Year 7
Mathematics
Unit 4

Name: _____

Class: _____

Contents

1 Rounding

1.1 Midpoint of Two Numbers

In this section you will look at how to find the midpoint of two numbers.

You can find the midpoint of two numbers by adding both the numbers and dividing by two, i.e., the mean of the two numbers.

Worked Example	Your Turn
Find the midpoint of -5 and 6	Find the midpoint of -6 and 5

1.2 Rounding to the Nearest Multiple

In this section you will look at how to round numbers to the nearest multiple.

- 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.

Worked Example	Your Turn
Round 63 to the nearest: a) 10 b) 2 c) 3	Round 65 to the nearest: a) 10 b) 2 c) 3

1.3 Rounding to Decimal Places

In this section you will look at how to round numbers to a certain amount of 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: a) 1 decimal place b) 2 decimal places c) 3 decimal places	Round 8.3773 to: a) 1 decimal place b) 2 decimal places c) 3 decimal places

Worked Example	Your Turn
Round 0.0337 to: a) 1 decimal place b) 2 decimal places c) 3 decimal places	Round 0.0377 to: a) 1 decimal place b) 2 decimal places c) 3 decimal places

Worked Example	Your Turn
Round 8.7997 to: a) 1 decimal place b) 2 decimal places c) 3 decimal places	Round 7.8998 to: a) 1 decimal place b) 2 decimal places c) 3 decimal places

1.4 Rounding to Significant Figures

In this section you will look at how to round numbers to a certain amount of 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: a) 1 significant figure b) 2 significant figures c) 3 significant figures	Round 738906 to: a) 1 significant figure b) 2 significant figures c) 3 significant figures

Worked Example	Your Turn
Round 2.71828 to: a) 1 significant figure b) 2 significant figures c) 3 significant figures	Round 7.38906 to: a) 1 significant figure b) 2 significant figures c) 3 significant figures

Worked Example	Your Turn
Round 0.00271828 to: a) 1 significant figure b) 2 significant figures c) 3 significant figures	Round 0.00738906 to: a) 1 significant figure b) 2 significant figures c) 3 significant figures

Worked Example	Your Turn
Round 0.00279999 to: a) 1 significant figure b) 2 significant figures c) 3 significant figures	Round 0.00739999 to: a) 1 significant figure b) 2 significant figures c) 3 significant figures

2 Metric Units

Conversions

Unit of measurement	Useful conversions	Examples – what would usually be measured in these units?
Distance		
Millimetres (mm)		
Centimetres (cm)		
Metres (m)		
Kilometres (km)		
Weight		
Grams (g)		
Kilograms (kg)		
Tonnes (T)		
Capacity		
Millilitres (ml)		
Litres (l)		

2.1 Metric Units of Length

In this section you will look at the metric units of length.

The commonly used metric units of length include:

- kilometre (km)
- metre (m)
- centimetre (cm)
- millimetre (mm)

Worked Example	Your Turn
Convert 3.54 kilometres into: a) metres b) centimetres c) millimetres	Convert 5.3 kilometres into: a) metres b) centimetres c) millimetres

Worked Example	Your Turn
Convert 3.54 metres into: a) kilometres b) centimetres c) millimetres	Convert 5.3 metres into: a) kilometres b) centimetres c) millimetres

Worked Example	Your Turn
Convert 3.54 centimetres into: a) kilometres b) metres c) millimetres	Convert 5.3 centimetres into: a) kilometres b) metres c) millimetres

Worked Example	Your Turn
Convert 3.54 millimetres into: a) kilometres b) metres c) centimetres	Convert 5.3 millimetres into: a) kilometres b) metres c) centimetres

2.2 Metric Units of Mass

In this section you will look at the metric units of mass.

The commonly used metric units of mass include:

- tonne (t)
- kilogram (kg)
- gram (g)

Worked Example	Your Turn
Convert 3.54 tonnes into: a) kilograms b) grams	Convert 5.3 tonnes into: a) kilograms b) grams

Worked Example	Your Turn
Convert 3.54 kilograms into: a) grams b) tonnes	Convert 5.3 kilograms into: a) grams b) tonnes

Worked Example	Your Turn
Convert 3.54 grams into: a) kilograms b) tonnes	Convert 5.3 grams into: a) kilograms b) tonnes

2.3 Metric Units of Capacity

In this section you will look at the metric units of capacity.

The commonly used metric units of capacity include:

- litre (l)
- centilitre (cl)
- millilitre (ml)

Worked Example	Your Turn
Convert 3.54 litres into: a) millilitres b) centilitres	Convert 5.3 litres into: a) millilitres b) centilitres

Worked Example	Your Turn
Convert 3.54 millilitres into: a) litres b) centilitres	Convert 5.3 millilitres into: a) litres b) centilitres

Worked Example	Your Turn
Convert 3.54 centilitres into: a) millilitres b) litres	Convert 5.3 centilitres into: a) millilitres b) litres

2.4 Metric Units of Time

In this section you will look at the metric units of time.

The commonly used metric units of time include:

- second (s)
- minute (min)
- hour (hr)

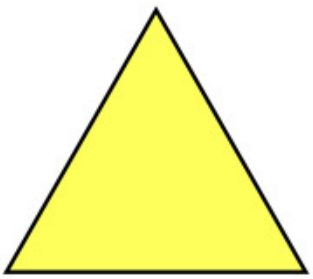
3 Properties of 2D Shapes

3.1 Names of 2D Shapes

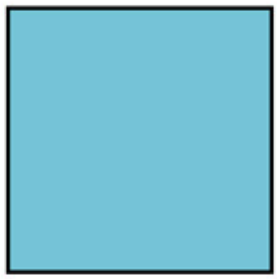
In this section you will look at the names of 2D Shapes.

2-dimensional (2D) shapes have only two dimensions, length and width.

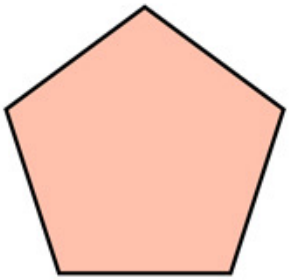
A polygon is a closed 2D shape with straight sides. Polygons are named depending on the number of sides.



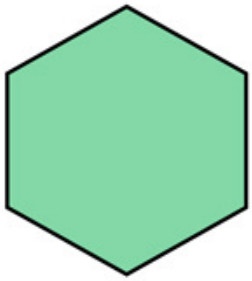
Triangle



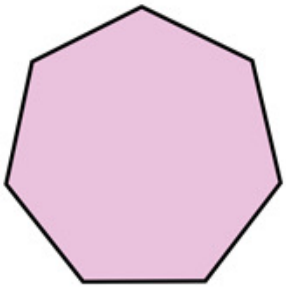
Quadrilateral



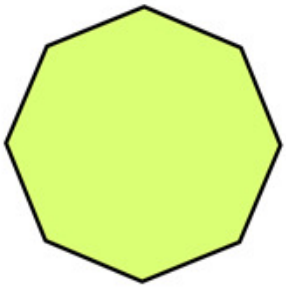
Pentagon



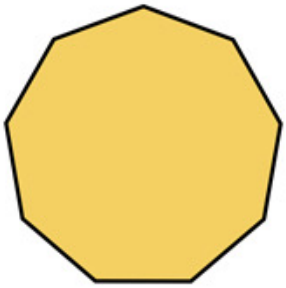
Hexagon



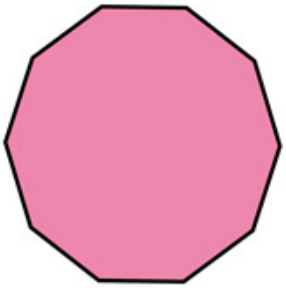
Heptagon



Octagon



Nonagon



Decagon

3.2 Line Symmetry

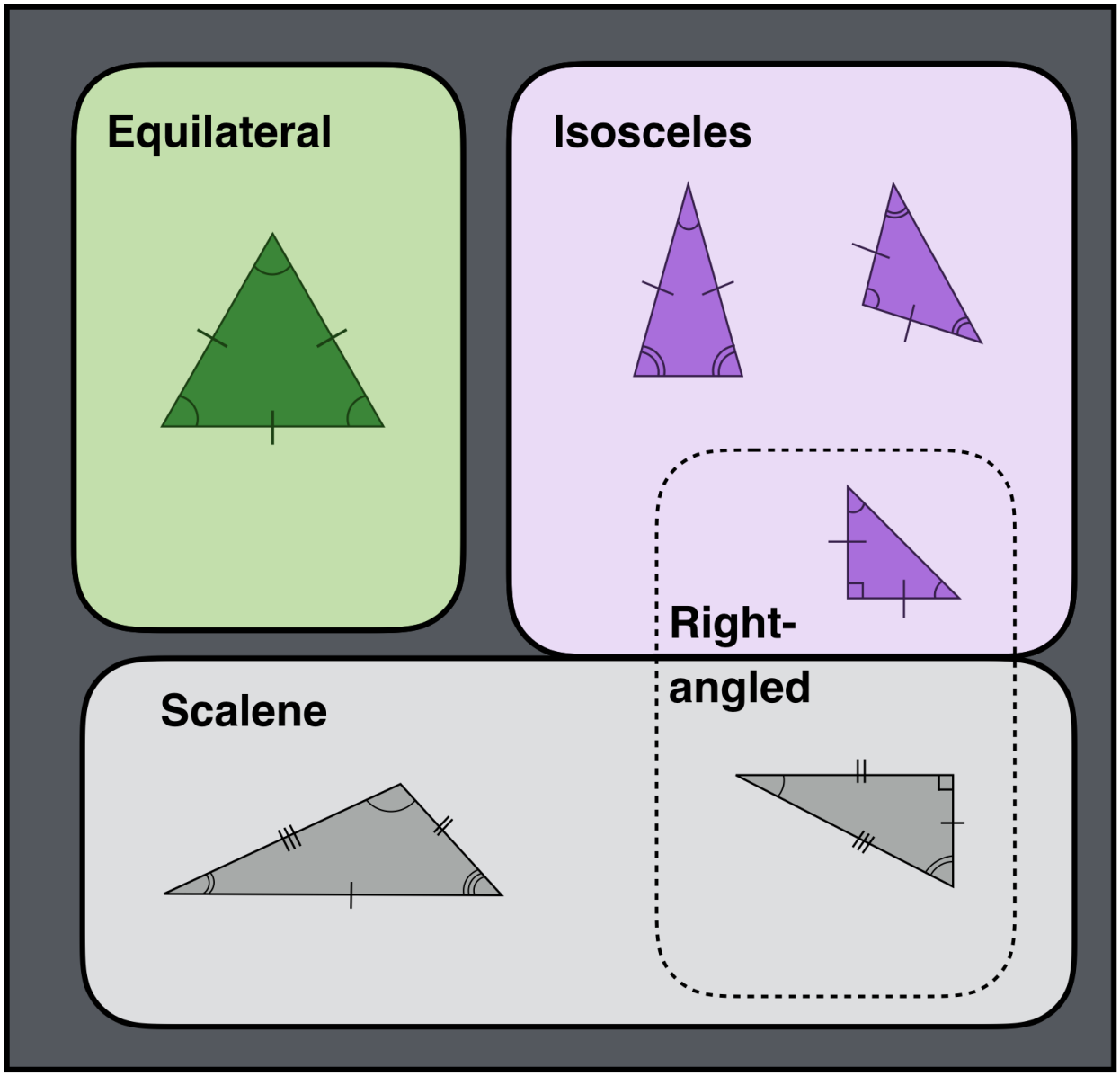
In this section you will look at line symmetry in shapes.

3.3 Rotational Symmetry

In this section you will look at rotational symmetry in shapes.

3.4 Types and Properties of Triangles

In this section you will look at the different types of triangles and their properties.

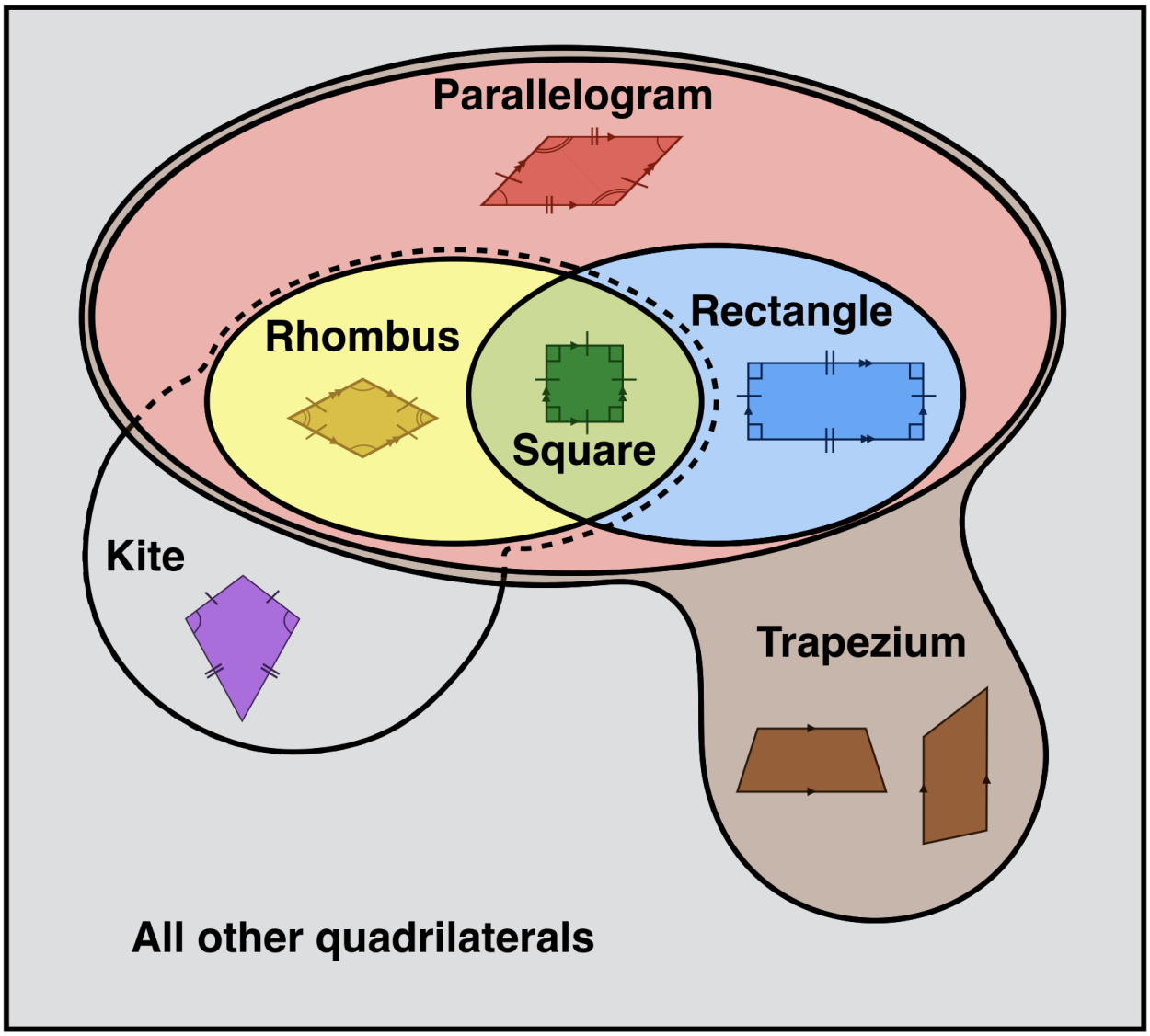


Types and Properties of Triangles

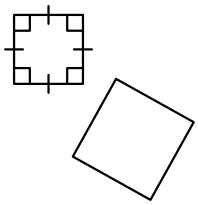
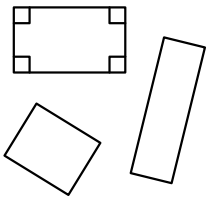
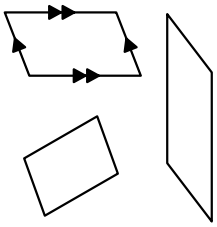
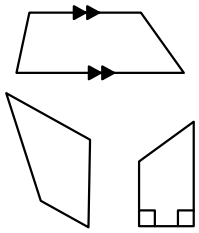
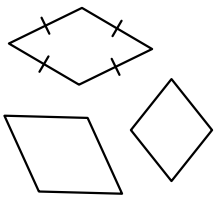
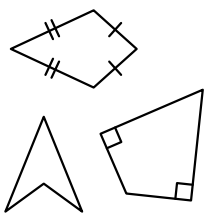
Name	Examples	Properties
Equilateral		
Isosceles		
Scalene		
Right-Angled		

3.5 Types and Properties of Quadrilaterals

In this section you will look at the different types of quadrilaterals and their properties.



Types and Properties of Quadrilaterals

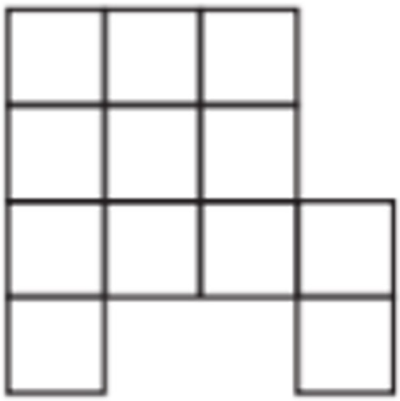
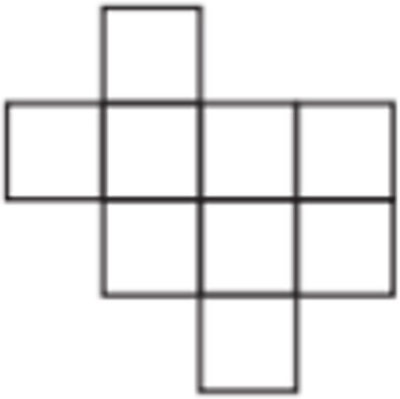
Name	Examples	Properties	Diagonals
Square			
Rectangle			
Parallelogram			
Trapezium			
Rhombus			
Kite			

4 Area and Perimeter

4.1 Perimeter on a Grid

In this section you will look at perimeter of shapes on a grid.

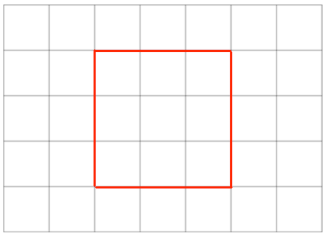
The perimeter is the total distance around the edge of a 2D shape.
Units: mm, cm, in, ft, m, km, miles

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

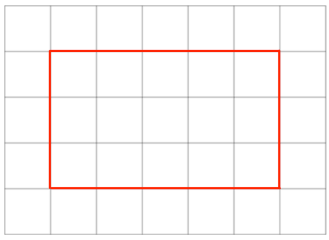
Fluency Practice

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

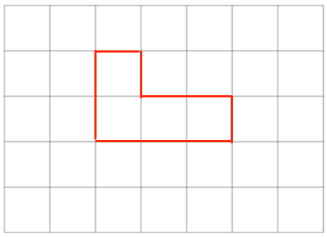
(a)



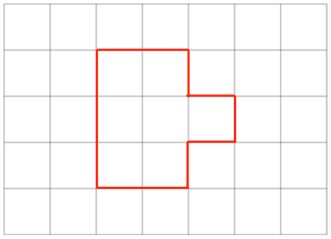
(b)



(c)



(d)



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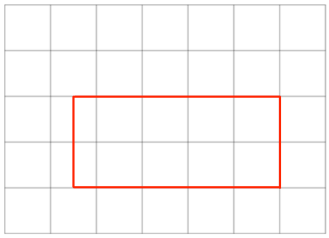

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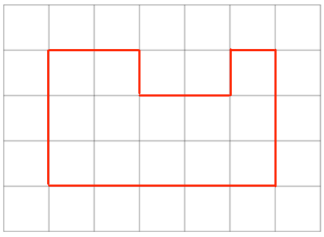
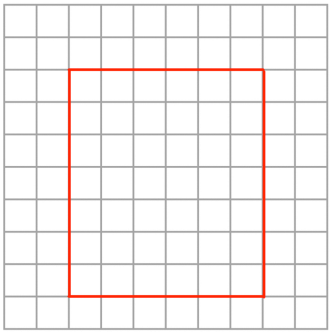
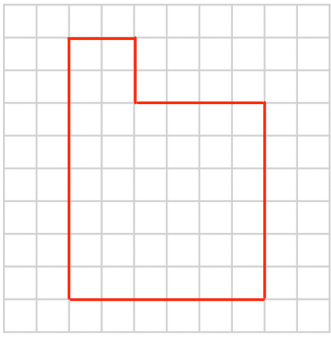


Question 2: The following shapes are drawn on centimetre-squared paper.
Find the perimeter of each shape.

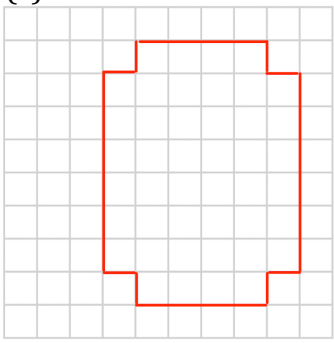
(a)



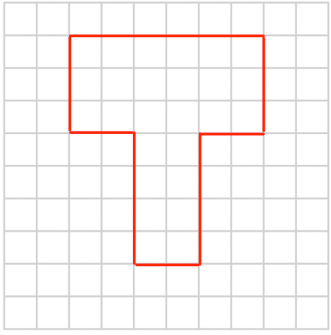
(b)



(c)



(d)



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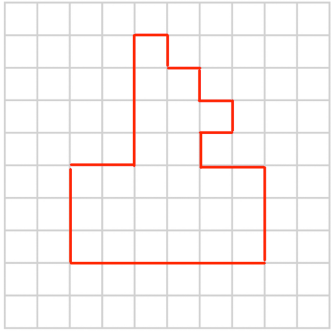

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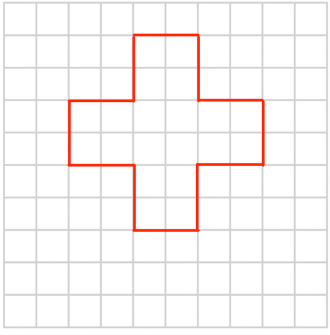
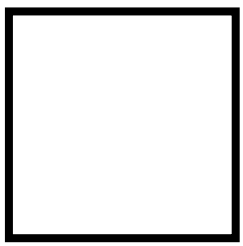
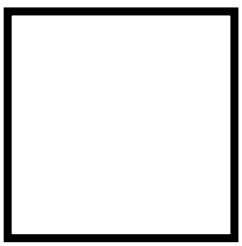
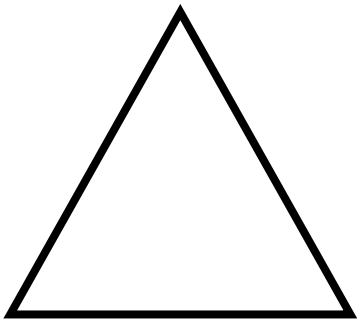
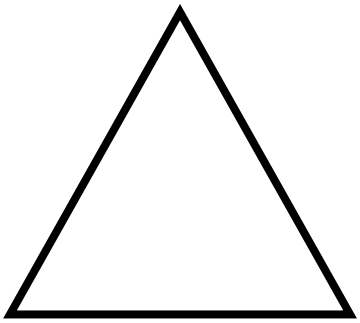
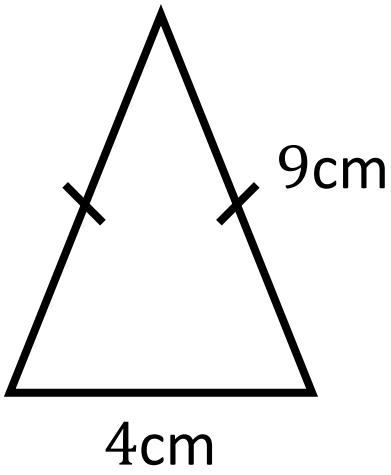
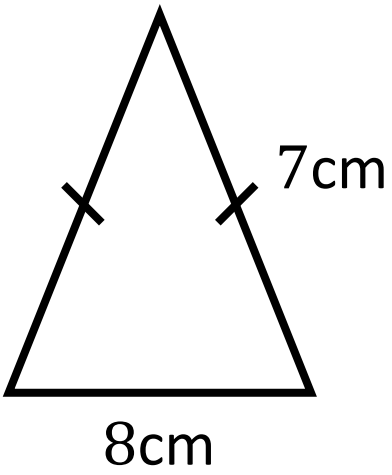


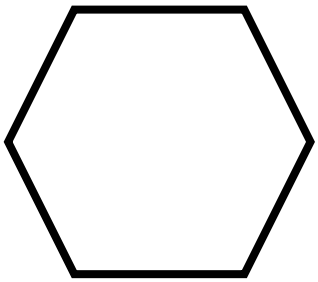
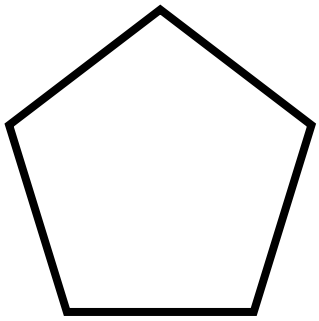
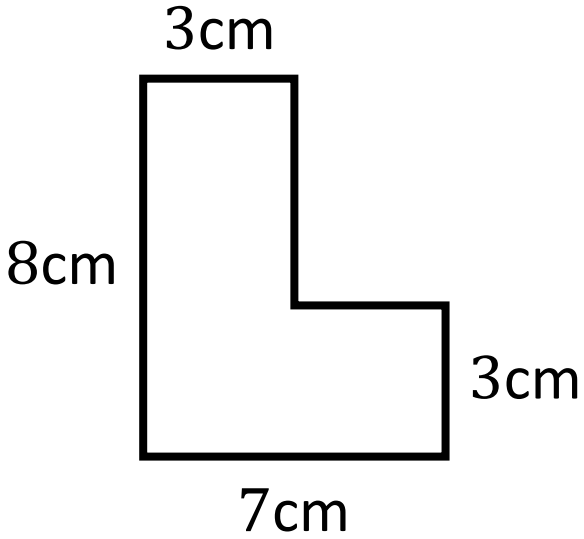
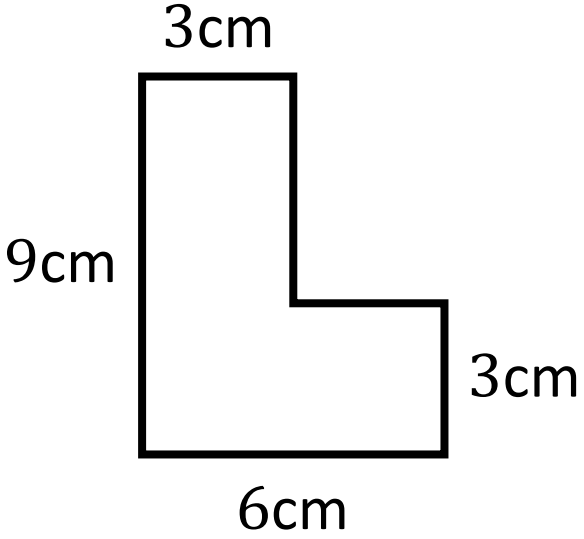
4.2 Perimeter

In this section you will look at perimeter of shapes.

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

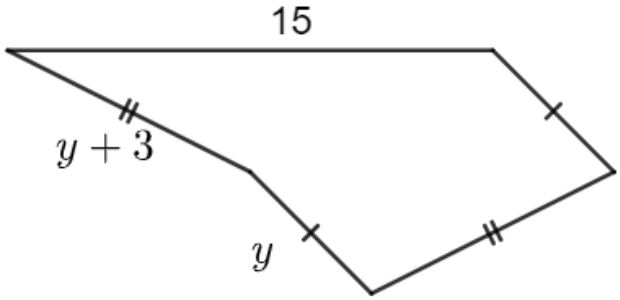
Worked Example	Your Turn
Calculate the perimeter of the rectangle: 6cm  2cm Calculate the perimeter of the square: 3cm 	Calculate the perimeter of the rectangle: 12cm  4cm Calculate the perimeter of the square: 6cm 

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 pentagon: 
Calculate the perimeter of the shape below:  	Calculate the perimeter of the shape below: 

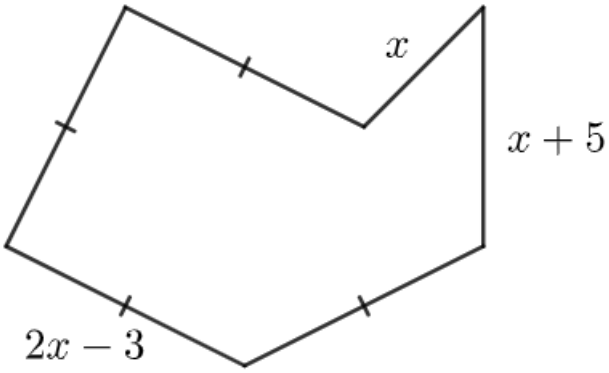
Worked Example

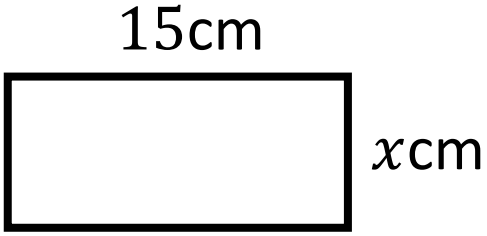
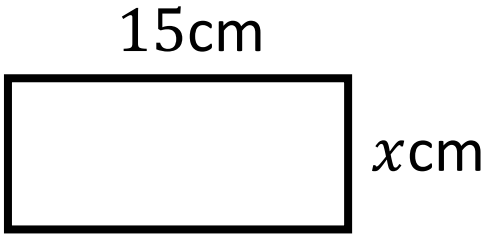
Find an expression for the perimeter of the following shape:



Your Turn

Find an expression for the perimeter of the following shape:

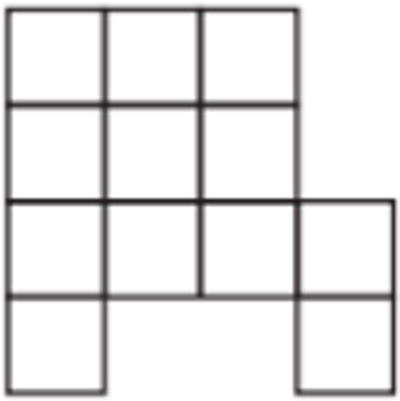
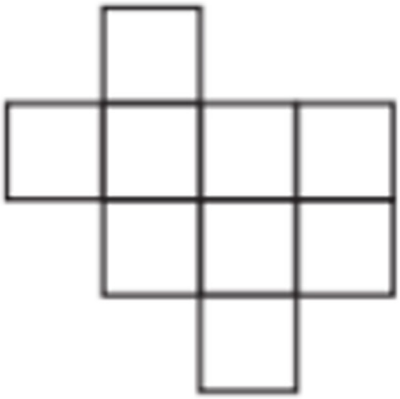


Worked Example	Your Turn
Calculate the length of x if the perimeter of the rectangle is 44cm:  	Calculate the length of x if the perimeter of the rectangle is 88cm: 

4.3 Area on a Grid

In this section you will look at area of shapes on a grid.

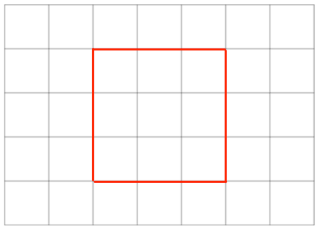
The area of a 2D shape is the space inside the shape.
Units: mm^2, cm^2, in^2, ft^2, m^2, km^2, $miles^2$

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

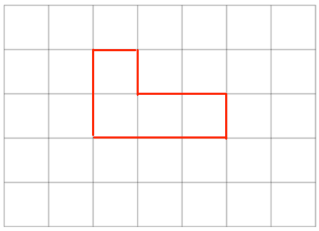
Fluency Practice

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

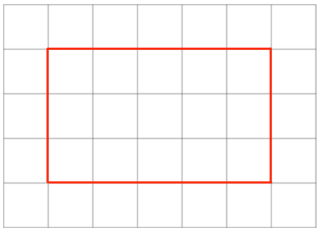
(a)



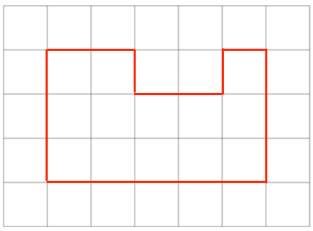
(b)



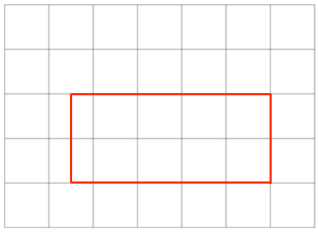
(c)



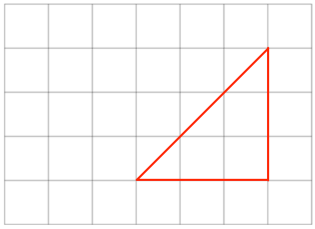
(d)



(e)

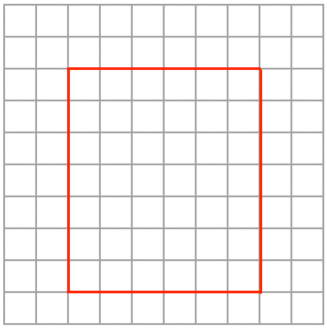


(f)

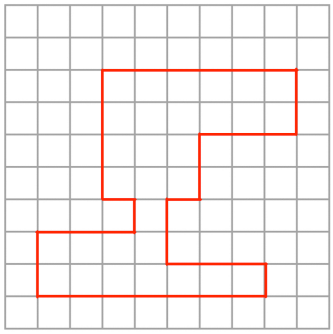


Question 2: The following shapes are drawn on centimetre-squared paper.
Find the area of each shape.

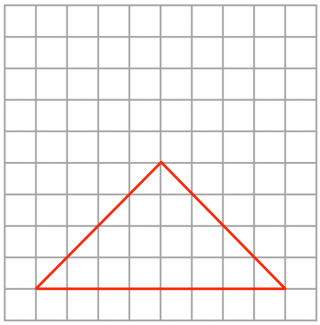
(a)



(b)

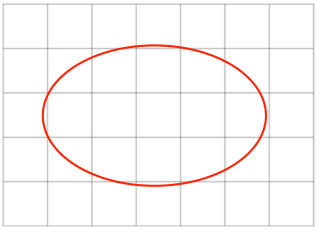


(c)

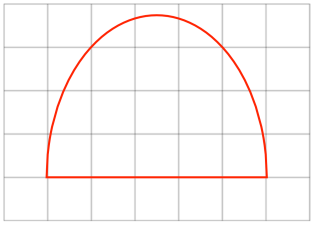


Question 3: The following shapes are drawn on centimetre-squared paper.
Estimate their areas.

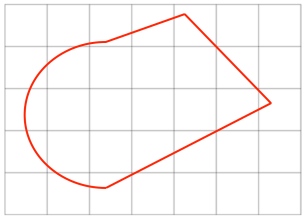
(a)



(b)



(c)

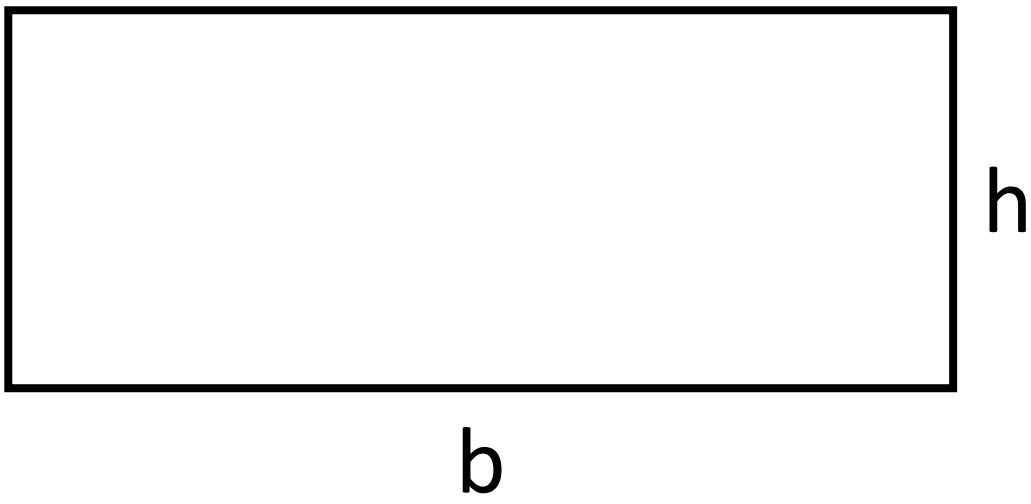


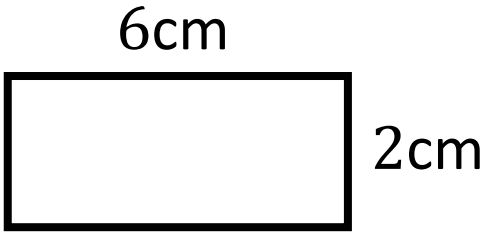
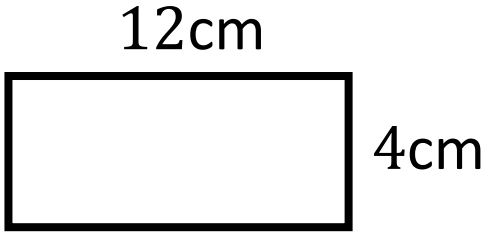
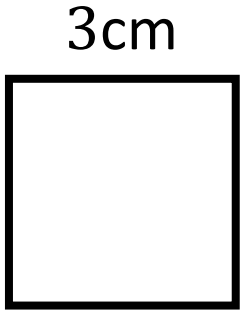
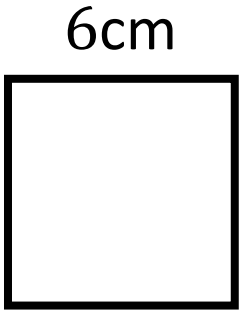
4.4 Area of Rectangles

In this section you will look at area of rectangles.

Area = base x height

$A = b \times h$



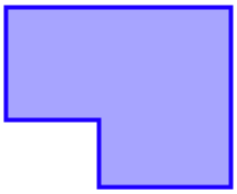
Worked Example	Your Turn
Calculate the area of the rectangle:  	Calculate the area of the rectangle: 
Calculate the area of the square:  	Calculate the area of the square: 

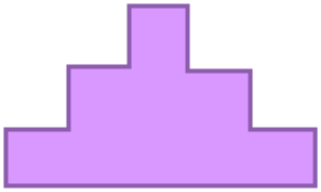
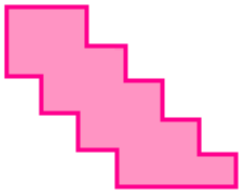
Worked Example	Your Turn
Calculate x if the area of the rectangle is 12cm^2: 6cm  $x$cm	Calculate x if the area of the rectangle is 48cm^2: 12cm  $x$cm

4.5 Area of Rectilinear Shapes

In this section you will look at area of rectilinear shapes.

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

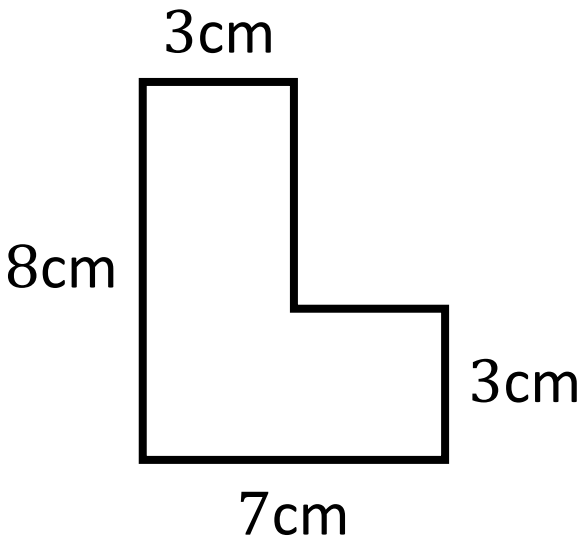



Worked Example

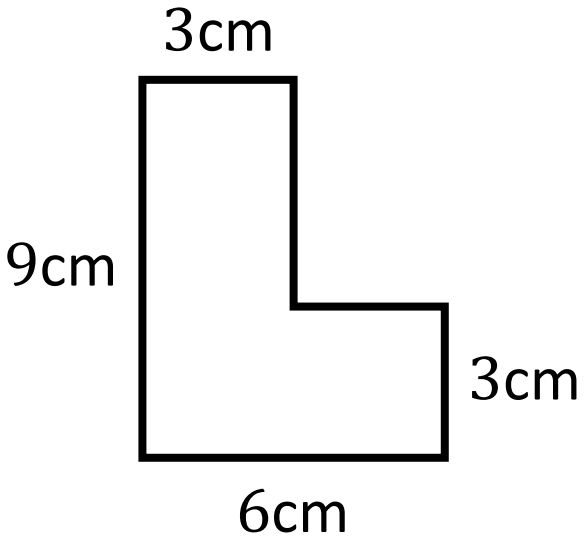
Calculate the area of the shape below:

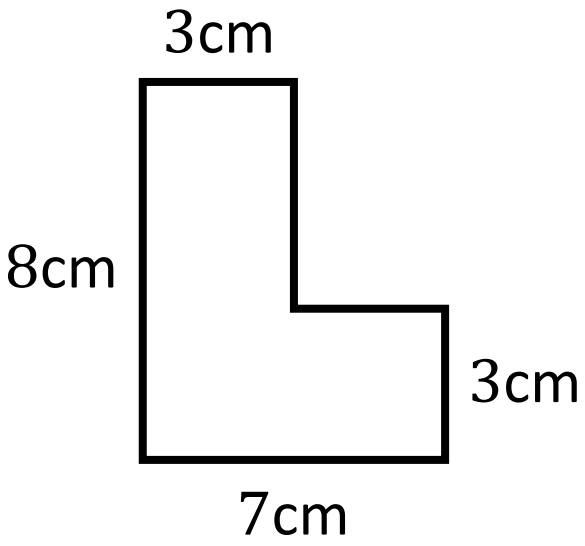
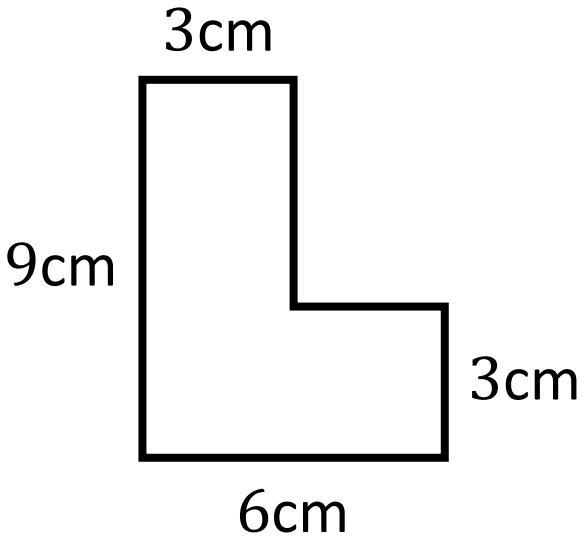
Additive Method 1

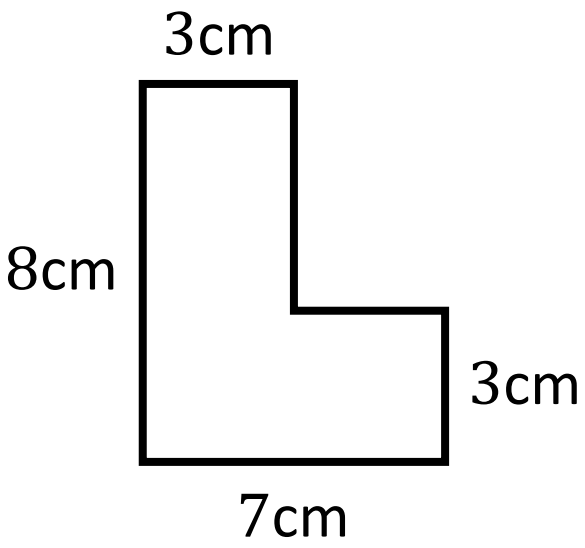
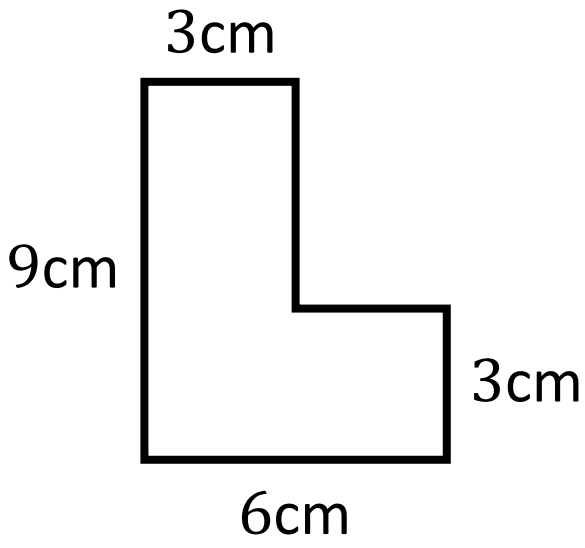


Your Turn

Calculate the area of the shape below:

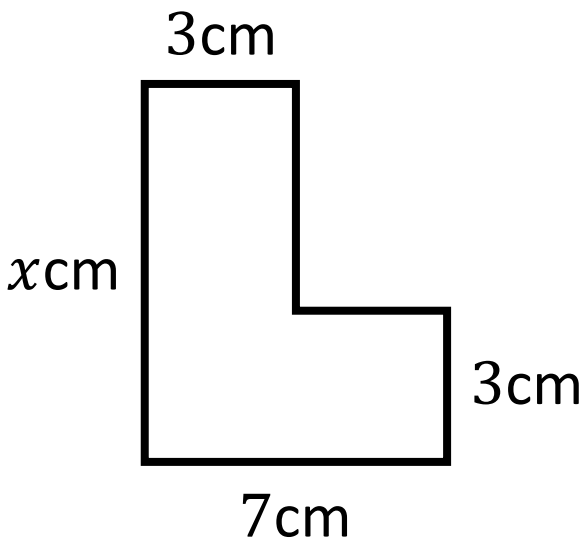


Worked Example	Your Turn
Calculate the area of the shape below: Additive Method 2  	Calculate the area of the shape below: 

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

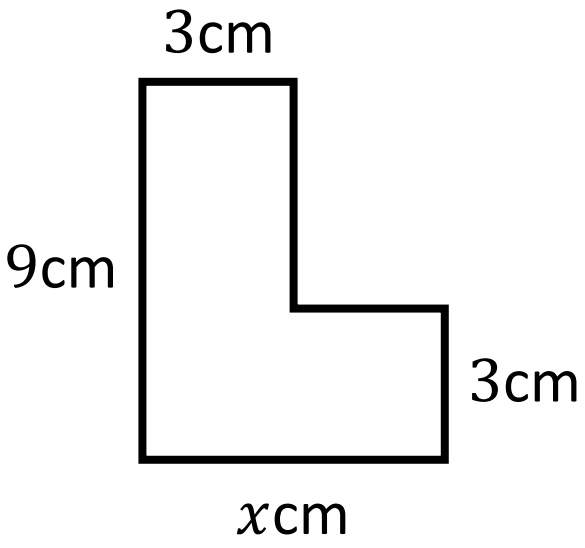
Worked Example

The area of the shape below is 36 cm^2. Find x.



Your Turn

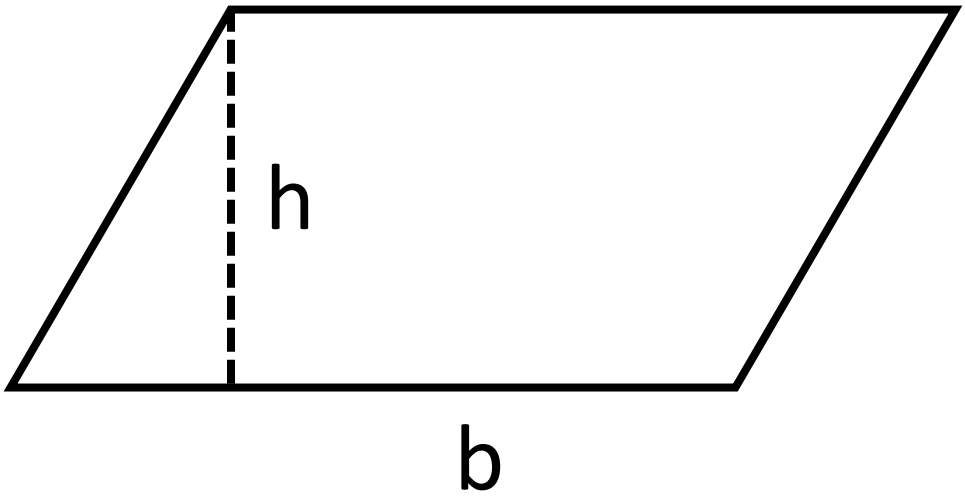
The area of the shape below is 36 cm^2. Find x.



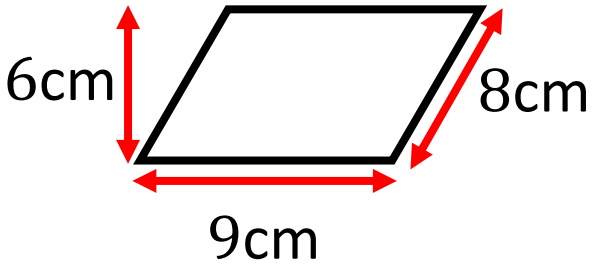
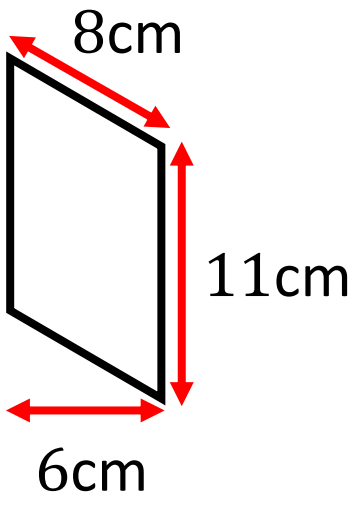
4.6 Area of Parallelograms

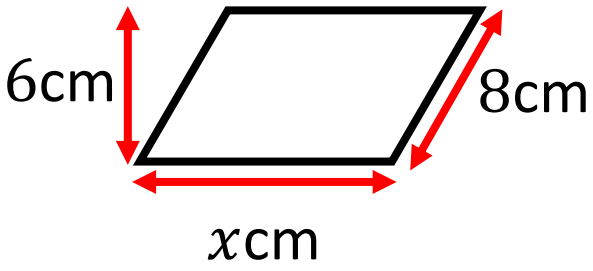
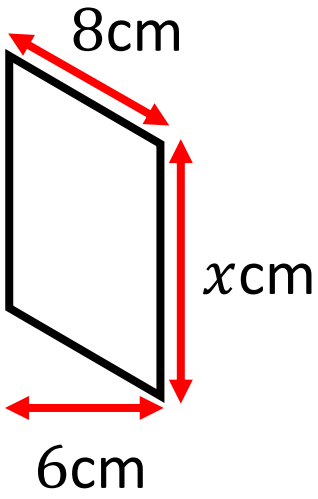
In this section you will look at area of parallelograms.

$$\text{Area of a parallelogram} = \text{base x perpendicular height}$$
$$A = b \times h$$



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

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

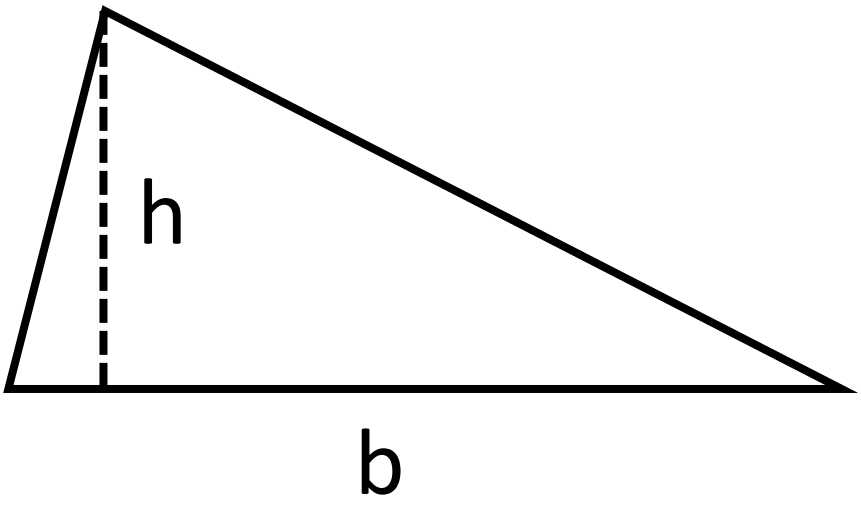
Worked Example	Your Turn
Calculate x if the area of the parallelogram is 54cm^2: 	Calculate x if the area of the parallelogram is 66cm^2: 

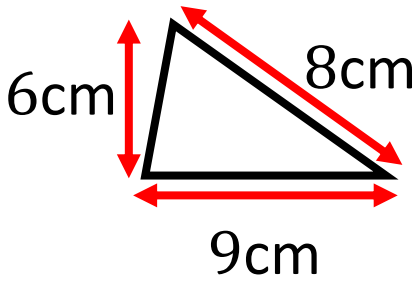
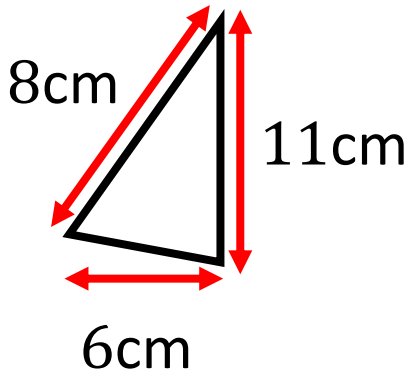
4.7 Area of Triangles

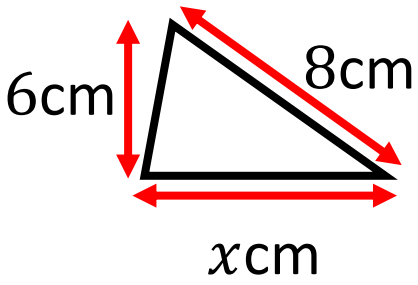
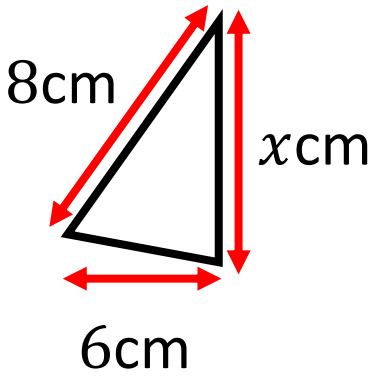
In this section you will look at area of triangles.

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

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



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

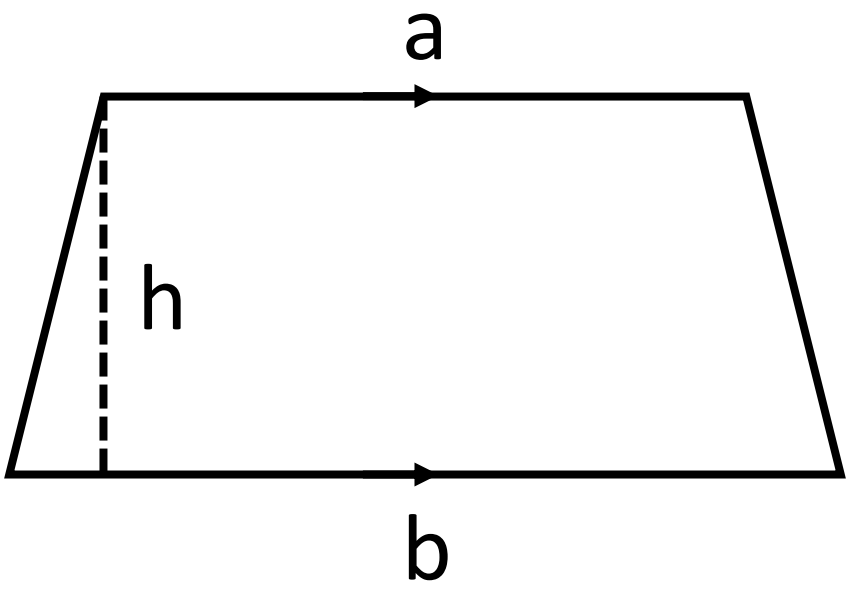
Worked Example	Your Turn
Calculate x if the area of the triangle is 27cm^2:  	Calculate x if the area of the triangle is 33cm^2: 

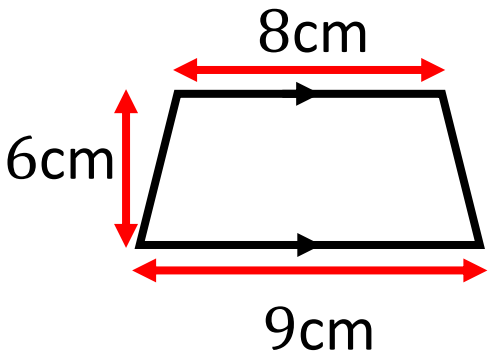
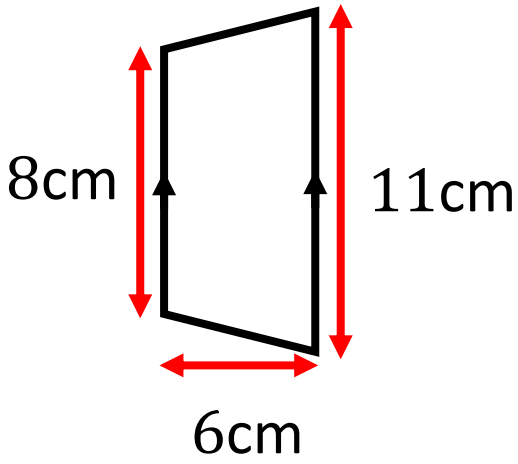
4.8 Area of Trapeziums

In this section you will look at area of trapeziums.

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

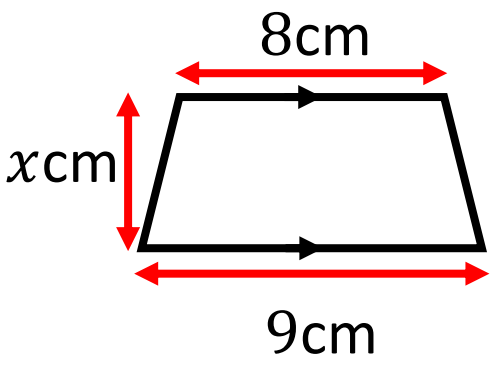
$$A = \frac{a+b}{2} \times h$$



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

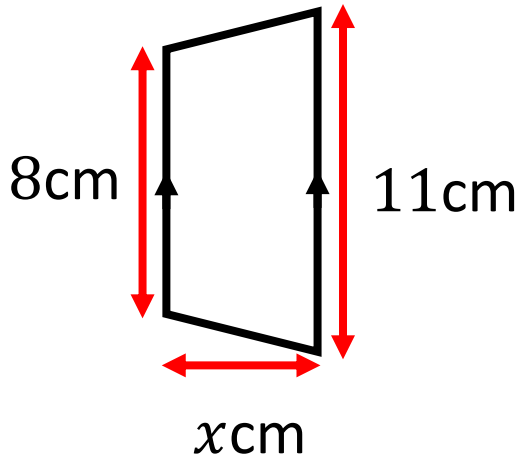
Worked Example

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



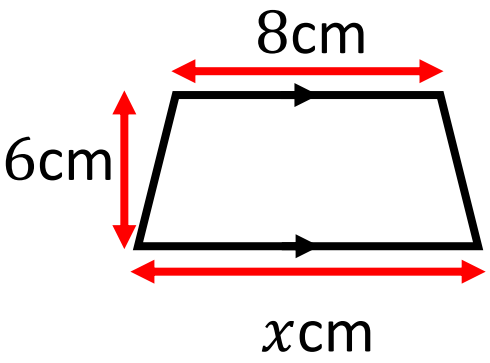
Your Turn

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



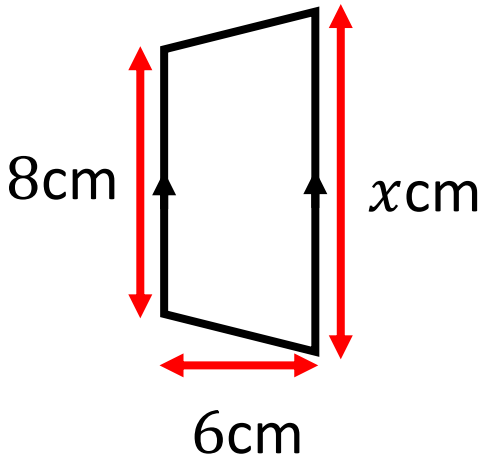
Worked Example

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



Your Turn

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

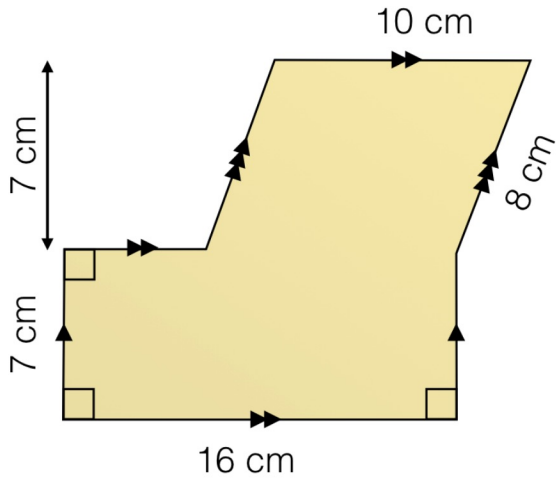


4.9 Area of Compound Shapes without Circles

In this section you will look at area of compound shapes without circles.

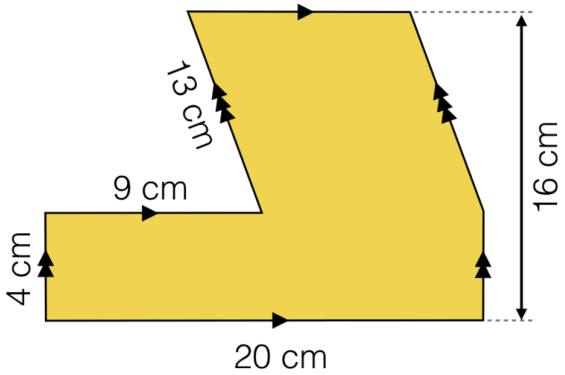
Worked Example

Calculate the area of the compound shape:



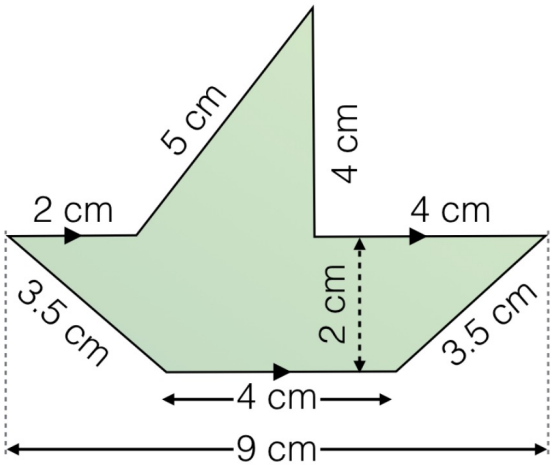
Your Turn

Calculate the area of the compound shape:



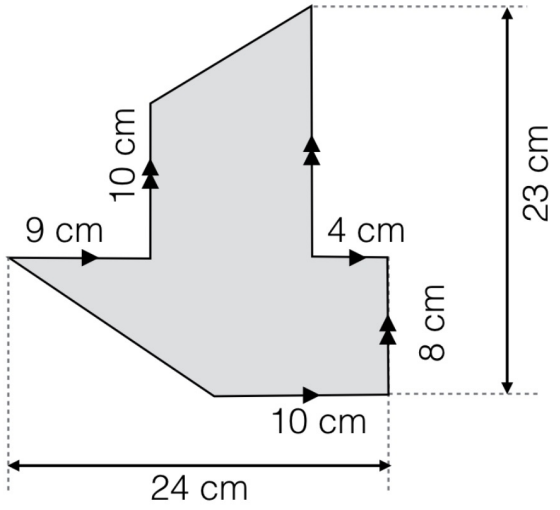
Worked Example

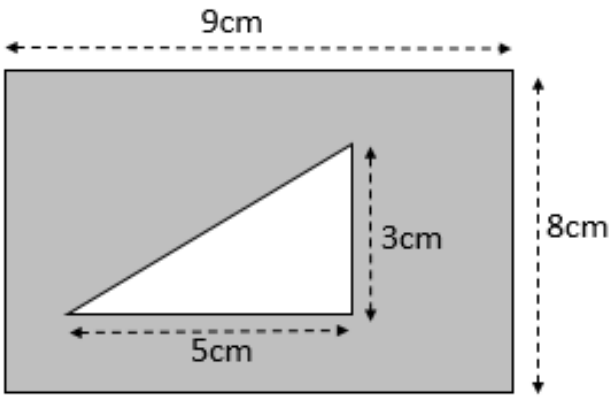
Calculate the area of the compound shape:



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: