bksb
Excellence in skills development

Functional Skills Mathematics

Level 2

Learning Resource 12
Perimeter and Area

west nottinghamshire college

MSS1/L2.7 MSS1/L2.8

Contents

©West Nottinghamshire College

Information **Perimeter and Circumference**

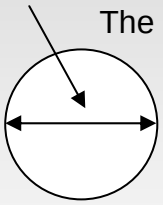
The **perimeter** is the distance all the way around the edge of a shape. To calculate the perimeter, measure all the sides and add these measurements together.

The **circumference** is the distance all the way around the edge of a circle. The circumference is just like the perimeter but is only used when talking about circles. To calculate the circumference of a circle we use a formula.

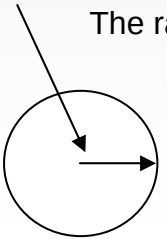
Circumference = 2 × pi × radius or $C = 2\pi r$

The symbol used for pi is π $\pi = 3.14$

The **diameter** of a circle is the distance across the centre.
The diameter is the widest part of the circle.



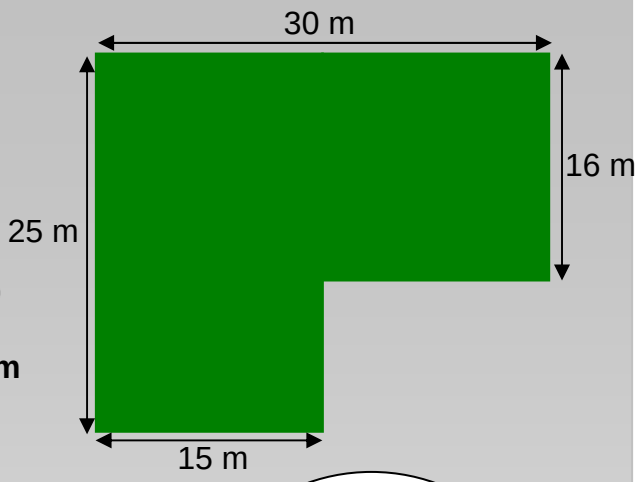
The **radius** of a circle is the distance from the middle of the circle to the outside edge.
The radius is exactly half of the diameter.



©West Nottinghamshire College

Examples **Perimeter and Circumference**

What is the perimeter of Jo's garden, which is shown in the diagram on the right?

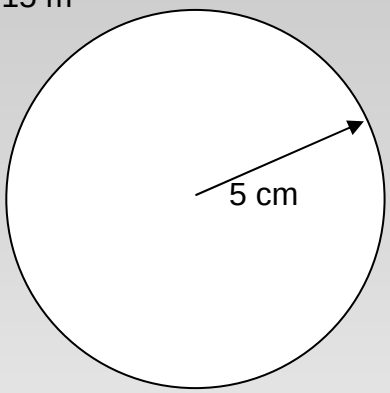


Work out the length of the sides not given in the question, then add together the measurements for all the sides.

25 + 30 + 16 + (30 – 15) + (25 – 16) + 15 = 110

Perimeter = 110 m

Find the circumference of the circle shown on the right.

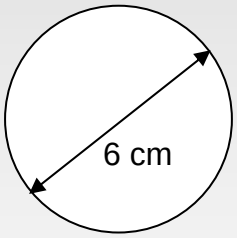


C = 2πr

π = 3.14 r = 5 cm

C = 2 × 3.14 × 5 = 31.4 **Circumference = 31.4 cm**

Find the circumference of the circle shown on the right.



C = 2πr

First, work out the radius.

The radius is half the measurement of the diameter.

Therefore: $r = \frac{6}{2} = 3$ cm

π = 3.14 r = 3 cm

C = 2 × 3.14 × 3 = 18.84 **Circumference = 18.84 cm**

A circular running track measures 95.55 metres from the centre of the circle to the edge. What is the length of the track to the nearest metre?

C = 2 πr

π = 3.14 r = 95.55 m

C = 2 × 3.14 × 95.55 = 600.054 (rounded to 600)

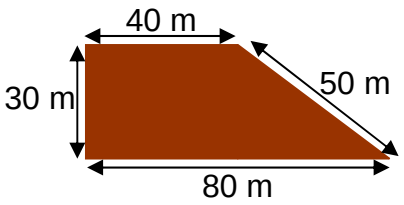
The length of the track is 600 m.

©West Nottinghamshire College

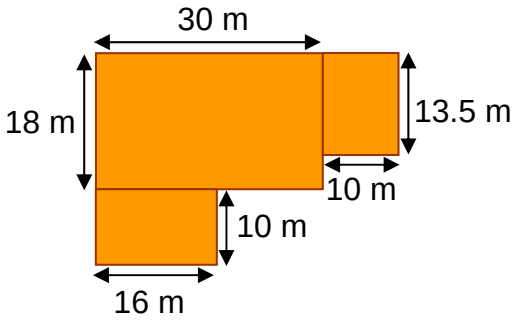
Exercise 1 **Perimeter**

A calculator can be used for this exercise.

1) Find the perimeter of a piece of land which has the following measurements:



2) Cassidy is running rainwater guttering all around her house. What length of guttering will she need?



3) A wall is to be built around a triangular playground area where each side measures 30 metres. There will be 3 entrance gates measuring 1.5 metres each. What will the total wall length be?

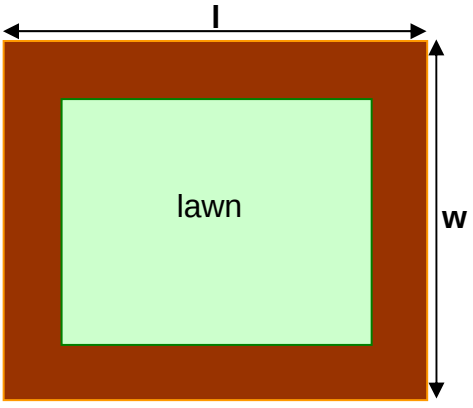
4) The manager of a factory has decided that he needs to put fencing all the way around the factory perimeter as a security measure. The land is 475 metres by 284 metres and he needs to allow for 2 sets of access gates measuring 10 metres per set. How much fencing does he need to order?

5) A garden has a lawn 8.2 metres long and 6.5 metres wide. The border around the lawn is 1.5 metres wide on each side as shown.
Find:

a) the length **l** of the garden _____ m

b) the width **w** of the garden _____ m

c) the perimeter of the border around the garden _____ m



©West Nottinghamshire College

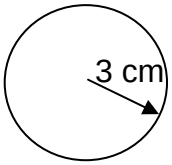
Exercise 2

Circumference

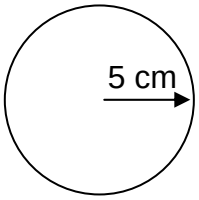
A calculator can be used for this exercise.

1) For each of the following, find the circumference.
(Round your answers to 2 decimal places where necessary.)

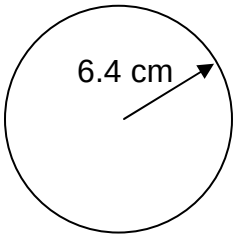
a)



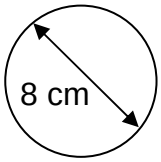
b)



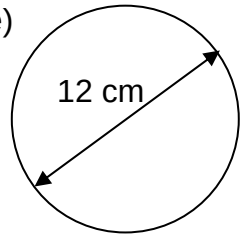
c)



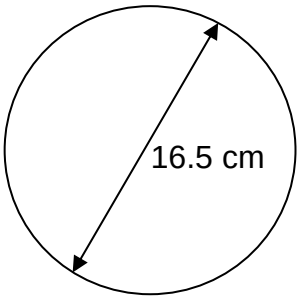
d)



e)



f)



2) The radius of a circular field is 70 metres. What would be the distance around its boundary?

3) Jessica is making a circular cushion with braiding around the edge. The cushion is 30 centimetres in diameter. How much braiding will she need?

4) Blake is marking out the football pitch. If the radius of the centre circle is 9.15 metres, what is the circumference of the circle?

5) A circular table has a diameter of 3.2 metres. What is the circumference?

©West Nottinghamshire College

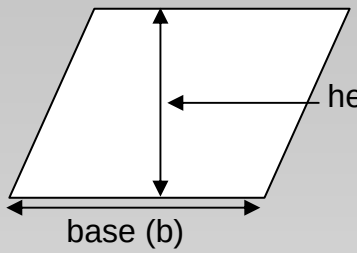
Information **Finding the Area of Regular Shapes**

The area of a rectangle is:

Area of a rectangle = base × height

A = b × h

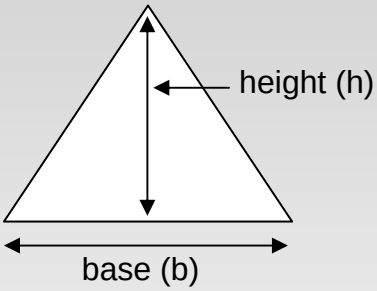
A parallelogram is a tipped over rectangle. This means we can use the same formula for working out the area of a parallelogram as for working out the area of a rectangle.



Area of a parallelogram = base × height

A = b × h

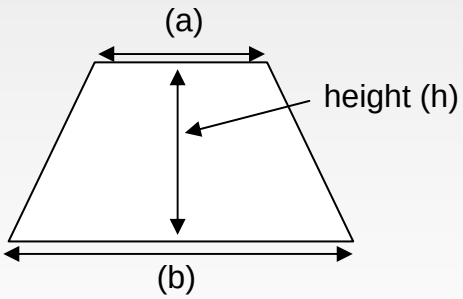
The area of a triangle is half the area of a rectangle or parallelogram.



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

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

To find the area of a trapezium, add the lengths, a + b, together; divide by 2 to find the average length; then multiply by the height.

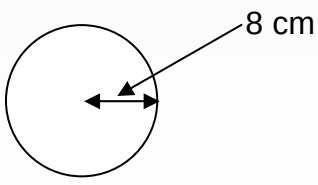


Area of a trapezium= $\frac{(a + b)}{2} \times$ height

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

The area of a circle:

Area of a circle = $\pi \times (\text{radius})^2$



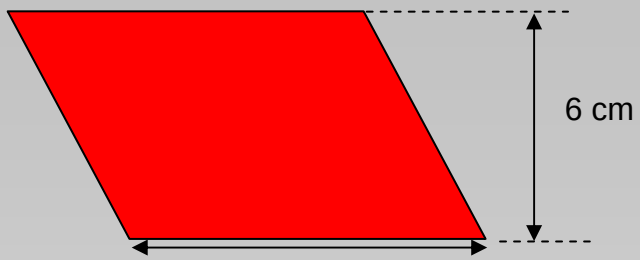
A = πr^2

Remember that all units should be the same and the calculated area always has square units.

©West Nottinghamshire College

Examples

Area of a parallelogram

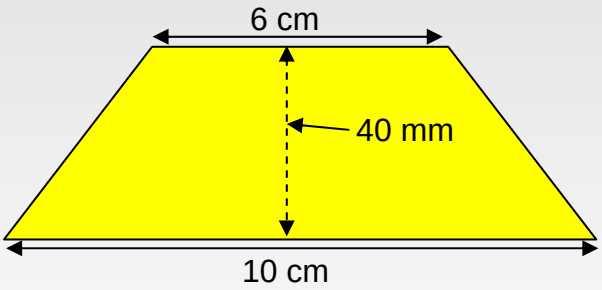


$A = b \times h$

$A = 8 \times 6 = 48$

Area = 48 cm²

Area of a trapezium



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

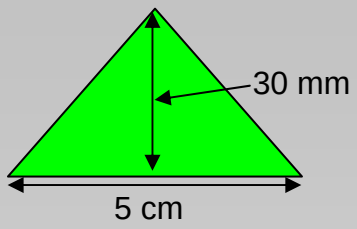
Convert 40 mm to 4 cm

$A = \frac{(6 + 10)}{2} \times 4 = 32$

Area = 32 cm²

Finding the Area of Regular Shapes

Area of a triangle



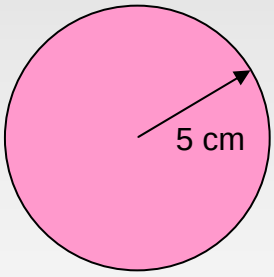
$A = \frac{b \times h}{2}$

Convert 30 mm to 3 cm

$A = \frac{5 \times 3}{2} = 7.5$

Area = 7.5 cm²

Area of a circle



$A = \pi r^2$

$A = 3.14 \times 5^2$

$A = 3.14 \times 25 = 78.5$

Area = 78.5 cm²

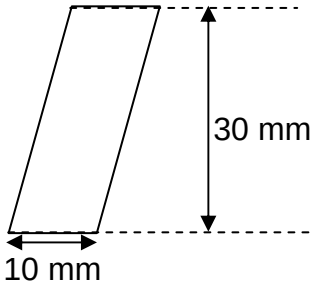
In all the examples, since the measurements are either in cm or converted to cm, the areas are in square centimetres (cm^2).

©West Nottinghamshire College

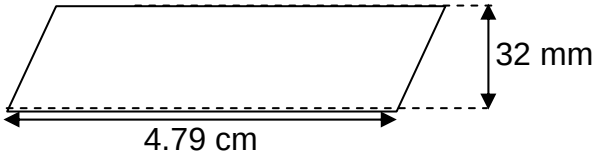
Exercise 3 **Finding the Area of Regular Shapes**

Find the area of each of the following shapes.
(Round your answers to 2 decimal places where necessary.)

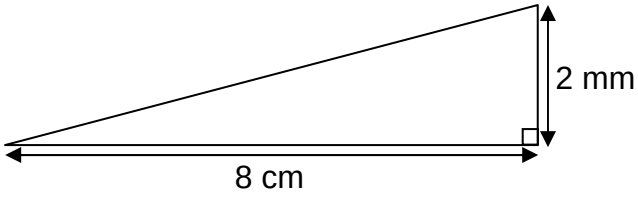
1)



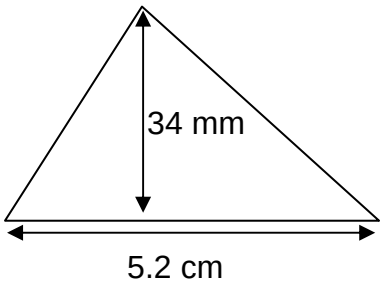
2)



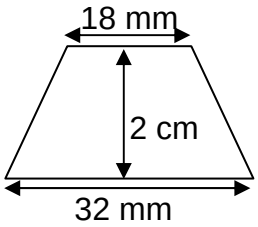
3)



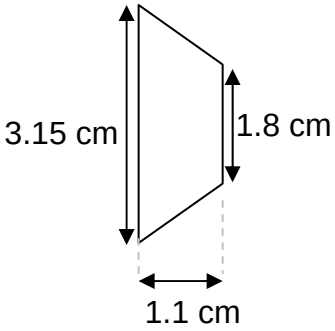
4)



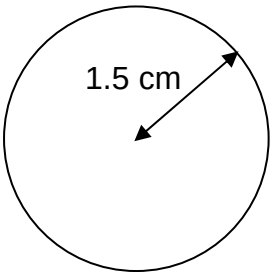
5)



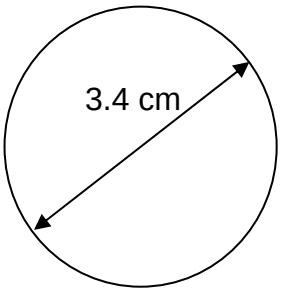
6)



7)



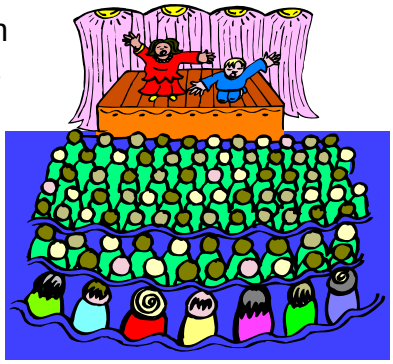
8)



©West Nottinghamshire College

Exercise 4 **Finding the Area of Regular Shapes**

1) A triangular shape has to be painted on some scenery in an outdoor theatre. The triangle has a base of 6 metres and a height of 7 metres.



To calculate the amount of paint required, find the total area.

_____ m^2

2) Tyler is adding an upright **triangular** feature to his garden. He needs to know the area of the piece, so that he can work out the cost of the steel he will need. He has two designs. Calculate the area for both sizes.

His first design is 8 ft high and 5 ft wide.

Area = _____ sq ft

His second design is 6ft high and 3ft 6 inches wide. Area = _____ sq ft

3) A circular pond has a diameter of 4.3 metres. What is the area of the pond?

_____ m^2

4) A baseball stadium has a circular pitch with a radius of 100 metres.

The groundsman is going to use a fertilizer and needs to know the area of the pitch. What is the area?

_____ m^2

5) The diameter of a circular field is 0.12 kilometres. What is the area of the field in square metres?

_____ m^2

6) 

The diameter of the Earth at the equator is rather difficult to measure; it is much easier to measure the circumference.

The circumference of the Earth is 40,000 km.

Can you calculate its diameter?

_____ km

©West Nottinghamshire College

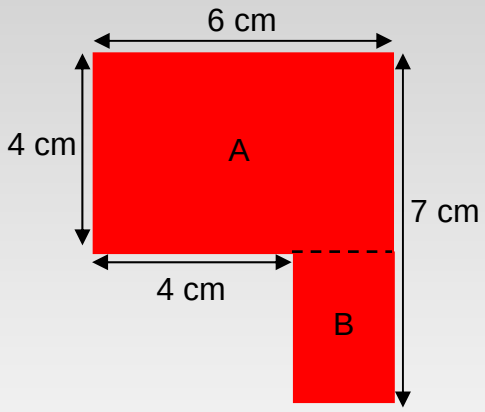
Information **Finding the Area of a Composite Shape**

A composite shape can be thought of as a number of regular shapes joined together.

In order to calculate the area of a composite shape, you will need to split it up into separate, regular shapes. The area of each one of these regular shapes is then calculated and all the areas are added together to find the total area. It is often possible to split the composite shape in several different ways. You choose the way that is easiest for you.

You must make all units the same before you work out the area.

Examples



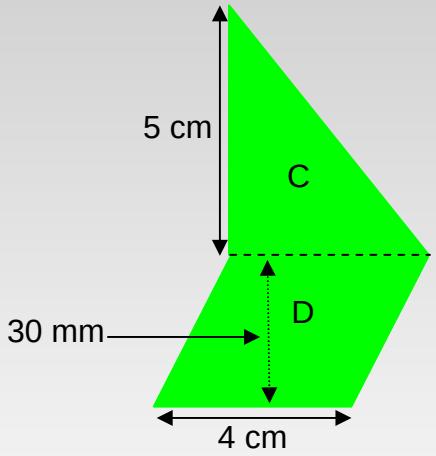
The shape is split into the two regular shapes A and B.

Area of shape A $= 6 \times 4 = 24\ cm^2$

Area of shape B $= 3 \times 2 = 6\ cm^2$

Total Area $= 24 + 6$

$= \mathbf{30\ cm^2}$



The shape is split into the two regular shapes C and D.

Change 30 mm to 3 cm.

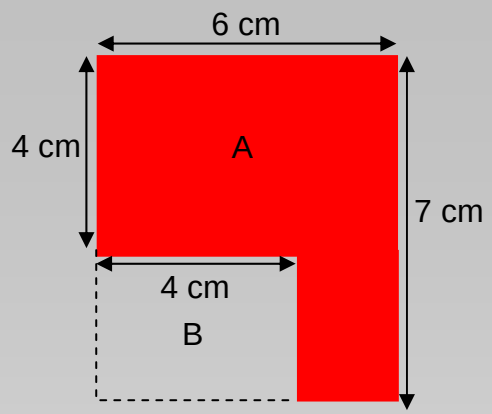
Area of shape C (triangle) $= \frac{1}{2}(5 \times 4) = 10\ cm^2$

Area of shape D (parallelogram) $= 4 \times 3 = 12\ cm^2$

Total Area $= 10 + 12$

$= \mathbf{22\ cm^2}$

Examples **Finding the Area of a Composite Shape**



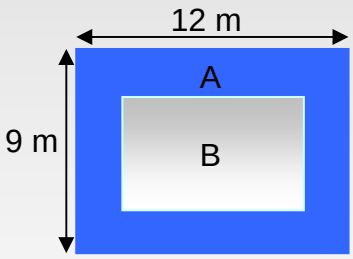
You can also calculate the area of this shape by calculating the area of the large rectangle (A) and subtracting the area of the small rectangle (B).

Area of shape A $= 6 \times 7 = 42$ cm^2

Area of shape B $= 4 \times (7 - 4) = 12$ cm^2

Total Area $= 42 - 12$

$= \mathbf{30\ cm^2}$



20 mm border

Calculate the area of the border by calculating the area of the large rectangle and subtracting the area of the small rectangle.

Change 20 mm to 2 cm so that all units are the same for the calculations.

Area of shape A $= 12 \times 9 = 108$ cm^2

Area of shape B $= (12 - (2 + 2)) \times (9 - (2 + 2)) = 40$ cm^2

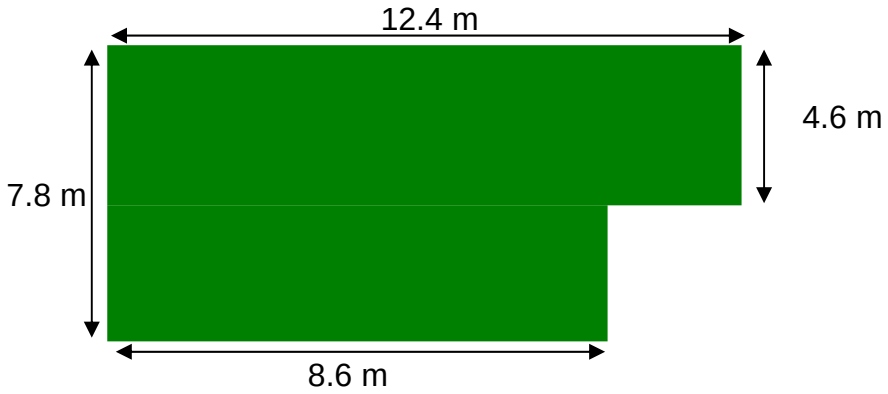
Total Area $= 108 - 40$

$= \mathbf{68\ cm^2}$

©West Nottinghamshire College

Exercise 5 **Finding the Area of a Composite Shape**

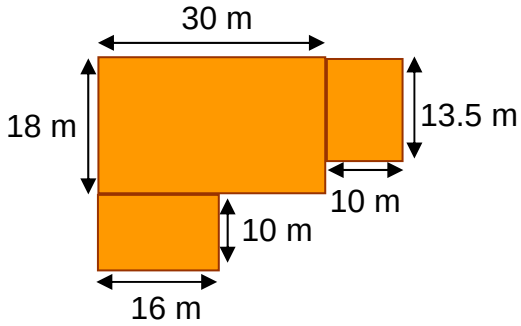
1) You need to order turf to make a new lawn as illustrated below:



Find the total area in order that you can buy the correct amount of turf.

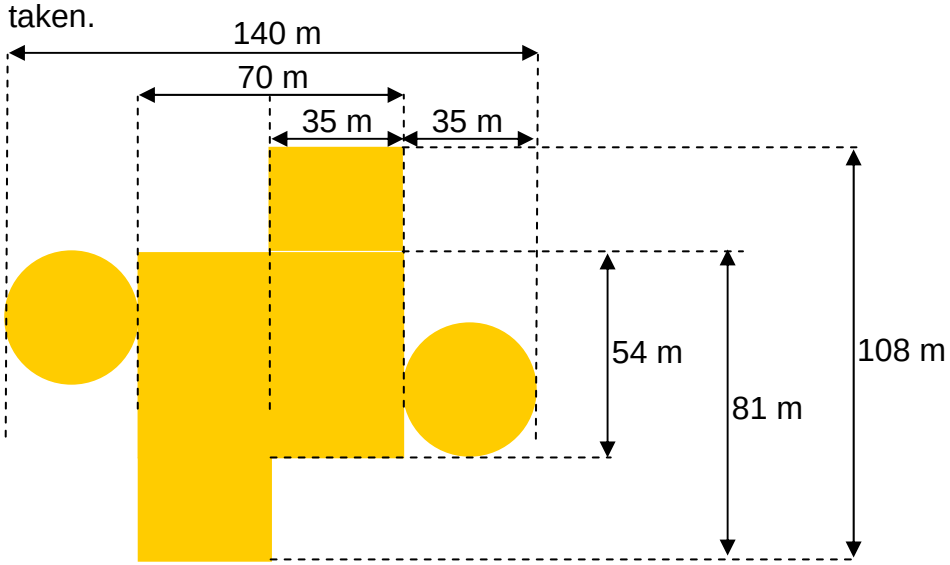
_____ m^2

2) This is a plan of Cassidy's house. Calculate the total floor area.



_____ m^2

3) Toby is trying to calculate the area of the new building which he is writing an article about. He has marked the plan with the measurements that he has taken.



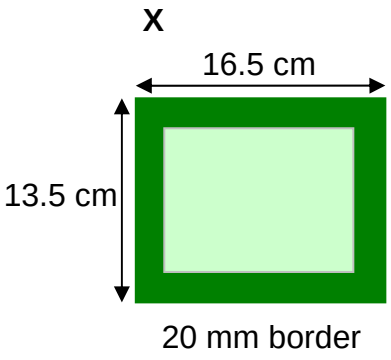
What is the total area of the building plan? _____ m^2

Exercise 6 **Finding the Area of a Composite Shape**

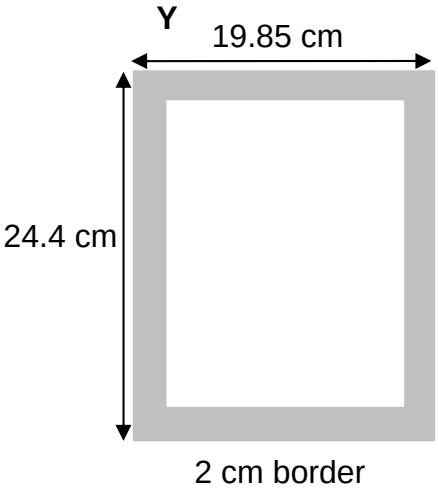
1) A photographer sells three sizes of frames with borders. For each size, find the area of:

a) the photograph without the frame border;
b) the photograph and frame border together;
c) the frame border.

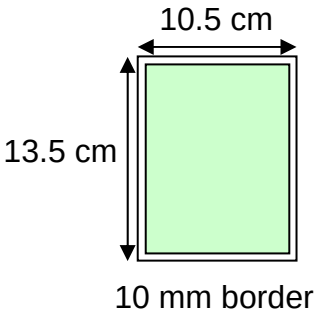
X



Y



Z

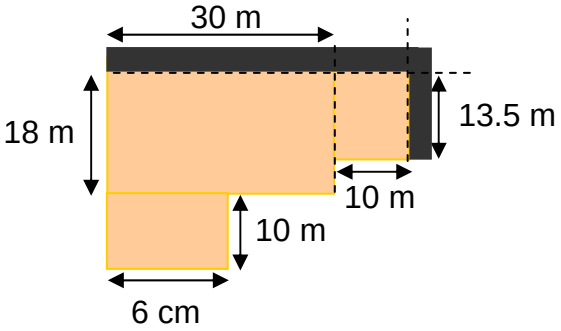


	X	Y	Z
a)	_____ cm^2	_____ cm^2	_____ cm^2
b)	_____ cm^2	_____ cm^2	_____ cm^2
c)	_____ cm^2	_____ cm^2	_____ cm^2

2) A garden has a lawn 8.2 metres long and 6.5 metres wide. The garden is surrounded by a border which is 150 centimetres wide. Find the area of the border.

_____ m^2

3) Cassidy has decided to put a 1 metre wide path down the side and round the back of her house, as shown in dark grey on the plan. What is the area of the path?



_____ m^2