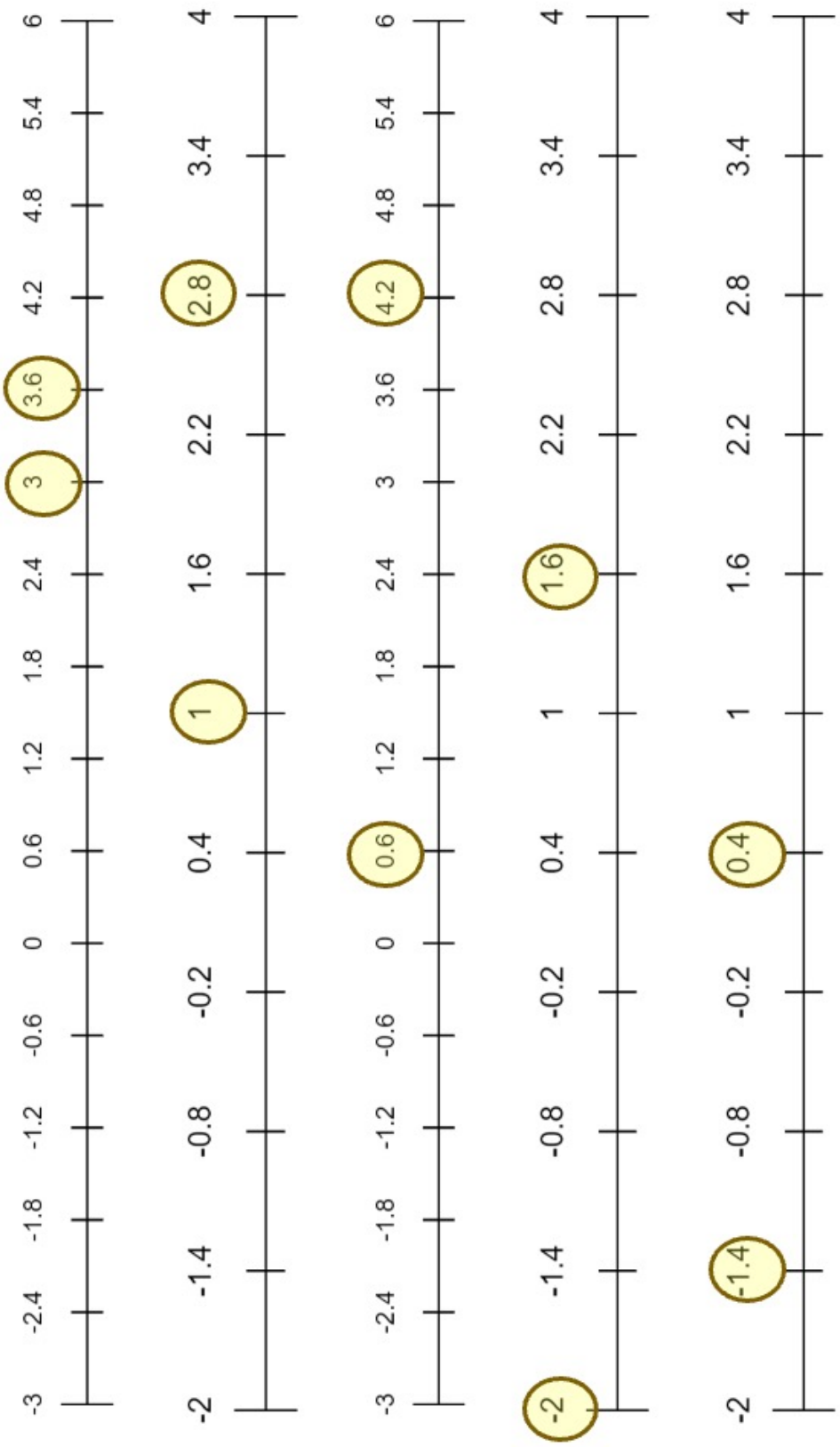
C



Each of these number lines could be described as the 'odd one out' of the three. Why?

Intelligent Practice

Find the midpoints of the circled numbers on each number line.



1.2 Rounding to the Nearest Multiple

It is important to think about how accurately numbers are needed in different contexts. For example, football crowds to the nearest 1000 or country populations to the nearest $1\ 000\ 000$.

Worked Example	Your Turn
Round 63 to the nearest: 10 2 3	Round 65 to the nearest: 10 2 3

Intelligent Practice

Round:

1) 73 to the nearest 1
2) 73 to the nearest 10
3) 73 to the nearest 100
4) 73 to the nearest 50
5) 73 to the nearest 25
6) 73 to the nearest 5
7) 73 to the nearest 2
8) 73 to the nearest 4
9) 73 to the nearest 3
10) 73 to the nearest 0.5
11) 73 to the nearest 1.5
12) 73 to the nearest 7.3

Round:

1) 75 to the nearest 1
2) 75 to the nearest 10
3) 75 to the nearest 100
4) 75 to the nearest 50
5) 75 to the nearest 25
6) 75 to the nearest 5
7) 75 to the nearest 2
8) 75 to the nearest 4
9) 75 to the nearest 3
10) 75 to the nearest 0.5
11) 75 to the nearest 1.5
12) 75 to the nearest 7.5

Intelligent Practice

1) Round 17 to the nearest 6.

2) Round 17 to the nearest 8.

3) Round 17 to the nearest 5.

4) Round 17 to the nearest 2.

5) Round 59 to the nearest 7.

6) Round 58 to the nearest 7.

7) Round 60 to the nearest 7.

8) Round 61 to the nearest 7.

9) Round 53 to the nearest 5.

10) Round 53 to the nearest 11.

11) Round -7 to the nearest 3.

12) Round -12 to the nearest 5.

13) Round -3.987 to the nearest 5.

14) Round -3.987 to the nearest 8.

15) A number has been rounded to 20 to the nearest

10. What are the integers values for this number?

16) A number has been rounded to 20 to the nearest 5.

What are the integers values for this number?

17) A number has been rounded to 20 to the nearest 4.

What are the integers values for this number?

18) A number has been rounded to 20 to the nearest 6.

How do you know a mistake has been made?

Intelligent Practice

What would be a midpoint if I were rounding to the nearest 10? Nearest 100? Nearest 348?

1) Round 17 to the nearest 6.
2) Round 17 to the nearest 8.
3) Round 17 to the nearest 5.
4) Round 17 to the nearest 2.

How does this change as we round 17 to different numbers?

At which point did you recognise that you need to use the same number line for these questions?

5) Round 59 to the nearest 7.
6) Round 58 to the nearest 7.
7) Round 60 to the nearest 7.
8) Round 61 to the nearest 7.

Why do both of these have the same question and answer even though they're rounding to different numbers? Write another pair of questions that do this.

9) Round 53 to the nearest 5.
10) Round 53 to the nearest 11.

At which point did you recognise that you need to use the same number line for these questions?

11) Round -7 to the nearest 3.
12) Round -12 to the nearest 5.
13) Round -3.987 to the nearest 5.
14) Round -3.987 to the nearest 8.

Did this question round up or down to zero? How does this compare to 3.987 to the nearest 8? Why does this happen?

Did you recognise that we'd done this before when it was in amongst other questions?

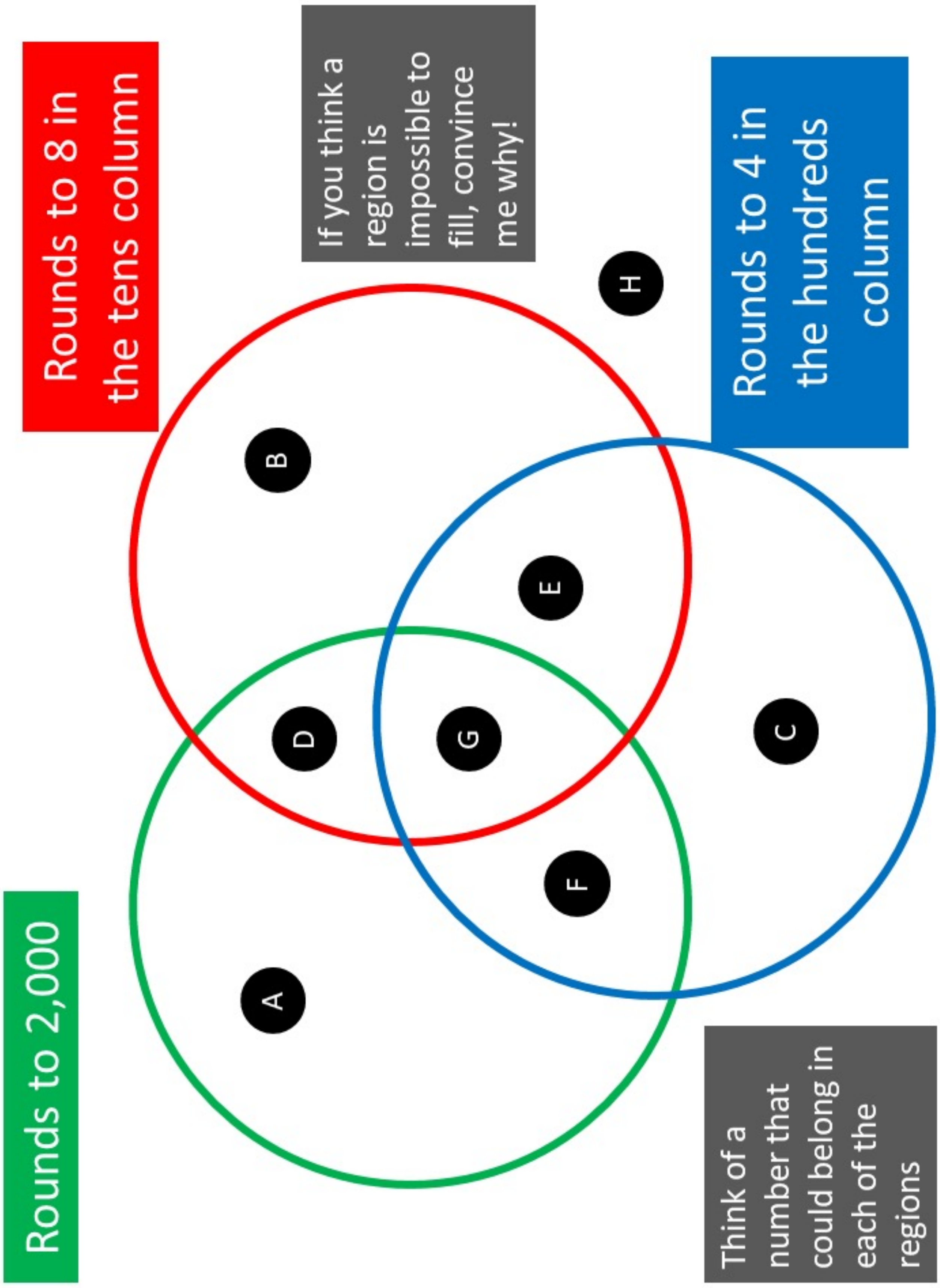
15) A number has been rounded to 20 to the nearest 10. What is the range of integer values for the number?
16) A number has been rounded to 20 to the nearest 5.
What is the range of integer values for the number?

How is it possible that these both have the same answer even though we're rounding the same number to different things?

17) A number has been rounded to 20 to the nearest 4. What is the range of integer values for the number?
18) A number has been rounded to 20 to the nearest 6.
How do you know a mistake has been made?

If we know this for rounding a number to the nearest 6, what would this means for rounding to the nearest 10? The nearest 100? The nearest 348?

Maths Venns


Rounds to 8 in the tens column
If you think a region is impossible to fill, convince me why!
Rounds to 4 in the hundreds column
Rounds to 2,000
Think of a number that could belong in each of the regions
A
B
C
D
E
F
G
H

1.3 Rounding to Decimal Places

Step 1: Imagine underlining up to the required accuracy, counting from the decimal point.

Step 2: Look at the number after the last underlined. If 5 or more, we increase the last number by 1 (ensure you propagate left any carries).

Step 3: Check that you have actually given the number to the required accuracy (if it is 1dp, then ensure there is one digit after the decimal point even if it is a zero).

Worked Example	Your Turn
Round 8.7337 to: 1 decimal place	Round 8.3773 to: 1 decimal place
2 decimal places	2 decimal places
3 decimal places	3 decimal places

Worked Example	Your Turn
Round 0.0337 to: 1 decimal place	Round 0.0377 to: 1 decimal place
2 decimal places	2 decimal places
3 decimal places	3 decimal places

Worked Example	Your Turn
Round 8.7339 to: 1 decimal place	Round 8.3779 to: 1 decimal place
2 decimal places	2 decimal places
3 decimal places	3 decimal places

Intelligent Practice

Number	1 decimal place	2 decimal places	3 decimal places
0.1234			
0.2345			
0.3456			
0.4567			
0.04567			
0.40567			
0.45067			
9.45067			
9.45967			
9.95967			

Purposeful Practice

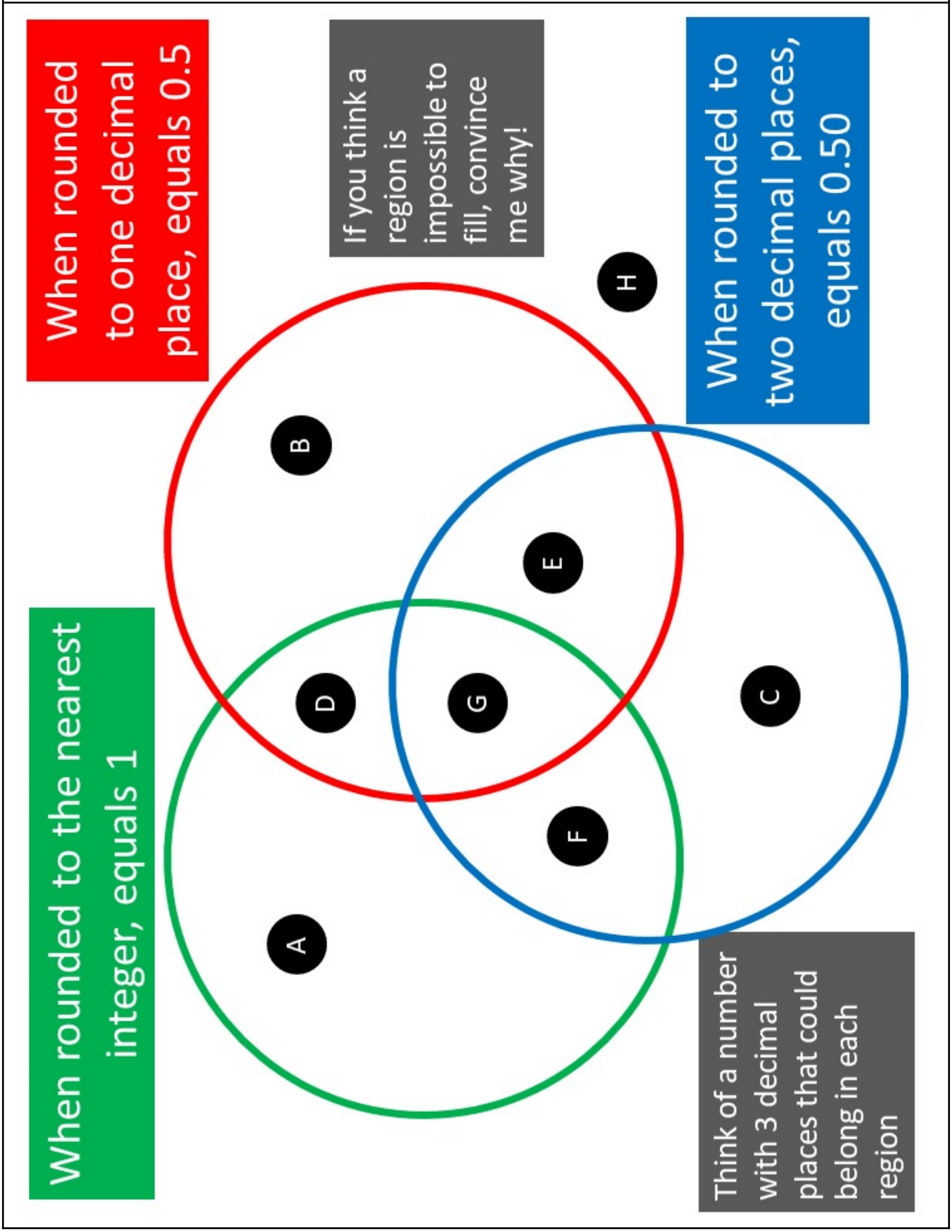
Rounding Square Roots

Use a calculator to find the square root of the number x each time.
Round your answers to 3 dp, 2 dp, 1 dp and to the nearest integer.
Round from the *original answer* each time and not from your previous rounding.

x	$\sqrt{x}$ (as on calculator)	3 dp	2 dp	1 dp	nearest integer
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

How many square roots are equal to 1 when rounded to the nearest integer?
How many round to 2?
How many round to 3?
Is there a pattern? How many do you think would round to 20?

Maths Venns


When rounded to one decimal place, equals 0.5
If you think a region is impossible to fill, convince me why!
When rounded to two decimal places, equals 0.50
When rounded to the nearest integer, equals 1
Think of a number with 3 decimal places that could belong in each region
A
B
C
D
E
F
G
H

1.4 Significant Figures

Suppose it is your 11^{th} birthday party and 16439 people attend. If you were casually saying to someone how many people came, what figure might you quote?

We might say 16000 people came.

We seem to have taken '2 digits' of accuracy. However, unlike 2dp, where we would count 2 digits from the decimal point, we are counting digits from the start of the number. We say we have rounded to 2 significant figures.

This is exactly the same as rounding to decimal places, except:

(a) We start counting from **the first non-zero digit** (not the decimal point).

(b) We have to 'zero-out' any digits before the decimal point not used (otherwise we would have changed the place value of the digits we kept).

Worked Example

Circle the 2nd significant figure:

7 8 0 0

7 0 0 8

7 . 0 0 8

0 . 0 0 7 8

0 . 7 0 0 8

Your Turn

Circle the 2nd significant figure:

1) 4 5 6

2) 4 0 6

3) 4 0 0

4) 4 0 0 0

5) 4 5 0 0

6) 4 5 0 6

7) 4 5 . 0 6

8) 4 . 5 0 6

9) 0 . 4 5 0 6

10) 0 . 0 4 5 0 6

11) 0 . 0 0 4 5 0 6

12) 0 . 0 0 4 0 0 6

13) 3 . 0 0 4 0 0 6

14) 0 . 3 0 4 0 0 6

Worked Example

1) 8 Number of significant figures $=$

2) 0.8 Number of significant figures $=$

3) 800 Number of significant figures $=$

4) 0.800 Number of significant figures $=$

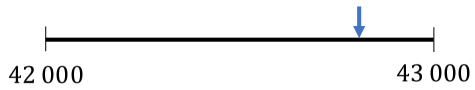
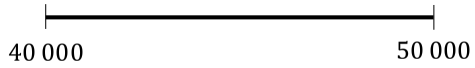
5) 0.008 Number of significant figures $=$

Your Turn

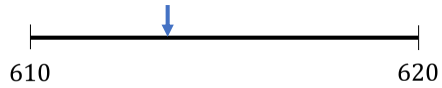
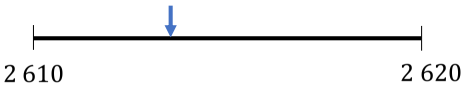
1) 456 Number of significant figures =
2) 450 Number of significant figures =
3) 406 Number of significant figures =
4) 400 Number of significant figures =
5) 40 Number of significant figures =
6) 4 Number of significant figures =
7) 0.4 Number of significant figures =
8) 0.40 Number of significant figures =
9) 0.04 Number of significant figures =
10) 0.004 Number of significant figures =
11) 0.00456 Number of significant figures =
12) 0.456 Number of significant figures =
13) 0.406 Number of significant figures =
14) 0.450 Number of significant figures =
15) 0.4500 Number of significant figures =
16) 0.45006 Number of significant figures =
17) 0.450067 Number of significant figures =
18) 450067 Number of significant figures =
19) 45067 Number of significant figures =
20) 4506.7 Number of significant figures =
21) 450.67 Number of significant figures =
22) 45.067 Number of significant figures =
23) 45.0067 Number of significant figures =
24) 4.50067 Number of significant figures =
25) 4.00067 Number of significant figures =
26) 0.00067 Number of significant figures =
27) 0.0067 Number of significant figures =
28) 6.0007 Number of significant figures =
29) 0.6007 Number of significant figures =
30) 0.0607 Number of significant figures =

Worked Example	Your Turn
Round 271828 to: 1 significant figure 2 significant figures 3 significant figures	Round 738906 to: 1 significant figure 2 significant figures 3 significant figures

Fill in the Gaps

Original Number	Round to ___ significant figure	Place value of that significant figure	Original Number on Number line	Round up or down?	Answer
42 850	2	1 000		Up	43 000
42 850	1	10 000			
42 850	3	100			
40 850	3				
40 950	3				
40 950	2				
563 814		1 000			
563 814		100 000			

Fill in the Gaps

Original Number	Round to ___ significant figure	Place value of that significant figure	Original Number on Number line	Round up or down?	Answer
614					
2 614					
3 649					3 600
3 999					4 000
				Up	28 000
				Down	28 000
					1 700

For which questions could you have more than one answer? For each of these explain the types of answers allowed and not allowed.

Worked Example	Your Turn
Round 2.71828 to: 1 significant figure	Round 7.38906 to: 1 significant figure
2 significant figures	2 significant figures
3 significant figures	3 significant figures

Worked Example	Your Turn
Round 0.00271828 to: 1 significant figure	Round 0.00738906 to: 1 significant figure
2 significant figures	2 significant figures
3 significant figures	3 significant figures

Worked Example	Your Turn
Round 0.00279999 to: 1 significant figure	Round 0.00739999 to: 1 significant figure
2 significant figures	2 significant figures
3 significant figures	3 significant figures

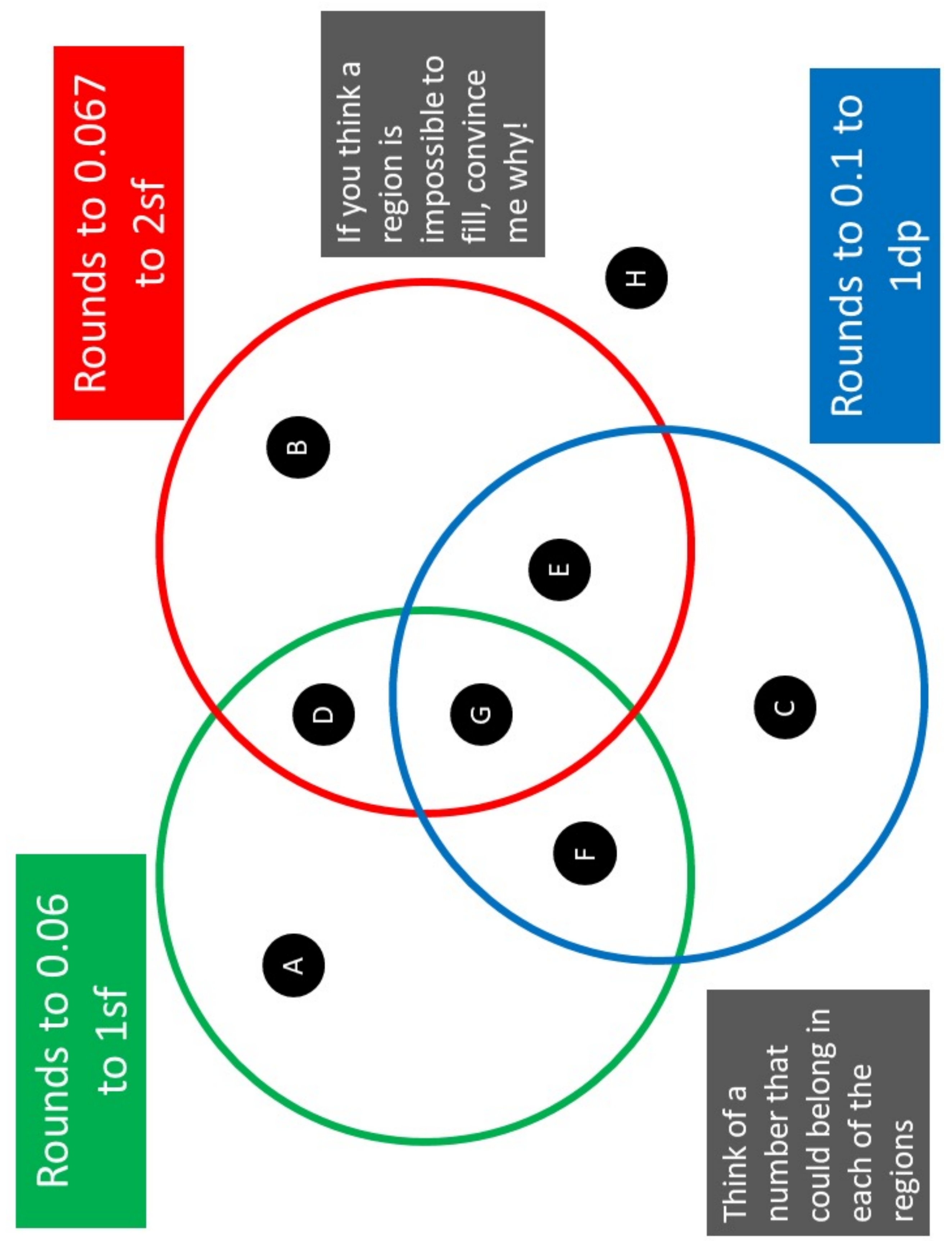
Fluency Practice

Number	Rounded to 1 significant figure	Rounded to 2 significant figures	Rounded to 3 significant figures
1254			
59287			
699721			
0.3451			
0.005231			
0.050554			
0.050999			

Extension

A number is rounded to 1sf to 1000. How many possible integers could the original number have been?

Maths Venns



Rounds to 0.067 to 2sf
If you think a region is impossible to fill, convince me why!
Rounds to 0.1 to 1dp
Rounds to 0.06 to 1sf
Think of a number that could belong in each of the regions
A
B
C
D
E
F
G
H

1.5 Review and Problem Solving

Fluency Practice

(1) Complete this table, rounding each number to appropriate degree of accuracy.

Number	Nearest 10	Nearest 100	Nearest 1000
56	*60*	*100*	*0*
75			
123			
149			
152			
501			
753			
1204			
3428			
5007			
6043			
8989			

Fluency Practice

(2) Complete this table, rounding each number to appropriate degree of accuracy.

Number	1 decimal place	2 decimal places	3 decimal places
5.6	*6.0*	*5.60*	*5.600*
7.5			
1.23			
1.49			
0.152			
1.5015			
1.2753			
0.1204			
2.3428			
12.5007			
1.6043			
9.9899			

Fluency Practice

Number	1dp	2dp	1sf	2sf	3sf
123.456					
144.402					
8888.888					
437.3946					
987.654					
3 809 830.492					
1.98043					
4.80808					
99.009900					

Rounding and Place Value Digit Problems

You have 6 cards with digits on them and a card with a decimal point.

0	0	0	4	5	6	.

Arrange the cards with no trailing zeros to have the following:

Two of the answers have the same solution, can you predict which ones they will be before you start the task?

The largest number with 3 significant figures							
The number closest to 1							
The number closest to $\frac{5}{100}$							
The number closest to a square number							
The largest number with four significant figures							
The smallest number with five significant figures							
The number closest to 0.005							
The highest number that rounds to 0.4							
The number closest to $\frac{4}{10}$							
The number closest to 0.004							
The number closest to an integer							

1.6 Estimations

Calculating an approximate answer to a calculation by rounding the numbers used in the calculation prior to carrying out the calculation.

- Typically, number used in the calculation will be rounded to 1 significant figure.
- The result of the calculation will be close to the actual real answer.
- Do not forget to use the correct notation: $\approx$ ‘approximately equal to’

Worked Example	Your Turn
Estimate: (a) $409 + 571$ (b) $\frac{409+571}{0.53}$ (c) $\frac{409+571}{0.53-0.11}$	Estimate: (a) $593 + 401$ (b) $\frac{593+401}{0.47}$ (c) $\frac{593+401}{0.47-0.13}$

Intelligent Practice

1) $211 + 317 \approx$

2) $317 + 211 \approx$

3) $317 + 21.1 \approx$

4) $317 + 2.11 \approx$

5) $317 + 0.211 \approx$

6) $317 \times 0.211 \approx$

7) $317 \times 0.47 \approx$

8) $317 \div 0.47 \approx$

9) $\frac{317}{0.47} \approx$

10) $\frac{317+211}{0.47} \approx$

11) $\frac{317+211}{0.47-0.29} \approx$

12) $\frac{3.17+2.11}{0.47-0.29} \approx$

13) $\frac{0.47-0.29}{3.17+2.11} \approx$

14) $\frac{0.29-0.47}{3.17+2.11} \approx$

Worked Example	Your Turn
Estimate: a) $354 \div 6.9$ b) $\sqrt{17} \times 14$	Estimate: a) $357 \div 8.9$ b) $\frac{\sqrt{150}}{3}$

Fluency Practice

1) $681 \times 42 \approx$

2) $78 \times 722 \approx$

3) $232 \times 494 \approx$

4) $722 \div 9.3 \approx$

5) $6344 \div 7.21 \approx$

6) $1421 \div 72.3 \approx$

7) $\sqrt{17} \times \sqrt{24} \approx$

8) $\sqrt{142} \times \sqrt{99} \approx$

9) $\sqrt{121} \times 5.23 \approx$

10) $2.345 \times 9.873 \approx$

11) $5.745 \times 0.9873 \approx$

12) $4.796 \times 0.56 \approx$

13) $12 \times 34 \times 56 \approx$

14) $29 \times 41 \times 79 \approx$

15) $13 \times 4.7 \times 0.42 \approx$

16) $\frac{84 \times 91}{2.3} \approx$

17) $\frac{67}{0.52} \approx$

18) $\frac{55 \times 31}{5.3 \times 3.78} \approx$

Exam Questions

Estimate the value of

$$\frac{68\times 401}{198}$$

Work out an estimate for

$$\frac{10.1\times 29.7}{5.9-3.1}$$

Work out an estimate for the value of

$$\frac{5.79\times 312}{0.523}$$

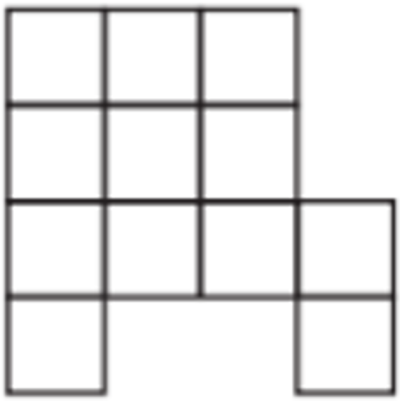
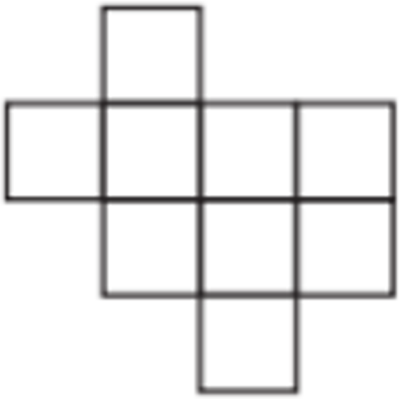
Work out an estimate for the value of

$$\frac{6.8\times 191}{0.051}$$

2 Area and Perimeter

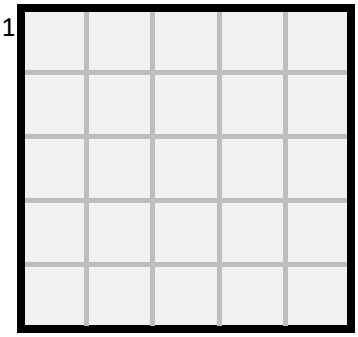
2.1 Perimeter on a Grid

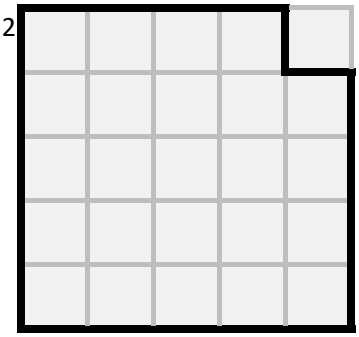
The perimeter is the total distance around the edge of a 2D shape.

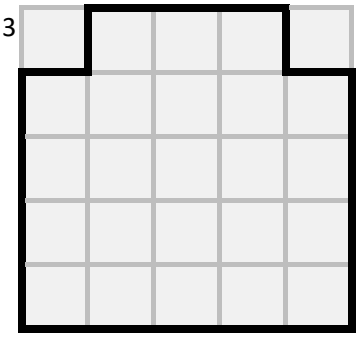
Worked Example	Your Turn
Calculate the perimeter of the shape below: 	Calculate the perimeter of the shape below: 

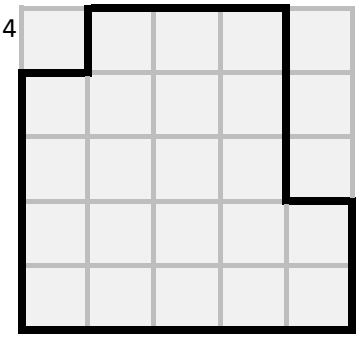
Intelligent Practice

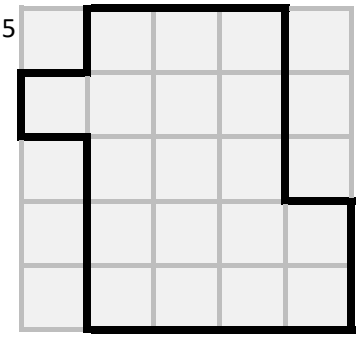
In each question, a section of the shape gets nibbled away. Find the perimeter of each shape.

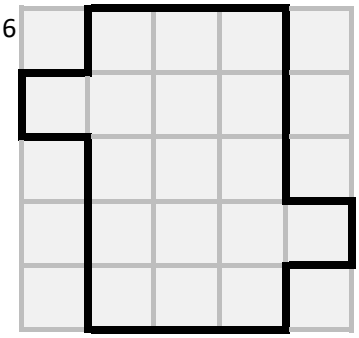
1 

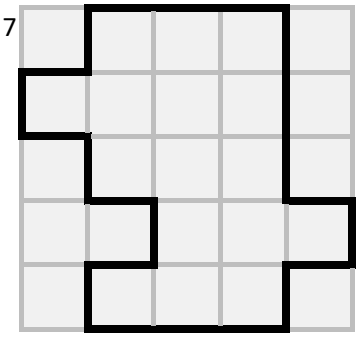
2 

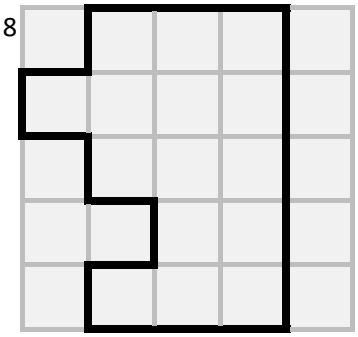
3 

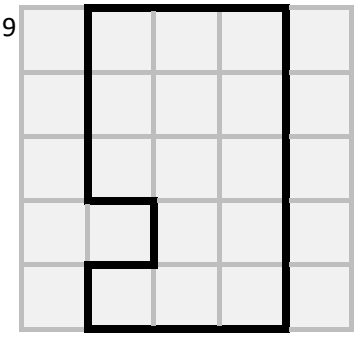
4 

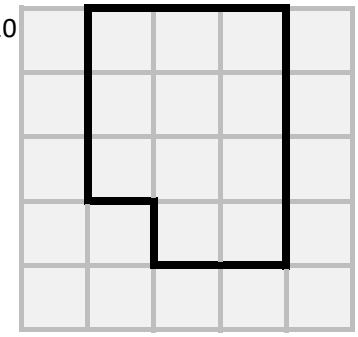
5 

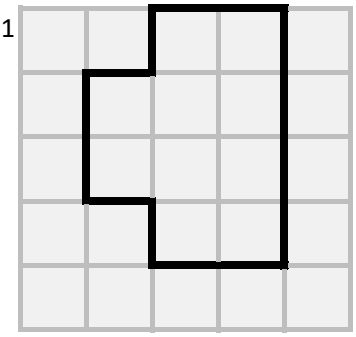
6 

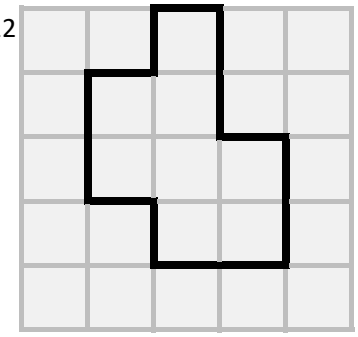
7 

8 

9 

10 

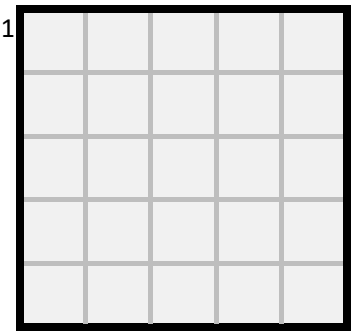
11 

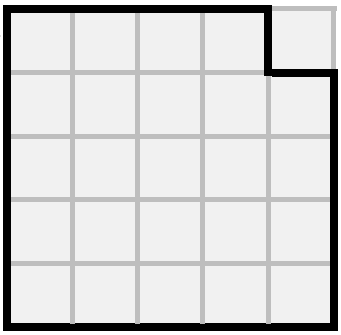
12 

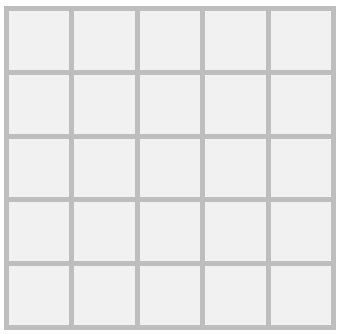
Intelligent Practice

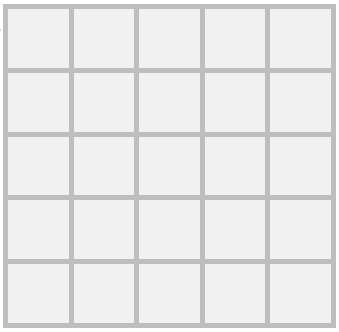
For each question, nibble off one square

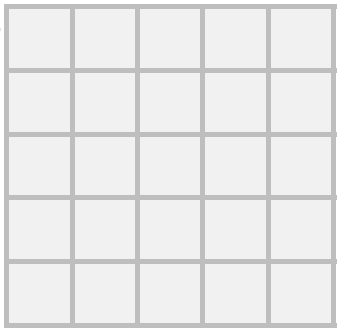
each time but keep the same perimeter

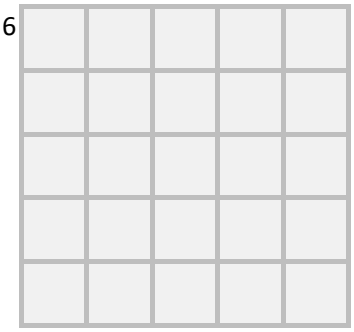
1 

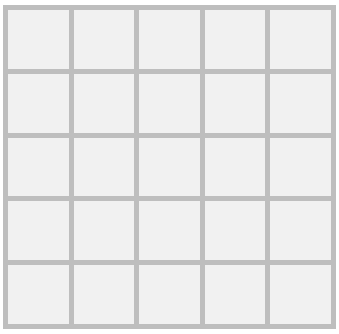
2 

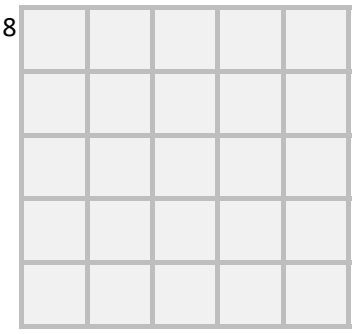
3 

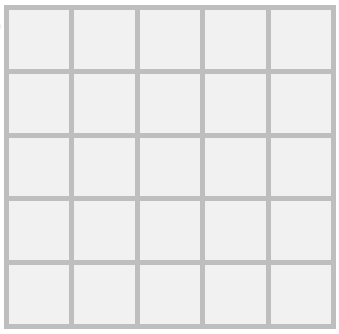
4 

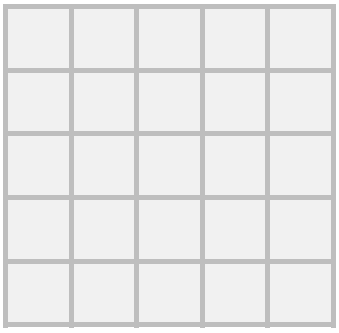
5 

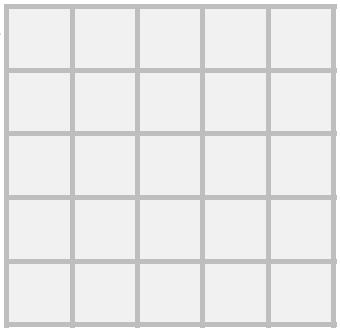
6 

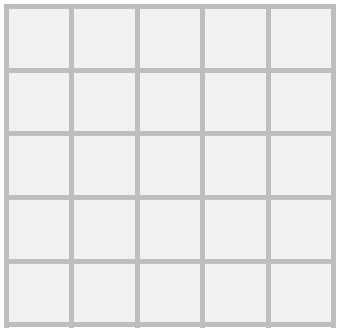
7 

8 

9 

10 

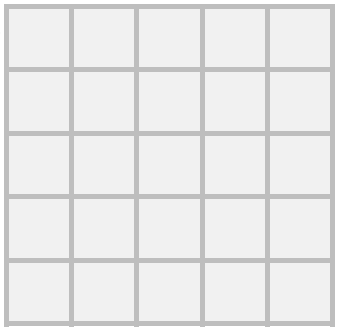
11 

12 

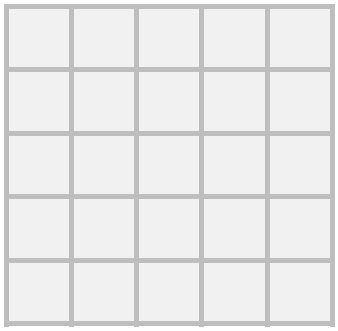
Intelligent Practice

For each question, draw a shape using the following instructions on the grids below

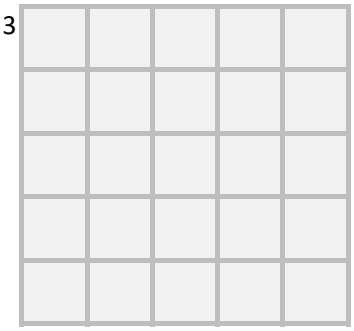
1) Draw a shape where the value of the perimeter is more than the number of squares used.

1 

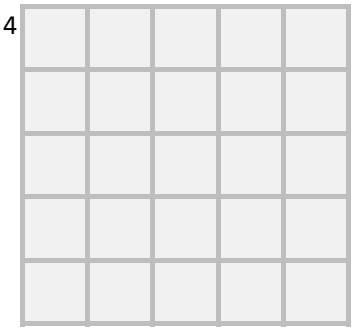
2) Draw a shape where the value of the perimeter is less than the number of squares used.

2 

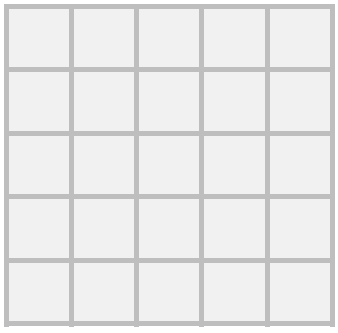
3) Draw a shape where the value of the perimeter is equal to the number of squares used.

3 

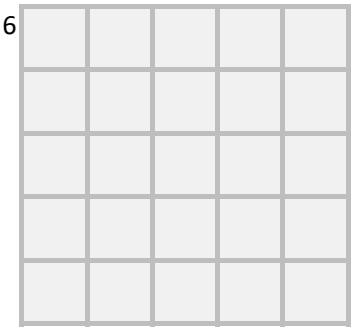
4) Draw a shape where the value of the perimeter is three times larger the number of squares used.

4 

5) Draw a shape where the value of the perimeter is twice as large the number of squares used.

5 

6) The largest perimeter you can make on a 5 by 5 grid has a length of 34. Draw a shape with a perimeter of 34 units.

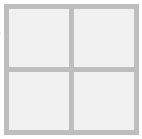
6 

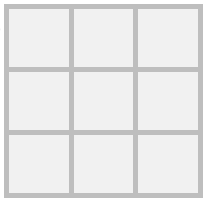
Intelligent Practice

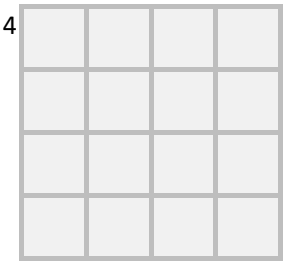
For each grey grid, find the maximum

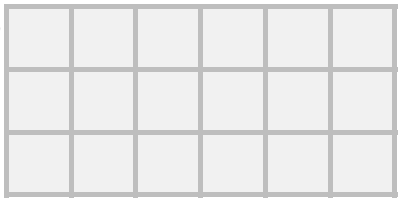
perimeter shape that will fit inside it

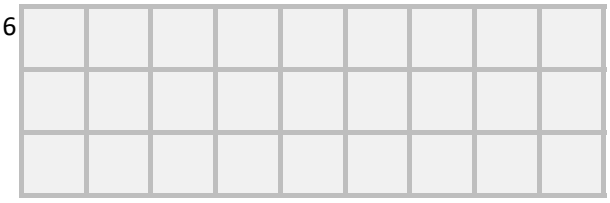
1 

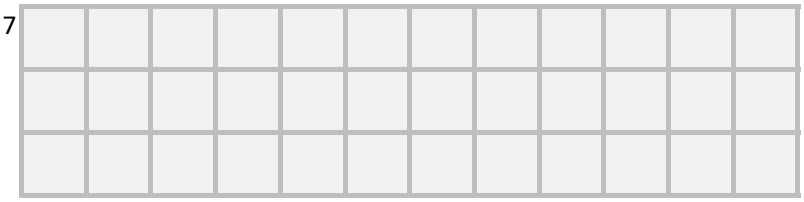
2 

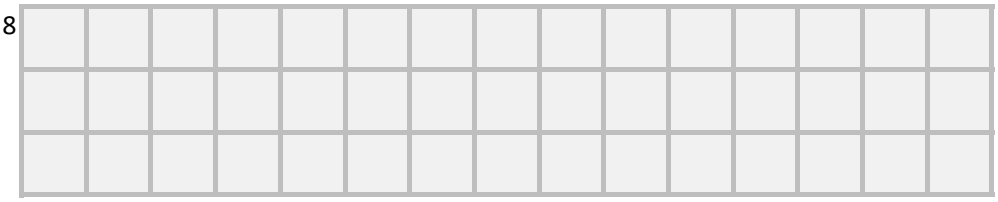
3 

4 

5 

6 

7 

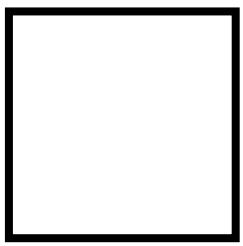
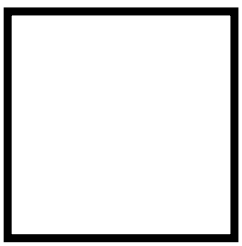
8 

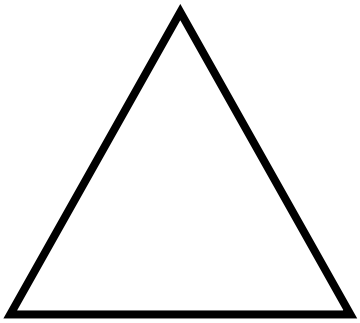
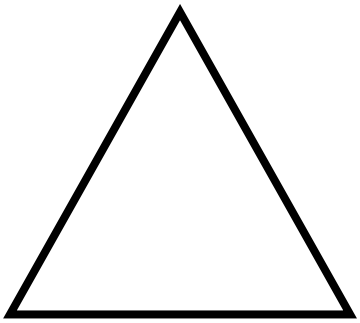
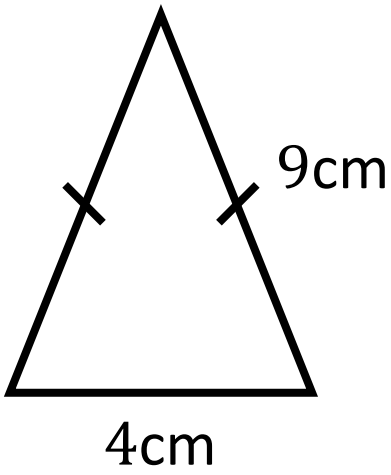
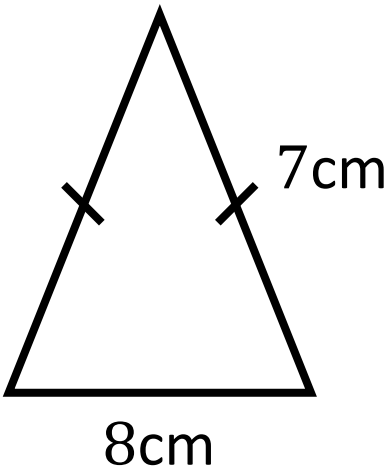
9) Without drawing them, can you use what you know from your answers to questions 5-8 to predict the maximum perimeters for grey grids that are:

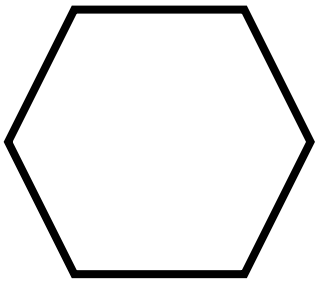
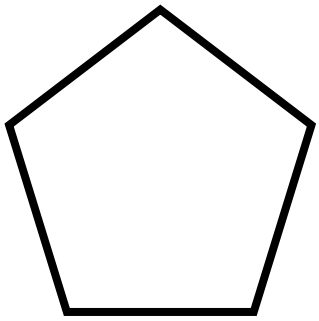
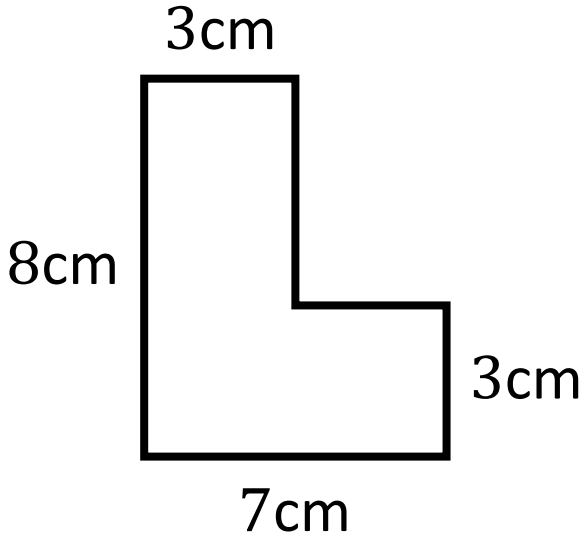
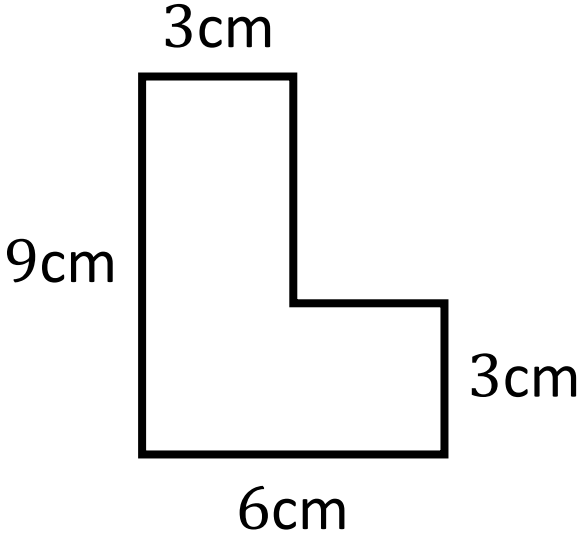
a) 3x18 b) 3x21 c) 3x30

2.2 Perimeter

The perimeter is the total distance around the edge of a 2D shape.
Units: mm, cm, in, ft, m, km, miles

Worked Example	Your Turn
Calculate the perimeter of the rectangle: 6cm  2cm Calculate the perimeter of the square: 3cm 	Calculate the perimeter of the rectangle: 12cm  4cm Calculate the perimeter of the square: 6cm 

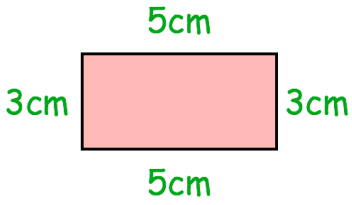
Worked Example	Your Turn
Calculate the perimeter of the equilateral triangle:  	Calculate the perimeter of the equilateral triangle: 
Calculate the perimeter of the isosceles triangle:  	Calculate the perimeter of the isosceles triangle: 

Worked Example	Your Turn
Calculate the perimeter of the regular hexagon:  	Calculate the perimeter of the regular hexagon: 
Calculate the perimeter of the shape below:  	Calculate the perimeter of the shape below: 

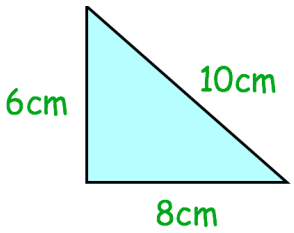
Fluency Practice

Question 1: Work out the perimeter of each shape below

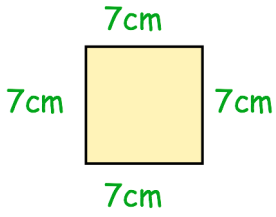
(a)



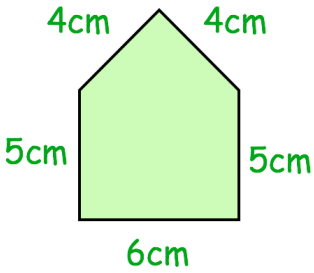
(b)



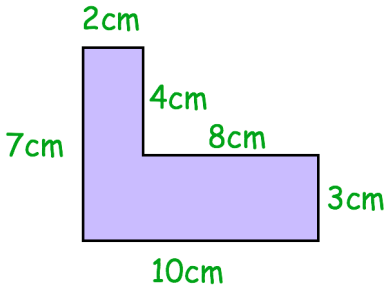
(c)



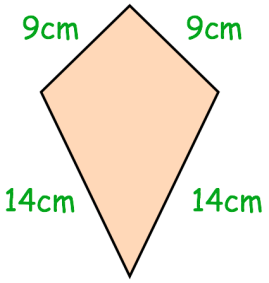
(d)



(e)

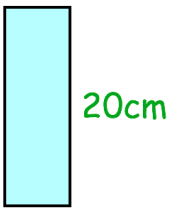


(f)

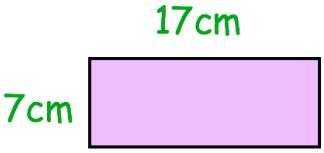


Question 2: Find the perimeter of each of these rectangles.

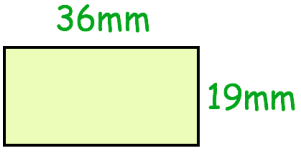
(a)



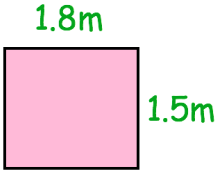
(b)



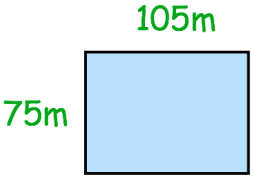
(c)



(d)



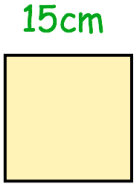
(e)



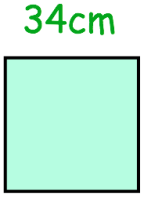
(f)

Question 3: Work out the perimeter of each of these squares

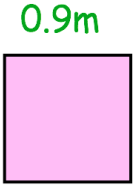
(a)



(b)



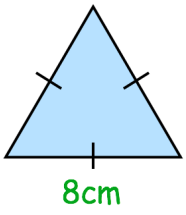
(c)



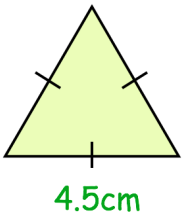
Fluency Practice

Question 4: Work out the perimeter of each of these equilateral triangles

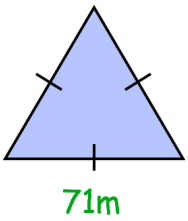
(a)



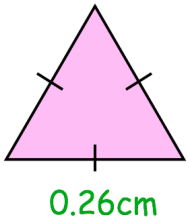
(b)



(c)

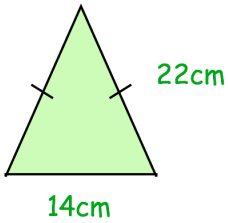


(d)

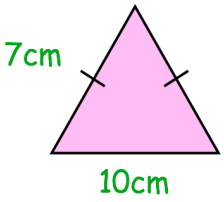


Question 5: Calculate the perimeter of each of these isosceles triangles

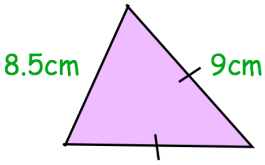
(a)



(b)

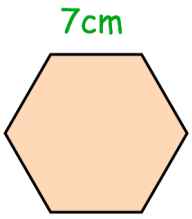


(c)

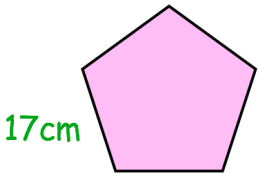


Question 6: Work out the perimeter of each of these regular shapes

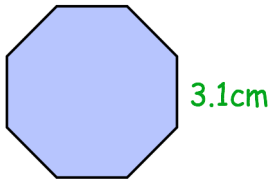
(a)



(b)

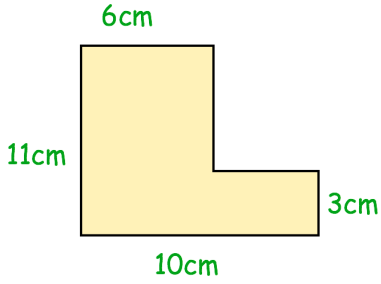


(c)

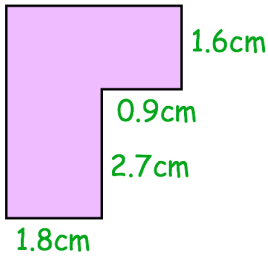


Question 7: Find the perimeter of each of these shapes

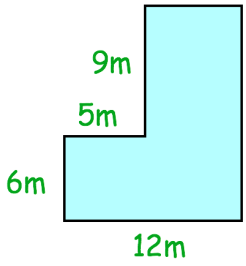
(a)



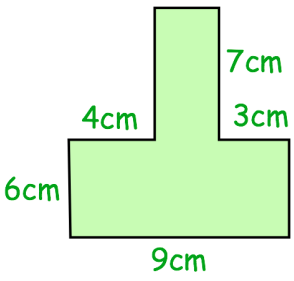
(b)



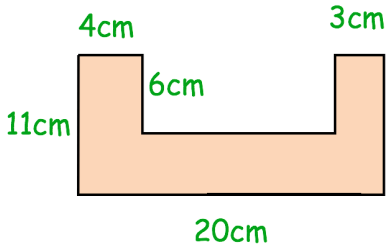
(c)



(d)



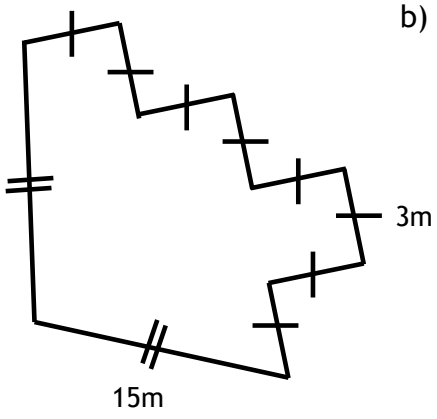
(e)



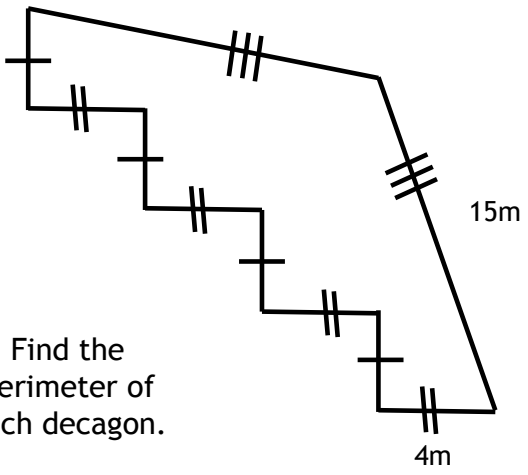
Fluency Practice

Find the perimeter of each decagon.

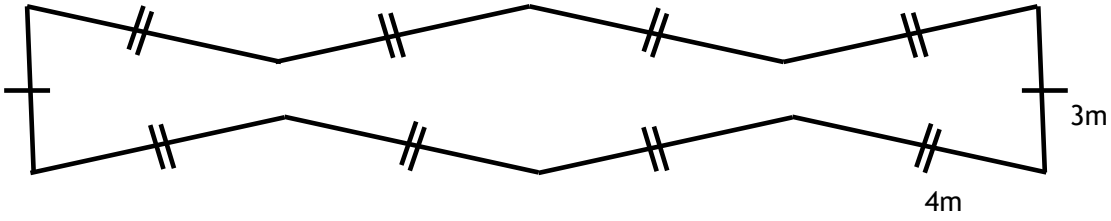
a)



b)

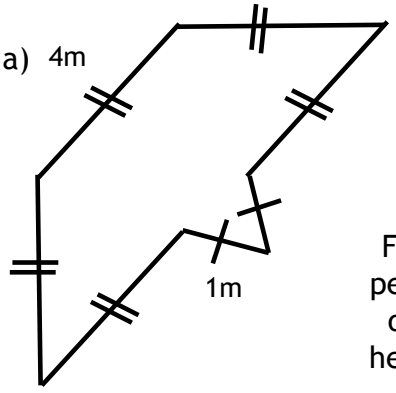


c)

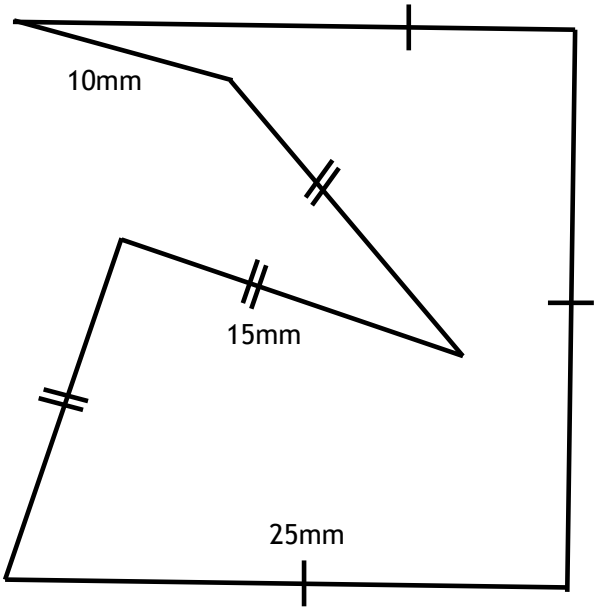


Find the perimeter of each heptagon.

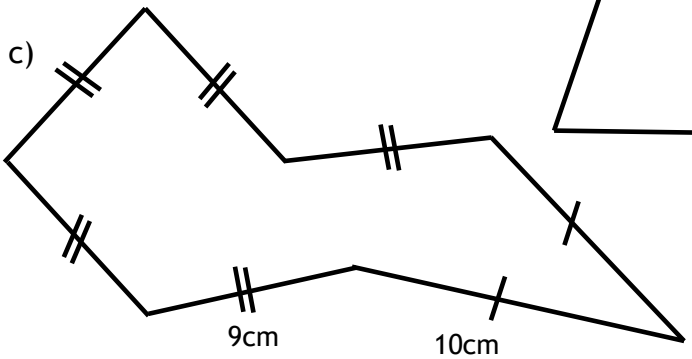
a)



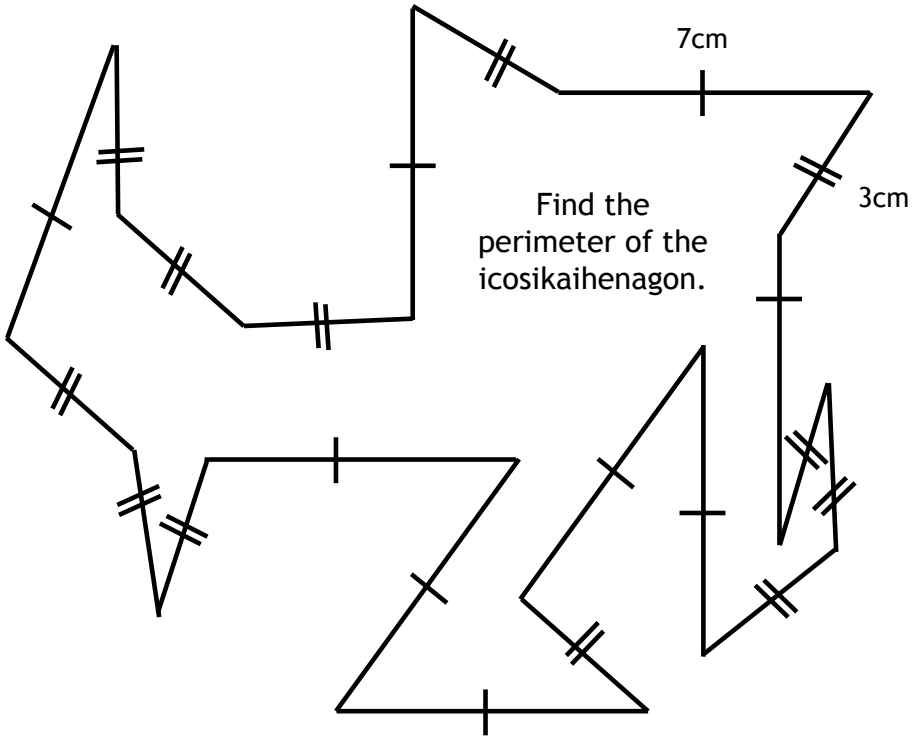
b)

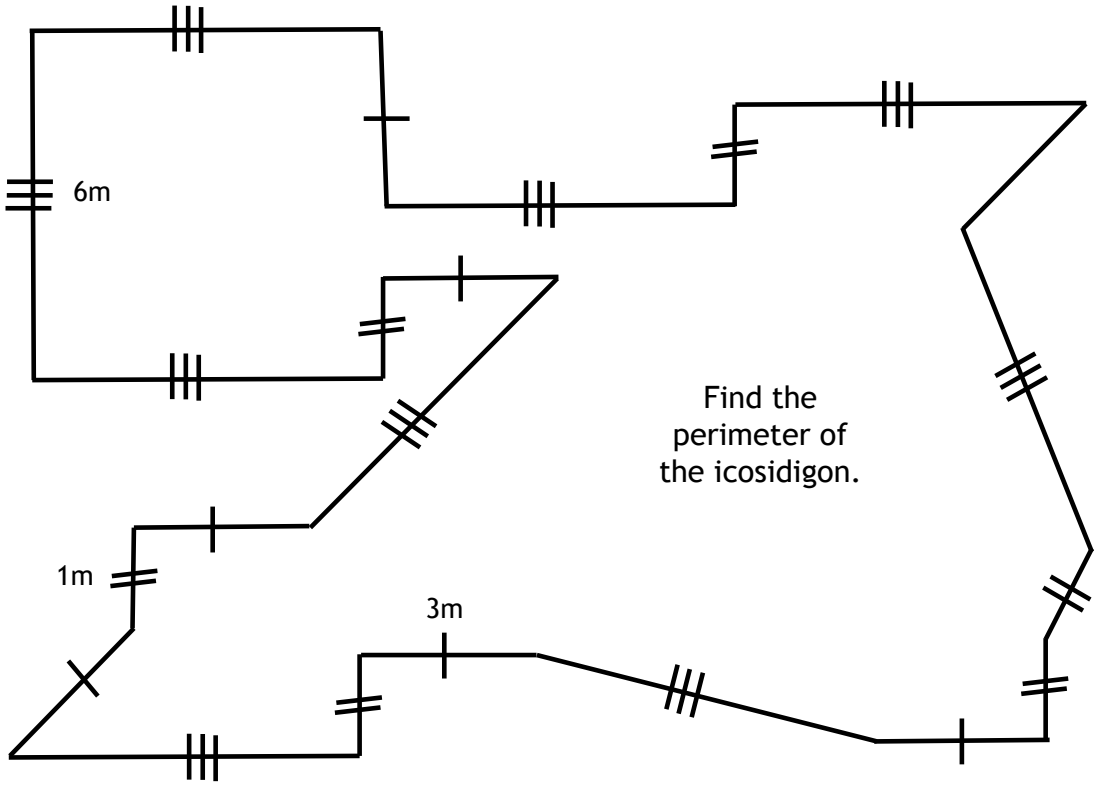


c)



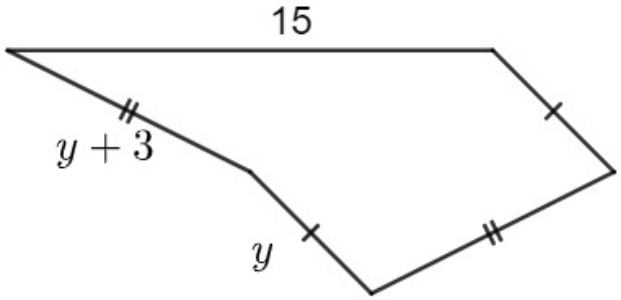
Fluency Practice





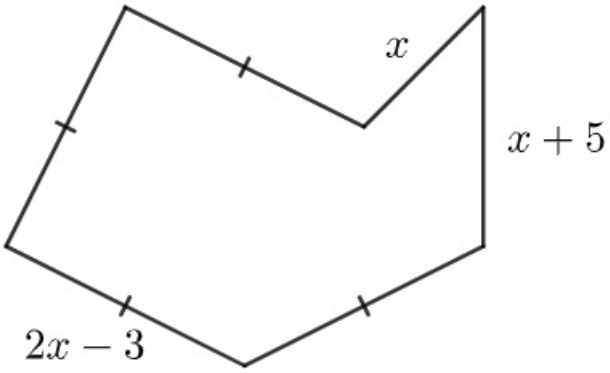
Worked Example

Find an expression for the perimeter of the following shape:

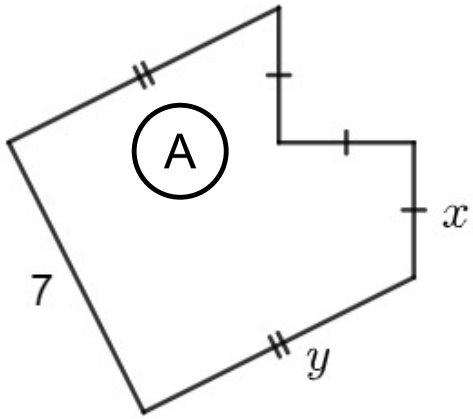


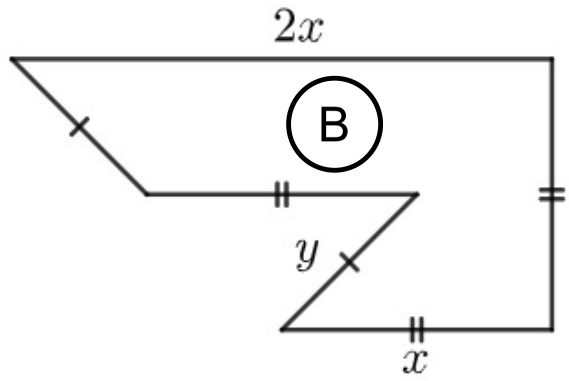
Your Turn

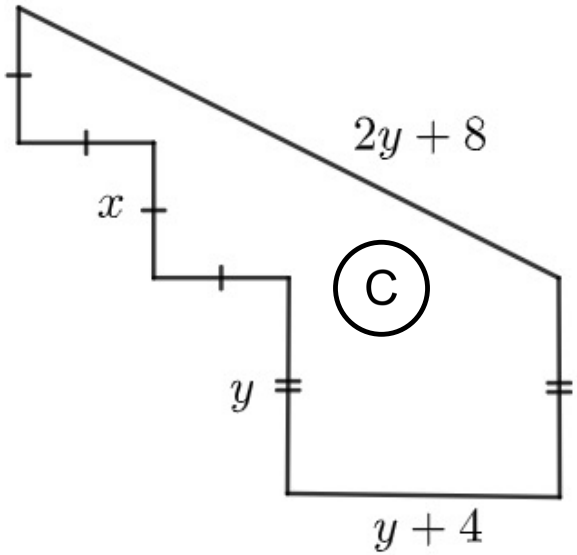
Find an expression for the perimeter of the following shape:

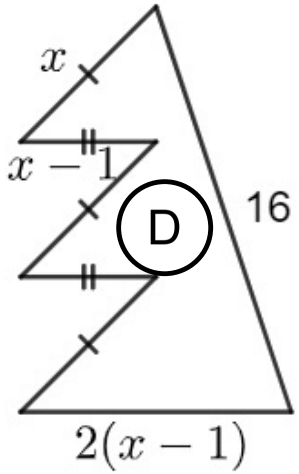


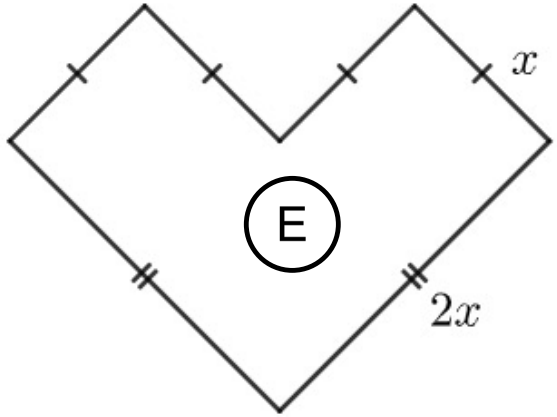
For each polygon, find an expression for the perimeter of the polygon.

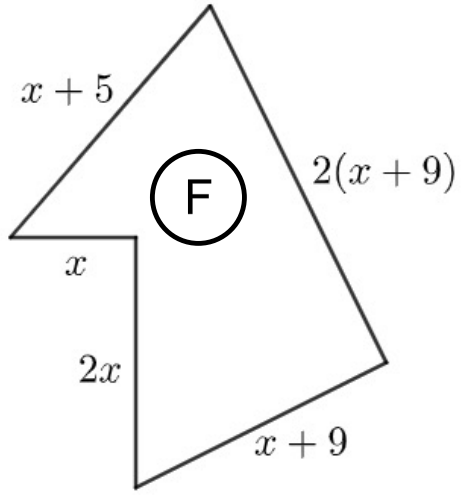






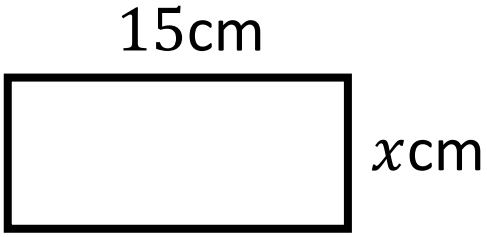






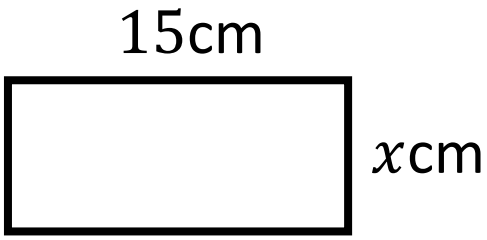
Worked Example

Calculate the length of x if the perimeter of the rectangle is 44cm:



Your Turn

Calculate the length of x if the perimeter of the rectangle is 44cm:



Fluency Practice

Question 8: The perimeter of each shape is given. Find the length of the missing side

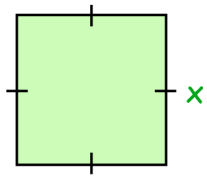
(a)

Perimeter = 26cm

(b)

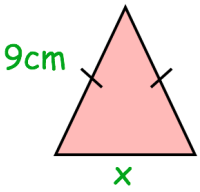
Perimeter = 80cm

(c)



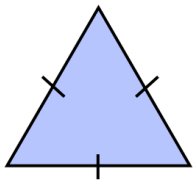
Perimeter = 20cm

(d)



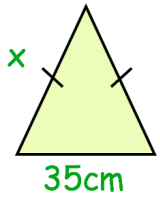
Perimeter = 25cm

(e)



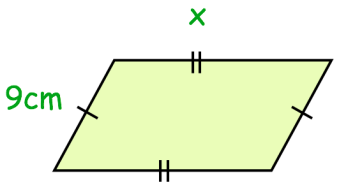
Perimeter = 36cm

(f)



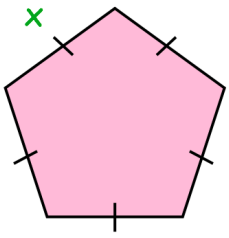
Perimeter = 79cm

(g)



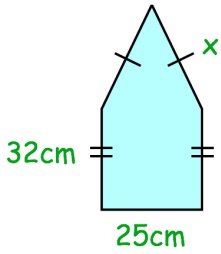
Perimeter = 45cm

(h)



Perimeter = 2m

(i)

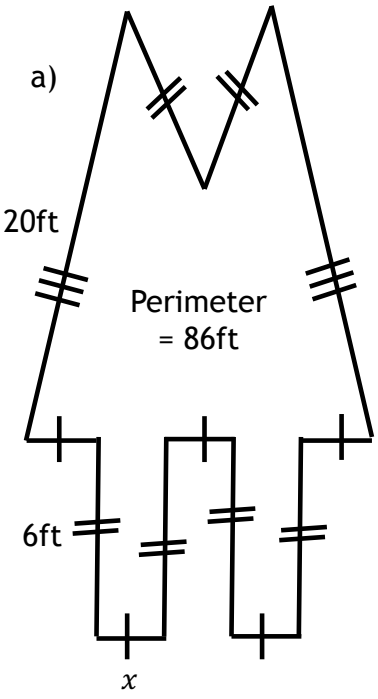


Perimeter = 163cm

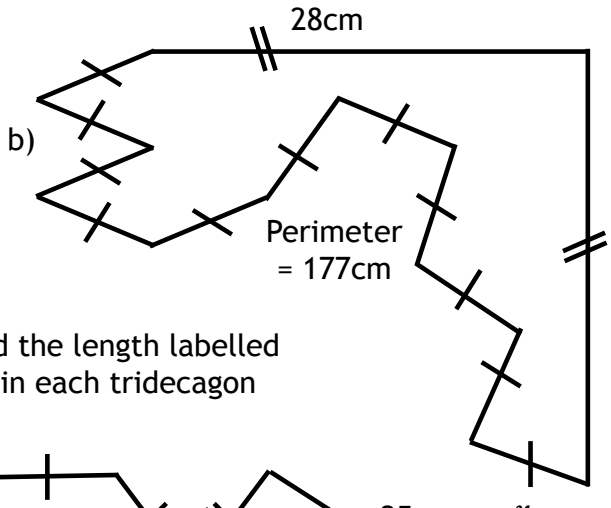
Fluency Practice

Find the length labelled x in each tridecagon

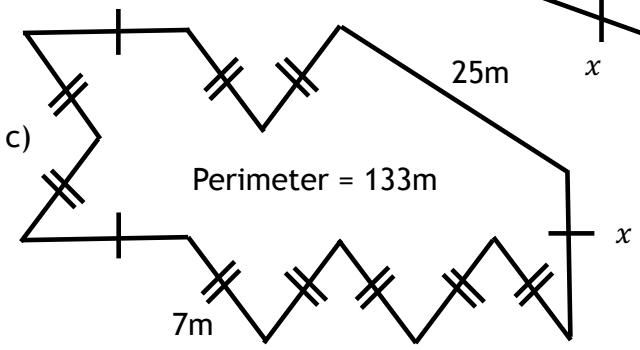
a)



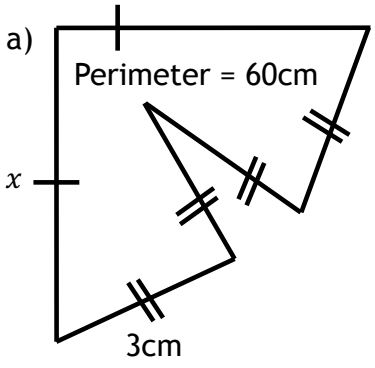
b)



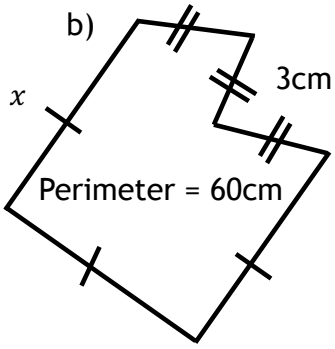
c)



a)



b)



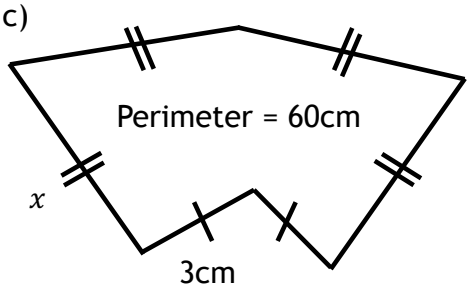
All four hexagons have a perimeter of 60cm

All four hexagons are made up of only two lengths

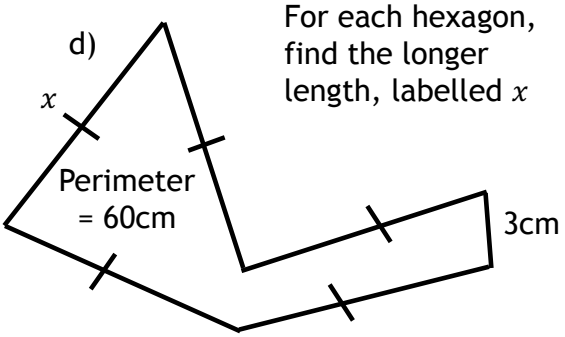
All four hexagons have a shorter length of 3cm

For each hexagon, find the longer length, labelled x

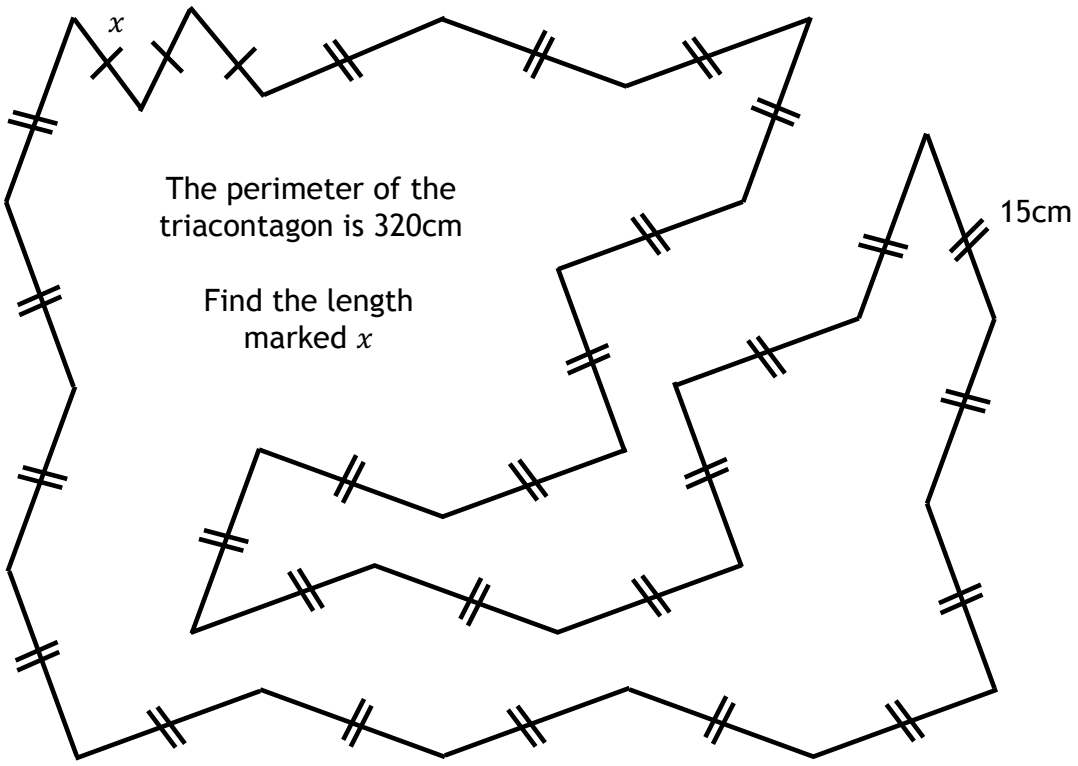
c)



d)

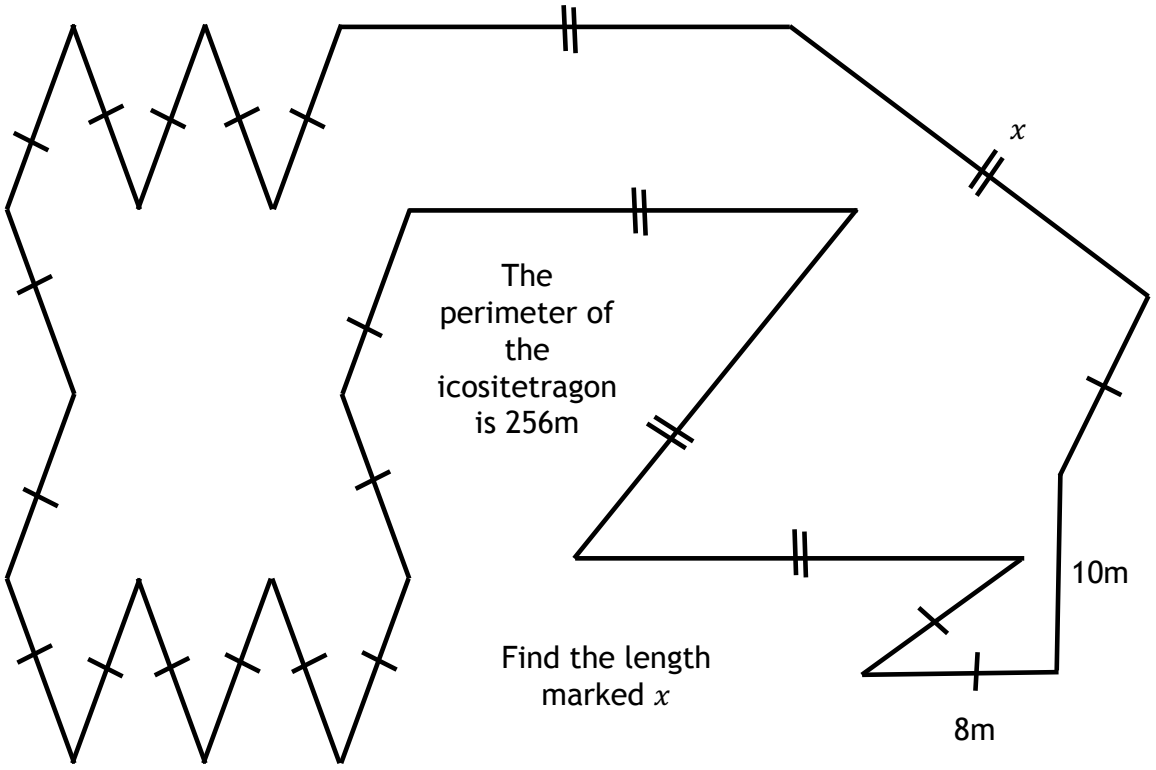


Fluency Practice



The perimeter of the triacontagon is 320cm

Find the length marked x



The perimeter of the icositetragon is 256m

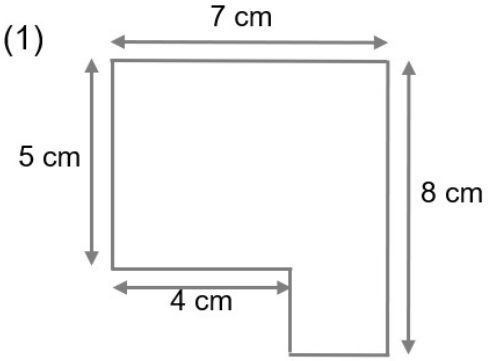
Find the length marked x

2.3 Review and Problem Solving

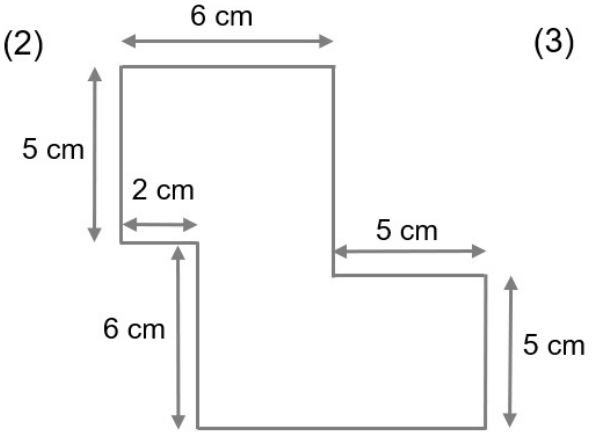
Harder Perimeter

what are the overall perimeters of each shape?

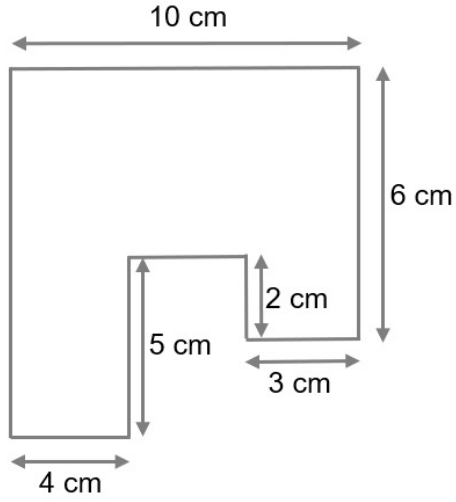
(1)



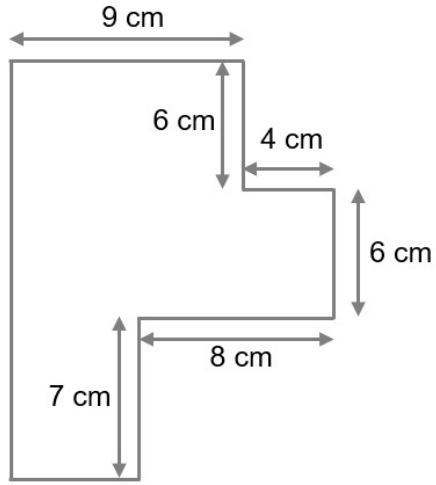
(2)



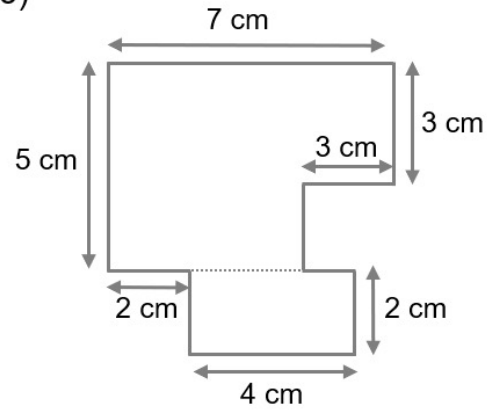
(3)



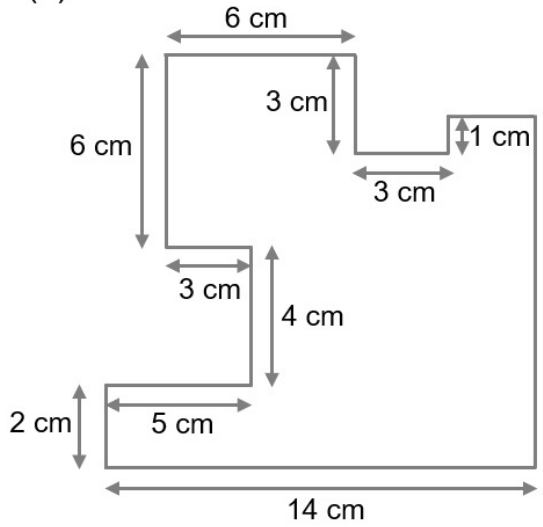
(4)



(5)



(6)

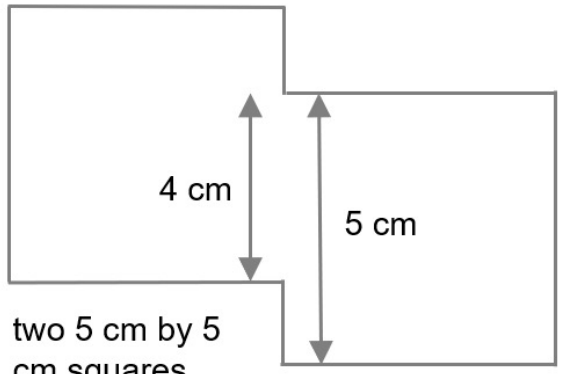


notes: the diagrams are not drawn accurately and the angles between lines are right angles

Harder Perimeter

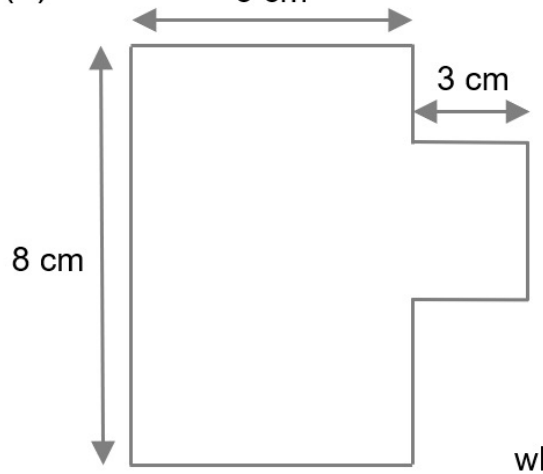
what are the overall perimeters of each shape?

(1)

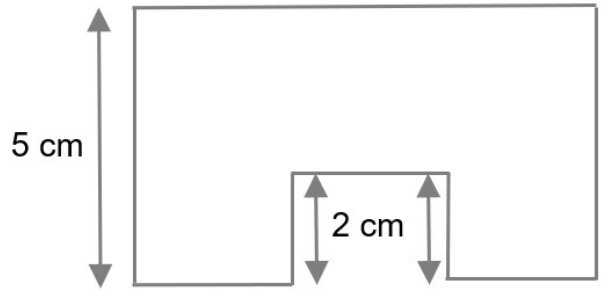


two 5 cm by 5 cm squares overlap

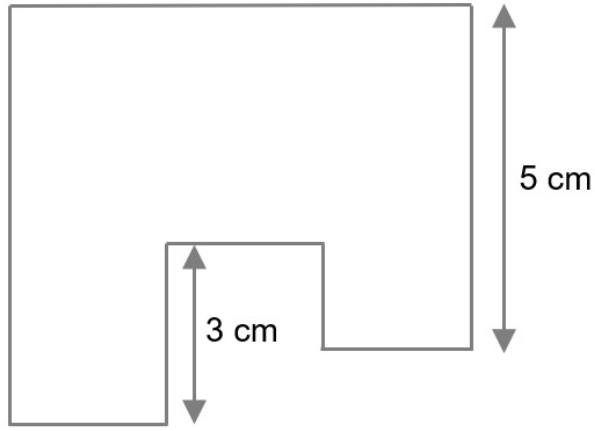
(2)



(3)



(4)

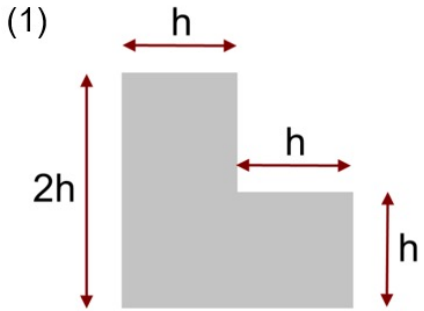


which shape has the largest perimeter?

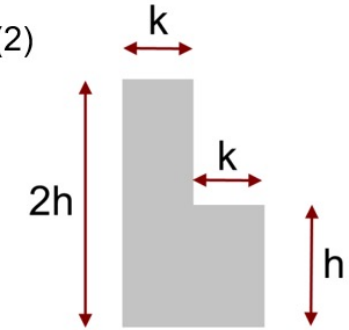
L-Shaped Perimeters

try to write the perimeters of these shapes as an expression

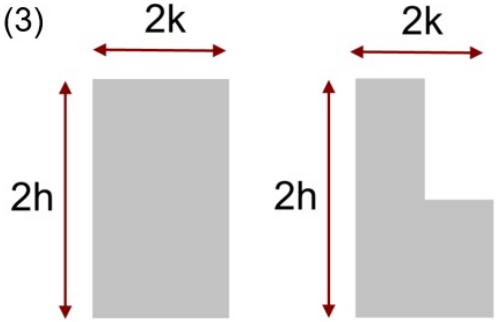
(1)



(2)

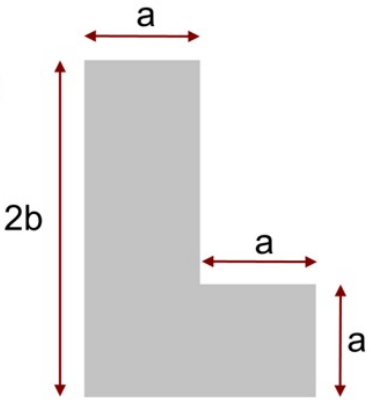


(3)

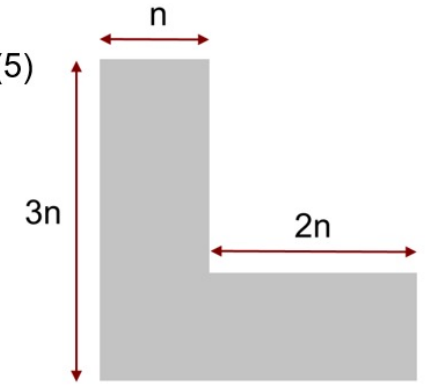


what happens to the perimeter when you take a bite out of it?

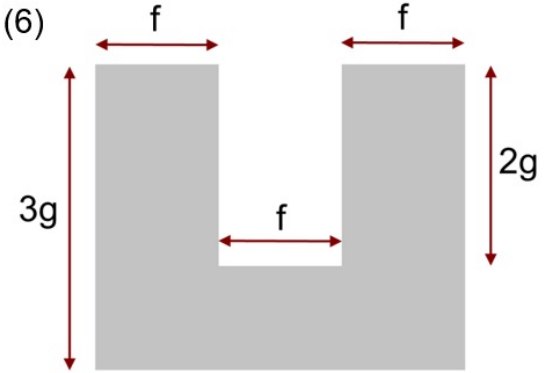
(4)



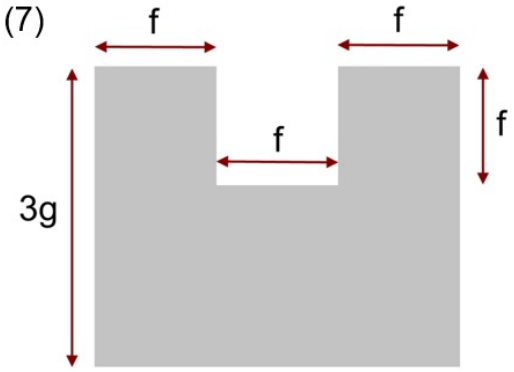
(5)



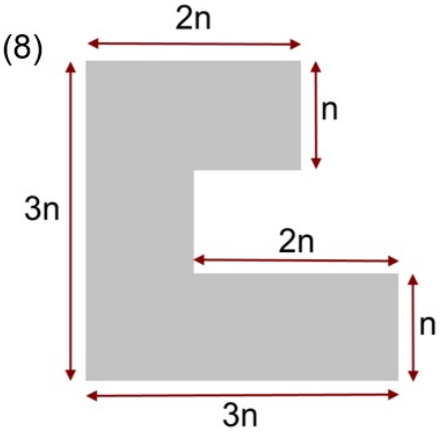
(6)



(7)

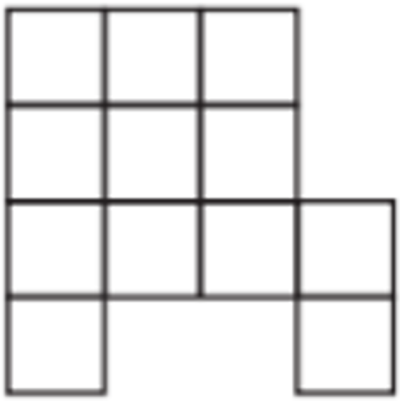
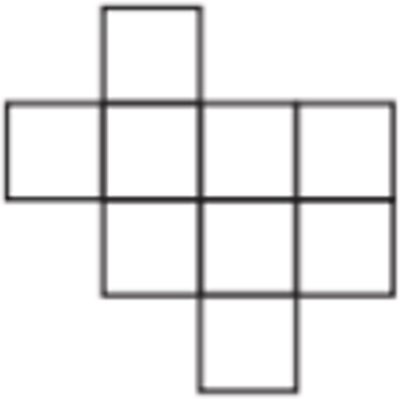


(8)



2.4 Area on a Grid

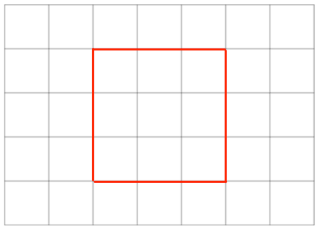
The area of a 2D shape is the space inside the shape.
Units: mm^2, cm^2, in^2, ft^2, m^2, km^2, $miles^2$

Worked Example	Your Turn
Calculate the area of the shape below: 	Calculate the area of the shape below: 

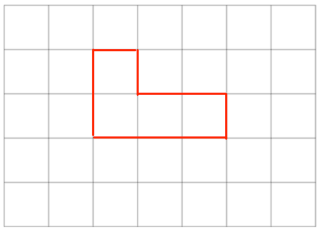
Fluency Practice

Question 1: The following shapes are drawn on centimetre-squared paper.
Find the area of each shape.

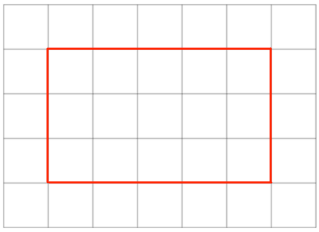
(a)



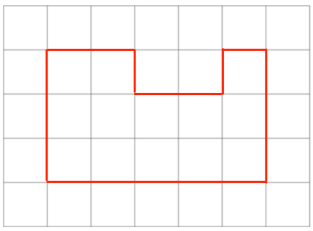
(b)



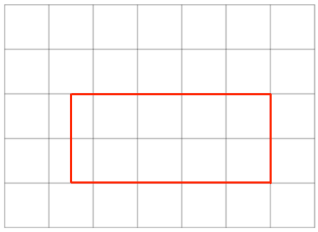
(c)



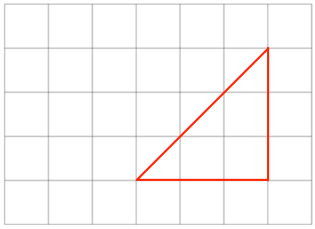
(d)



(e)

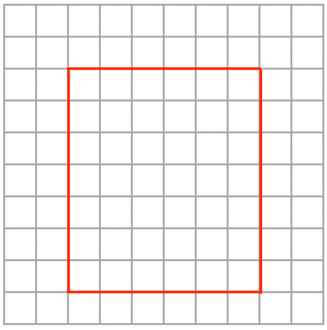


(f)

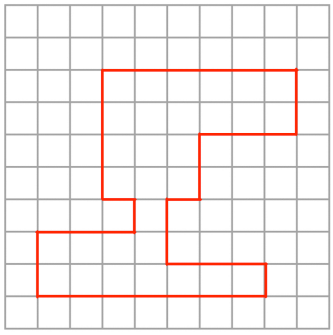


Question 2: The following shapes are drawn on centimetre-squared paper.
Find the area of each shape.

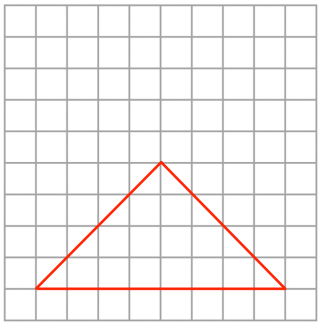
(a)



(b)

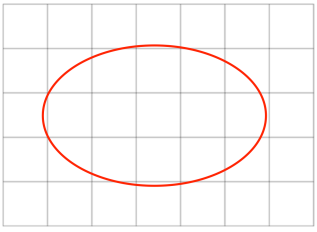


(c)

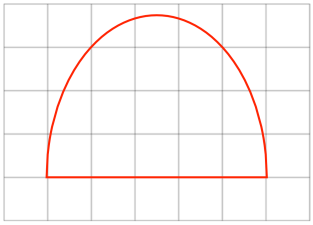


Question 3: The following shapes are drawn on centimetre-squared paper.
Estimate their areas.

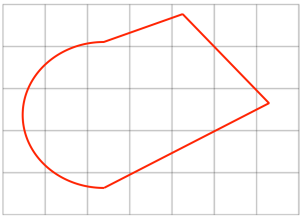
(a)



(b)

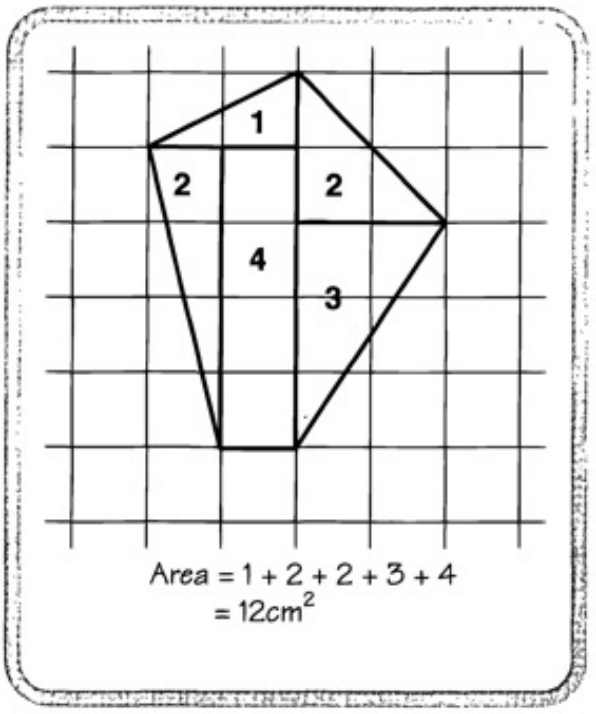


(c)

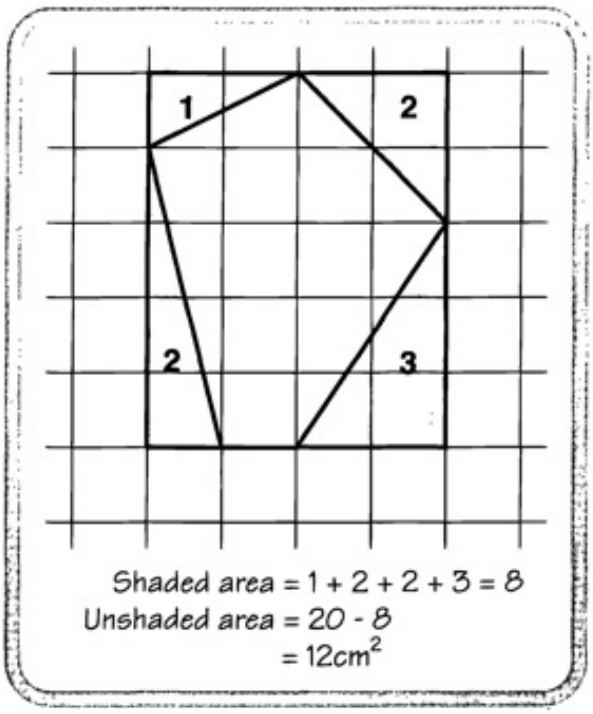


Fluency Practice

Here are two methods for finding the area of a polygon.



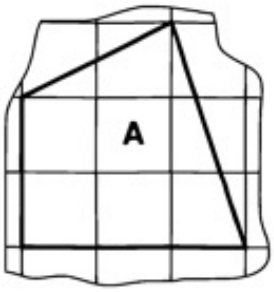
Area = 1 + 2 + 2 + 3 + 4
= 12cm^2

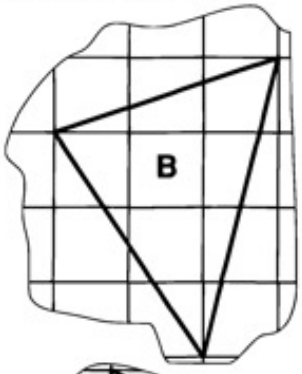


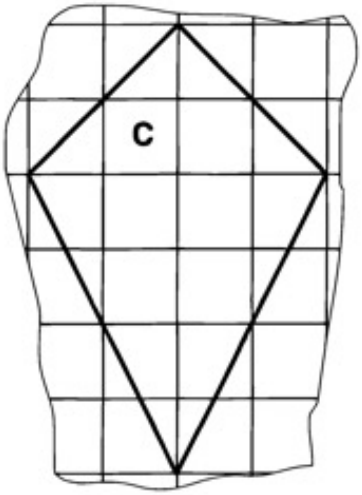
Shaded area = 1 + 2 + 2 + 3 = 8
Unshaded area = 20 - 8
= 12cm^2

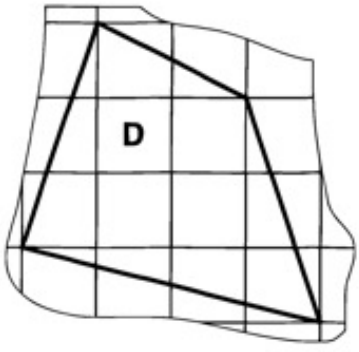
- Copy these shapes on to squared paper.

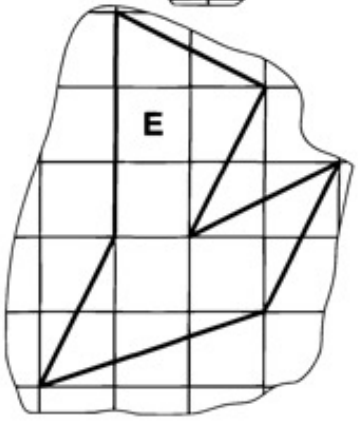
Choose one of the methods or your own to find the areas of these shapes.

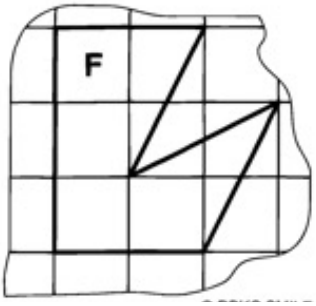








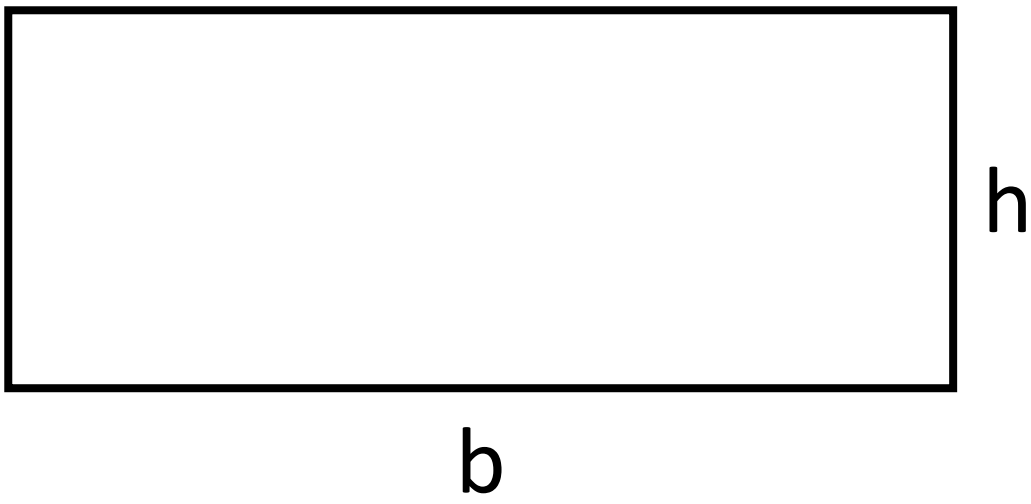


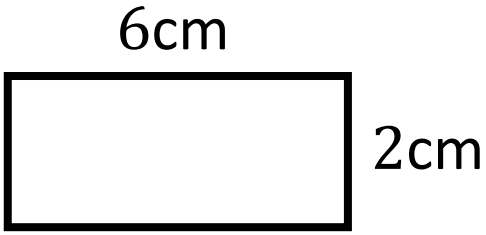
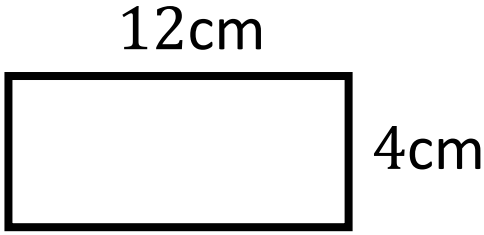
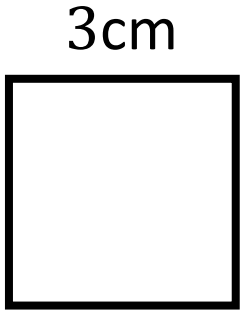
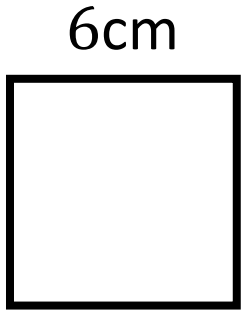


2.5 Area of Rectangles

Area = base x height

A = b x h

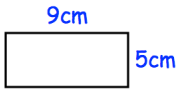


Worked Example	Your Turn
Calculate the area of the rectangle:  	Calculate the area of the rectangle: 
Calculate the area of the square:  	Calculate the area of the square: 

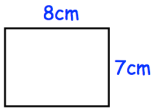
Fluency Practice

Question 1: Calculate the area of each of these rectangles

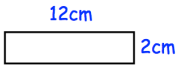
(a)



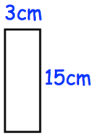
(b)



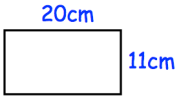
(c)



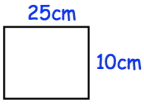
(d)



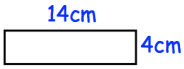
(e)



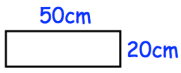
(f)



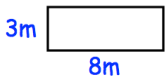
(g)



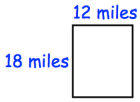
(h)



(i)



(j)



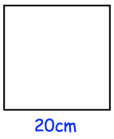
(k)

(l)

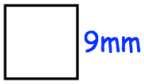
Question 2: Work out the area of each of these squares

(a)

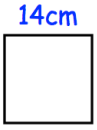
(b)



(c)

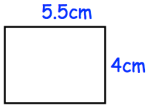


(d)

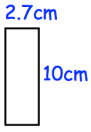


Question 3: Work out the area of each of these rectangles

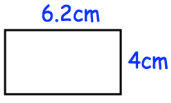
(a)



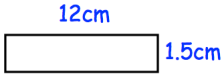
(b)



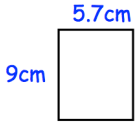
(c)



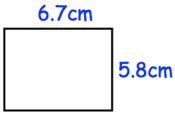
(d)



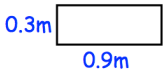
(e)



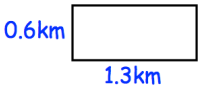
(f)



(g)

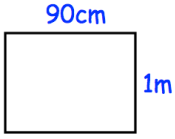


(h)

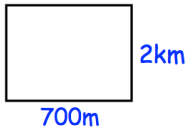


Question 4: Work out the area of each of these rectangles.
State your units for each answer.

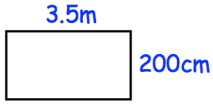
(a)



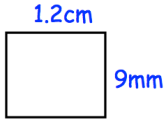
(b)



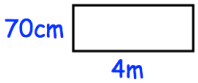
(c)



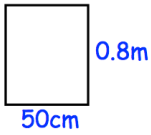
(d)



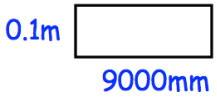
(e)

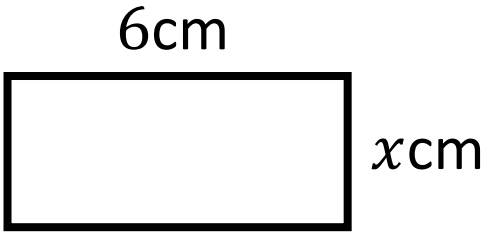
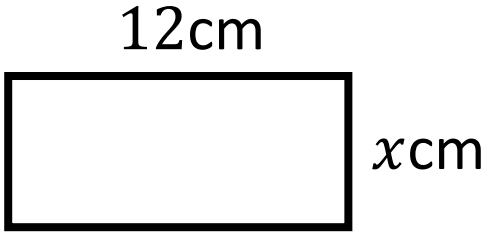


(f)



(g)

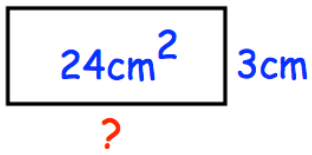


Worked Example	Your Turn
Calculate x if the area of the rectangle is 12cm^2:  	Calculate x if the area of the rectangle is 48cm^2: 

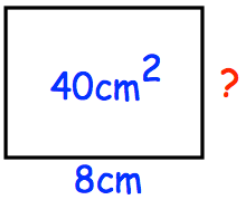
Fluency Practice

Question 5: The area of each of these rectangles have been given.
Find the length of the missing sides.

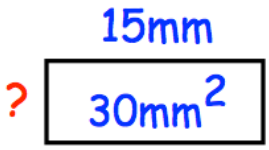
(a)



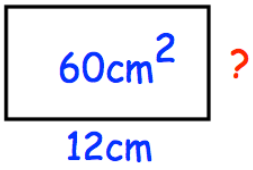
(b)



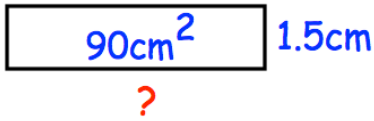
(c)



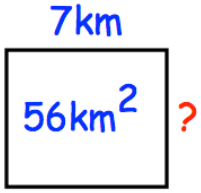
(d)



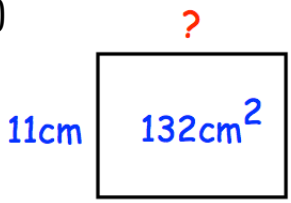
(e)



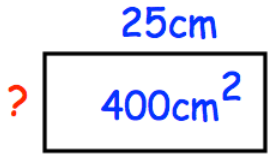
(f)



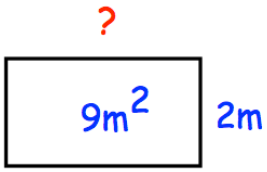
(g)



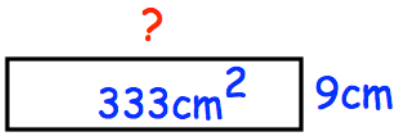
(h)



(i)

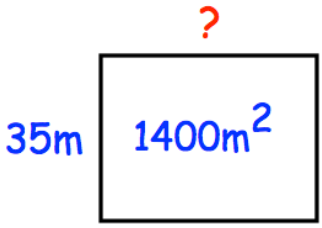


(j)



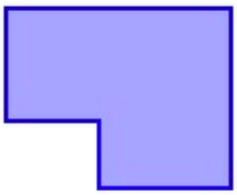
(k)

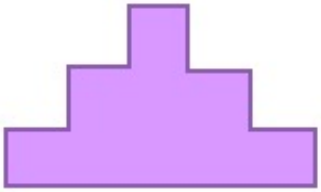
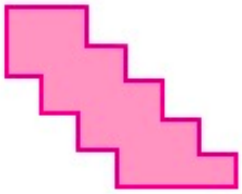
(l)



2.6 Area of Rectilinear Shapes

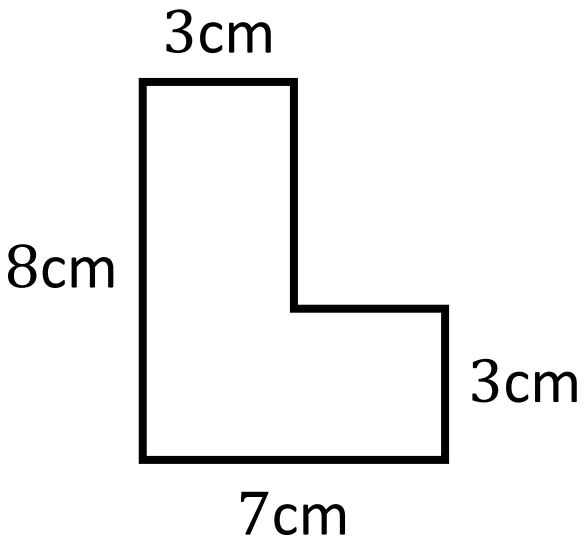
A rectilinear shape is one whose edges all meet at right angles.

Worked Example

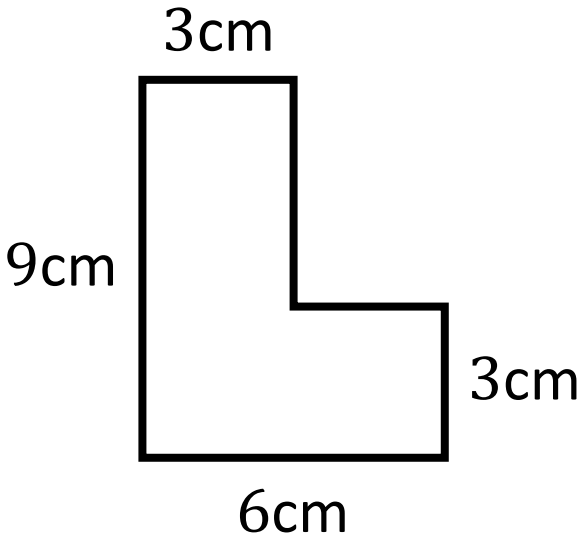
Calculate the area of the shape below:



Your Turn

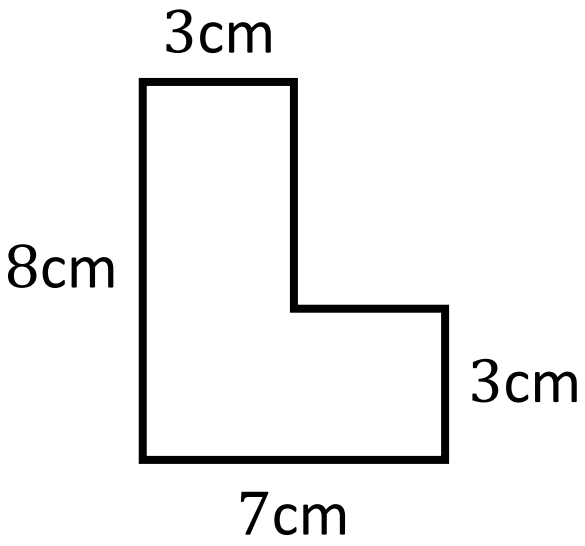
Calculate the area of the shape below:

Additive Method 1



Worked Example

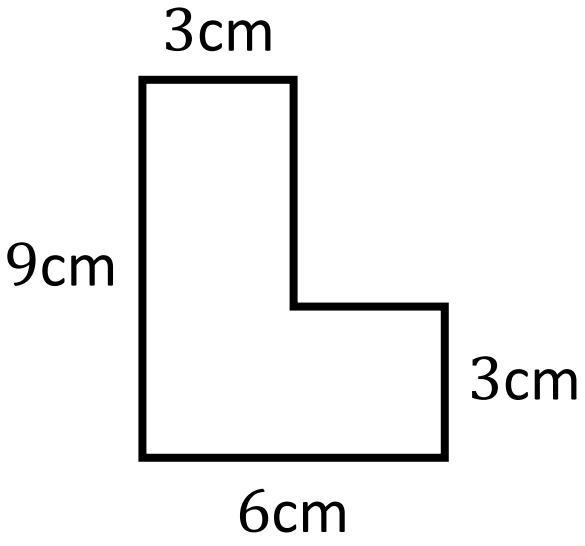
Calculate the area of the shape below:



Your Turn

Calculate the area of the shape below:

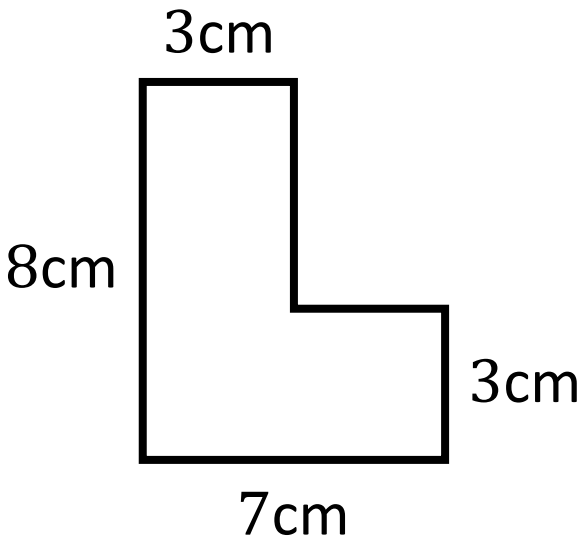
Additive Method 2



Worked Example

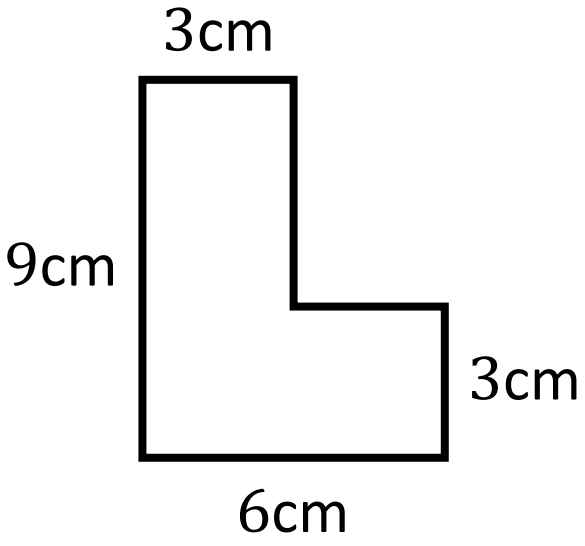
Calculate the area of the shape below:

Subtractive Method



Your Turn

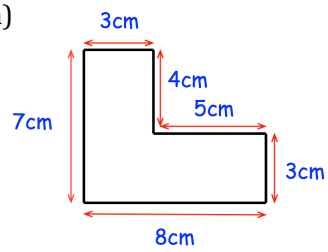
Calculate the area of the shape below:



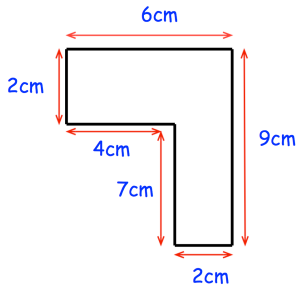
Fluency Practice

Question 1: Work out the area of each of these shapes.

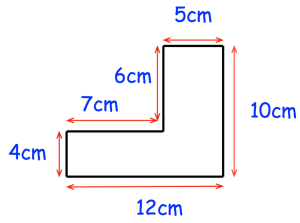
(a)



(b)

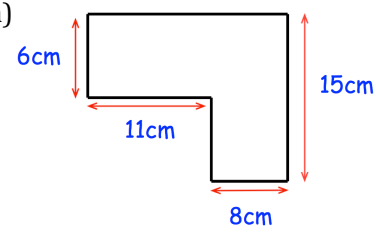


(c)

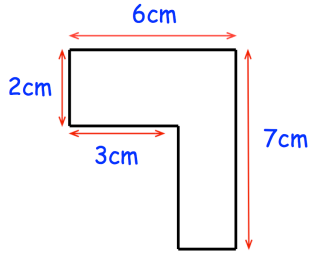


Question 2: Work out the area of each of these shapes.

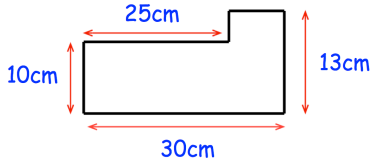
(a)



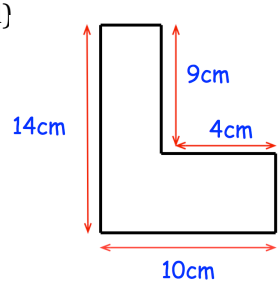
(b)



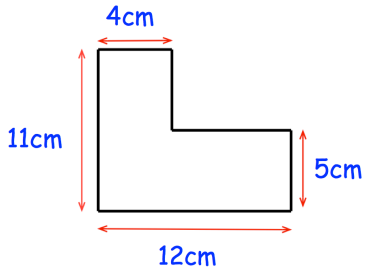
(c)



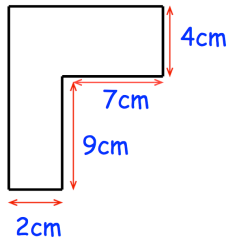
(d)



(e)

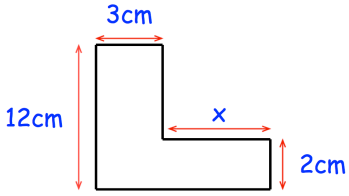


(f)



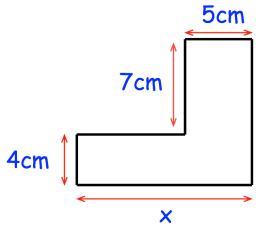
Question 3: The area of each shape is given.
Work out the size of the missing sides.

(a)



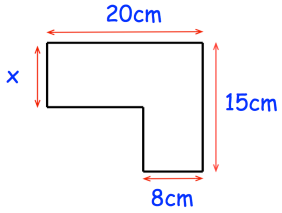
Total area = 48cm²

(b)



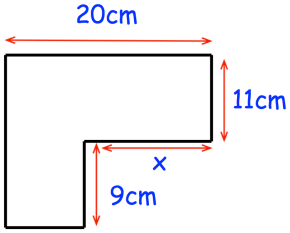
Total area = 91cm²

(c)



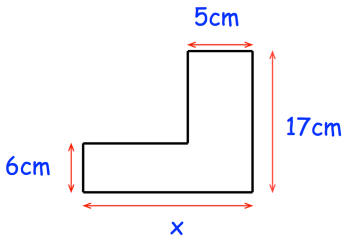
Total area = 228cm²

(d)



Total area = 283cm²

(e)

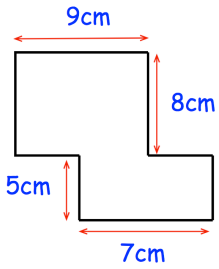


Total area = 151cm²

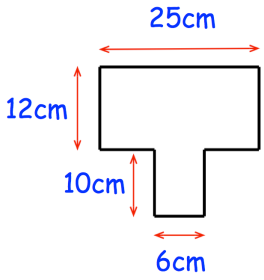
Fluency Practice

Question 1: Work out the area of each of these shapes.

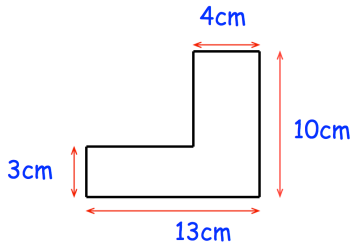
(a)



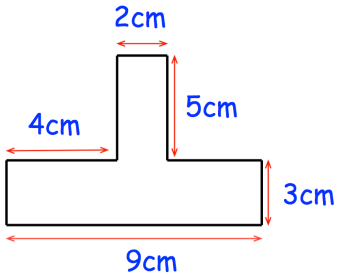
(b)



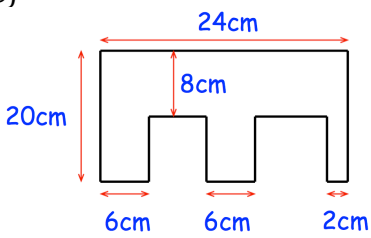
(c)



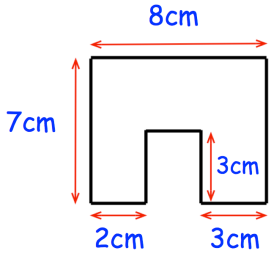
(d)



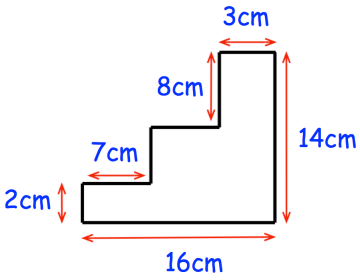
(e)



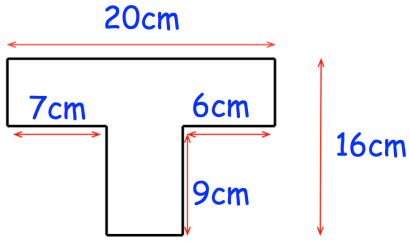
(f)



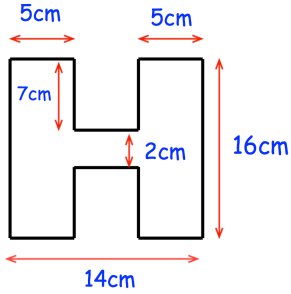
(g)



(h)

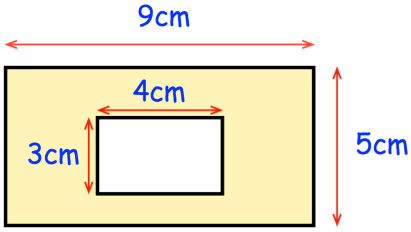


(i)

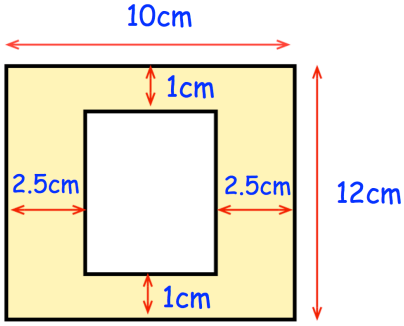


Question 2: Work out the shaded area.

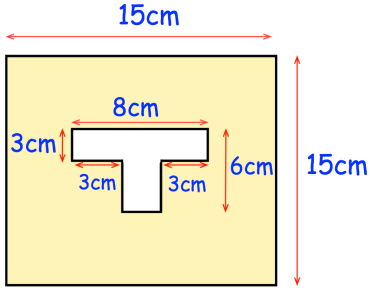
(a)



(b)



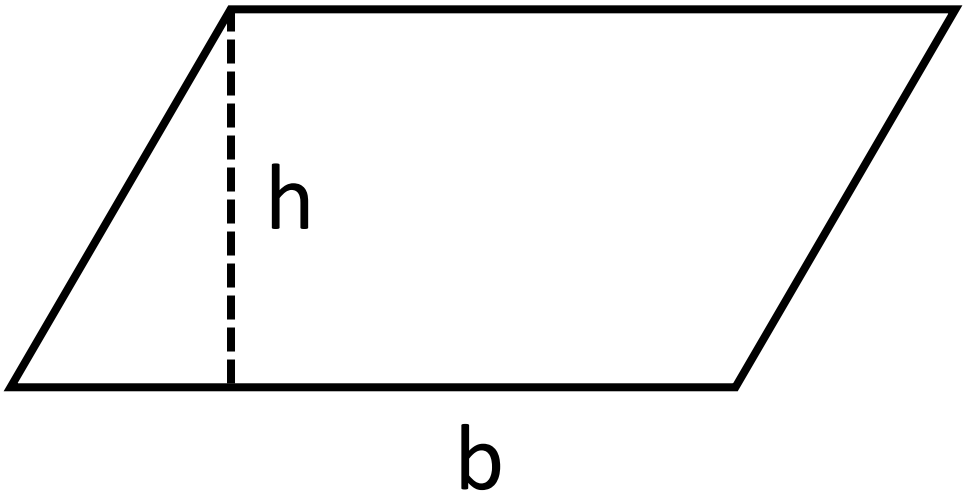
(c)



2.7 Area of Parallelograms

Area of a parallelogram = base x perpendicular height

$A = b \times h$



The two lengths used in the formula need to be **perpendicular**.

Frayer Model – Perpendicular

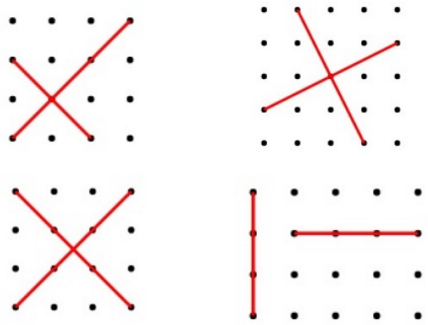
Definition

Lines are perpendicular if, when connected, they would meet at 90^{o}.

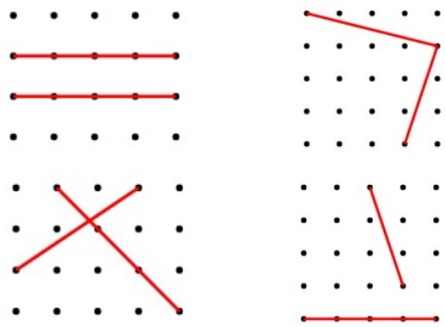
Characteristics

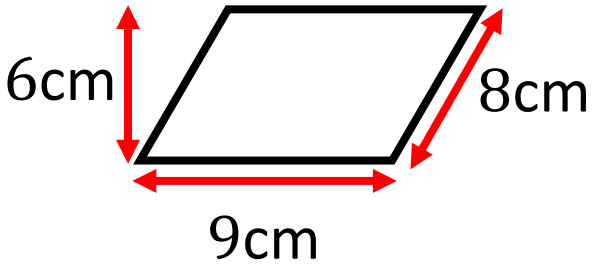
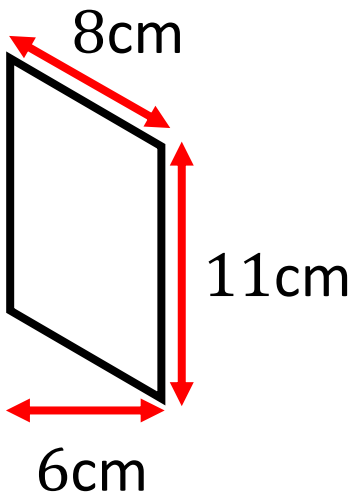
- At least two lines.
- Lines don't have to be connected.
- If lines are connected, or were extended until they connected, they meet at 90^{o}.

Examples



Non Examples

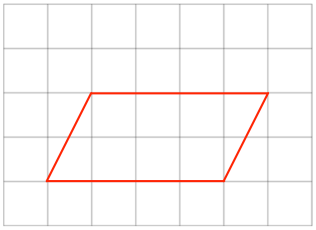


Worked Example	Your Turn
Calculate the area of the parallelogram:  	Calculate the area of the parallelogram: 

Fluency Practice

Question 1: The following parallelograms are drawn on centimetre-squared paper.
Find the area of each.

(a)

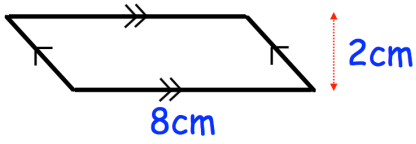


(b)

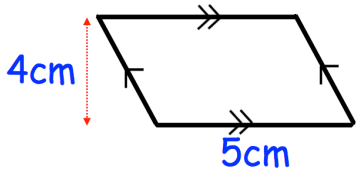
(c)

Question 2: Work out the area of each of the parallelograms below.
Include suitable units.

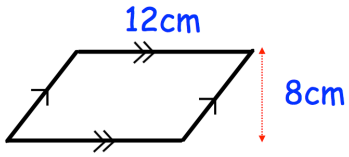
(a)



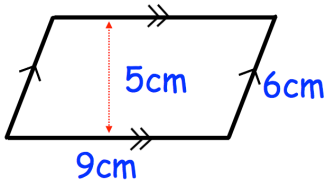
(b)



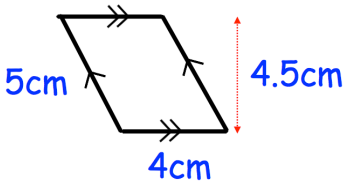
(c)



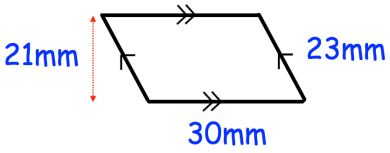
(d)



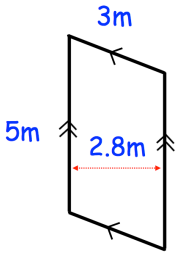
(e)



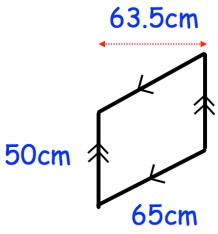
(f)



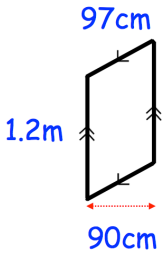
(g)



(h)



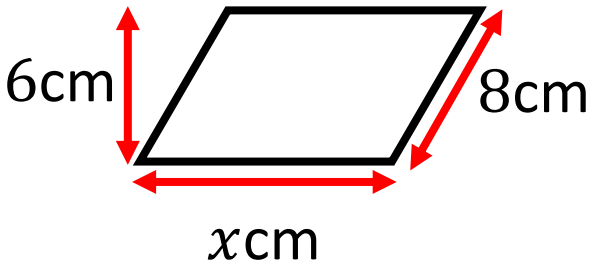
(i)



Question 3: A parallelogram has a base of 8cm and a perpendicular height of 6cm.
Calculate the area of the parallelogram.

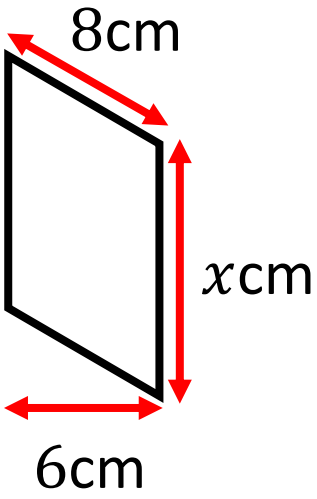
Worked Example

Calculate x if the area of the parallelogram is 54cm^2:



Your Turn

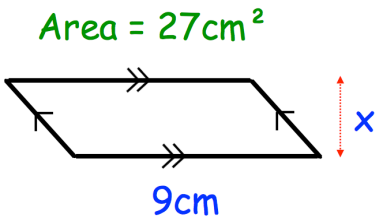
Calculate x if the area of the parallelogram is 66cm^2:



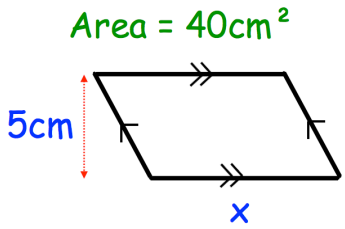
Fluency Practice

Question 4: The areas of each of the parallelograms has been given.
Calculate the length of the missing sides.

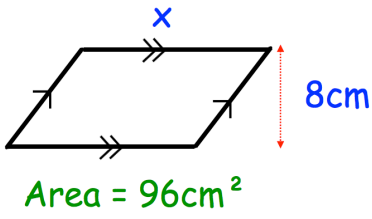
(a)



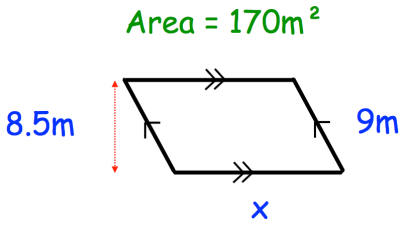
(b)



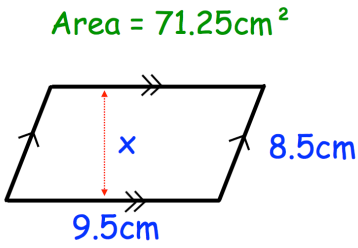
(c)



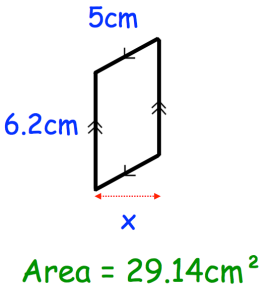
(d)



(e)



(f)

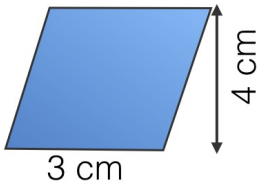


Fluency Practice

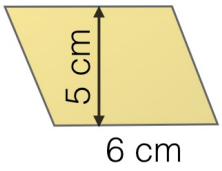
Alpha Exercise

Find the area of each of the following parallelograms:

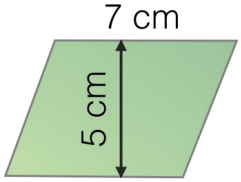
(1)



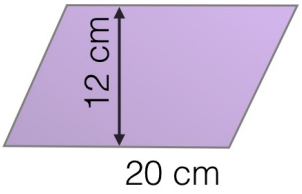
(2)



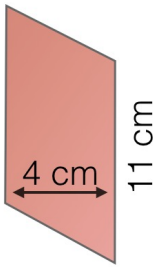
(3)



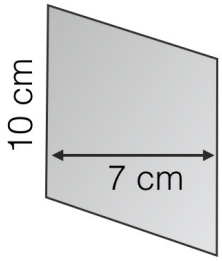
(4)



(5)



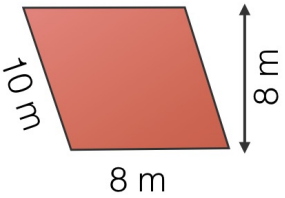
(6)



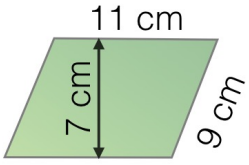
Beta Exercise

Find the area of each of the following parallelograms:

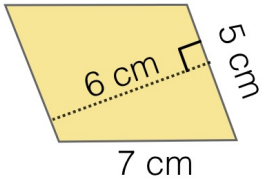
(1)



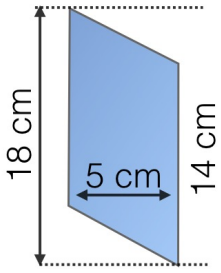
(2)



(3)



(4)

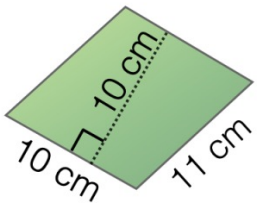


Fluency Practice

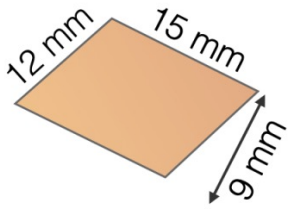
Gamma Exercise

Find the area of each of the following parallelograms:

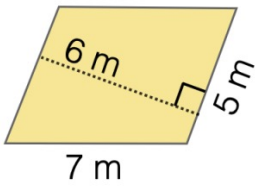
(1)



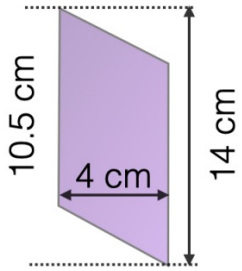
(2)



(3)



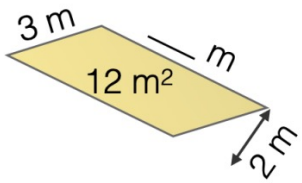
(4)



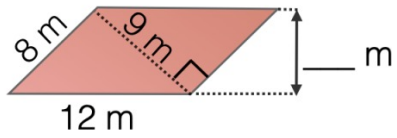
Delta Exercise

Here are four parallelograms.
Fill in the missing values in each diagram.

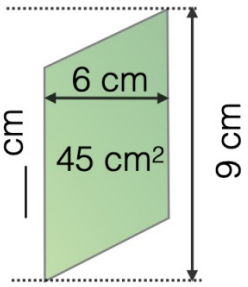
(1)



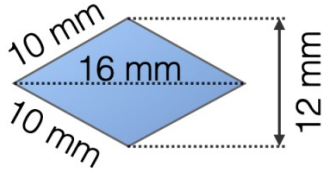
(2)



(3)



(4)



Area= ___ mm²

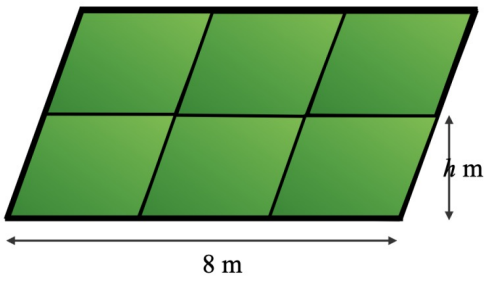
Exam Questions

Exam-style question 1

Six identical parallelograms are tiled as shown to form one large parallelogram with a base of 8 metres, as shown in the diagram.

This large parallelogram has a total area of 32 m^2.

Work out the height, h, of one tile, in metres.

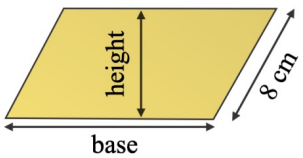


Exam-style question 2

Keith draws a parallelogram whose base is twice its perpendicular height.

The area of the parallelogram is 72 cm^2 and the two sides which are not parallel to the base are 8 cm long.

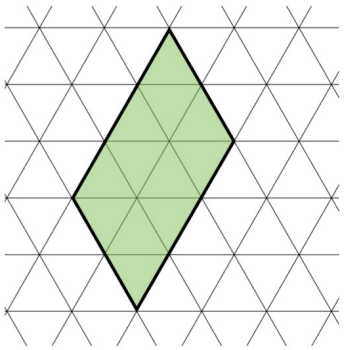
Find the base and height of the parallelogram.



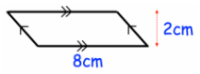
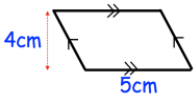
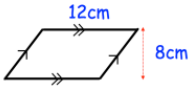
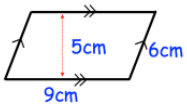
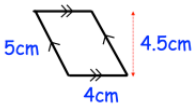
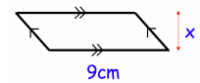
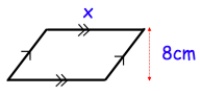
Exam-style question 3

Here is a grid made up of equilateral triangles. Each small triangle has an area of 5 cm^2.

What is the area of the shaded parallelogram?



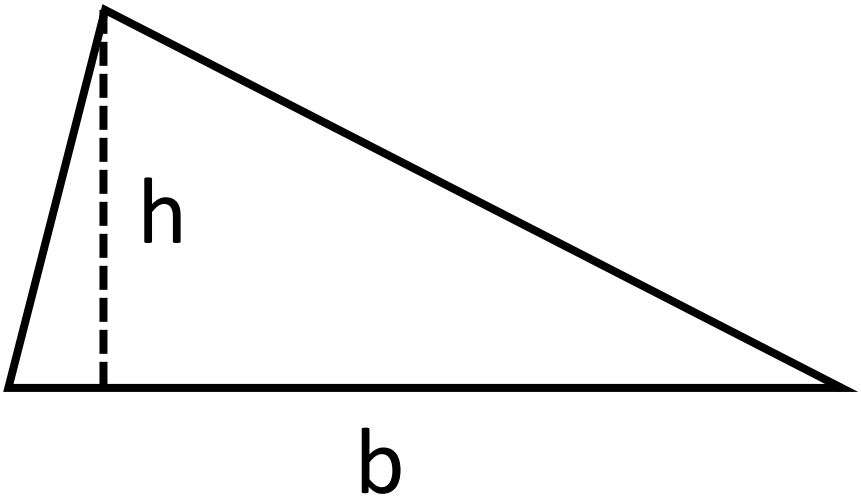
Fill in the Gaps

Question	Diagram	Base	Perpendicular Height	Calculation	Area
(a)		8 cm	2 cm	8×2	16 cm^2
(b)					
(c)					
(d)					
(e)					
(f)					27 cm^2
(g)		5 cm			40 cm^2
(h)					48 mm^2
(i)					
(j)					xy cm^2

2.8 Area of Triangles

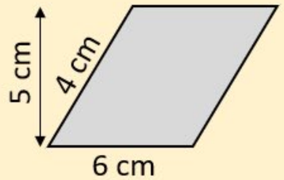
$$\text{Area of a triangle} = \frac{\text{base x perpendicular height}}{2}$$

$$A = \frac{b \times h}{2}$$

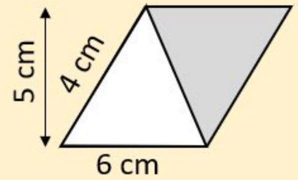


Fluency Practice

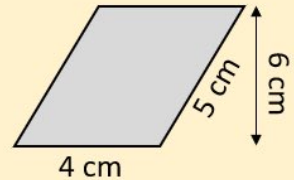
1a) Find the area of the grey parallelogram



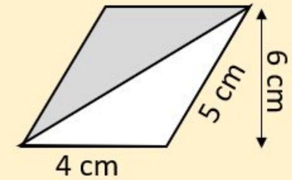
1b) Find the area of the white triangle



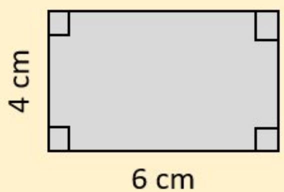
2a) Find the area of the grey parallelogram



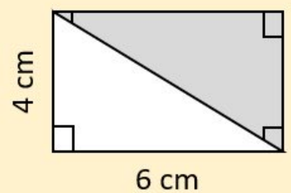
2b) Find the area of the white triangle



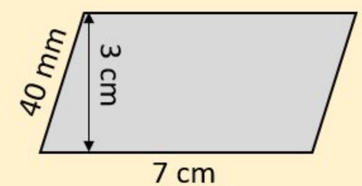
3a) Find the area of the grey rectangle



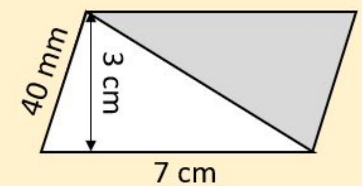
3b) Find the area of the white right-angled triangle



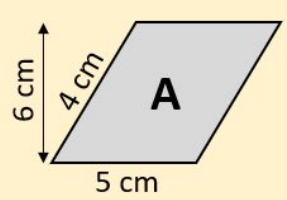
4a) Find the area of the grey parallelogram

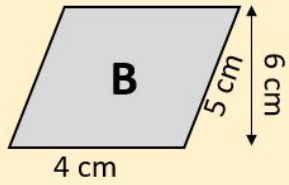


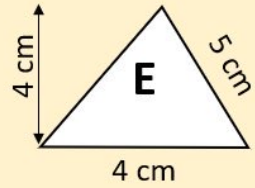
4b) Find the area of the white triangle

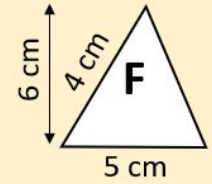


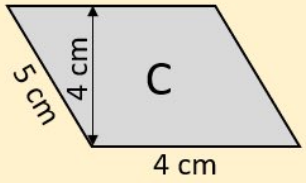
5) Some of the parallelograms A - D can be used to help find the areas of the triangles E – H.
Match each parallelogram up with the triangle you could use it with.

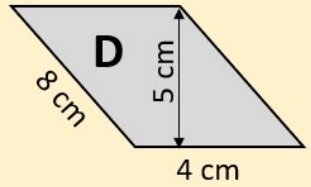


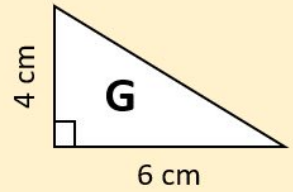


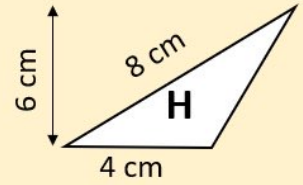




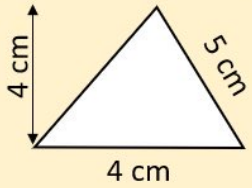


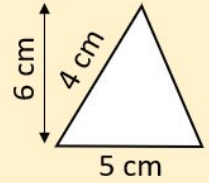


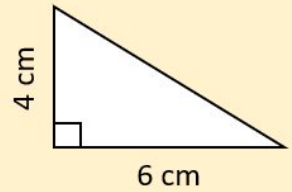


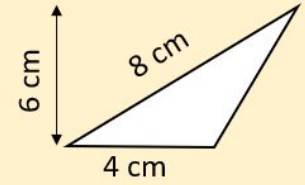


6) Find the area of each triangle:

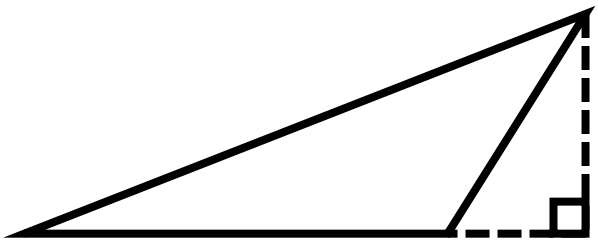






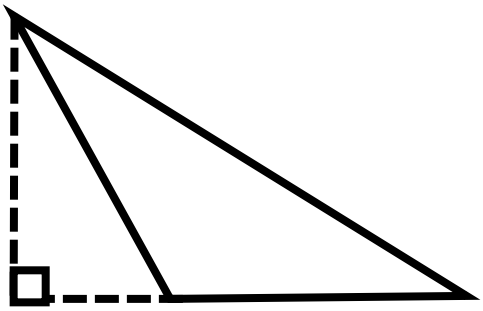


Worked Example

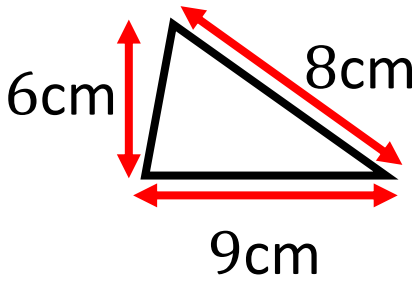
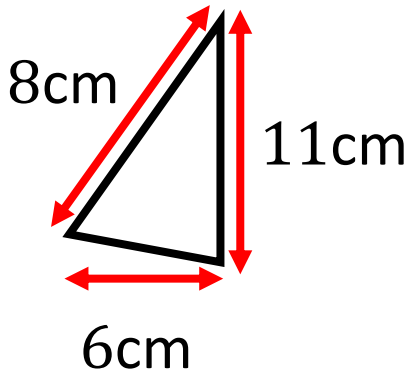


a) What is the height?
b) What is the base?

Your Turn



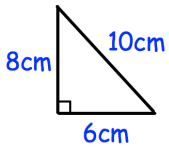
a) What is the height?
b) What is the base?

Worked Example	Your Turn
Calculate the area of the triangle:  	Calculate the area of the triangle: 

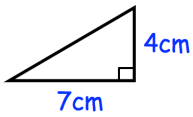
Fluency Practice

Question 1: Find the area of each triangle.

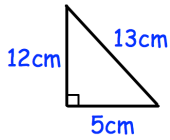
(a)



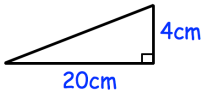
(b)



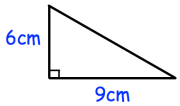
(c)



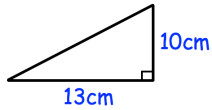
(d)



(e)

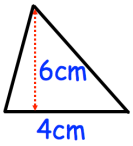


(f)

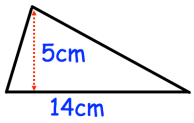


Question 2: Find the area of each triangle.

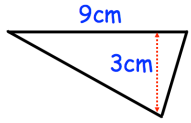
(a)



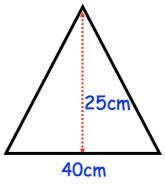
(b)



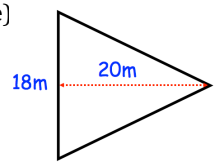
(c)



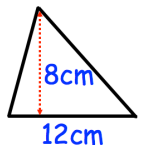
(d)



(e)

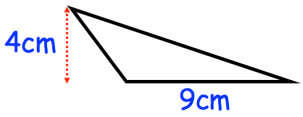


(f)

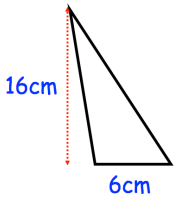


Question 3: Find the area of each triangle.

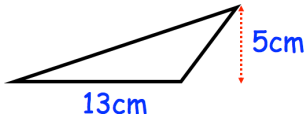
(a)



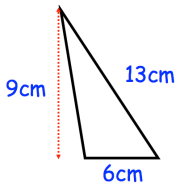
(b)



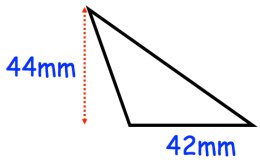
(c)



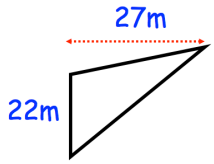
(d)



(e)



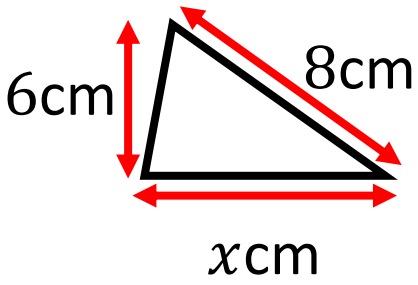
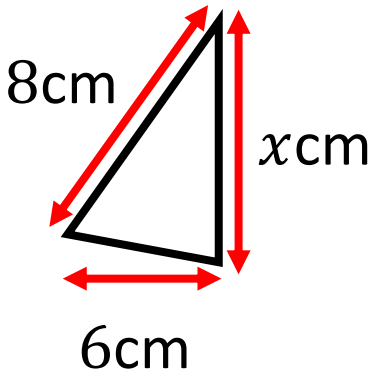
(f)



Question 4: Find the area of the triangle with a base of 12cm and perpendicular height of 9cm.

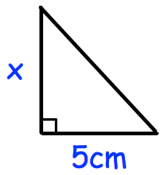
Question 5: Find the area of the triangle with a base of 9cm and perpendicular height of 14cm.

Question 6: Find the area of the triangle with a base of 19cm and perpendicular height of 7cm.

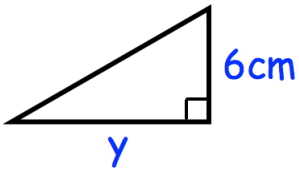
Worked Example	Your Turn
Calculate x if the area of the triangle is 27cm^2:  	Calculate x if the area of the triangle is 33cm^2: 

Fluency Practice

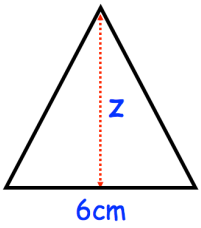
Question 7: The area of the triangle is $20cm^2$, find x.



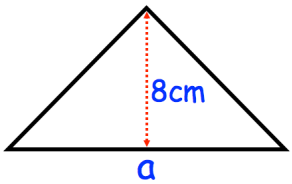
Question 8: The area of the triangle is $30cm^2$, find y.



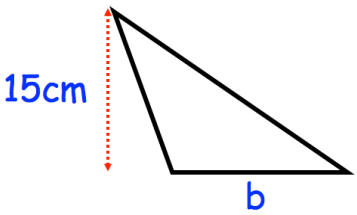
Question 9: The area of the triangle is $12cm^2$, find z.



Question 10: The area of the triangle is $56cm^2$, find a.



Question 11: The area of the triangle is $165cm^2$, find b.

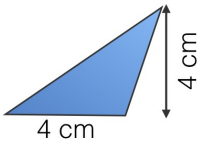


Fluency Practice

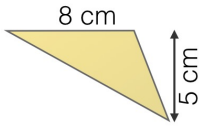
Alpha Exercise

Find the area of each of the following triangles:

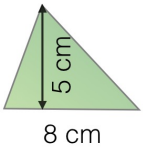
(1)



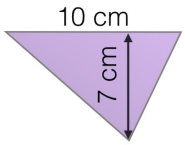
(2)



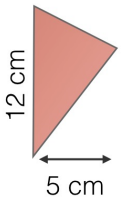
(3)



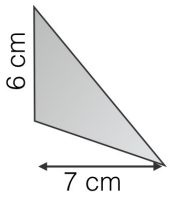
(4)



(5)



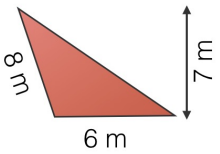
(6)



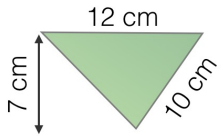
Beta Exercise

Find the area of each of the following triangles:

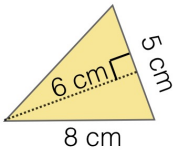
(1)



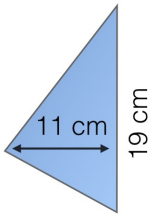
(2)



(3)



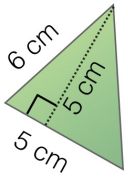
(4)



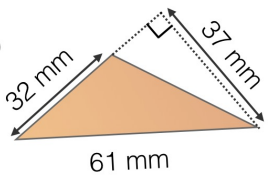
Gamma Exercise

Find the area of each of the following triangles:

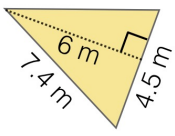
(1)



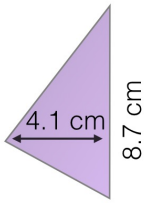
(2)



(3)



(4)

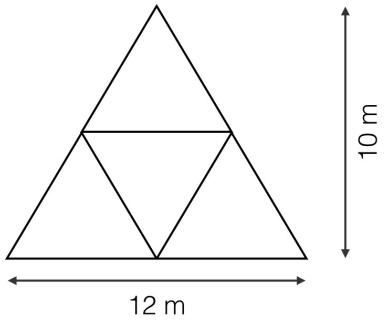


Exam Questions

Exam-style question 1

Four identical triangles are tiled as shown to form one large triangle with a base of 12 metres, and a height of 10 metres, as shown in the diagram.

Work out the area of one tile.

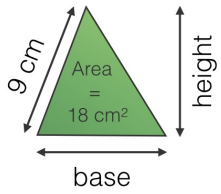


Exam-style question 2

Tyler draws a triangle whose base is equal to its perpendicular height.

The area of the triangle is 18 cm^2, and one of the sides is 9 cm long.

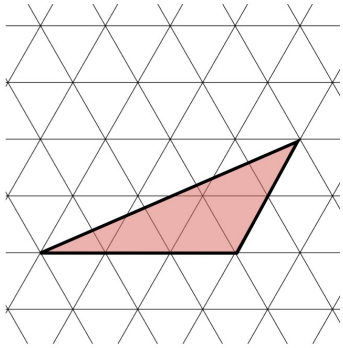
Find the base and height of the triangle.



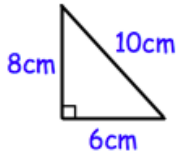
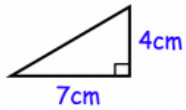
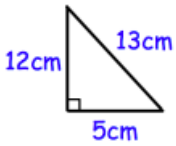
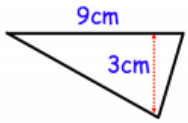
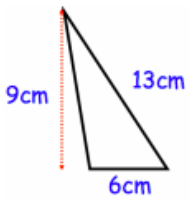
Exam-style question 3

Here is a grid made up of equilateral triangles. Each small triangle has an area of 5 cm^2.

What is the area of the shaded triangle?



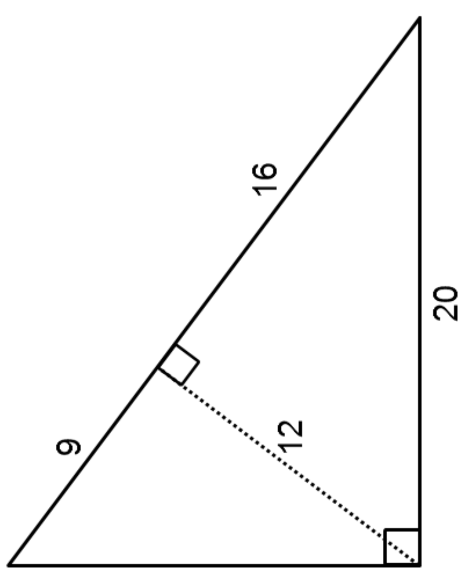
Fill in the Gaps

Question	Diagram	Base	Height	Calculation	Area
(a)		6 cm	8 cm	$\frac{6 \times 8}{2}$	24 cm^2
(b)					
(c)					
(d)					
(e)					
(f)		7 m	6 m	$\frac{7 \times 6}{2}$	
(g)				$\frac{3 \times 5}{2}$	
(h)		8 mm			12 mm^2
(i)					18 cm^2

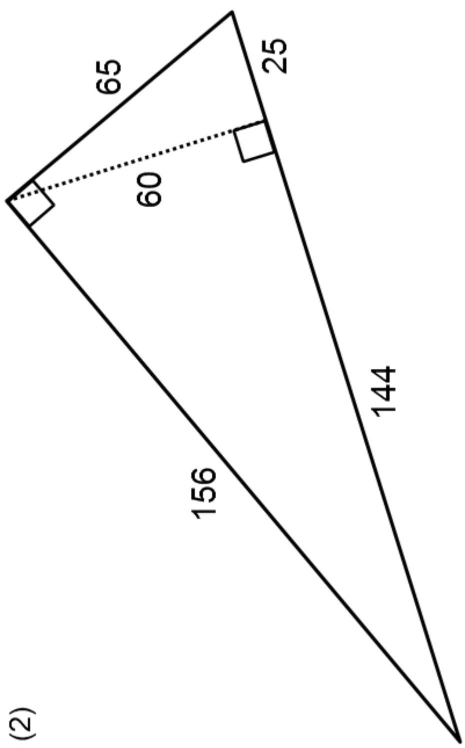
Triangle Areas – Various Ways

work out the area of the triangles, then work out the area another way

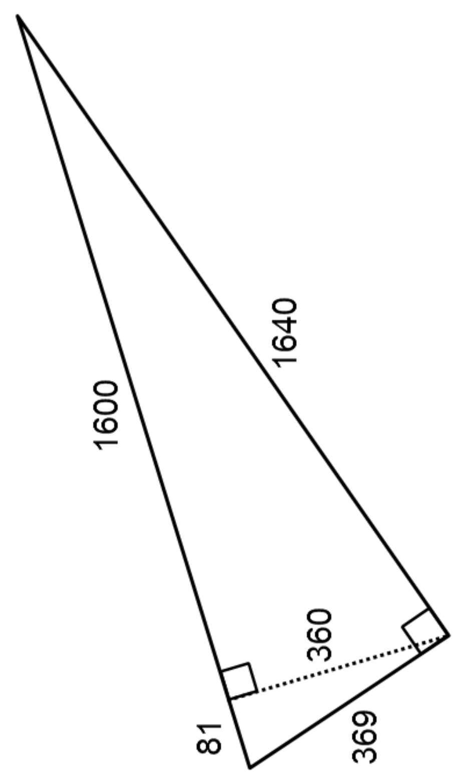
(1)



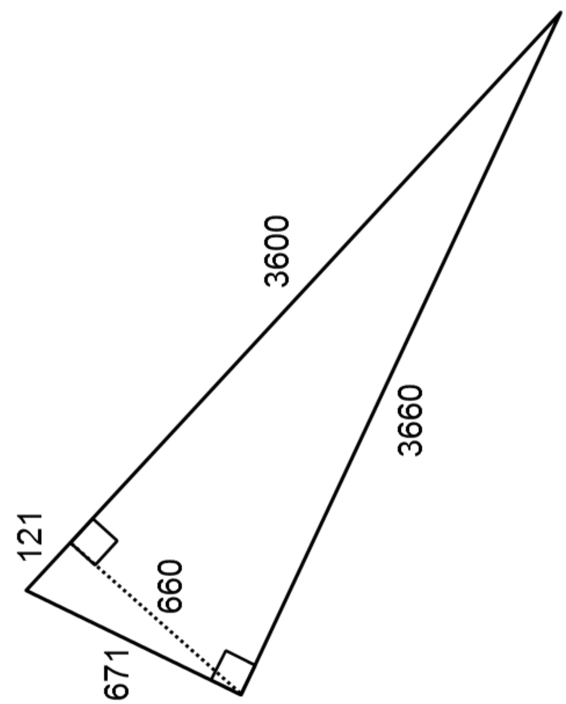
(2)



(3)



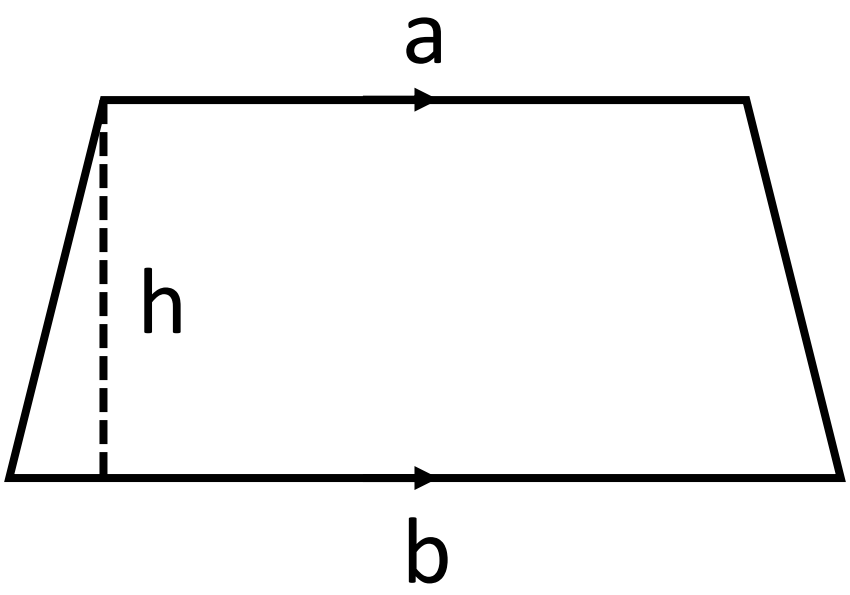
(4)

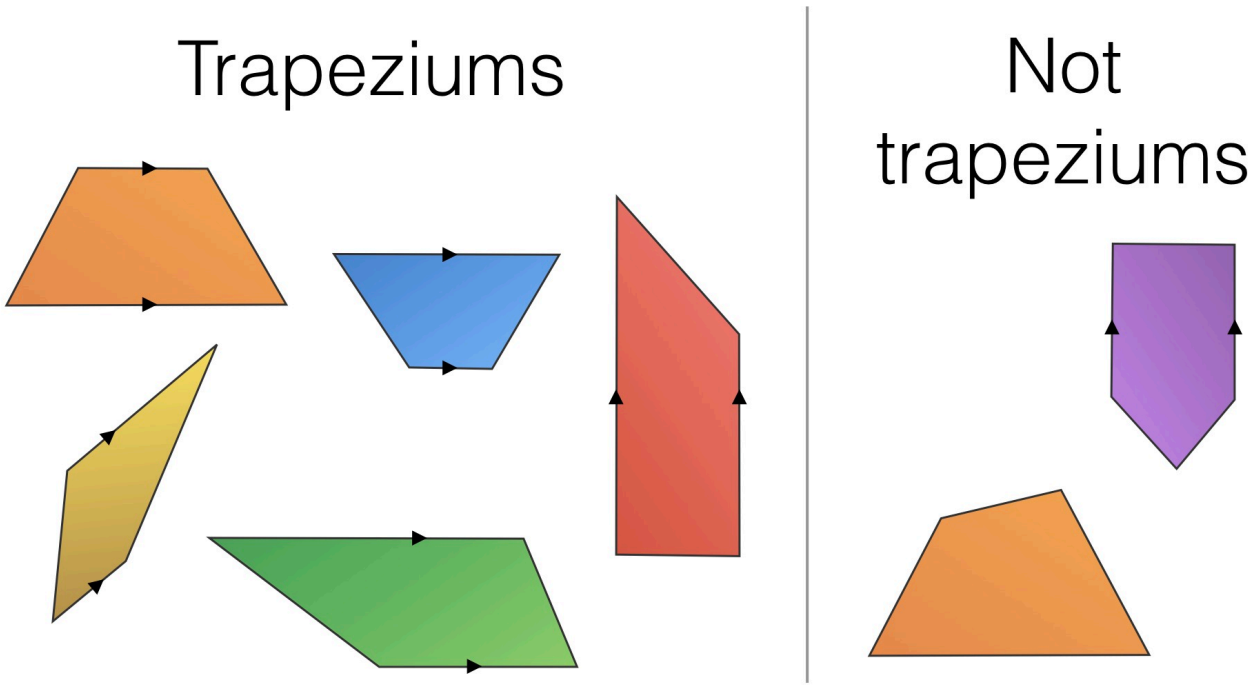


2.9 Area of Trapeziums

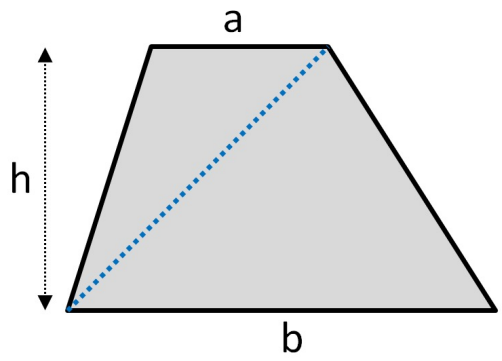
$$\text{Area of a trapezium} = \frac{\text{sum of parallel sides}}{2} \text{ x perpendicular height}$$

$$A = \frac{a+b}{2} \times h$$

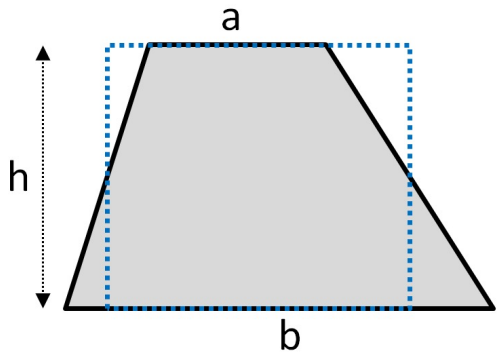




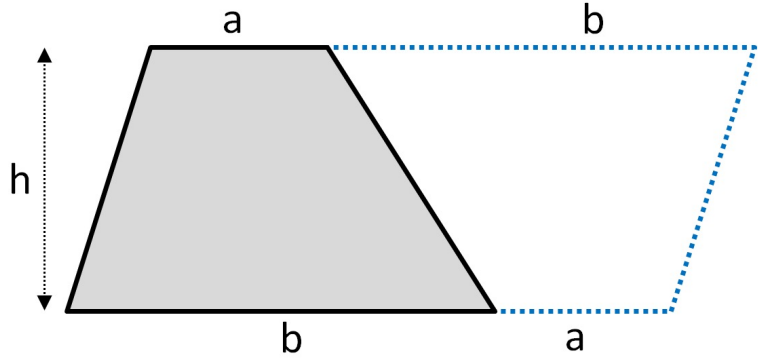
Formula



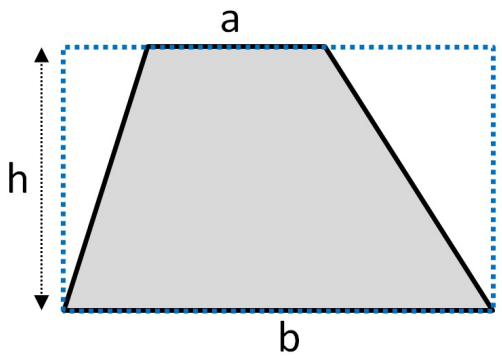
$$\frac{1}{2}ah+\frac{1}{2}bh$$



$$\frac{a+b}{2}\times h$$



$$\frac{(a+b)h}{2}$$



$$bh-\frac{1}{2}(b-a)h$$

Frayer Model – Parallel

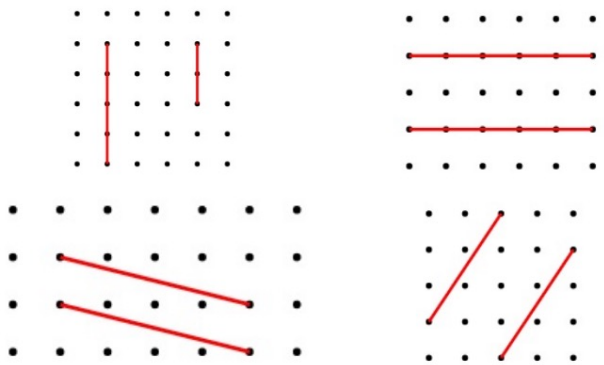
Definition

Straight lines that will never meet no matter how far they are extended.

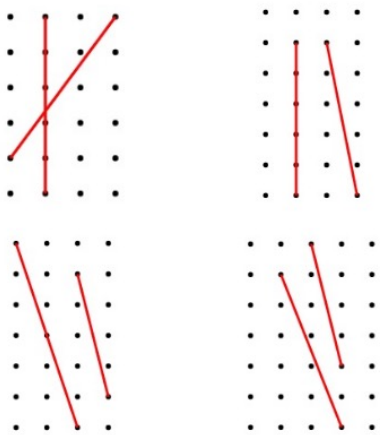
Characteristics

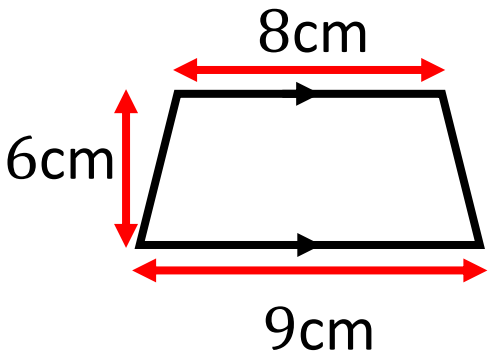
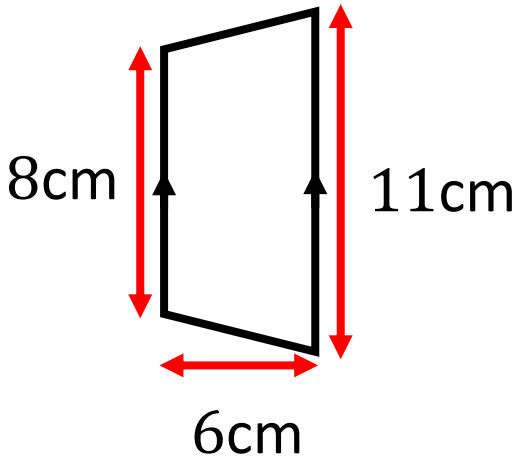
- All lines must be straight.
- Arrows are often used to show parallel lines.

Examples



Non Examples

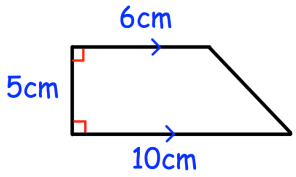


Worked Example	Your Turn
Calculate the area of the trapezium:  	Calculate the area of the trapezium: 

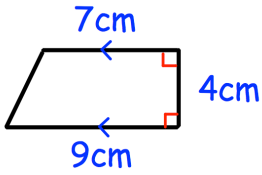
Fluency Practice

Question 1: Find the area of each trapezium.

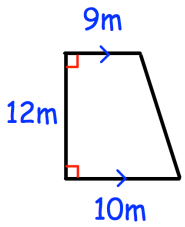
(a)



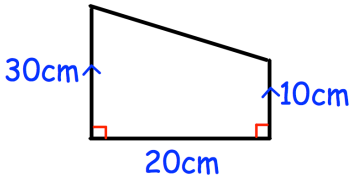
(b)



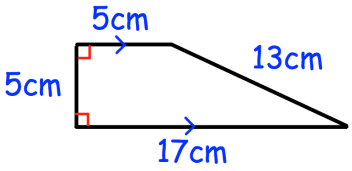
(c)



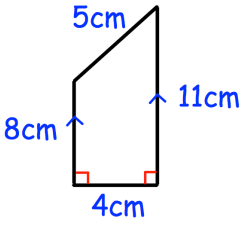
(d)



(e)

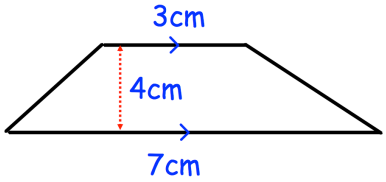


(f)

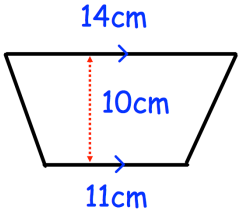


Question 2: Find the area of each trapezium.

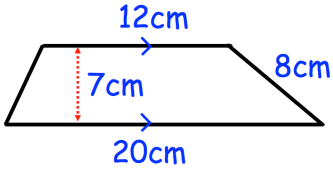
(a)



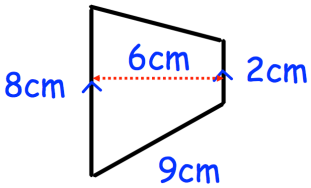
(b)



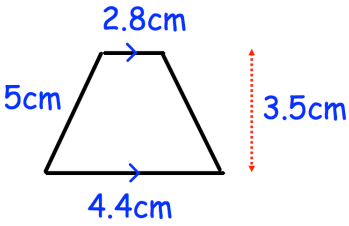
(c)



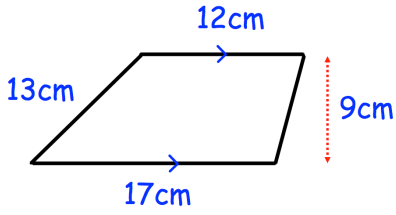
(d)

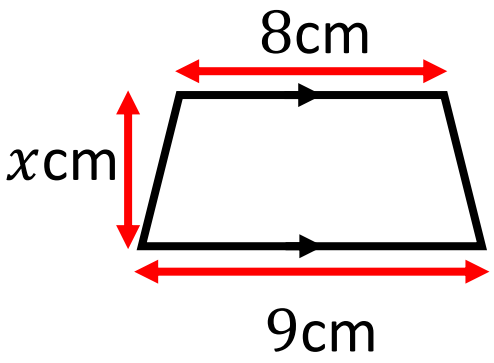
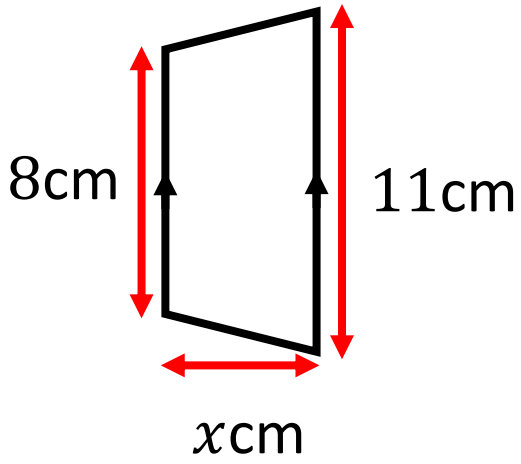


(e)



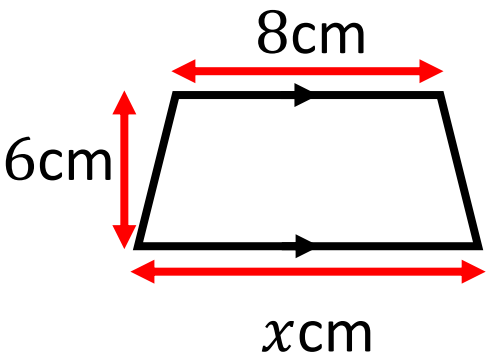
(f)



Worked Example	Your Turn
Calculate x if the area of the trapezium is 51cm^2: 	Calculate x if the area of the trapezium is 57cm^2: 

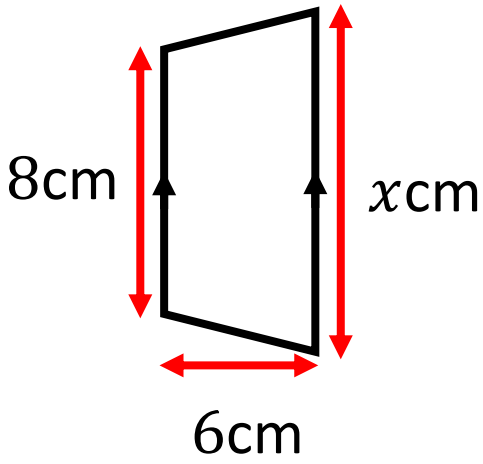
Worked Example

Calculate x if the area of the trapezium is 51cm^2:



Your Turn

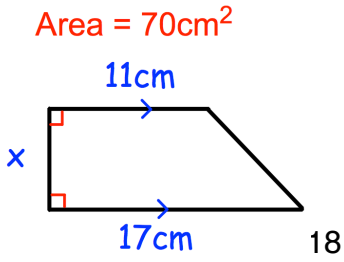
Calculate x if the area of the trapezium is 57cm^2:



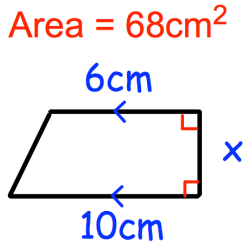
Fluency Practice

Question 3: Find x for each trapezium.

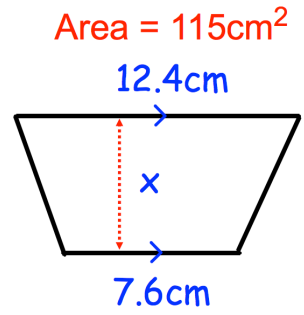
(a)



(b)

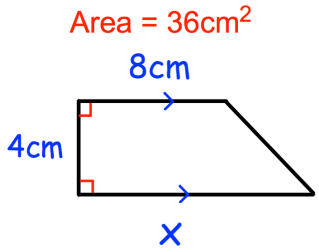


(c)

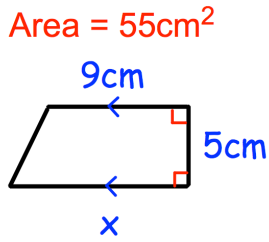


Question 4: Find x for each trapezium.

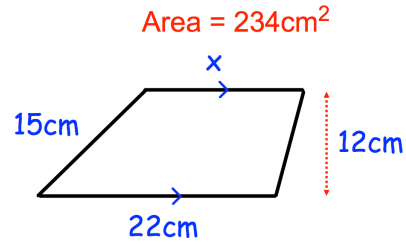
(a)



(b)



(c)

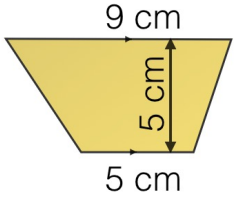


Fluency Practice

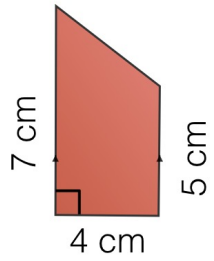
Alpha Exercise

Find the area of each of the following trapeziums:

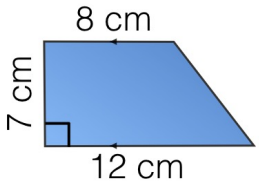
(1)



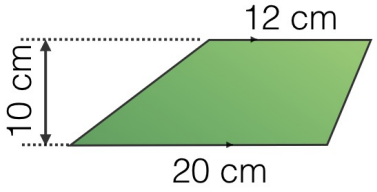
(2)



(3)



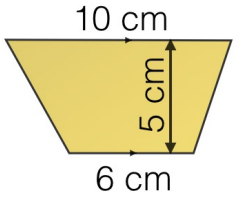
(4)



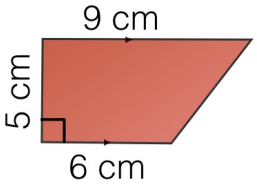
Beta Exercise

Find the area of each of the following trapeziums:

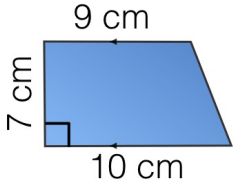
(1)



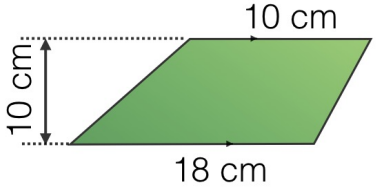
(2)



(3)



(4)

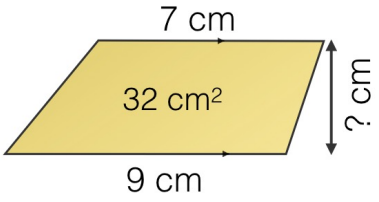


Fluency Practice

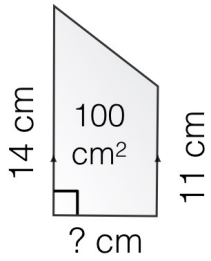
Gamma Exercise

Find the missing length in each trapezium, given its area:

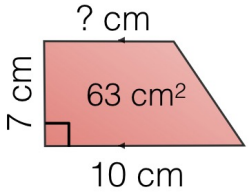
(1)



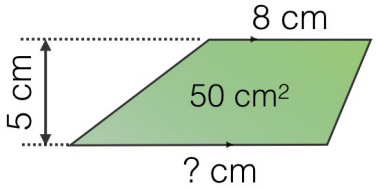
(2)



(3)

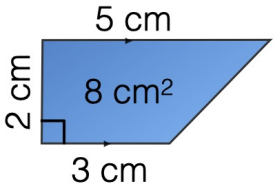


(4)

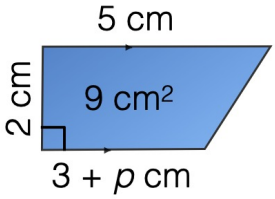


Delta Exercise

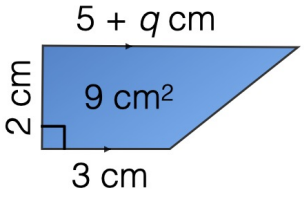
The area of this trapezium is 8 cm². You want to increase its area to 9 cm² by extending the length of one of the three indicated sides. You can do this in three ways:



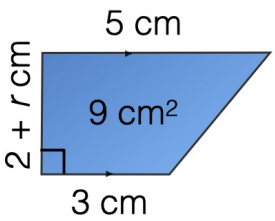
Trapezium 1



Trapezium 2



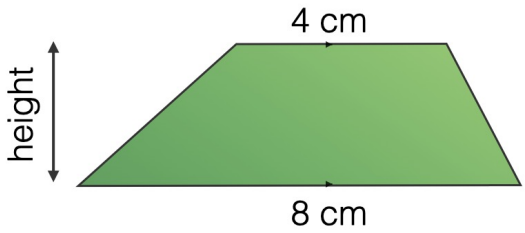
Trapezium 3



(a) Find the values of *p*, *q* and *r*.
(b) Which trapezium has the longest *unlabelled* edge?

Exam-style question 1

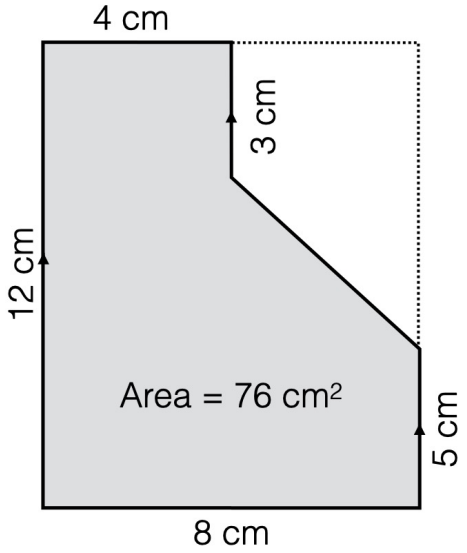
The trapezium in the diagram has an area of 18 cm^2. Find its height.



Exam-style question 2

An 8 × 12 cm rectangle of paper has had a piece cut out of it, as shown in the diagram.

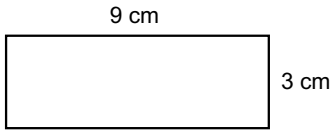
By calculating the area of the piece that was cut out, show that the remaining paper has an area of 76 cm^2.



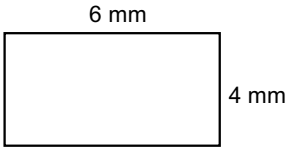
2.10 Review and Problem Solving

Fluency Practice

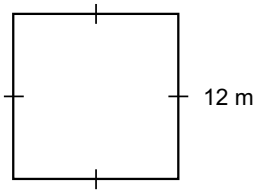
1. Calculate the area.



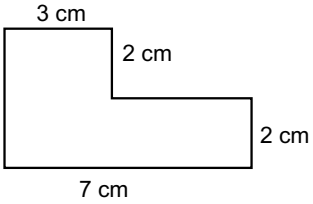
2. Calculate the perimeter.



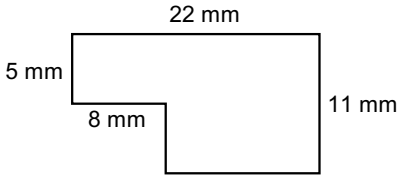
3. Calculate the area.



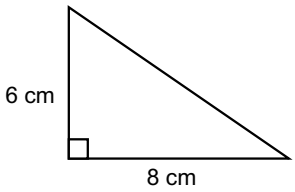
4. Calculate the perimeter.



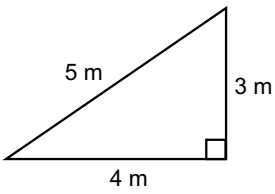
5. Calculate the area.



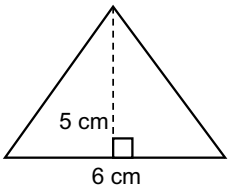
6. Calculate the area.



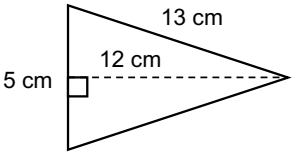
7. Calculate the perimeter.



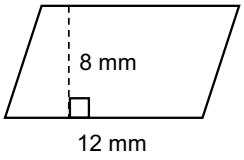
8. Calculate the area.



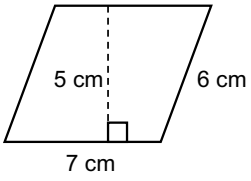
9. Calculate the area.



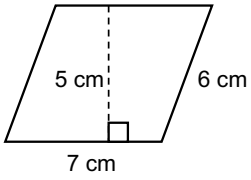
10. Calculate the area.



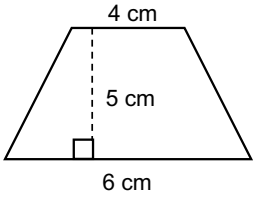
11. Calculate the area.



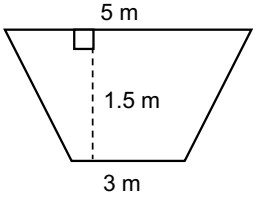
12. Calculate the perimeter.



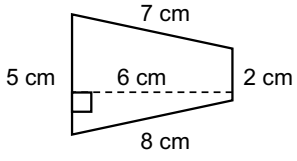
13. Calculate the area.



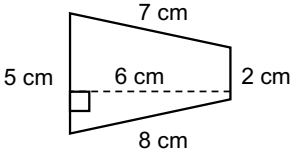
14. Calculate the area.



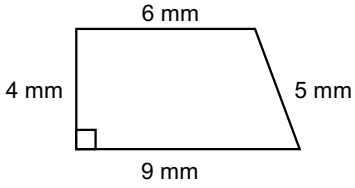
15. Calculate the perimeter.



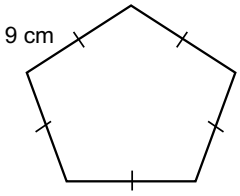
16. Calculate the area.



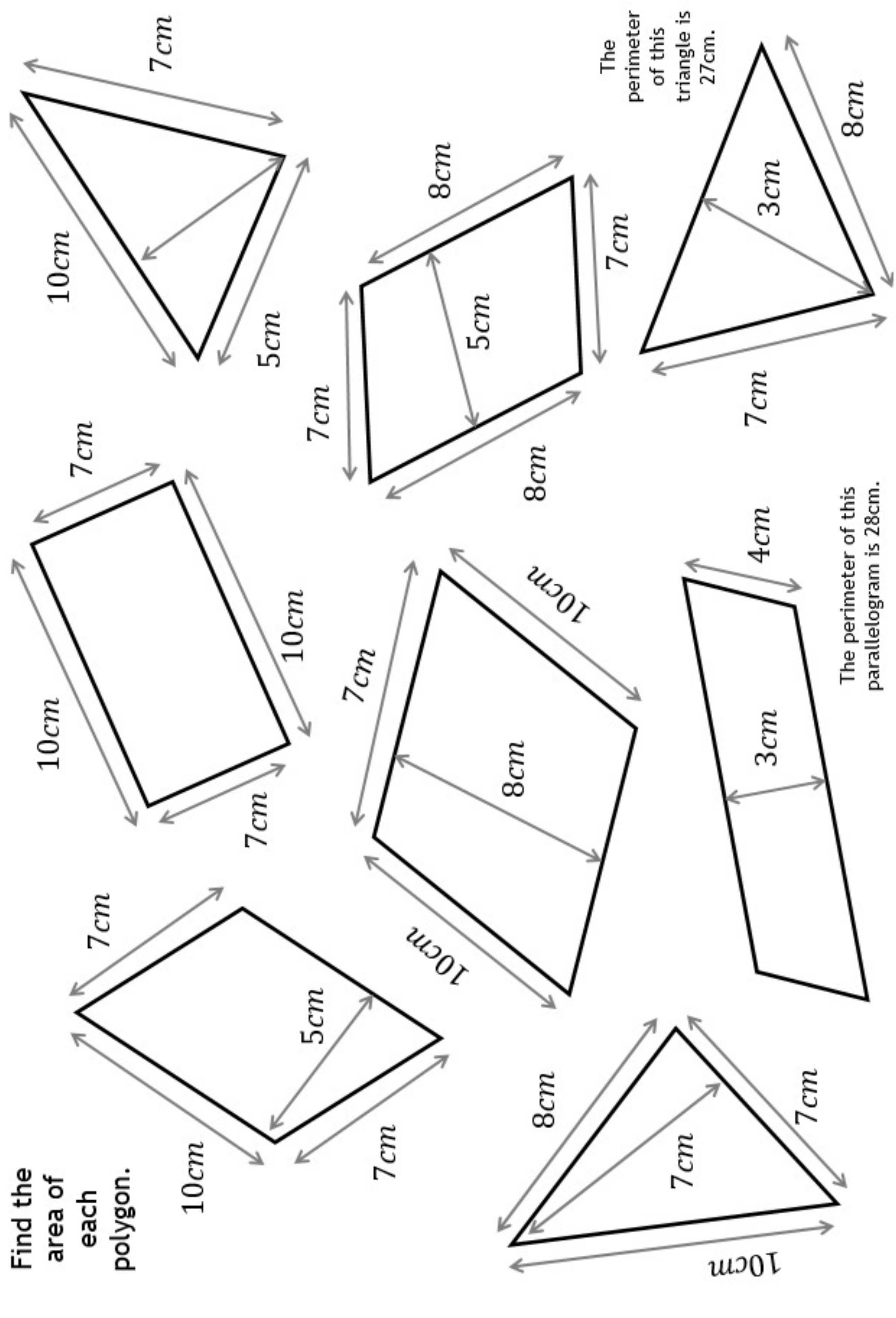
17. Calculate the area.



18. Calculate the perimeter.



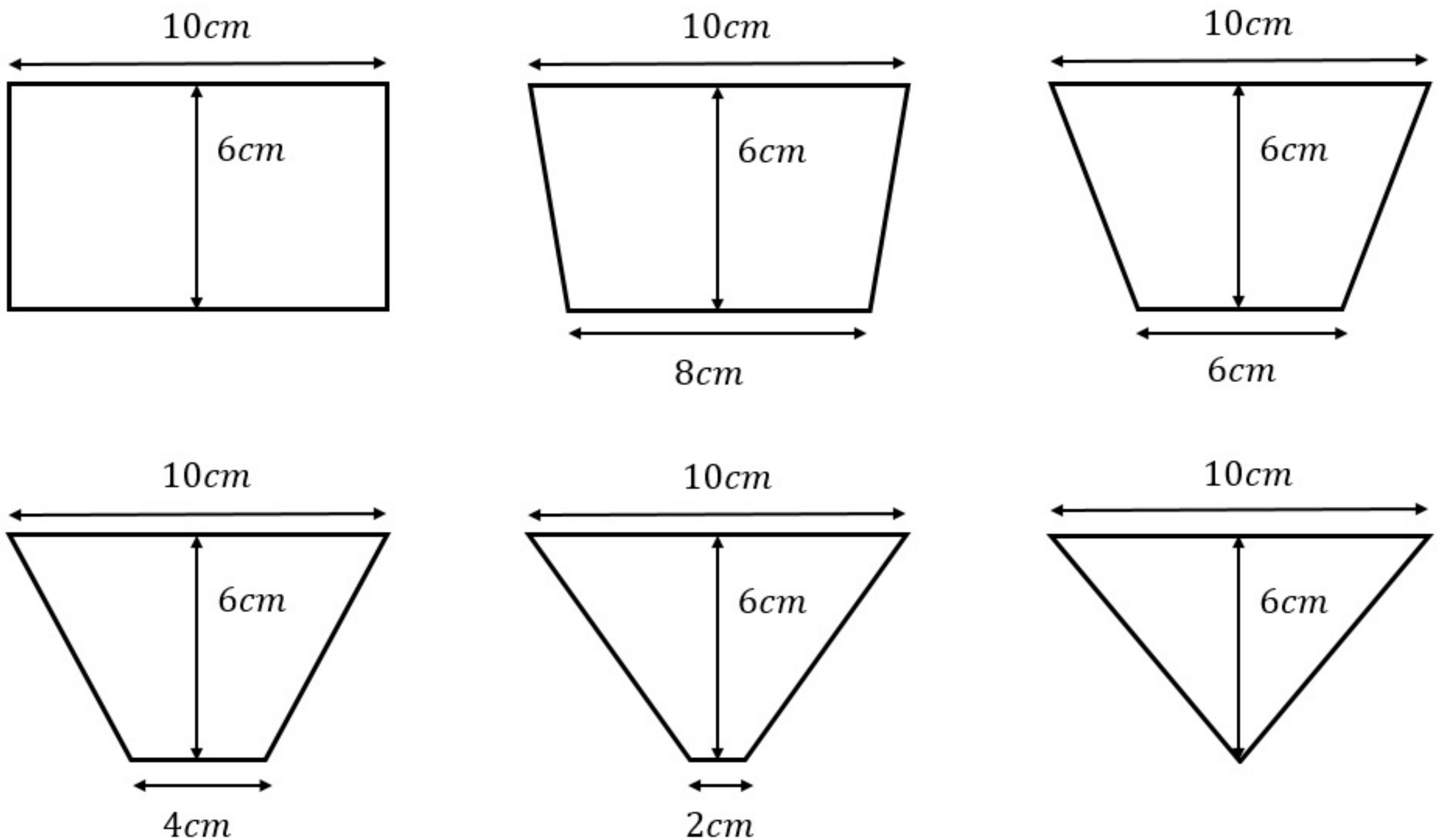
Fluency Practice



Intelligent Practice

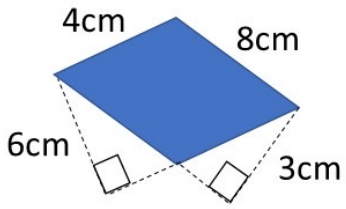
One edge of a rectangle decreases by 2cm in each question, leaving one rectangle, four trapezia and a triangle.

1) Predict how you think the area of each shape will change from question to question
2) Work out the area of each shape



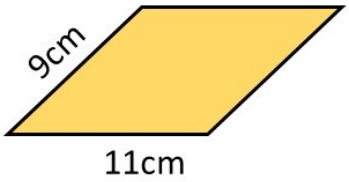
Extension

1) Find the blue parallelogram's area in two different ways.



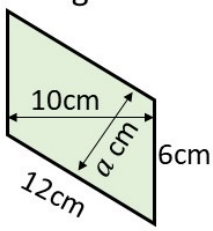
2) a) Explain why the area of this parallelogram is **not** 99cm^2

b) Will its area be greater than or less than 99cm^2? Explain how you know.

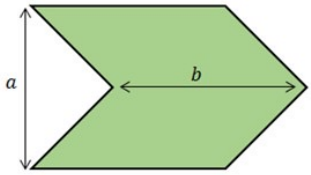


3) Draw two different parallelograms with area 24cm^2 and perimeter 22cm.

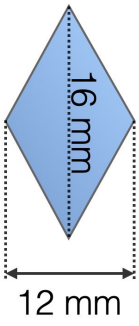
4) This shape is a parallelogram. Find the value of a.



5) This shape is made from two parallelograms. Explain why its area is ab

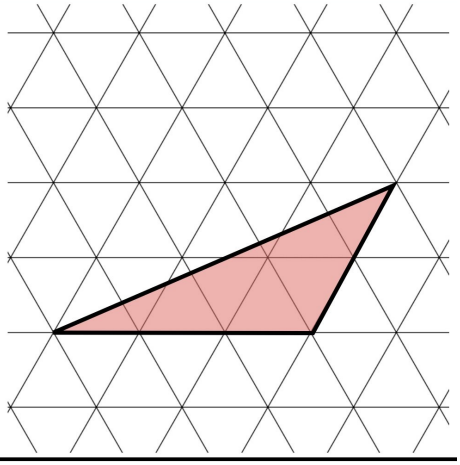


Find the area of this rhombus.

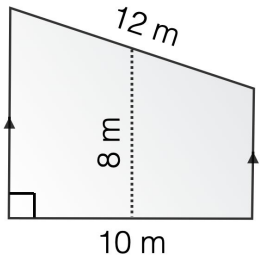


Here is a grid made up of equilateral triangles. Each small triangle has an area of 5 cm^2.

What is the area of the shaded triangle?



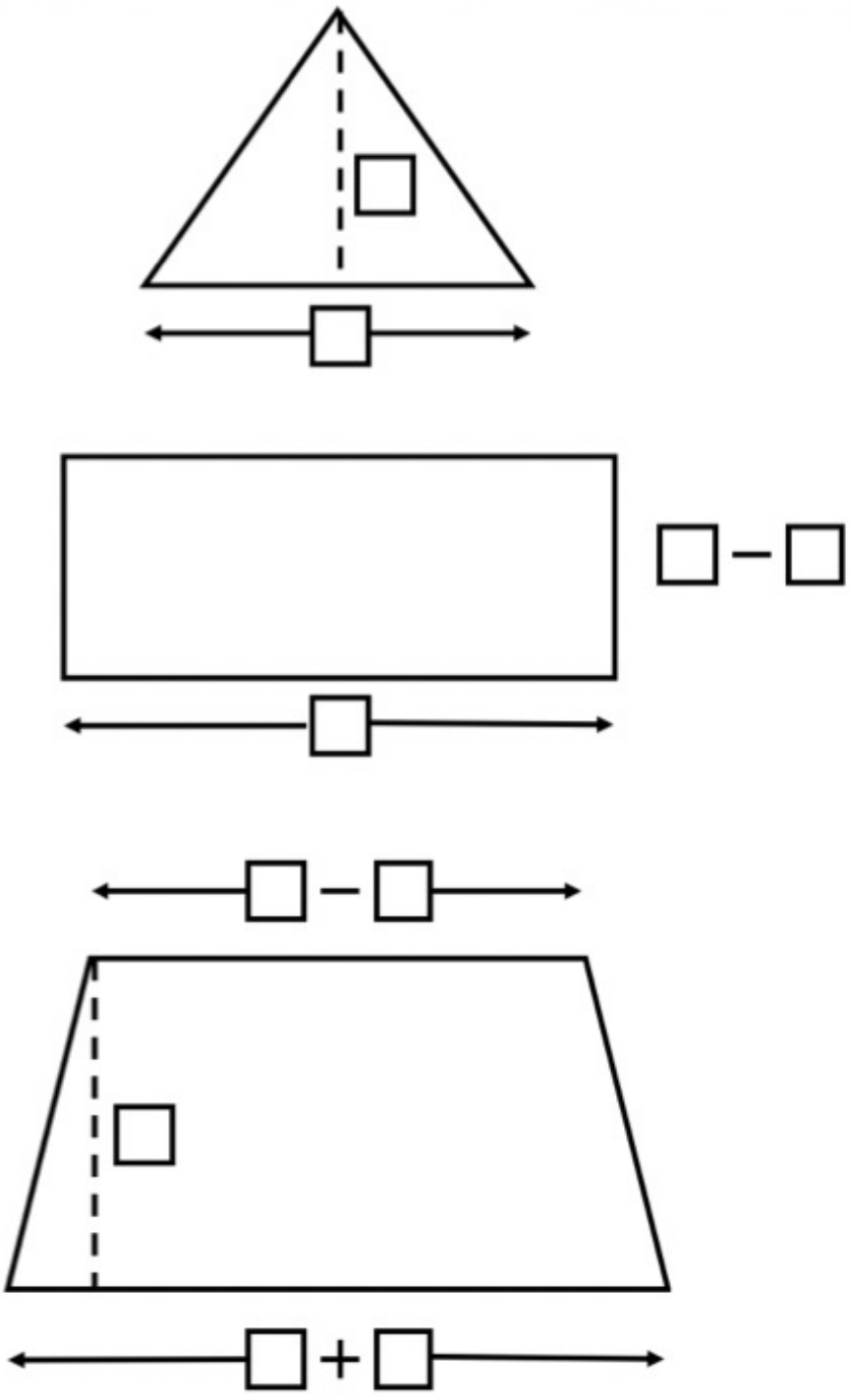
Find the area of this trapezium. The dashed line segment joins the midpoints of the 10 m and 12 m edges shown.



Can you find the perimeter of this trapezium?

Problem Solving

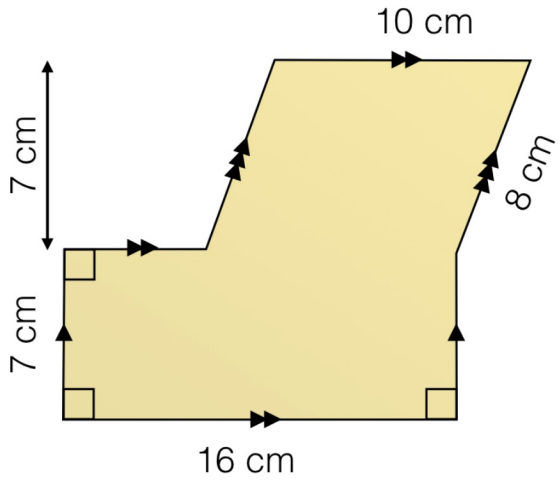
The shapes below have the same area. Fill in the gaps using only the numbers 1 to 10. You can only use each number once.



2.11 Area of Compound Shapes without Circles

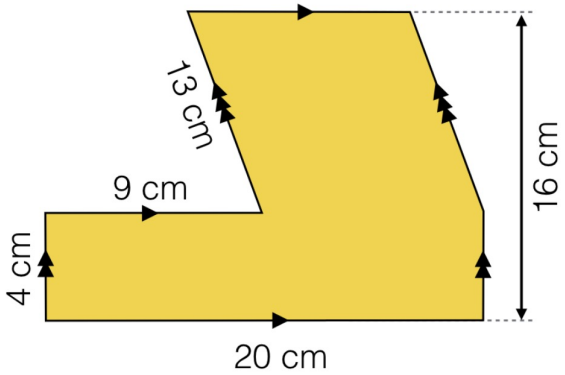
Worked Example

Calculate the area of the compound shape:



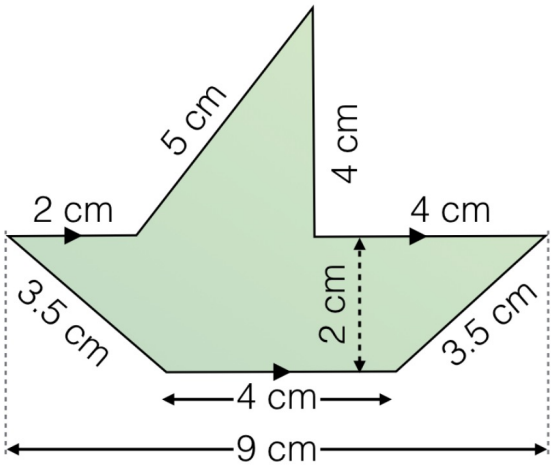
Your Turn

Calculate the area of the compound shape:



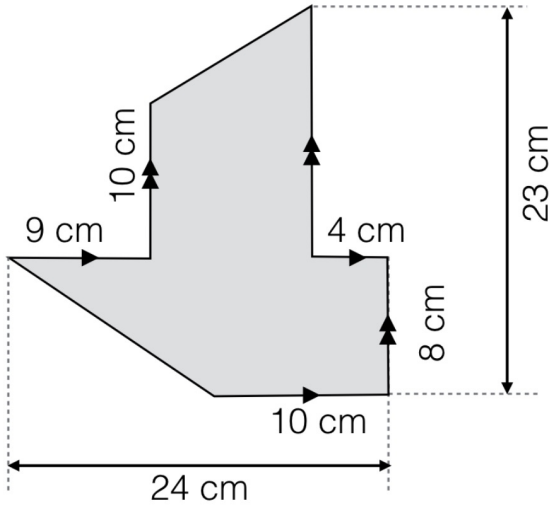
Worked Example

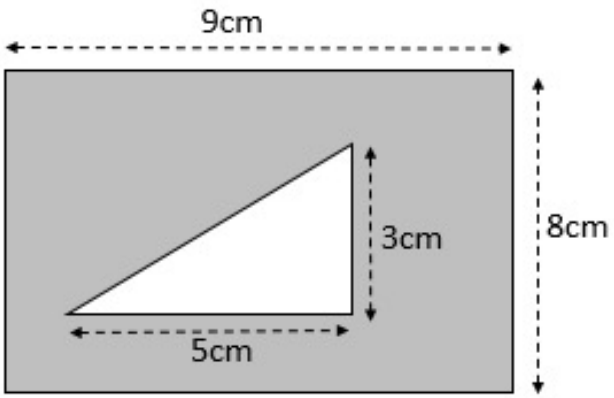
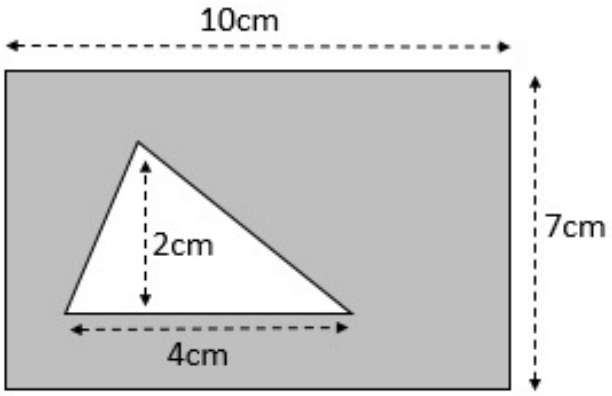
Calculate the area of the compound shape:



Your Turn

Calculate the area of the compound shape:

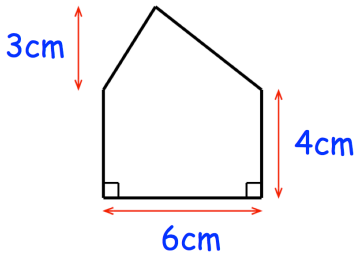


Worked Example	Your Turn
Calculate the area of the compound shape:  	Calculate the area of the compound shape: 

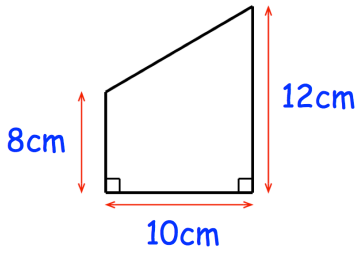
Fluency Practice

Question 3: Work out the area of each of these shapes.

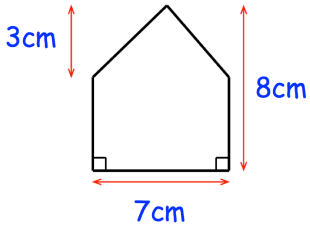
(a)



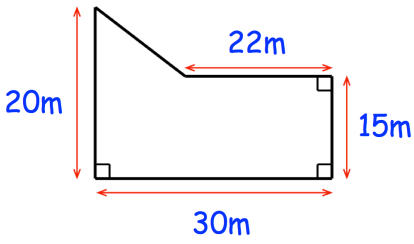
(b)



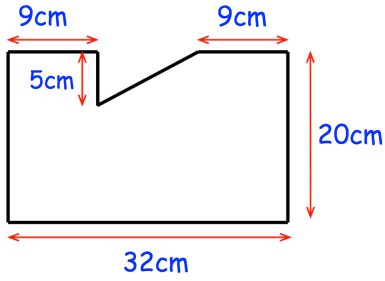
(c)



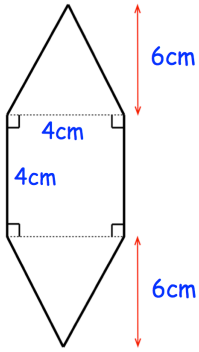
(d)



(e)

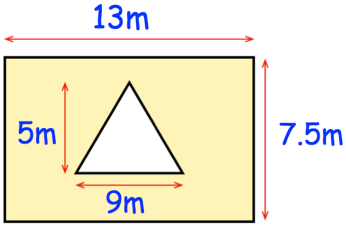


(f)

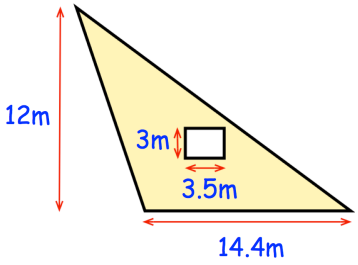


Question 4: Work out the shaded area.

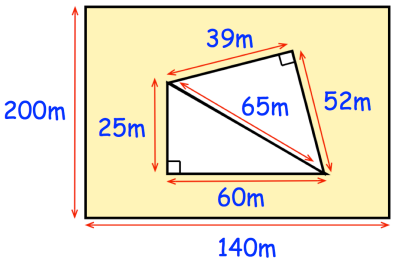
(a)



(b)

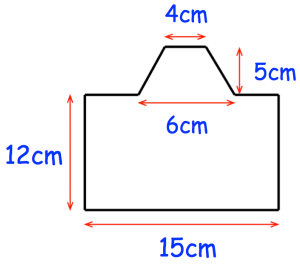


(c)

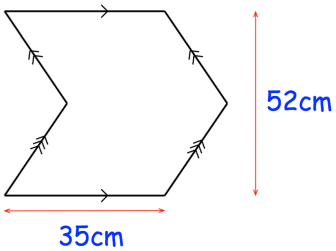


Question 5: Work out the area of each of these shapes.

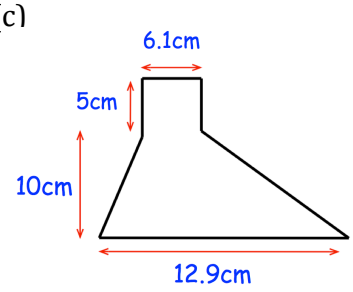
(a)



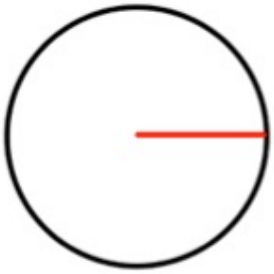
(b)



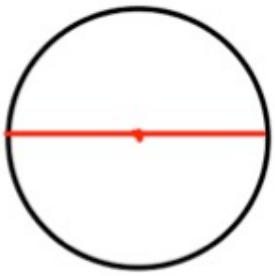
(c)



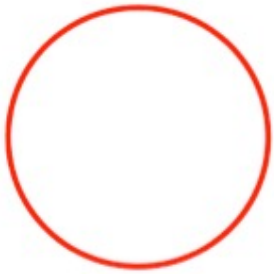
2.12 Parts of the Circle



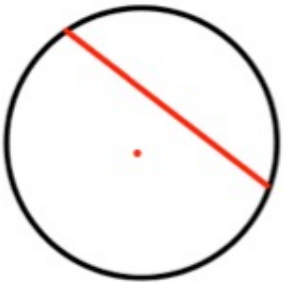
Radius



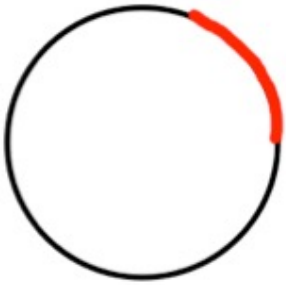
Diameter



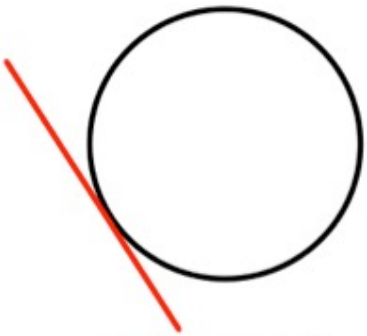
Circumference



Chord



Arc



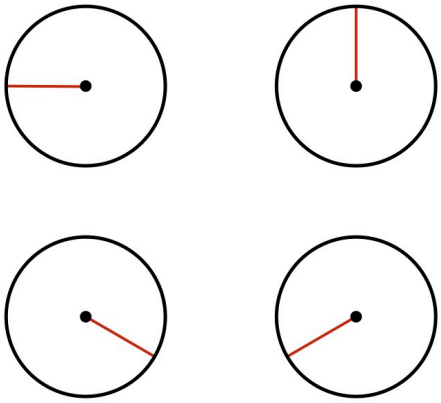
Tangent

Segment

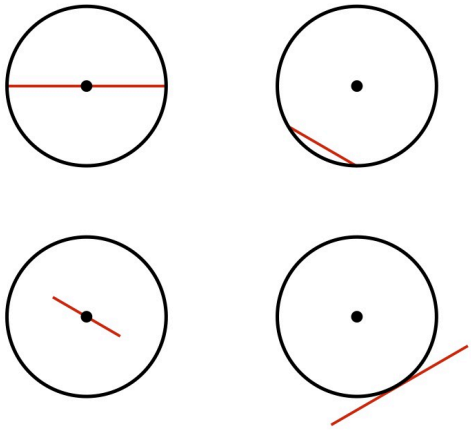
Sector

Radii and Diameters

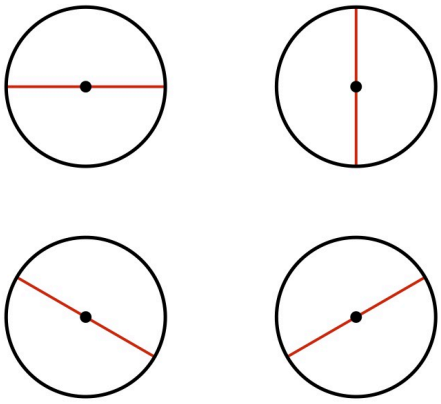
Radii



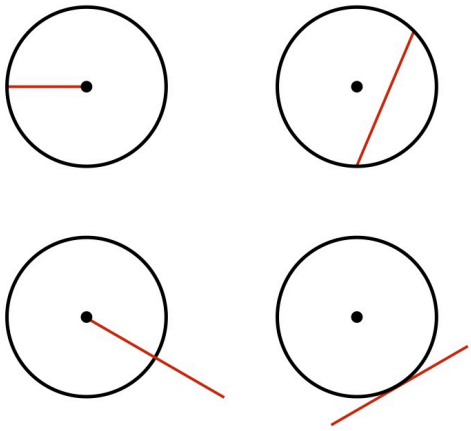
Not radii



Diameters



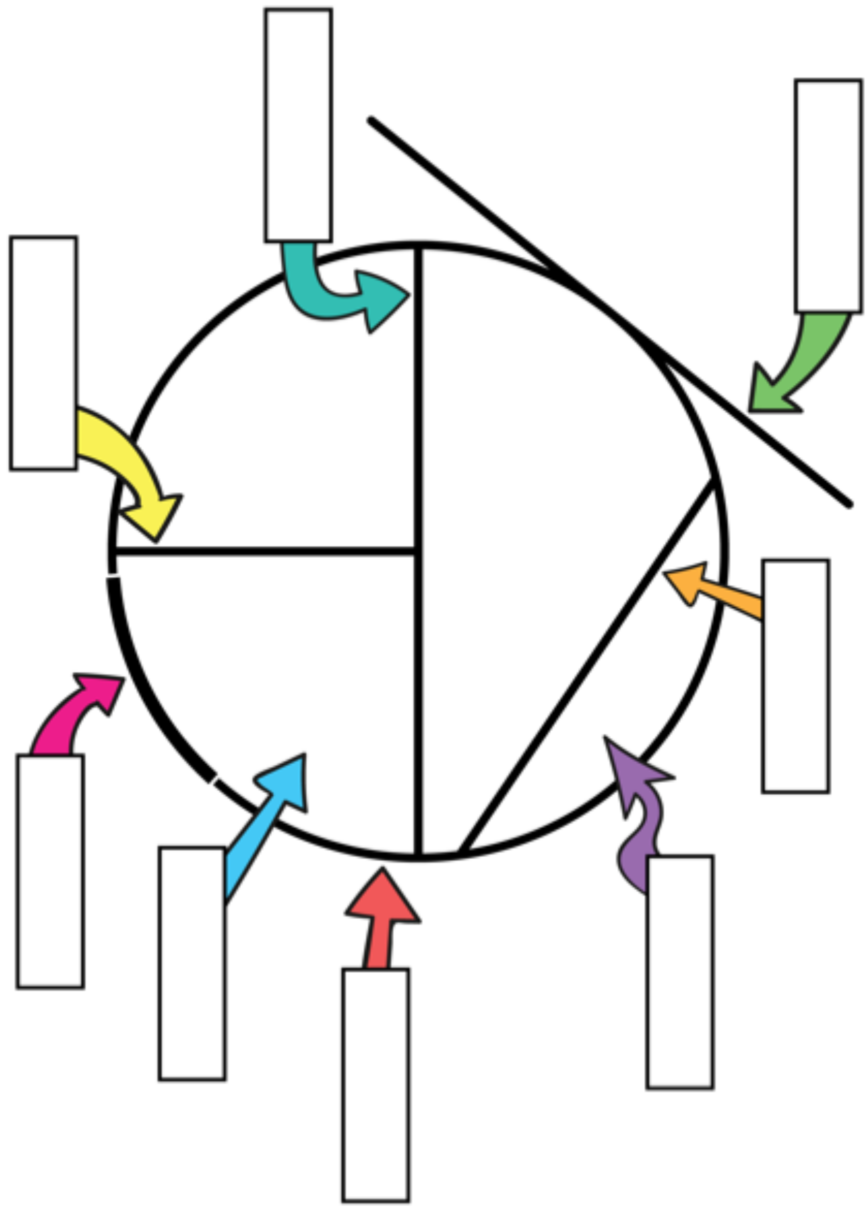
Not diameters



Fluency Practice

Labelling parts of a circle

Use the words below to label each part of the circle correctly



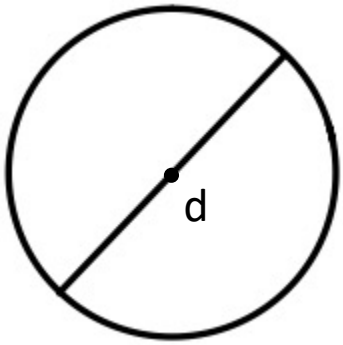
Arc | Chord | Circumference | Diameter | Radius | Sector | Segment | Tangent

2.13 Circumference of Circles

The circumference is the perimeter of a circle.

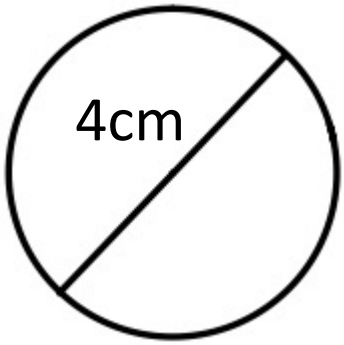
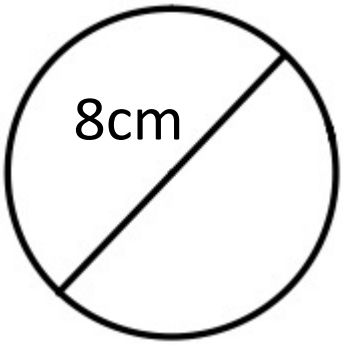
Circumference = π x diameter

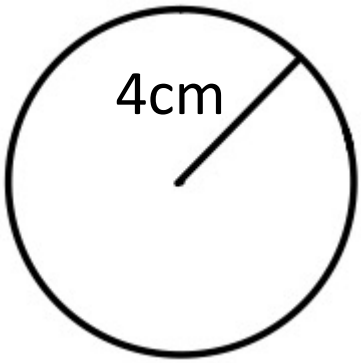
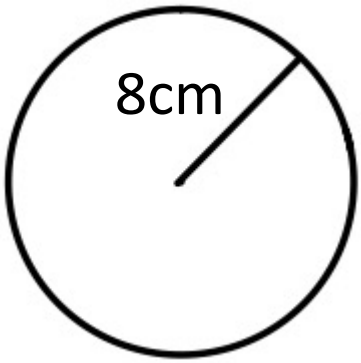
$C = \pi \times d$



What is π?

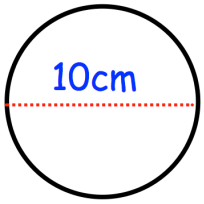
- π is a mathematical constant (it is a constant because its value can't change), with the value 3.14159265357989 …
- The digits of π go on forever, and it can't be expressed as a fraction involving whole numbers.
- For that reason, it is not possible to give an exact answer involving π in 'decimal form' (i.e. where we list out all the digits), as at some point we would have to round.
- We leave the π in the answer if we wish to express the answer 'exactly'.
- You can find it on your calculator.
- It is defined as the scale factor between the diameter of a circle and the circumference, but is used in other parts of maths.

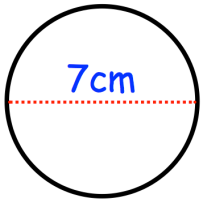
Worked Example	Your Turn
Calculate the circumference of the circle:  	Calculate the circumference of the circle: 

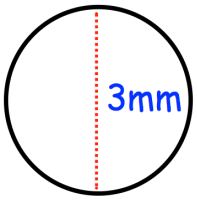
Worked Example	Your Turn
Calculate the circumference of the circle:  	Calculate the circumference of the circle: 

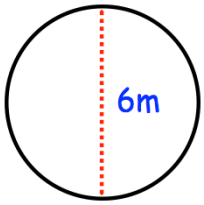
Fluency Practice

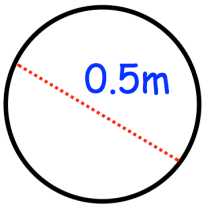
Question 1: Calculate the circumference of the following circles.
Give your answers to 1 decimal place.

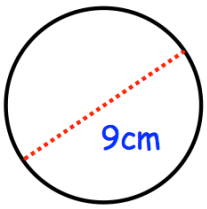
(a) 

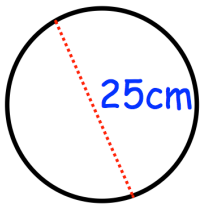
(b) 

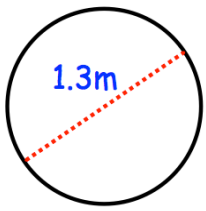
(c) 

(d) 

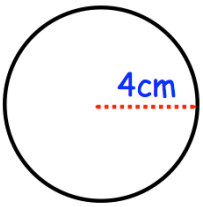
(e) 

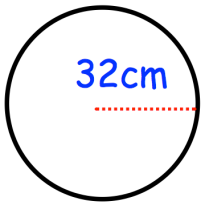
(f) 

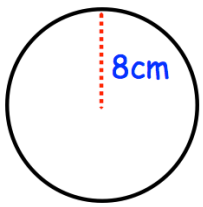
(g) 

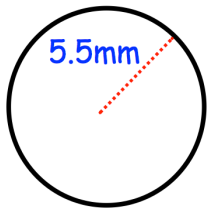
(h) 

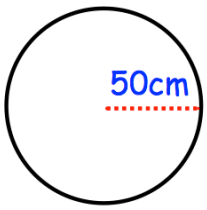
Question 2: Calculate the circumference of the following circles.
Give your answers to 1 decimal place.

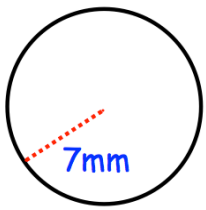
(a) 

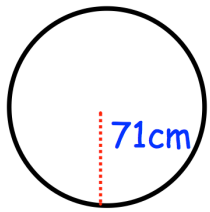
(b) 

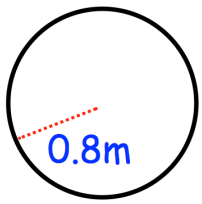
(c) 

(d) 

(e) 

(f) 

(g) 

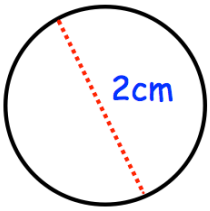
(h) 

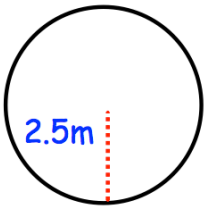
Question 3: Work out the circumference of the following circles.
Give your answers to 1 decimal place.

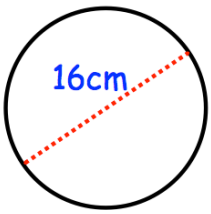
(a) A circle with diameter 2cm
(b) A circle with diameter 14m
(c) A circle with radius 3cm
(d) A circle with radius 0.15km
(e) A circle with diameter 90 inches
(f) A circle with radius 5.7 yards

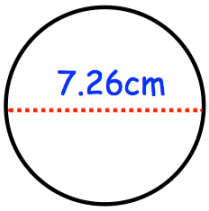
Fluency Practice

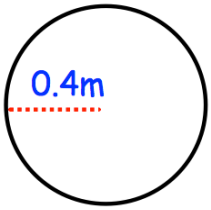
Question 4: Calculate the circumference of the following circles.
Give your answers to 1 decimal place.

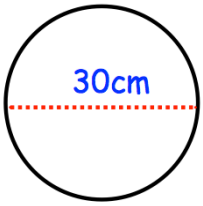
(a) 

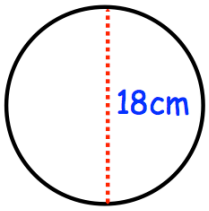
(b) 

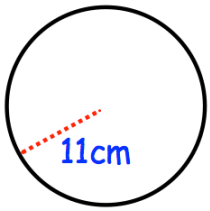
(c) 

(d) 

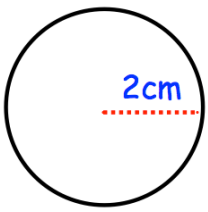
(e) 

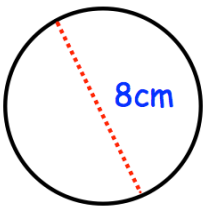
(f) 

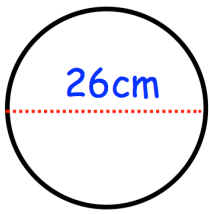
(g) 

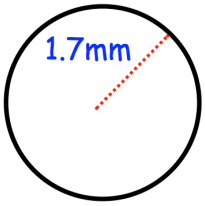
(h) 

Question 5: Calculate the circumference of the following circles.
Leave your answer in terms of π

(a) 

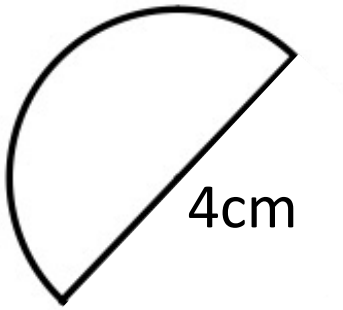
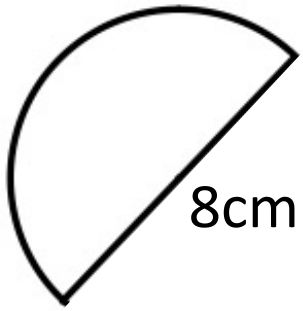
(b) 

(c) 

(d) 

Question 6: Work out the circumference of the following circles.
Leave your answer in terms of π

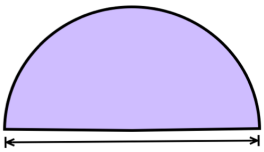
(a) A circle with diameter 12cm
(b) A circle with diameter 52cm
(c) A circle with radius 10cm
(d) A circle with diameter 3cm
(e) A circle with radius 4km

Worked Example	Your Turn
Calculate the perimeter of the semi-circle: 	Calculate the perimeter of the semi-circle: 

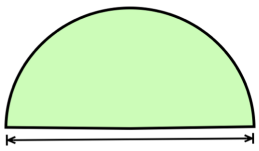
Fluency Practice

Question 1: Calculate the perimeter of each of these semi-circles.
Give your answers to 1 decimal place and include suitable units.

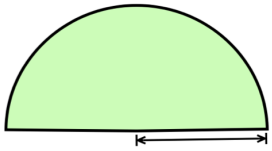
(a)



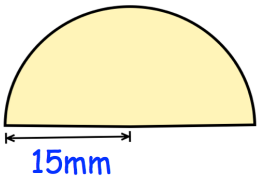
(b)



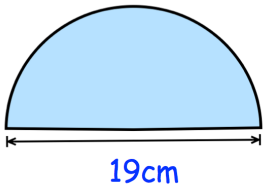
(c)



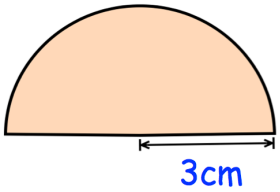
(d)



(e)

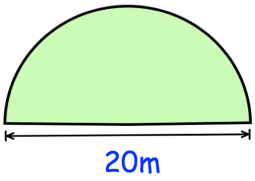


(f)

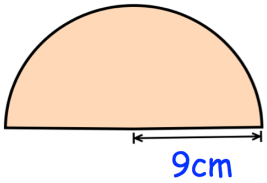


Question 2: Work out the perimeter of each of these semi-circles.
Give your answers in terms of **π** and include suitable units.

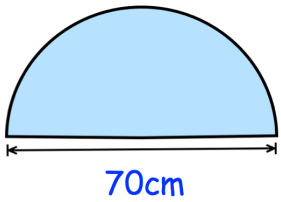
(a)



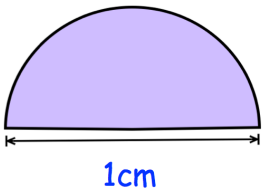
(b)



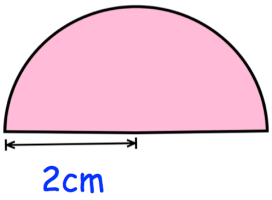
(c)



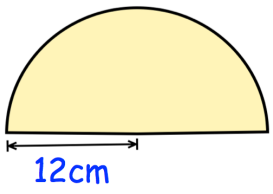
(d)



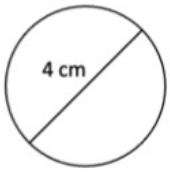
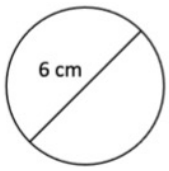
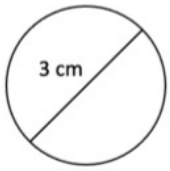
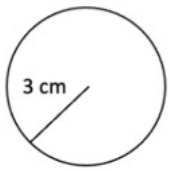
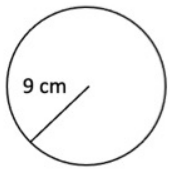
(e)



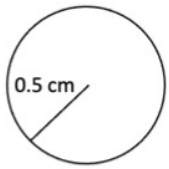
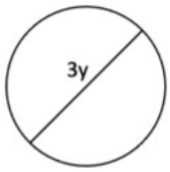
(f)



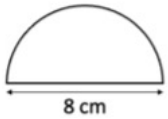
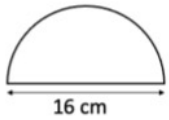
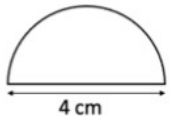
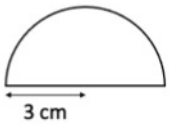
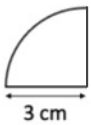
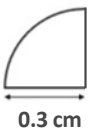
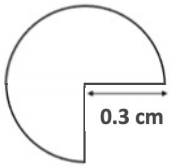
Fill in the Gaps

Diagram	Radius	Diameter	Calculation	Circumference (in terms of π)	Circumference (1 dp)
					
					
					
					
					
		12 mm			
	5 m				

Fill in the Gaps

Diagram	Radius	Diameter	Calculation	Circumference (in terms of π)	Circumference (1 dp)
				16π km	
					
					
	$5a$				

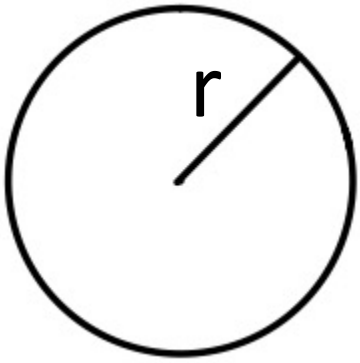
Fill in the Gaps

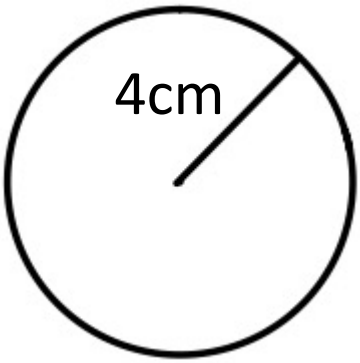
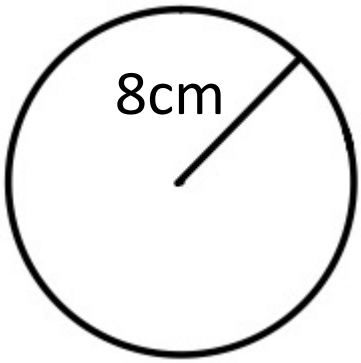
Diagram	Radius	Diameter	Calculation	Perimeter (in terms of π)	Perimeter (1 dp)
					
					
					
					
					
					
					

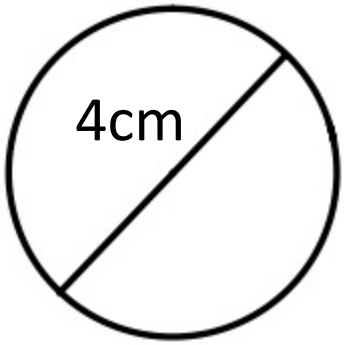
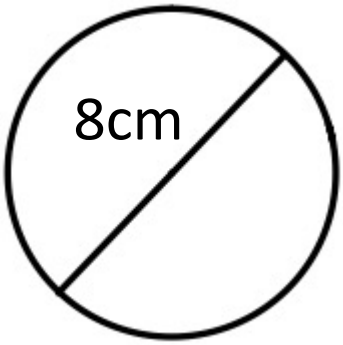
2.14 Area of Circles

Area = π x radius^2

$A = \pi \times r^2$

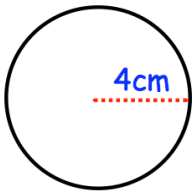


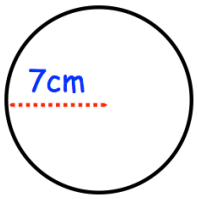
Worked Example	Your Turn
Calculate the area of the circle:  	Calculate the area of the circle: 

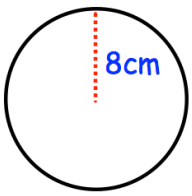
Worked Example	Your Turn
Calculate the area of the circle: 	Calculate the area of the circle: 

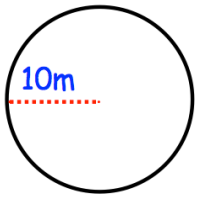
Fluency Practice

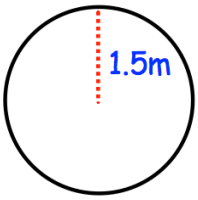
Question 1: Calculate the area of the following circles. Give your answers to 1 decimal place.

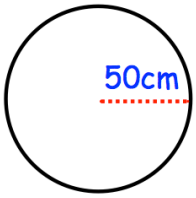
(a) 

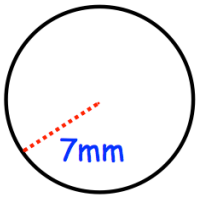
(b) 

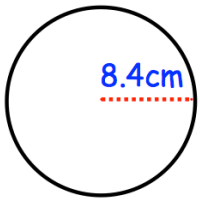
(c) 

(d) 

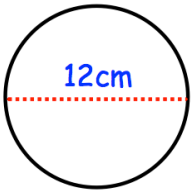
(e) 

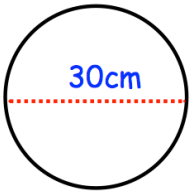
(f) 

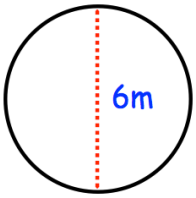
(g) 

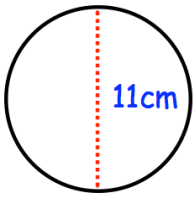
(h) 

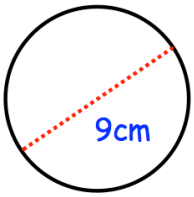
Question 2: Calculate the area of the following circles. Give your answers to 1 decimal place.

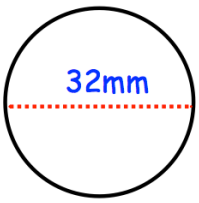
(a) 

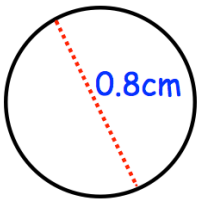
(b) 

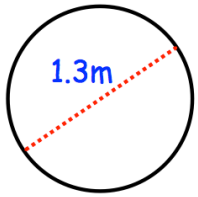
(c) 

(d) 

(e) 

(f) 

(g) 

(h) 

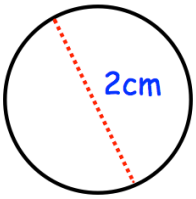
Question 3: Work out the area of the following circles. Give your answers to 1 decimal place.

(a) A circle with radius 9cm
(b) A circle with radius 12m
(c) A circle with diameter 40cm
(d) A circle with diameter 1km
(e) A circle with diameter 5 yards
(f) A circle with radius 10.5m

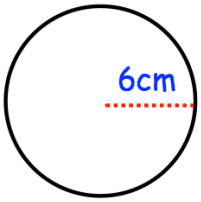
Fluency Practice

Question 4: Calculate the area of the following circles. Give your answers to 1 decimal place.

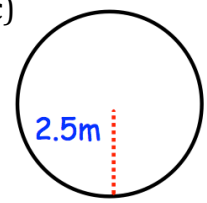
(a)



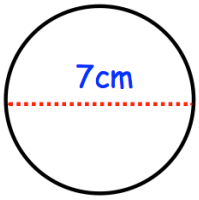
(b)



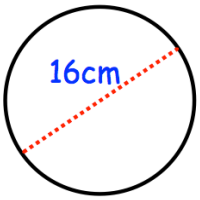
(c)



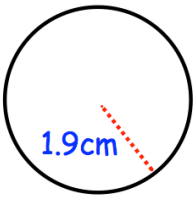
(d)



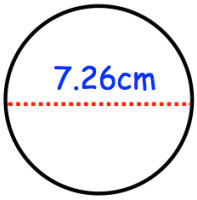
(e)



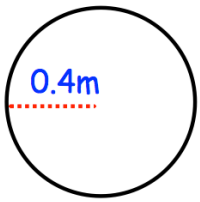
(f)



(g)

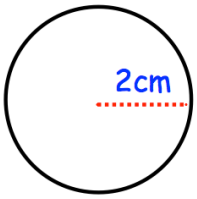


(h)

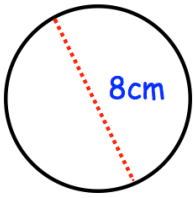


Question 5: Calculate the area of the following circles. Leave your answer in terms of π

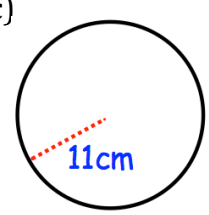
(a)



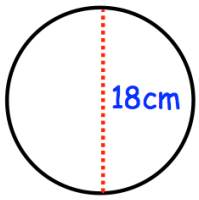
(b)



(c)

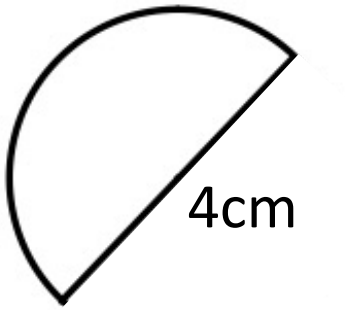
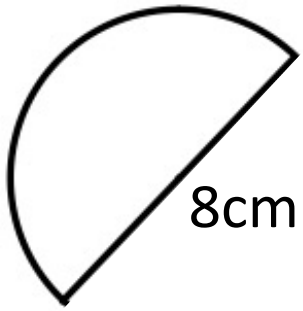


(d)



Question 6: Work out the area of the following circles. Leave your answer in terms of π

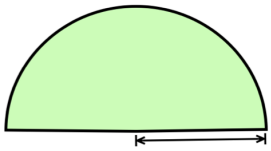
(a) A circle with radius 7cm
(b) A circle with radius 1cm
(c) A circle with diameter 10cm
(d) A circle with radius 3cm
(e) A circle with diameter 4cm

Worked Example	Your Turn
Calculate the area of the semi-circle:  	Calculate the area of the semi-circle: 

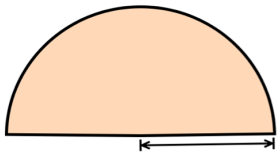
Fluency Practice

Question 1: Calculate the area of each of these semi-circles.
Give your answers to 1 decimal place and include suitable units.

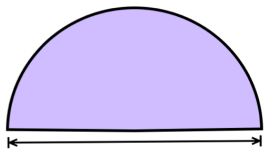
(a)



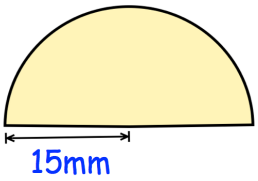
(b)



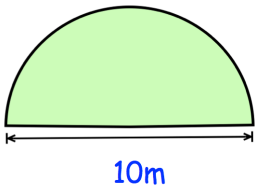
(c)



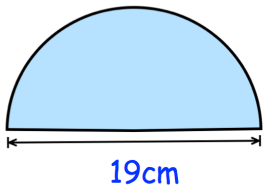
(d)



(e)

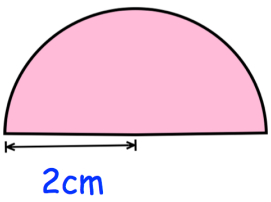


(f)

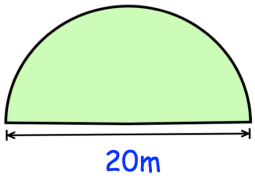


Question 2: Work out the area of each of these semi-circles.
Give your answers in terms of **π** and include suitable units.

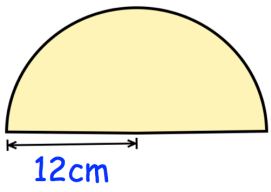
(a)



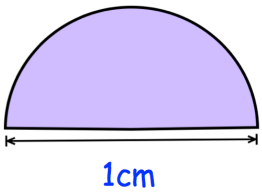
(b)



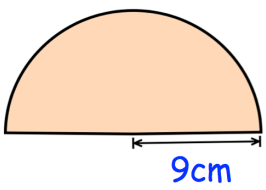
(c)



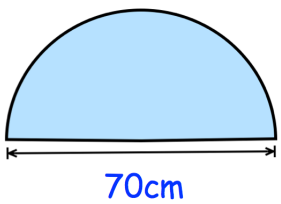
(d)



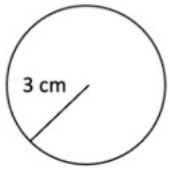
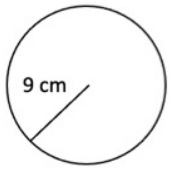
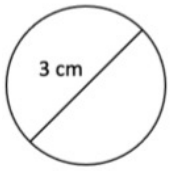
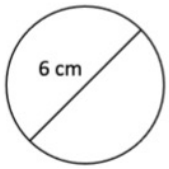
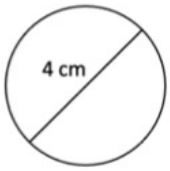
(e)



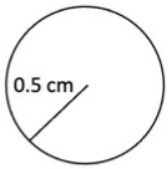
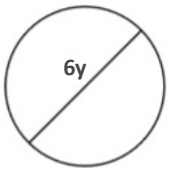
(f)



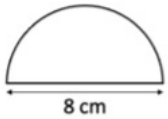
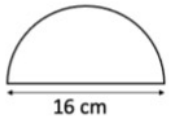
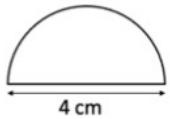
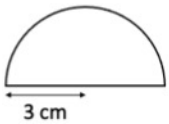
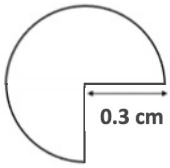
Fill in the Gaps

Diagram	Radius	Diameter	Calculation	Area (in terms of π)	Area (1 dp)
					
					
					
					
					
	6 mm				
		10 m			

Fill in the Gaps

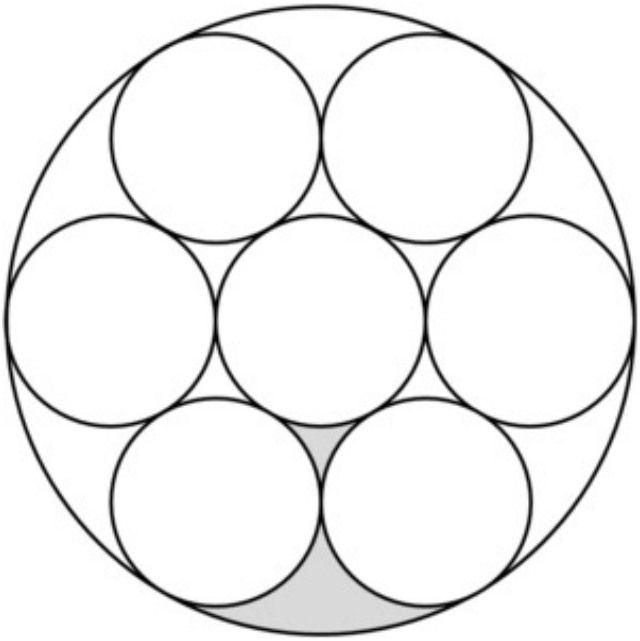
Diagram	Radius	Diameter	Calculation	Area (in terms of π)	Area (1 dp)
				16π km^2	
					
	$5a$				
					

Fill in the Gaps

Diagram	Radius	Diameter	Calculation	Area (in terms of π)	Area (1 dp)
					
					
					
					
					
					
					

Eight Circles

The figure below is composed of eight circles, seven small circles and one large circle containing them all. Neighboring circles only share one point, and two regions between the smaller circles have been shaded. Each small circle has a radius of $5\ \text{cm}$.



Calculate:

a. The area of the large circle.

b. The area of the shaded part of the figure.

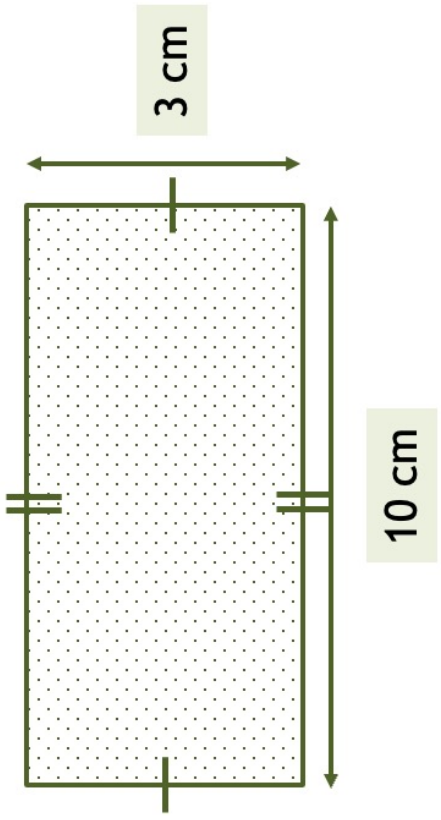
2.15 Review and Problem Solving

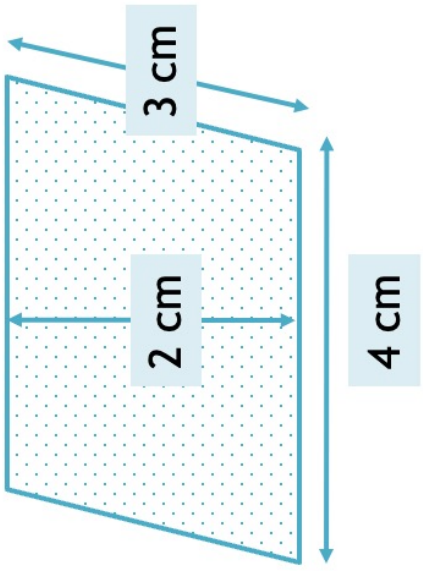
Apple pies are square: $A = \pi \times r^2$

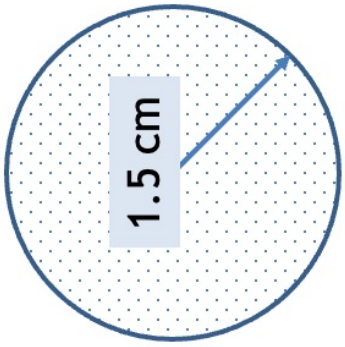
Cherry pie delicious!: $C = \pi \times d$

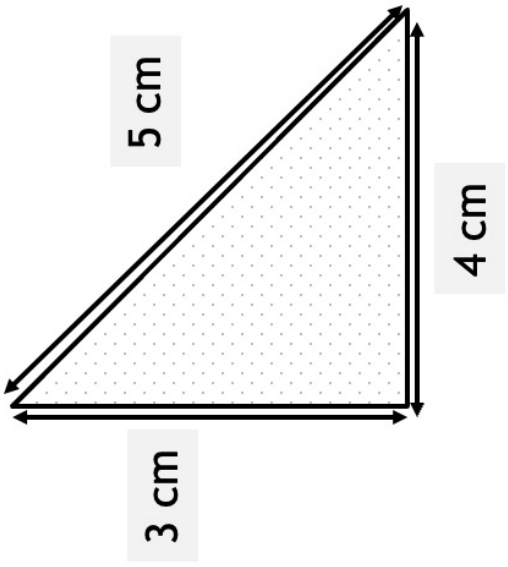
Fluency Practice

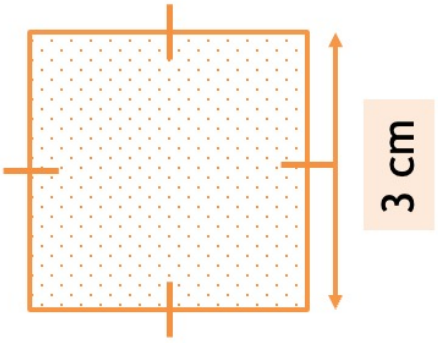
Find the perimeters and areas of the following shapes. The shapes are not to scale.

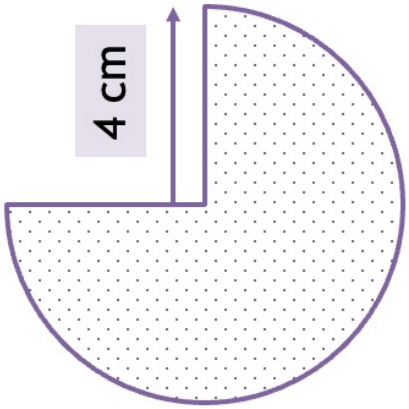








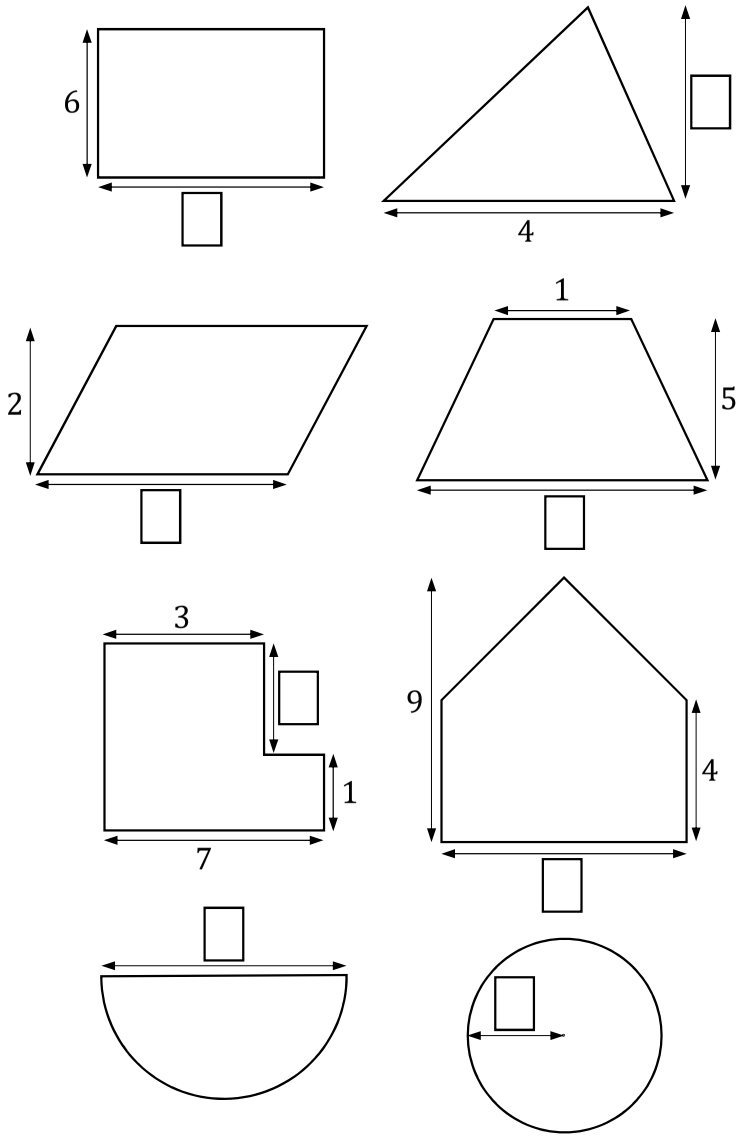




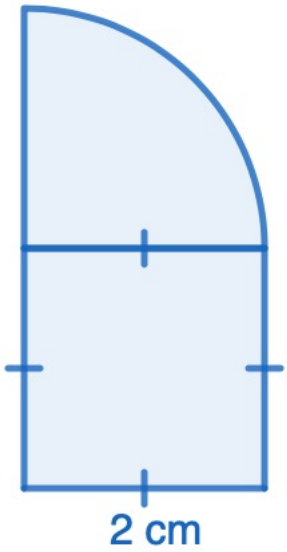
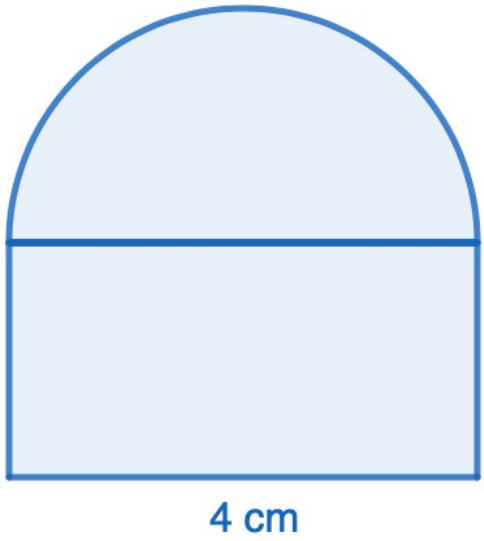
Changing Areas

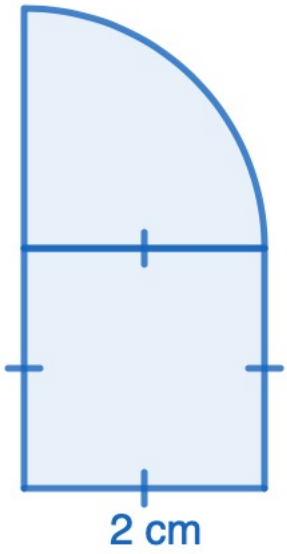
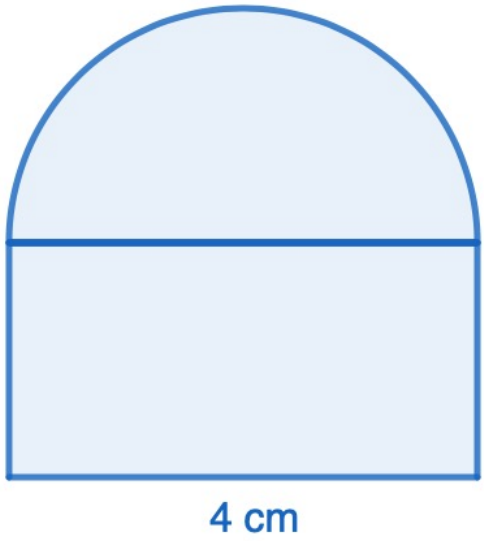
- Choose a value greater than 1.
- Put the value into the boxes and calculate the areas of the shapes.
- Put the shapes in order from largest to smallest.
- Choose different values greater than 1 and repeat (you could try really large numbers, decimals or fractions).
- How does the order change each time? How does it stay the same?
- What do you notice about the areas of the triangle and the parallelogram? Explain why this may be happening.

- Pick any pair of shapes. Decide whether their areas are Always, Sometimes or Never equal, given that the values in the boxes are the same.
- Design 2 of your own shapes, each with a missing length, so that their areas are sometimes equal.

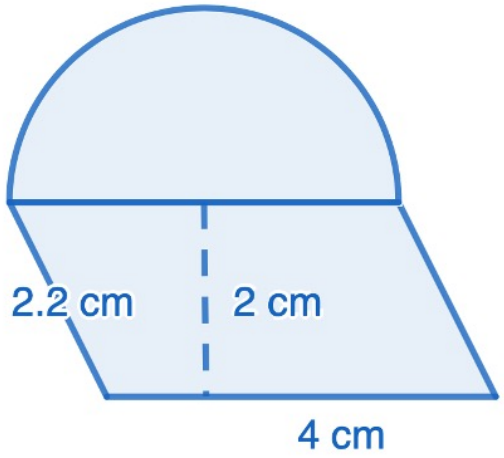


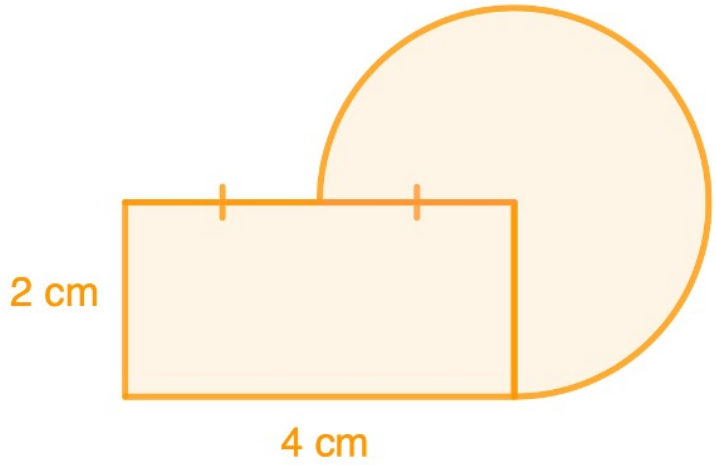
2.16 Area and Perimeter of Compound Shapes

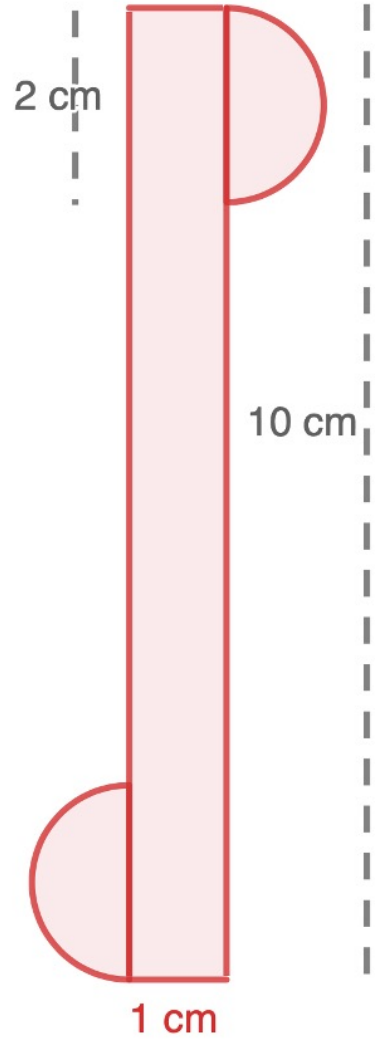
Worked Example	Your Turn
Find the perimeter of this shape:  	Find the perimeter of this shape: 

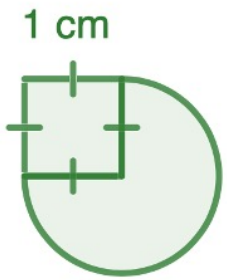
Worked Example	Your Turn
Find the area of this shape:  	Find the area of this shape: 

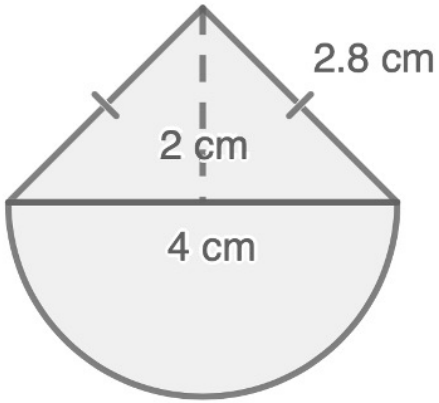
Find the area and perimeter of each shape. Round to 1 d.p.

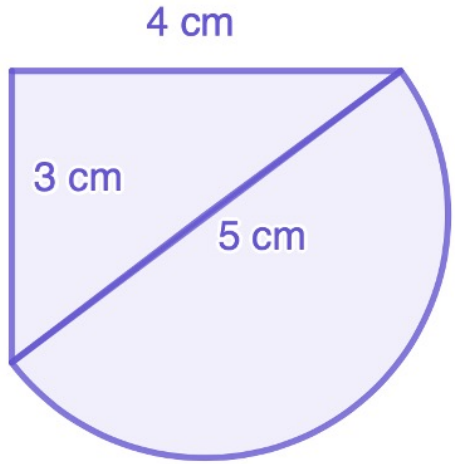






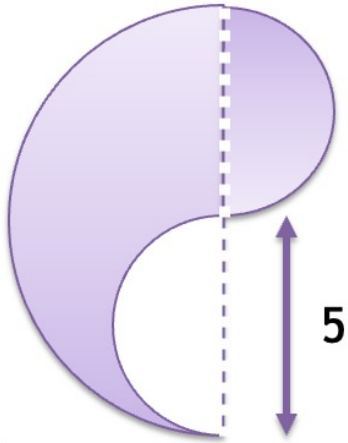


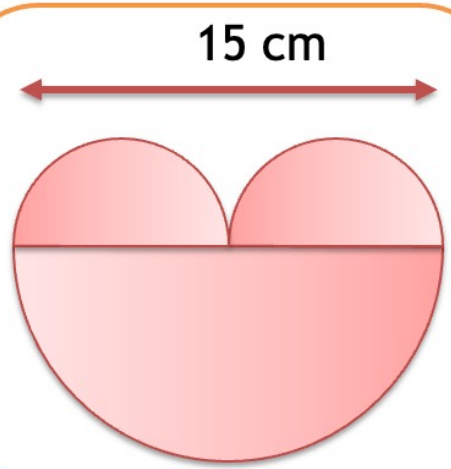


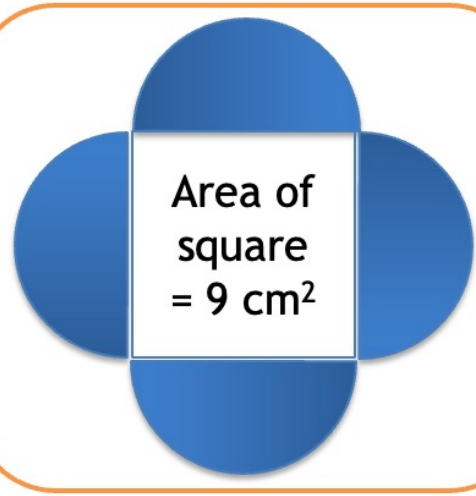


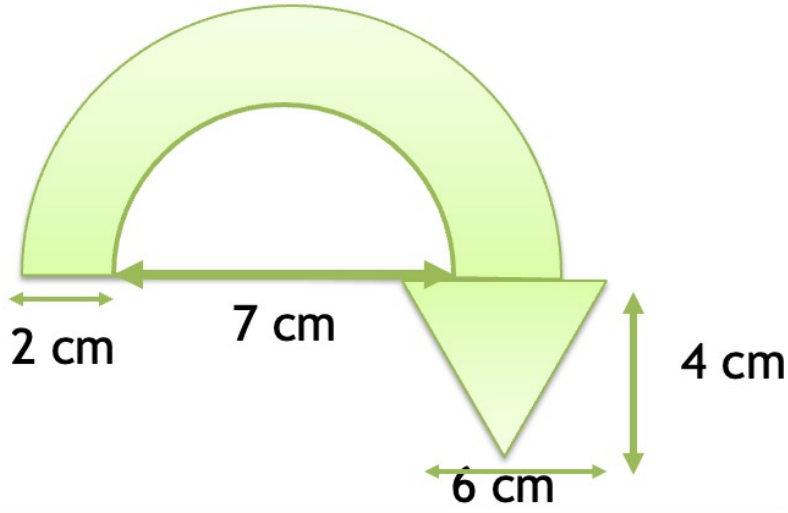
Fluency Practice

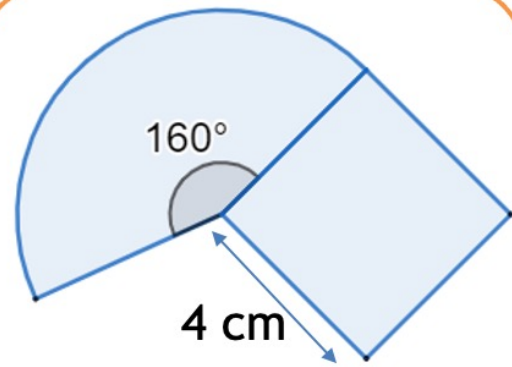
Find the perimeters and areas of these compound shapes





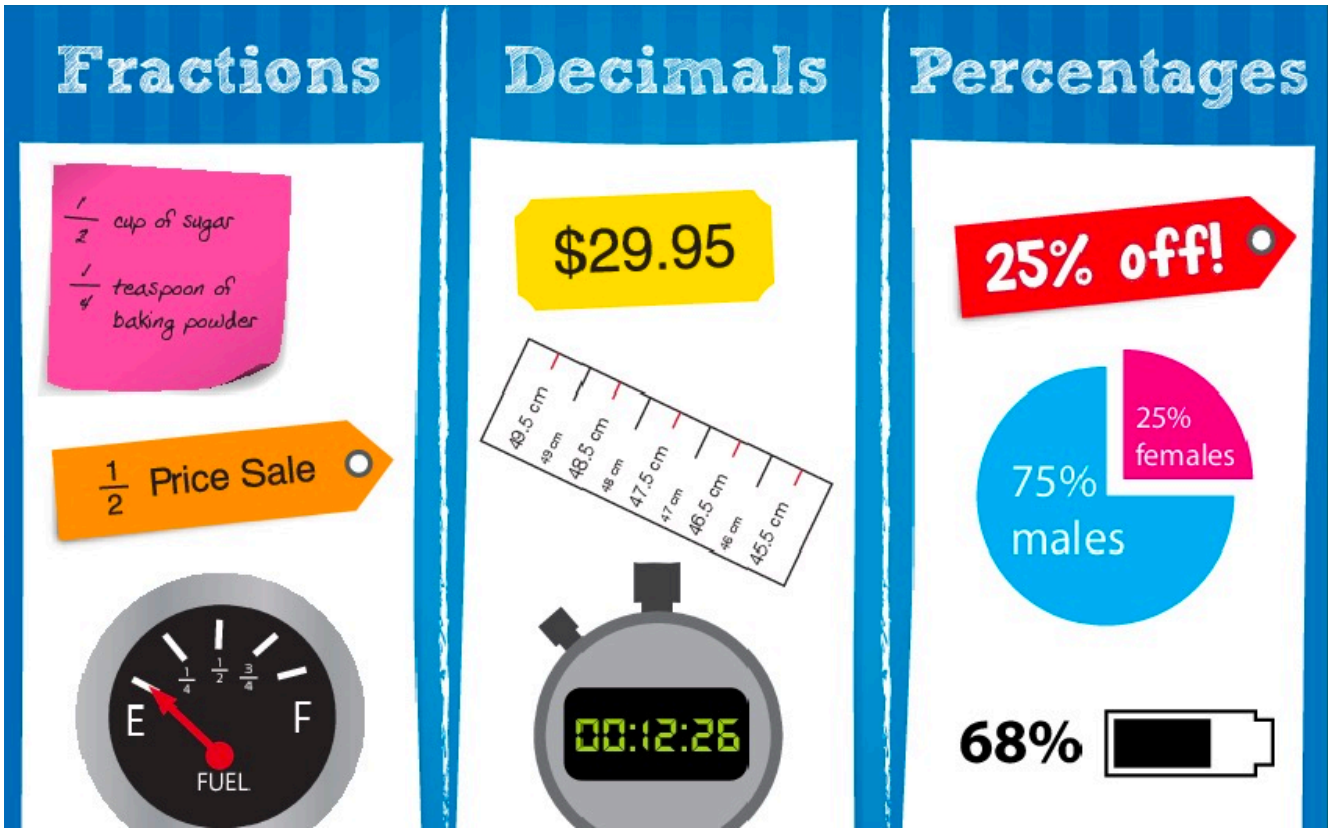




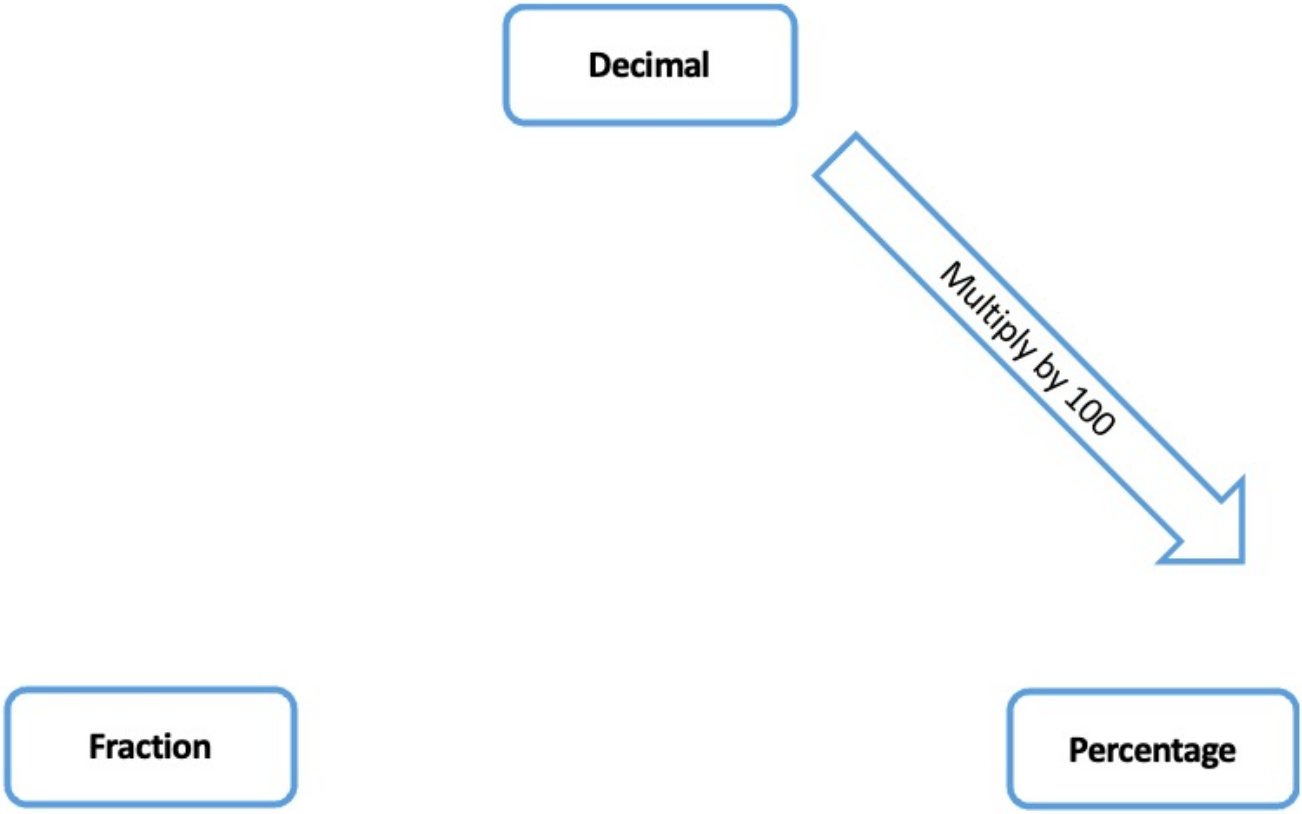


Extension

3 Fractions, Decimals and Percentages



3.1 Decimals to Percentages



Worked Example	Your Turn
Convert the following decimals into percentages: a) 0.37 b) 0.037 c) 3.7	Convert the following decimals into percentages: a) 0.38 b) 0.038 c) 3.8

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

Extension

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

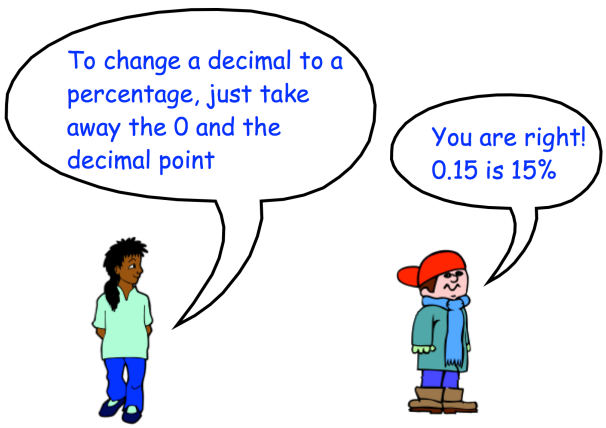
Question 2: Arrange in order from smallest to largest

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

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

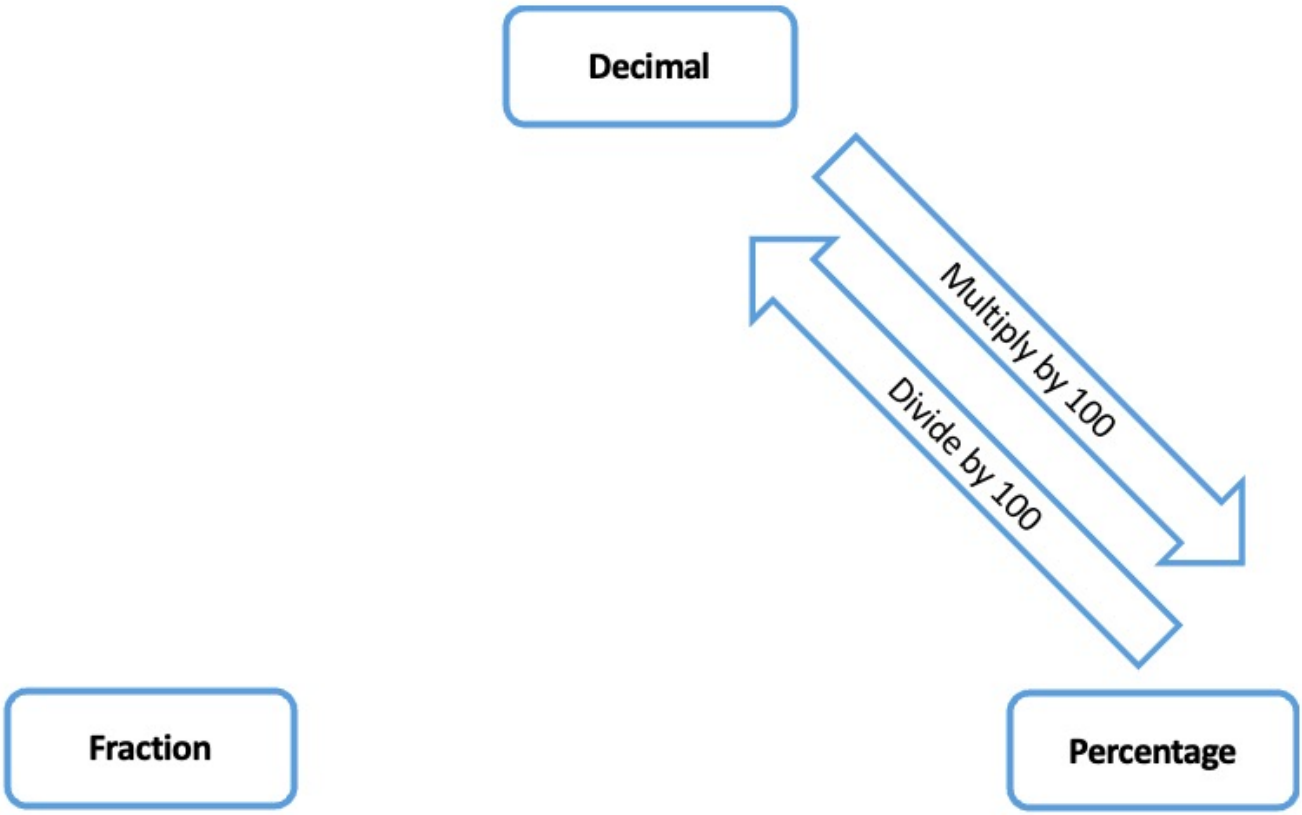
(c) 29%, 0.3, 35%, 0.33, 25%

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



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

3.2 Percentages to Decimals



Worked Example	Your Turn
Convert the following percentages into decimals: a) 82% b) 8.2% c) 820%	Convert the following percentages into decimals: a) 81% b) 8.1% c) 810%

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%

Extension

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

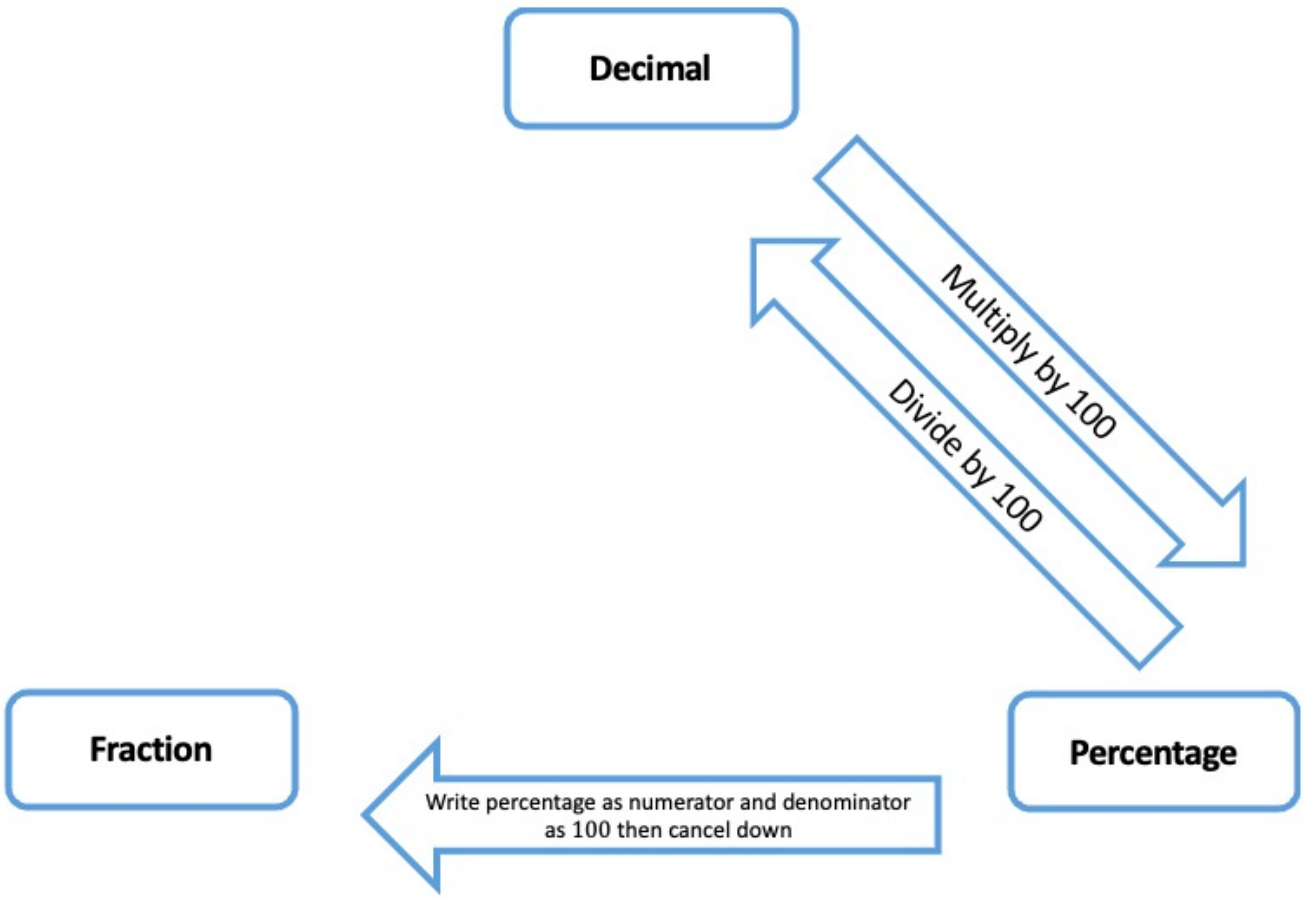
Question 2: Arrange in order from largest to smallest.

(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.

3.3 Percentages to Fractions



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

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%

Extension

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.

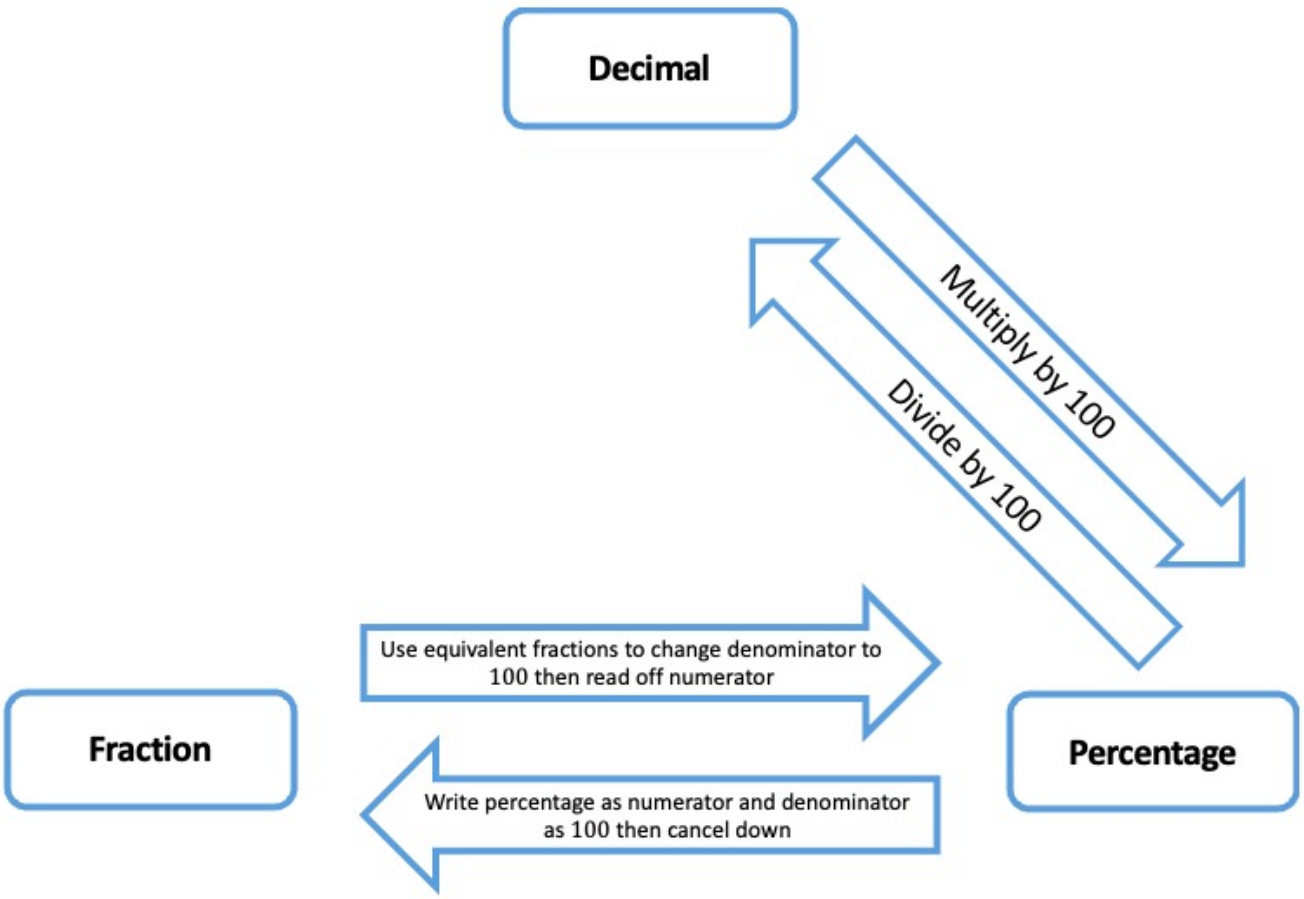
$$\frac{30}{100} = \frac{15}{50}$$

Q2

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

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

3.4 Fractions to Percentages



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

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) $\frac{30}{80}$

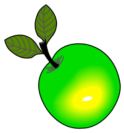
16) $\frac{60}{80}$

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

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

Extension

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?

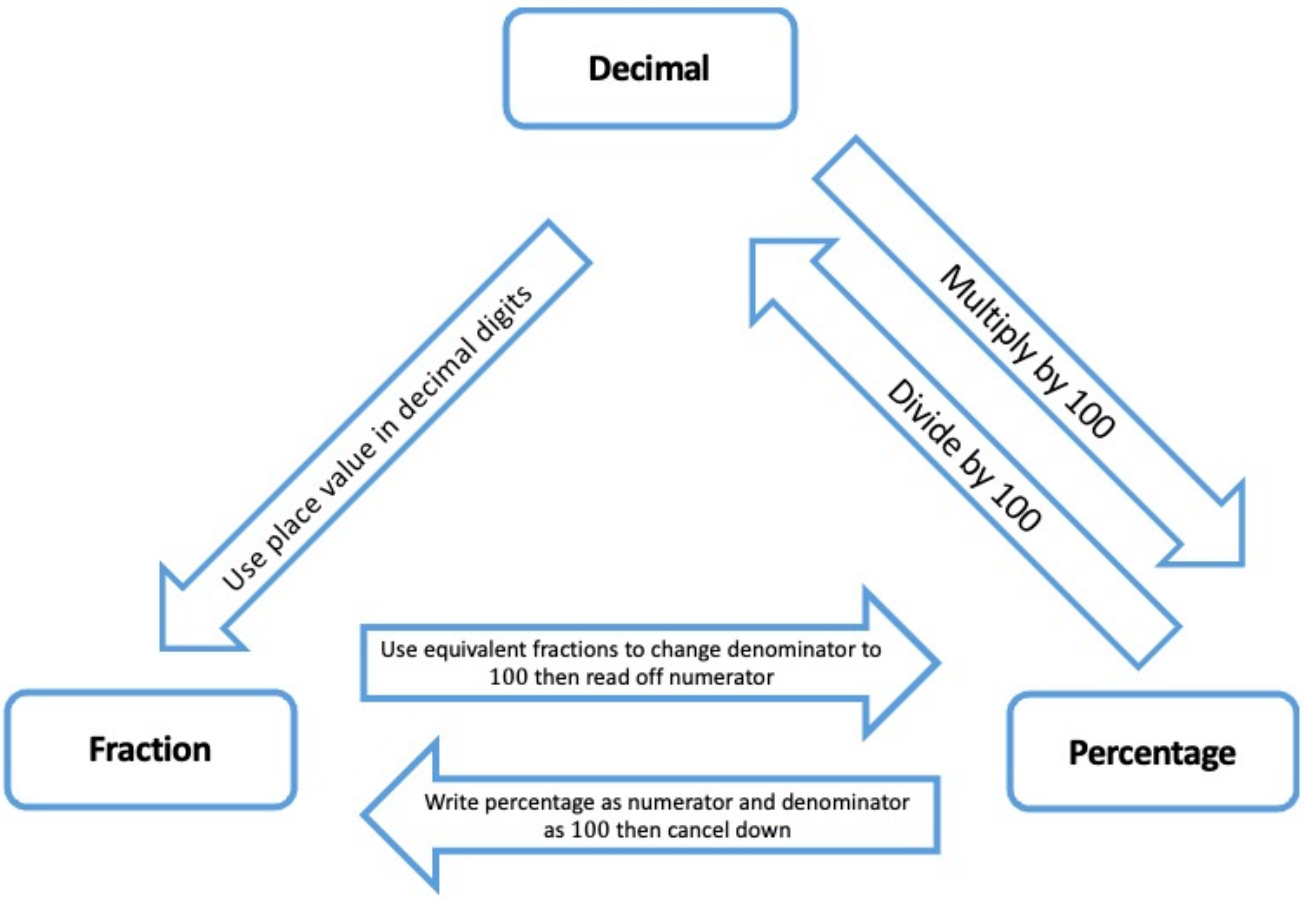
Question 5: Randalstown Rugby Club play 8 matches and win 7 of the matches.
What percentage of the matches did Randalstown win?

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?

3.5 Decimals to Fractions



Frayer Model – Terminating Decimal

Definition	**Characteristics**
A decimal with a finite number of digits following the decimal point.	• The decimal stops after a given number of decimal places. • You could count the number of digits after the decimal point.
Examples	**Non Examples**
• 0.2 • 0.278 • 1.87 • 12.76578 • 10000.1 • 4.0000000001 • 80.987654321	• $0.\dot{6}$ • $0.123\dot{4}$ • $\pi = 3.14159265358979 32 \ldots$ • $\sqrt{2} = 1.41421 \ldots$ • $e = 2.7182818 \ldots$

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

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

Extension

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.

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

3.6 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 Decimals

Definition	**Characteristics**
A decimal with an infinite number of digits after the decimal point that form a predictable pattern.	• The decimal continues forever, which may be shown using the recurring symbol ($\dot{}$) • The digits following the decimal point continue in a predictable pattern.
Examples • $0.1234\dot{}$ • $0.\dot{6}$ • $2.\dot{3}\dot{7}$ • $0.\dot{1}42857\dot{}$ • $7846.1\dot{3}$	**Non Examples** • 0.278 • 10000.1 • 80.987654321 • $\pi = 3.1415926535897932 \ldots$ • $\sqrt{2} = 1.41421 \ldots$ • $e = 2.7182818 \ldots$

Intelligent Practice

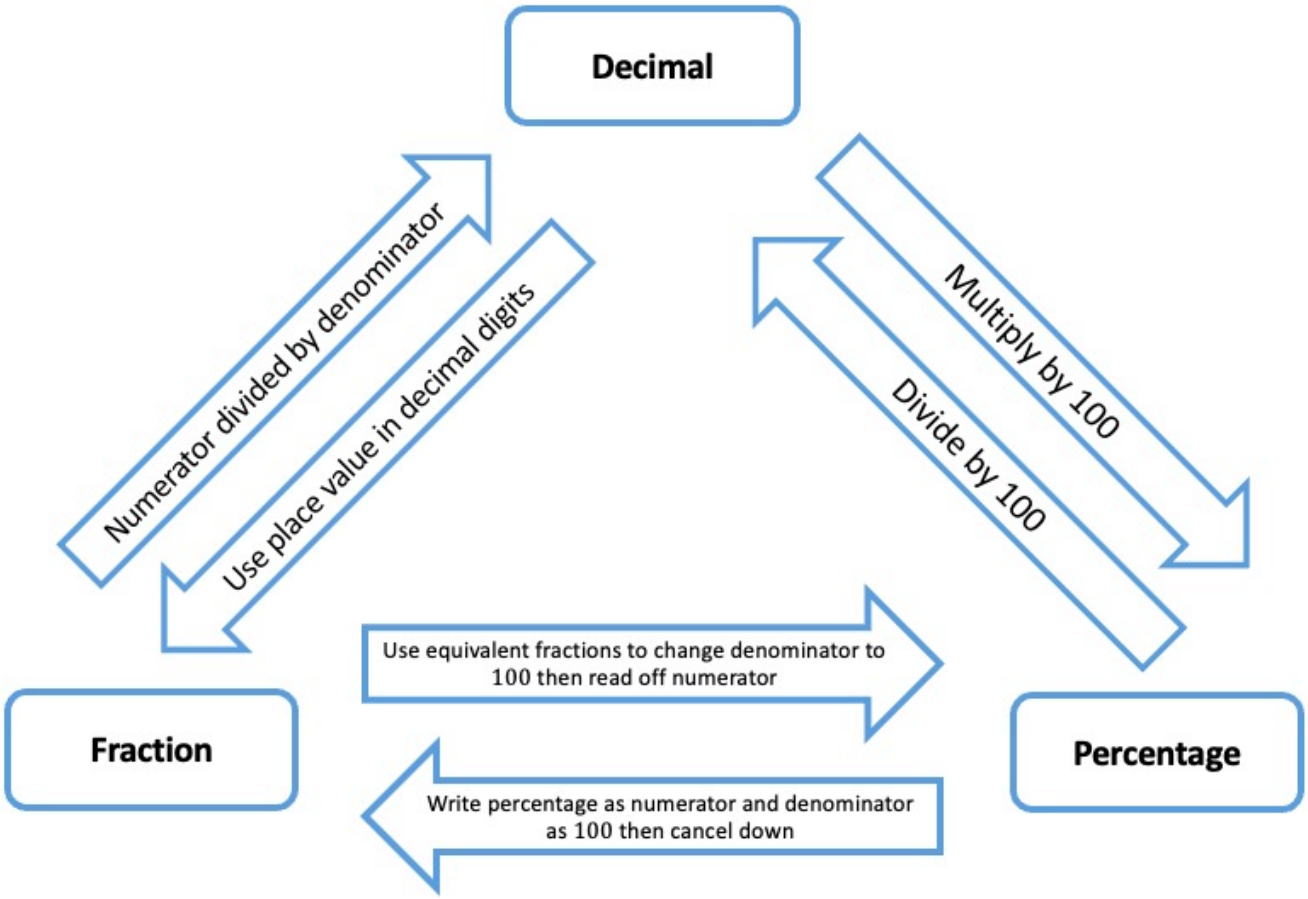
Write the following out fully:

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) $10.987698769876\ldots$

3.7 Fractions to Decimals



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

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) $\frac{66}{21}$

Extension

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

3.8 Review and Problem Solving

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%
$\frac{11}{4}$		

Extension

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

What percentage of the fruit punch is orange juice?

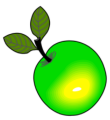
Question 2: 18% of a class wear glasses.
What fraction of the class wear glasses?

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?

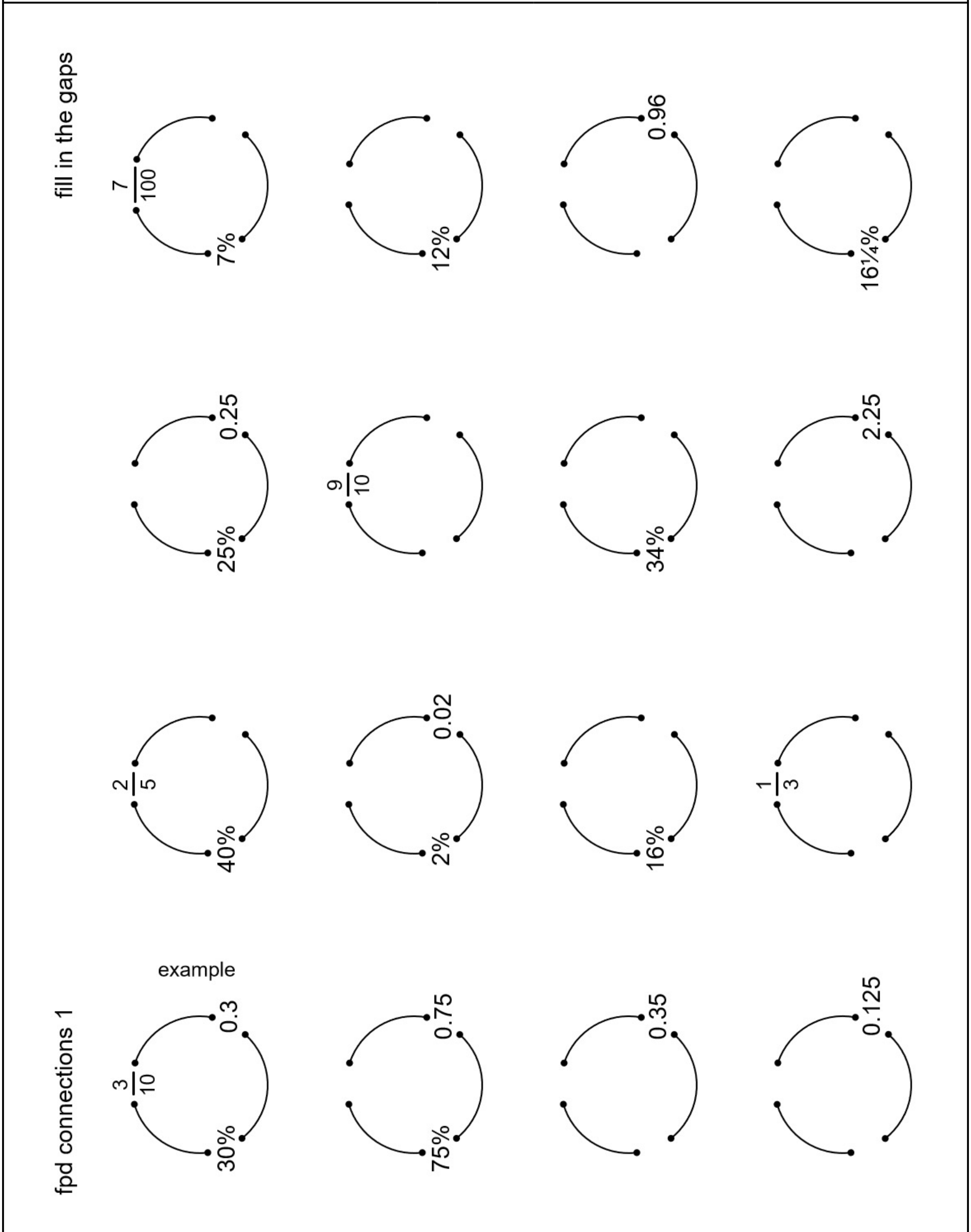
Question 9: Ricky has sat his summer exams.
His scores are below.

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

FDP Connections



fpd connections 3

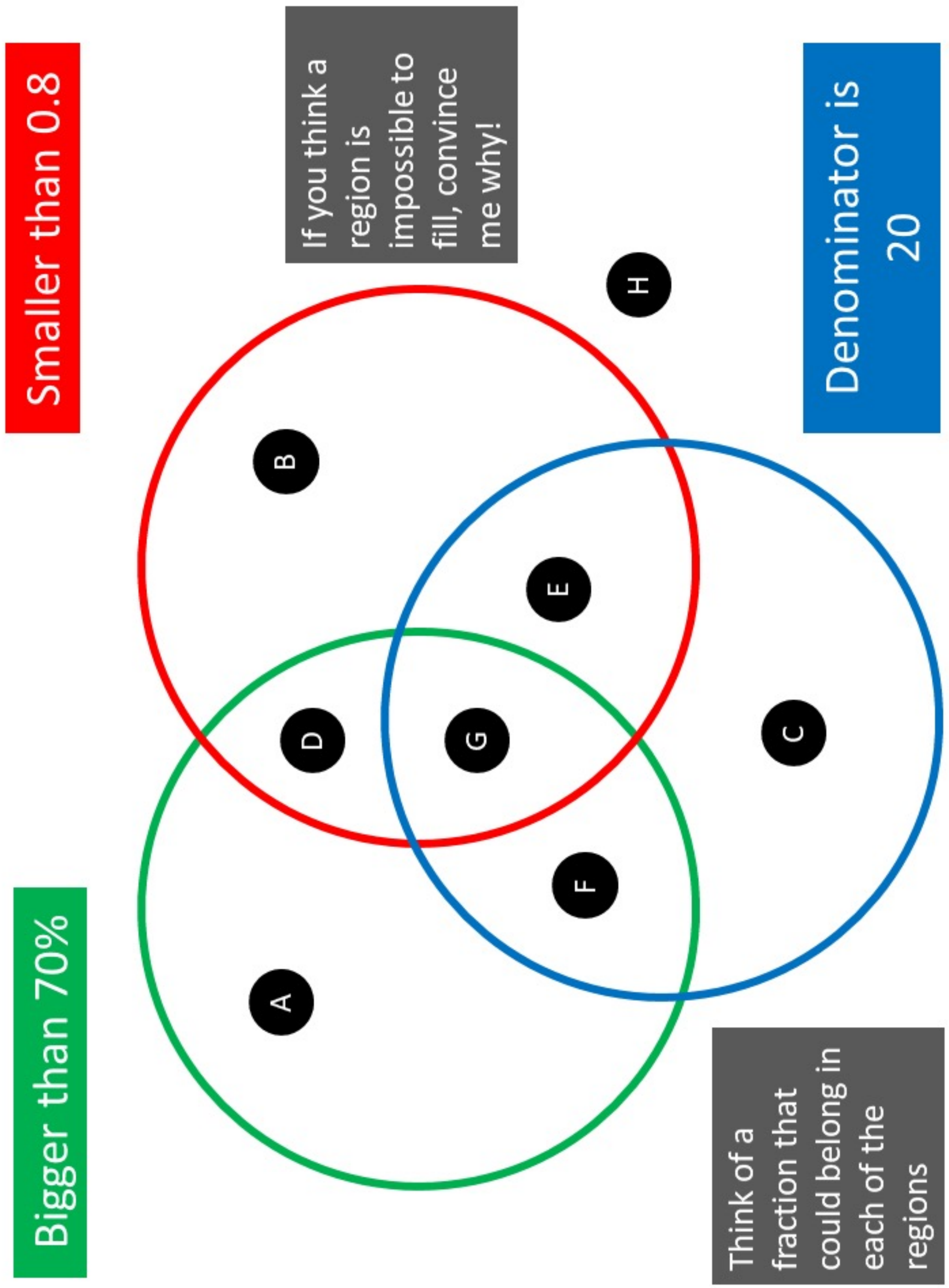
fill in the gaps

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%

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