Chhetri Academy

chhetriacademy.com

GCSE MATHS

Geometry and measures

Edexcel 1MA1 | Subtopic collection Topic 43

Area and perimeter

Higher tier

Past paper question booklet

149	2003-2025	Higher
question groups	available papers	tier

Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

15.

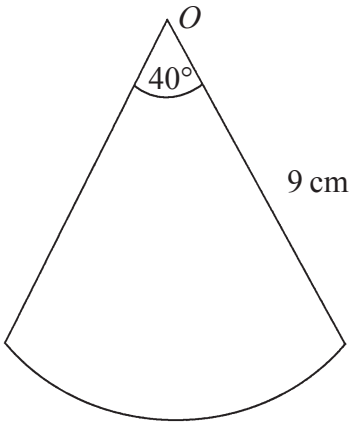


Diagram **NOT** accurately drawn

Leave blank

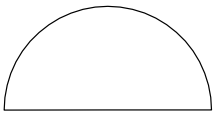
The diagram shows a sector of a circle, centre O.
The radius of the circle is 9 cm.
The angle at the centre of the circle is 40°.

Find the perimeter of the sector.
Leave your answer in terms of π.

.....cm

(4)

5.



15 cm

Diagram **NOT** accurately drawn

Leave blank

The diagram shows a semi-circle.
The diameter of the semi-circle is 15 cm.

Calculate the area of the semi-circle.
Give your answer correct to 3 significant figures.

.....

(3)

8.

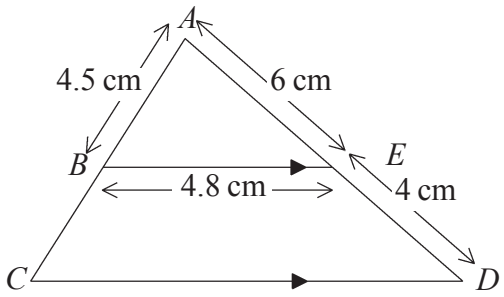


Diagram **NOT** accurately drawn

Leave blank

BE is parallel to *CD*.
AE = 6 cm, *ED* = 4 cm, *AB* = 4.5 cm, *BE* = 4.8 cm.

(a) Calculate the length of *CD*.

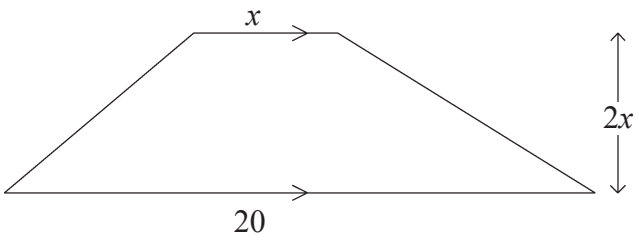
.....cm
(2)

(b) Calculate the perimeter of the trapezium *EBCD*.

.....cm
(2)

13.

Diagram **NOT** accurately drawn



Leave blank

The diagram shows a trapezium.
The measurements on the diagram are in centimetres.
The lengths of the parallel sides are x cm and 20 cm.
The height of the trapezium is $2x$ cm.

The area of the trapezium is 400 cm^2.

(a) Show that

$$x^2 + 20x = 400$$

(2)

(b) Find the value of x.
Give your answer correct to 3 decimal places.

.....

(3)

9.

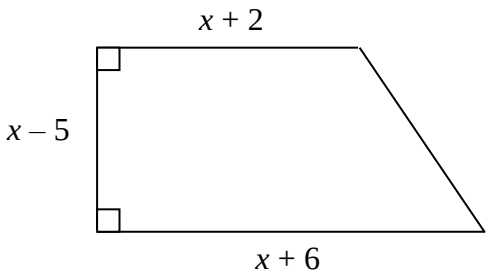


Diagram **NOT** accurately drawn

The diagram shows a trapezium.
The lengths of three of the sides of the trapezium are $x – 5$, $x + 2$ and $x + 6$.
All measurements are given in centimetres.

The area of the trapezium is 36 cm^2.

(a) Show that $x^2 – x – 56 = 0$

(4)

(b) (i) Solve the equation $x^2 – x – 56 = 0$

.....

(ii) Hence find the length of the shortest side of the trapezium.

..... cm
(4)

6. The diagram shows a wedge in the shape of a triangular prism.

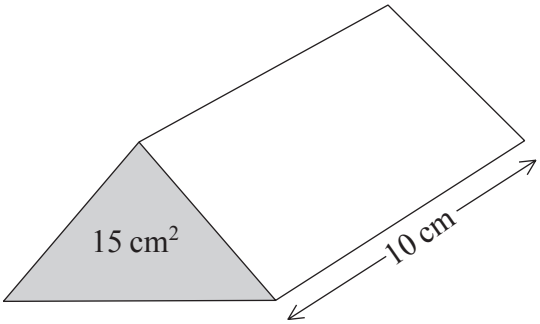


Diagram **NOT** accurately drawn

The cross section of the prism is shown as a shaded triangle.

The area of the triangle is 15 cm^2.
The length of the prism is 10 cm.

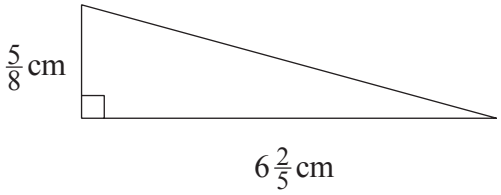
Work out the volume of the prism.

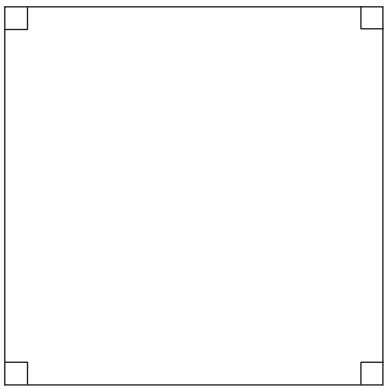
.....

(3)

Page Total

9. Diagrams **NOT** accurately drawn





The area of the square is 18 times the area of the triangle.

Work out the **perimeter** of the square.

..... cm
(5)

Page Total

18.

(a) Find the value of $16^{\frac{1}{2}}$

.....
(1)

(b) Given that $\sqrt{40} = k\sqrt{10}$, find the value of k.

.....
(1)

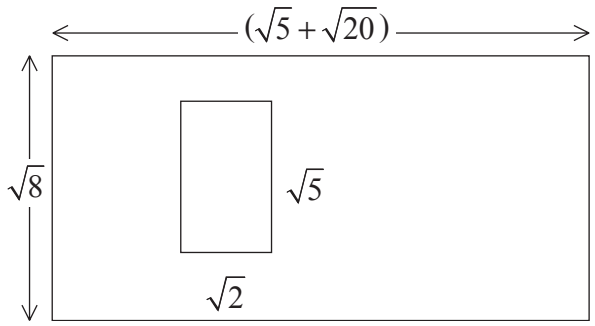


Diagram **NOT** accurately drawn

A large rectangular piece of card is $(\sqrt{5}+\sqrt{20})$ cm long and $\sqrt{8}$ cm wide.

A small rectangle $\sqrt{2}$ cm long and $\sqrt{5}$ cm wide is cut out of the piece of card.

(c) Express the area of the card that is left as a percentage of the area of the large rectangle.

%
.....
(4)

4.

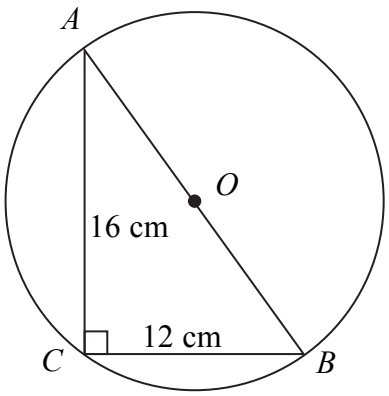


Diagram **NOT** accurately drawn

The diagram shows triangle ABC and a circle, centre O.
A, B and C are points on the circumference of the circle.
AB is a diameter of the circle.

$AC = 16$ cm and $BC = 12$ cm.

(a) Angle $ACB = 90°$.
Give a reason why.

.....

(1)

(b) Work out the diameter AB of the circle.

..... cm

(3)

(c) Work out the area of the circle.
Give your answer correct to 3 significant figures.

..... cm^2

(3)

Q4

(Total 7 marks)

15. The diagram below shows a 6-sided shape.
All the corners are right angles.
All measurements are given in centimetres.

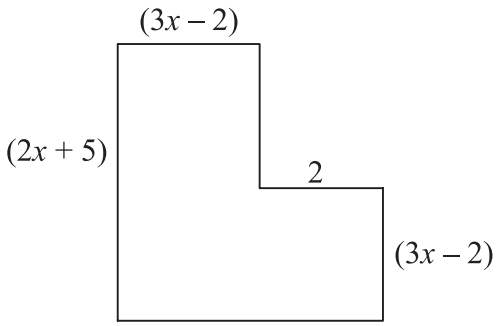


Diagram **NOT** accurately drawn

The area of the shape is 25 cm^2.

(a) Show that $6x^2 + 17x - 39 = 0$

(3)

(b) (i) Solve the equation

$6x^2 + 17x - 39 = 0$

$x =$ ..... or $x =$ .....

(ii) Hence work out the length of the longest side of the shape.

..... cm

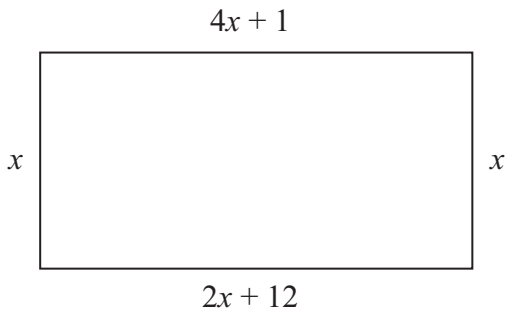
(4)

(Total 7 marks)

Q15

6.

Diagram **NOT** accurately drawn



The diagram shows a rectangle.
All the measurements are in centimetres.

(a) Explain why $4x + 1 = 2x + 12$

.....

(1)

(b) Solve $4x + 1 = 2x + 12$

$x =$ .....

(2)

(c) Use your answer to part (b) to work out the perimeter of the rectangle.

..... cm

(2)

(Total 5 marks)

Q6

13. Here is a tile in the shape of a semicircle.

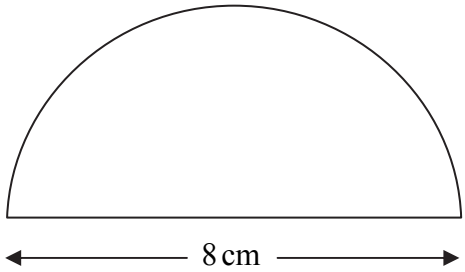


Diagram **NOT** accurately drawn

The diameter of the semicircle is 8 cm.

Work out the perimeter of the tile.
Give your answer correct to 2 decimal places.

..... cm

(Total 3 marks)

Q13

4. Frank did a survey on the areas of pictures in a magazine.

The magazine had 60 pages.
Frank worked out the area of each of the pictures in the first 2 pages.

This may not be a good method to do the survey.
Explain why.

.....

.....

Q4

(Total 1 mark)

7. A circle has a radius of 5 cm.

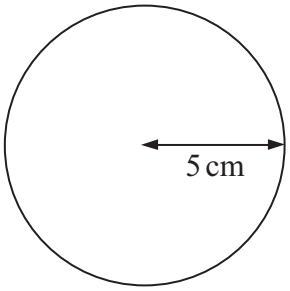


Diagram **NOT** accurately drawn

Work out the area of the circle.
Give your answer correct to 3 significant figures.

..... cm^2

(Total 2 marks)

Q7

12.

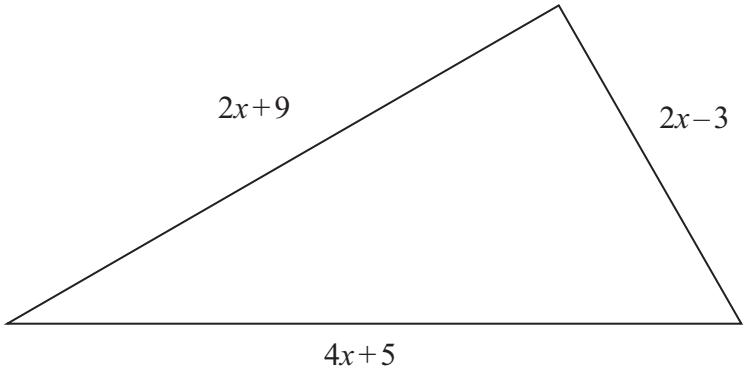


Diagram **NOT** accurately drawn

In the diagram, all measurements are in centimetres.

The lengths of the sides of the triangle are

$2x+9$
$2x-3$
$4x+5$

(a) Find an expression, in terms of x, for the perimeter of the triangle.
Give your expression in its simplest form.

.....

(2)

The perimeter of the triangle is 39 cm.

(b) Find the value of x.

x = ...

(2)

Q12

(Total 4 marks)

7. A circle has a diameter of 12 cm.

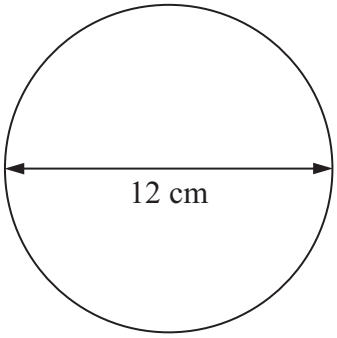


Diagram **NOT** accurately drawn

Work out the circumference of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total 2 marks)

Q7

12.

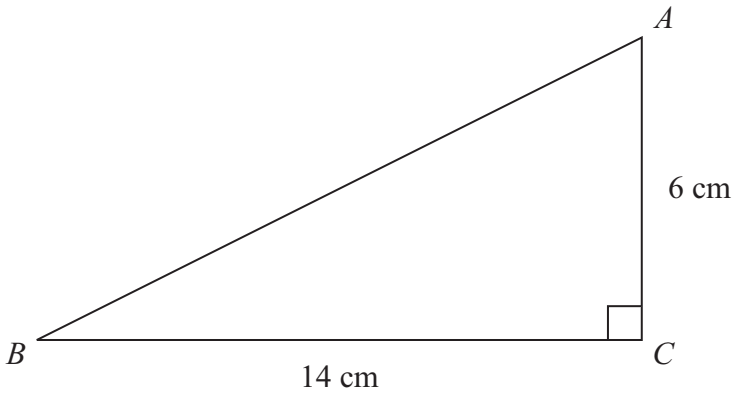


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
AC = 6 cm.
BC = 14 cm.

(a) Work out the area of triangle *ABC*.

..... cm^2
(2)

(b) Calculate the length of *AB*.
Give your answer correct to 2 decimal places.

..... cm
(3)

Q12

(Total 5 marks)

21. A field is in the shape of a rectangle.
The width of the field is 28 metres, measured to the nearest metre.

(a) Work out the upper bound of the width of the field.

..... metres
(1)

The length of the field is 145 metres, measured to the nearest 5 metres.

(b) Work out the upper bound for the perimeter of the field.

..... metres
(3)

(Total 4 marks)

Q21

26. The diagram shows a sector of a circle with centre O.
The radius of the circle is 8 cm.

PRS is an arc of the circle.
PS is a chord of the circle.
Angle $POS = 40°$

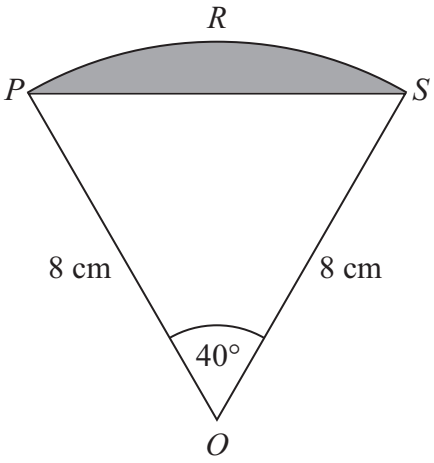


Diagram **NOT** accurately drawn

Calculate the area of the shaded segment.
Give your answer correct to 3 significant figures.

..... cm^2 **Q26**

(Total 5 marks)

5.

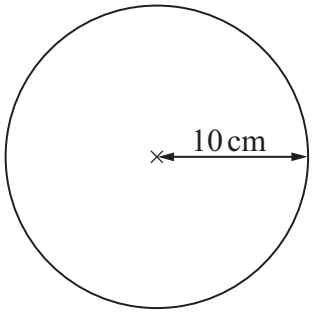


Diagram **NOT** accurately drawn

The radius of a circle is 10 cm.

Work out the area of this circle.
Use $\pi = 3.14$

.....cm^2

Q5

(Total 2 marks)

19.

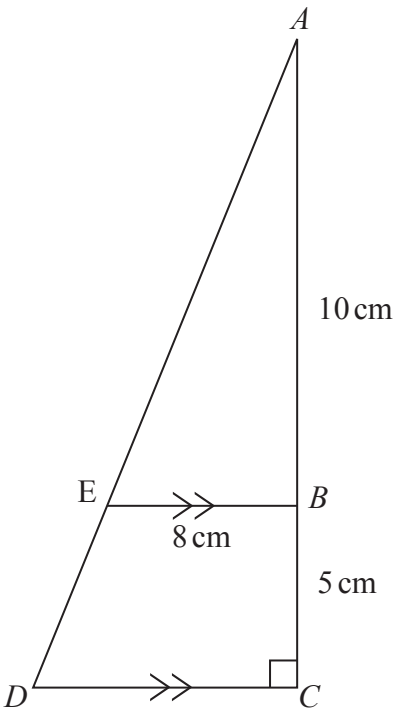


Diagram **NOT** accurately drawn

ABC and *AED* are straight lines.
EB is parallel to *DC*.
Angle *ACD* = 90°.

AB = 10 cm.
BC = 5 cm.
EB = 8 cm.

(a) Work out the length of *DC*.

.....cm
(2)

(b) Work out the area of the trapezium *EBCD*.

.....cm^2
(2)

Q19

(Total 4 marks)

1.

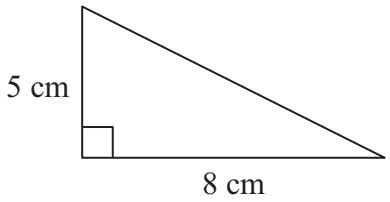


Diagram **NOT** accurately drawn

Work out the area of this right-angled triangle.

..... cm^2

(Total 2 marks)

Q1

24.

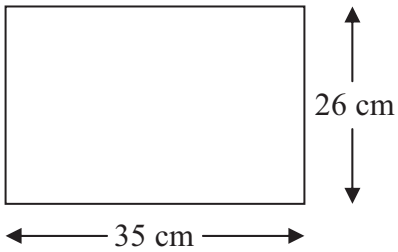


Diagram **NOT** accurately drawn

The length of the rectangle is 35 cm correct to the nearest cm.
The width of the rectangle is 26 cm correct to the nearest cm.

Calculate the upper bound for the area of the rectangle.
Write down all the figures on your calculator display.

.....cm^2 **Q24**

(Total 3 marks)

8 Mrs Kunal's garden is in the shape of a rectangle.
Part of the garden is a patio in the shape of a triangle.
The rest of the garden is grass.

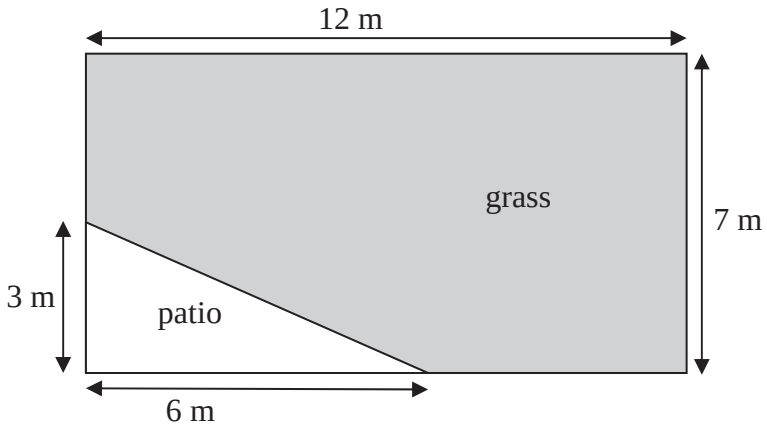


Diagram **NOT** accurately drawn

Mrs Kunal wants to spread fertiliser over all her grass.

One box of fertiliser is enough for 32 m^2 of grass.

How many boxes of fertiliser will she need?
You must show your working.

.....

(Total for Question 8 is 4 marks)

***14** The diagram shows a pentagon.

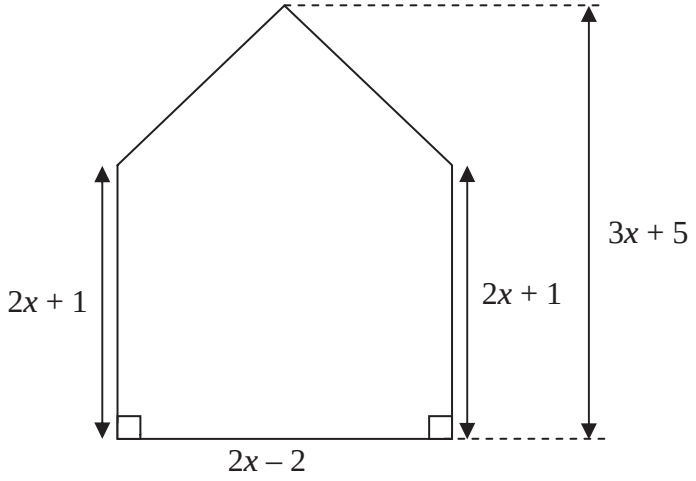


Diagram **NOT** accurately drawn

All measurements are in centimetres.

Show that the area of this pentagon can be written as $5x^2 + x - 6$

(Total for Question 14 is 4 marks)

7 A piece of card is in the shape of a trapezium.

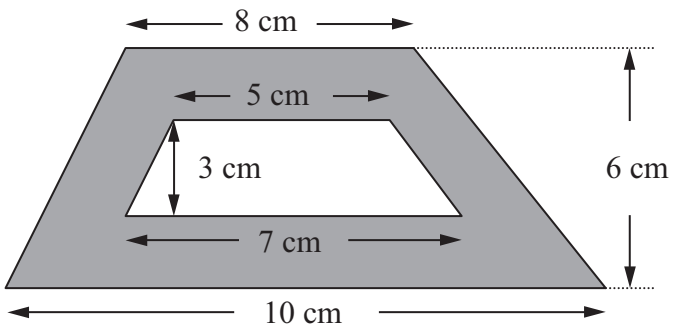


Diagram **NOT** accurately drawn.

A hole is cut in the card.
The hole is in the shape of a trapezium.

Work out the area of the shaded region.

..... cm^2

(Total for Question 7 is 3 marks)

5. The diagram shows a circular pond with a path around it.

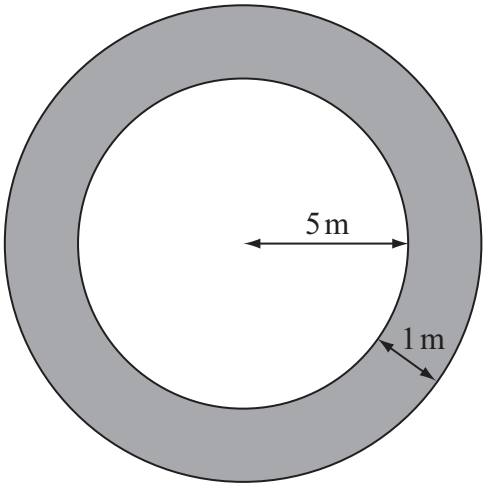


Diagram **NOT** accurately drawn

The pond has a radius of 5 m.
The path has a width of 1 m.

Work out the area of the path.
Give your answer correct to 3 significant figures.

..... m^2

(Total 3 marks)

Q5

23. The diagram below shows a large rectangle of length $(2x + 6)$ cm and width x cm.

A smaller rectangle of length x cm and width 3 cm is cut out and removed.

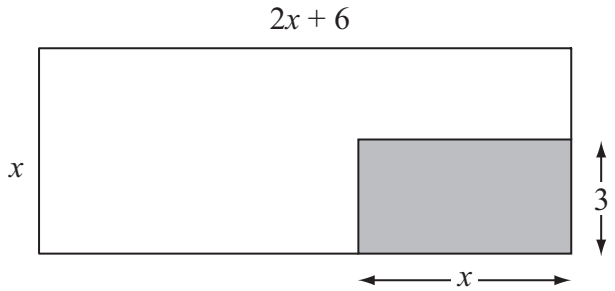


Diagram **NOT** accurately drawn

The area of the shape that is left is 100 cm^2.

(a) Show that $2x^2 + 3x - 100 = 0$

(3)

(b) Calculate the length of the smaller rectangle.
Give your answer correct to 3 significant figures.

..... cm

(4)

Q23

(Total 7 marks)

1

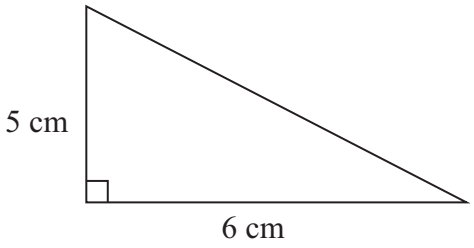


Diagram **NOT** accurately drawn

Work out the area of this triangle.

.....

(Total for Question 1 is 3 marks)

***6** The diagram shows the plan of Mrs Phillips' living room.

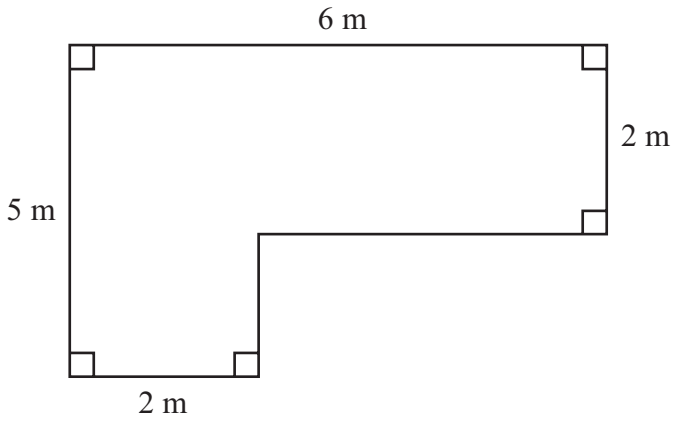


Diagram **NOT** accurately drawn

Mrs Phillips is going to cover the floor with floor boards.
One pack of floor boards will cover 2.5 m².

How many packs of floor boards does she need?
You must show your working.

(Total for Question 6 is 4 marks)

21.

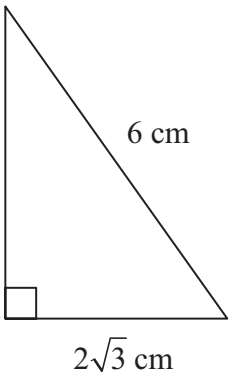


Diagram **NOT** accurately drawn

The diagram shows a right-angled triangle.

The length of the base of the triangle is $2\sqrt{3}$ cm.

The length of the hypotenuse of the triangle is 6 cm.

The area of the triangle is A cm^2.

Show that $A = k\sqrt{2}$ giving the value of k.

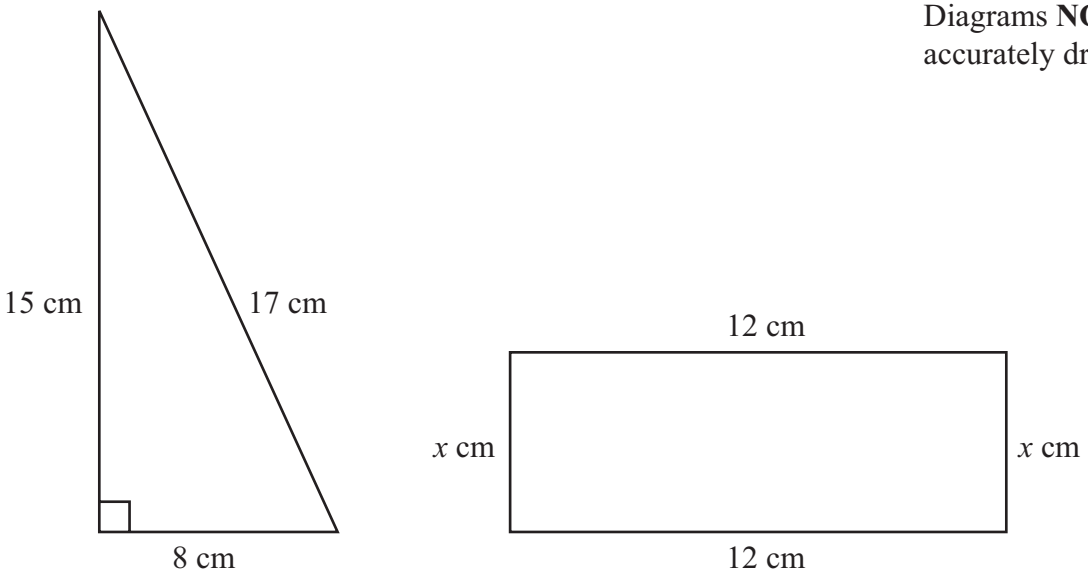
.....

Q21

(Total 5 marks)

7. The diagrams show a right-angled triangle and a rectangle.

Diagrams **NOT** accurately drawn



The area of the right-angled triangle is equal to the area of the rectangle.

Find the value of x.

x = ...

Q7

(Total 4 marks)

8. The diagram shows a CD.
The CD is a circle of radius 6 cm.

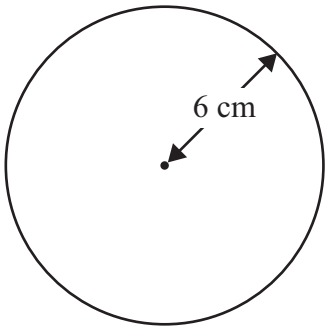


Diagram **NOT** accurately drawn

(a) Work out the circumference of the CD.

..... cm
(2)

CDs of this size are cut from rectangular sheets of plastic.
Each sheet is 1 metre long and 50 cm wide.

(b) Work out the greatest number of CDs that can be cut from one rectangular sheet.

.....
(2)
(Total 4 marks)

Q8

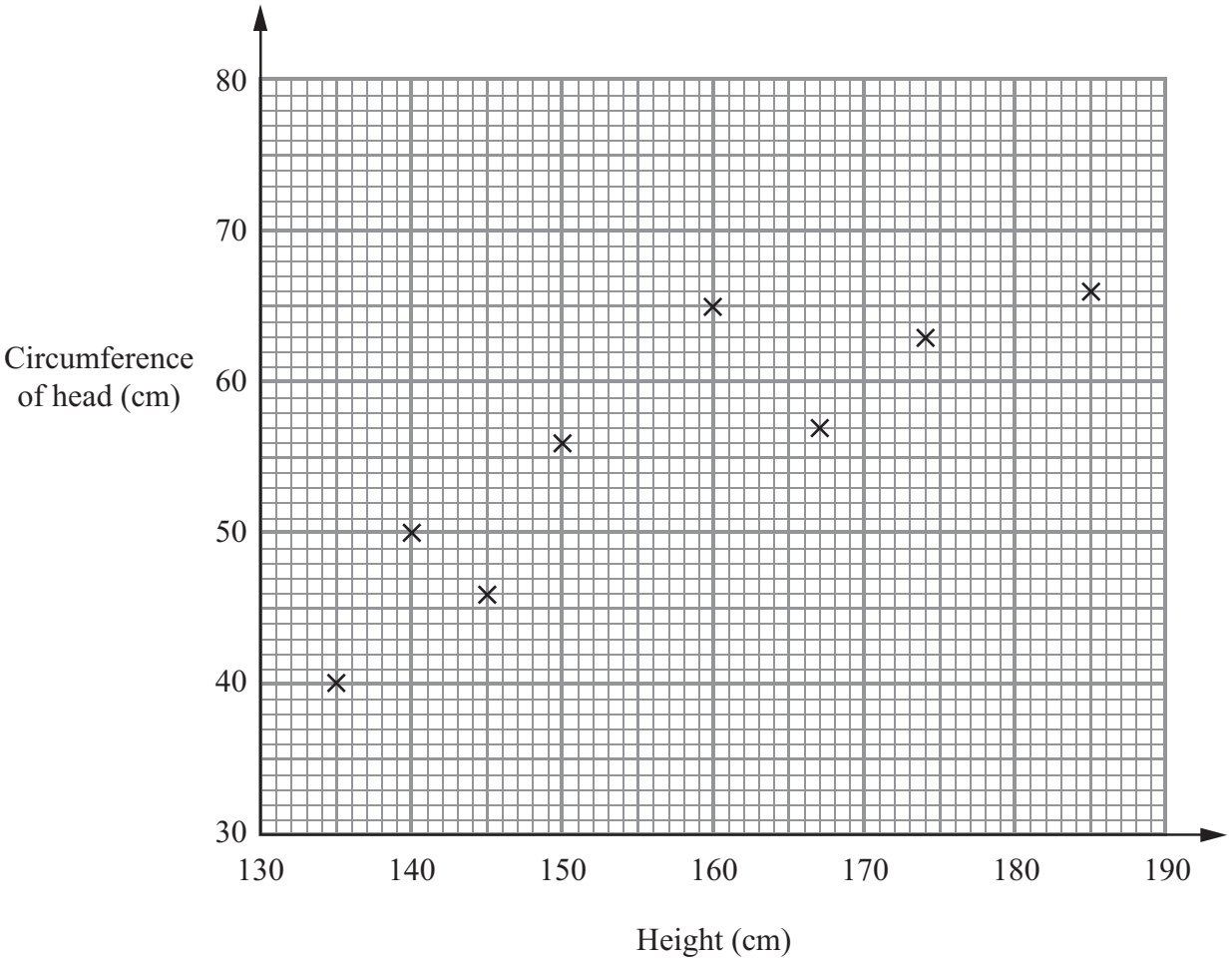
25. Steve measured the length and the width of a rectangle.
He measured the length to be 645 mm correct to the nearest 5 mm.
He measured the width to be 400 mm correct to the nearest 5 mm.

Calculate the lower bound for the area of this rectangle.
Give your answer correct to 3 significant figures.

..... mm^2 **Q25**

(Total 3 marks)

5 The scatter graph shows information about 8 people.
It shows each person's height and the circumference of their head.



The table gives this information for 2 other people.

Height (cm)	180	170
Circumference of head (cm)	72	65

(a) On the scatter graph, plot the information from the table.

(1)

(b) Describe the correlation.

.....

(1)

(c) Draw a line of best fit on your scatter graph.

(1)

(d) Estimate the circumference of the head of a person who is 156 cm tall.

..... cm

(1)

(Total for Question 5 is 4 marks)

4 Jake makes a picture frame from 4 identical pieces of card.
Each piece of card is in the shape of a trapezium.

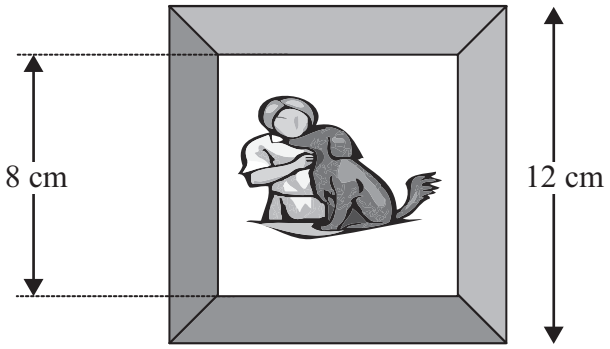


Diagram **NOT** accurately drawn

The outer edge of the frame is a square of side 12 cm.
The inner edge of the frame is a square of side 8 cm.

Work out the area of each piece of card.

..... cm^2

(Total for Question 4 is 4 marks)

15 The diagram shows shape **A**.
All the measurements are in centimetres.

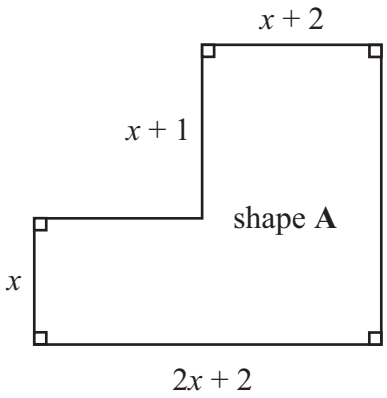


Diagram **NOT** accurately drawn

(a) Find an expression in terms of x for the area, in cm^2, of shape **A**.
You must simplify your answer.

.....

(4)

Shape **B** is a rectangle.
Shape **B** has the same area as shape **A**.
Shape **B** has a length of $(3x + 2)$ centimetres.

(b) Find an expression in terms of x for the width, in centimetres, of shape **B**.

.....

(1)

(Total for Question 15 is 5 marks)

***13** The diagram shows a triangle inside a rectangle.

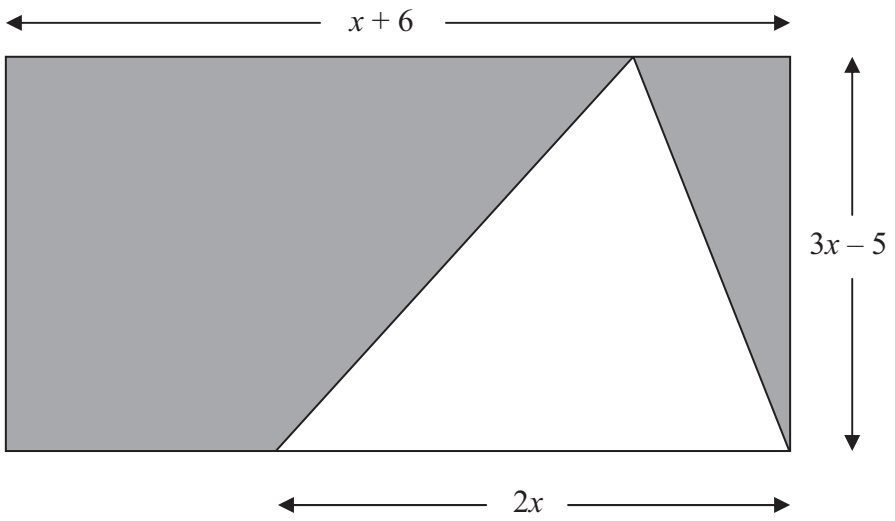


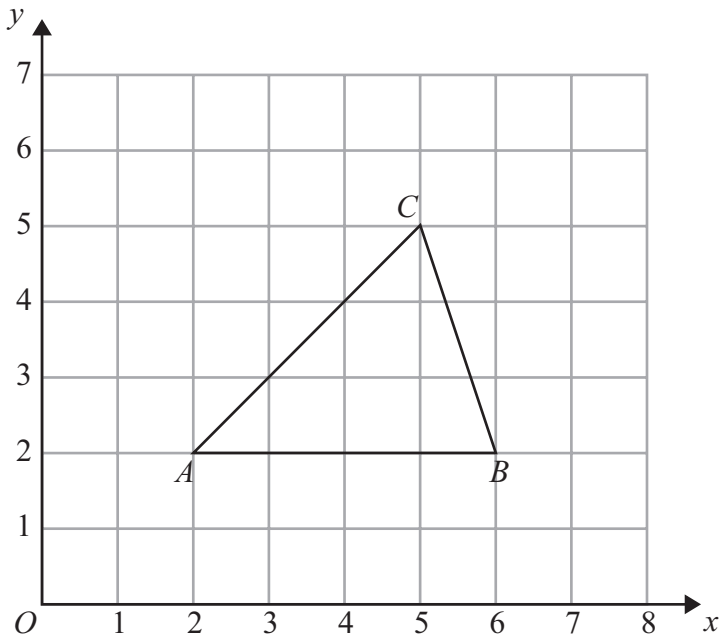
Diagram **NOT** accurately drawn

All measurements are given in centimetres.

Show that the total area, in cm^2, of the shaded regions is $18x - 30$

(Total for Question 13 is 4 marks)

18



Triangle ABC is drawn on a centimetre grid.
A is the point (2, 2).
B is the point (6, 2).
C is the point (5, 5).

Triangle PQR is an enlargement of triangle ABC with scale factor $\frac{1}{2}$ and centre (0, 0).

Work out the area of triangle PQR.

..... cm^2

(Total for Question 18 is 3 marks)

***5** Mr Weaver's garden is in the shape of a rectangle.

In the garden

there is a patio in the shape of a rectangle
and two ponds in the shape of circles with diameter 3.8 m.

The rest of the garden is grass.

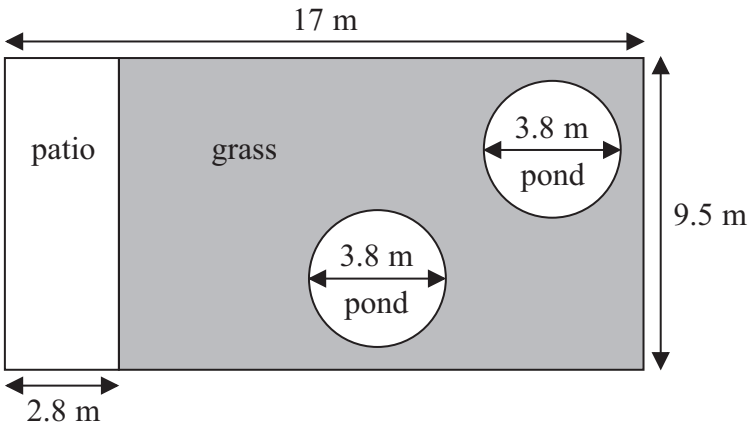


Diagram **NOT** accurately drawn

Mr Weaver is going to spread fertiliser over all the grass.
One box of fertiliser will cover 25 m^2 of grass.

How many boxes of fertiliser does Mr Weaver need?
You must show your working.

(Total for Question 5 is 5 marks)

10 Janice cuts a triangle from a rectangular piece of metal.
She uses the rest of the metal to make a name badge.

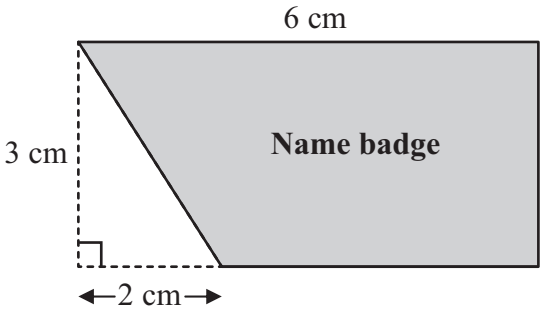


Diagram **NOT** accurately drawn

The rectangle has length 6 cm and width 3 cm.
The right-angled triangle has base 2 cm and height 3 cm.

Work out the area of the name badge.

.....

(Total for Question 10 is 4 marks)

12 The diagram shows a circle drawn inside a square.

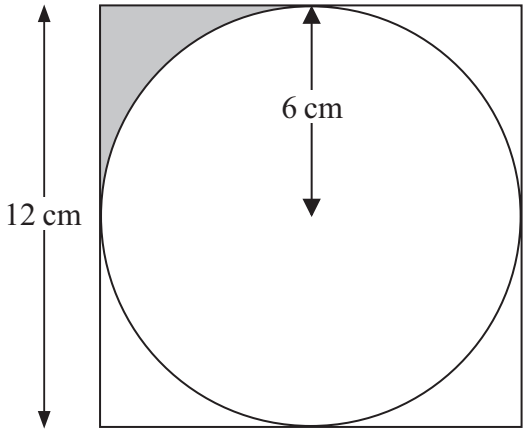


Diagram **NOT** accurately drawn

The circle has a radius of 6 cm.
The square has a side of length 12 cm.

Work out the shaded area.
Give your answer in terms of π.

.....cm^2

(Total for Question 12 is 3 marks)

16 The diagram shows a triangle.

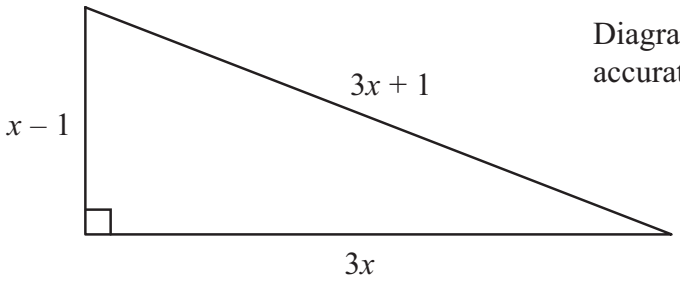


Diagram **NOT** accurately drawn

In the diagram, all the measurements are in metres.

The perimeter of the triangle is 56 m.
The area of the triangle is A m^2.

Work out the value of A.

.....

(Total for Question 16 is 4 marks)

3 Here is a right-angled triangle.

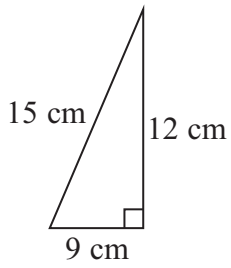


Diagram **NOT** accurately drawn

The shape below is made from 4 of these triangles.

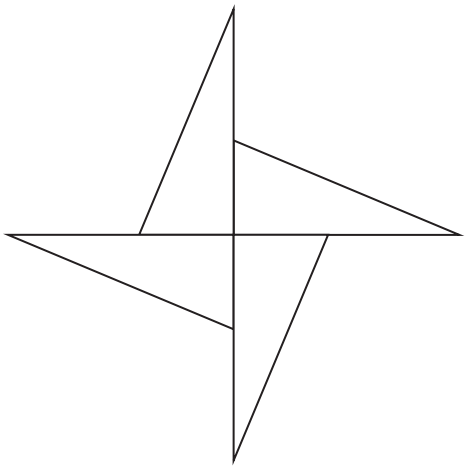


Diagram **NOT** accurately drawn

Work out the perimeter of the shape.

..... cm

(Total for Question 3 is 3 marks)

15

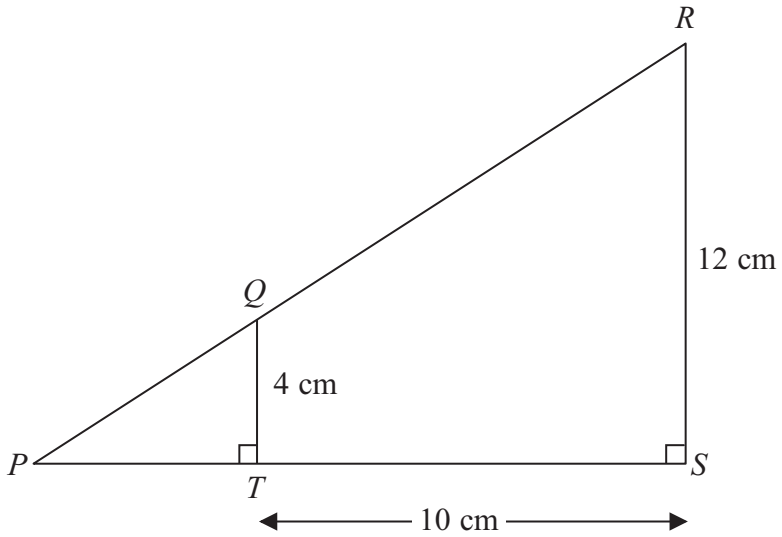


Diagram **NOT** accurately drawn

PQR and *PTS* are straight lines.
Angle *PTQ* = Angle *PSR* = 90°
QT = 4 cm
RS = 12 cm
TS = 10 cm

(a) Work out the area of the trapezium *QRST*.

..... cm^2
(2)

(b) Work out the length of *PT*.

..... cm
(3)

(Total for Question 15 is 5 marks)

19

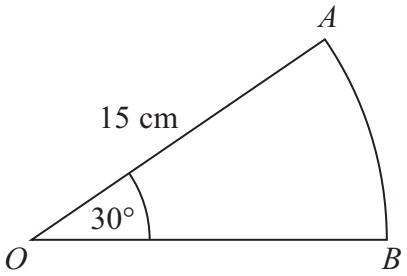


Diagram **NOT** accurately drawn

OAB is a sector of a circle, centre *O*.
The radius of the circle is 15 cm.
The angle of the sector is 30°.

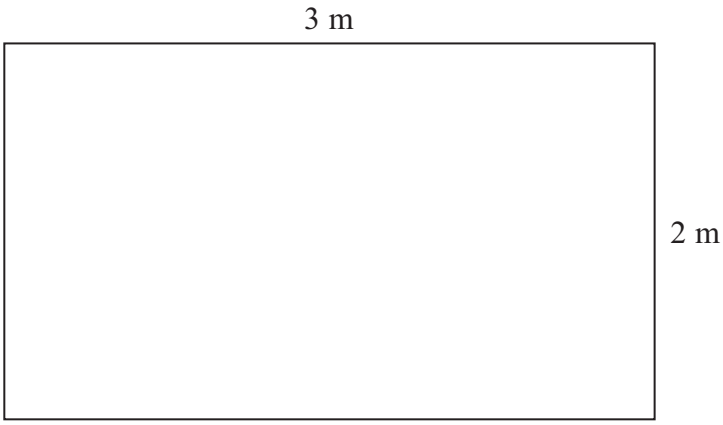
Calculate the area of sector *OAB*.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 19 is 2 marks)

4 Here is a diagram of part of a wall in Sarah's house.

Diagram **NOT** accurately drawn



Sarah is going to cover this part of the wall with square tiles.
The square tiles have sides of 20 cm.

Work out the number of tiles Sarah needs.

..... tiles

(Total for Question 4 is 3 marks)

5 Here is a circle.

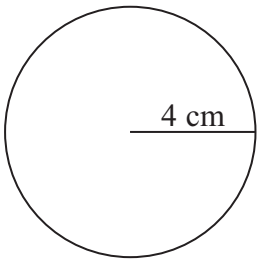


Diagram **NOT** accurately drawn

The radius of the circle is 4 cm.

Work out the circumference of the circle.

..... cm

(Total for Question 5 is 2 marks)

10 The diagram shows a garden in the shape of a rectangle.

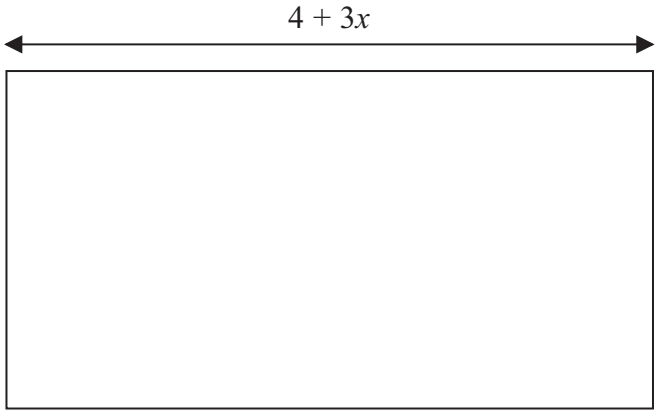


Diagram **NOT** accurately drawn

All measurements are in metres.
The perimeter of the garden is 32 metres.

Work out the value of x

.....

(Total for Question 10 is 4 marks)

20

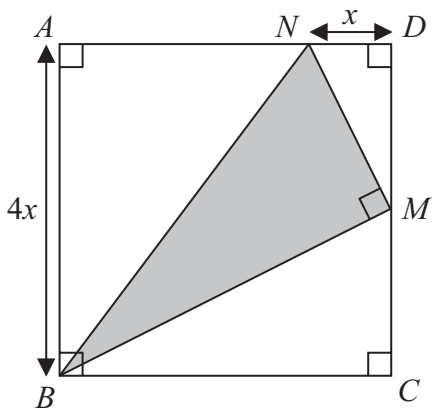


Diagram **NOT** accurately drawn

ABCD is a square with a side length of $4x$
M is the midpoint of *DC*.
N is the point on *AD* where $ND = x$

BMN is a right-angled triangle.

Find an expression, in terms of x, for the area of triangle *BMN*.
Give your expression in its simplest form.

.....

(Total for Question 20 is 4 marks)

22 **P** and **Q** are two triangular prisms that are mathematically similar.

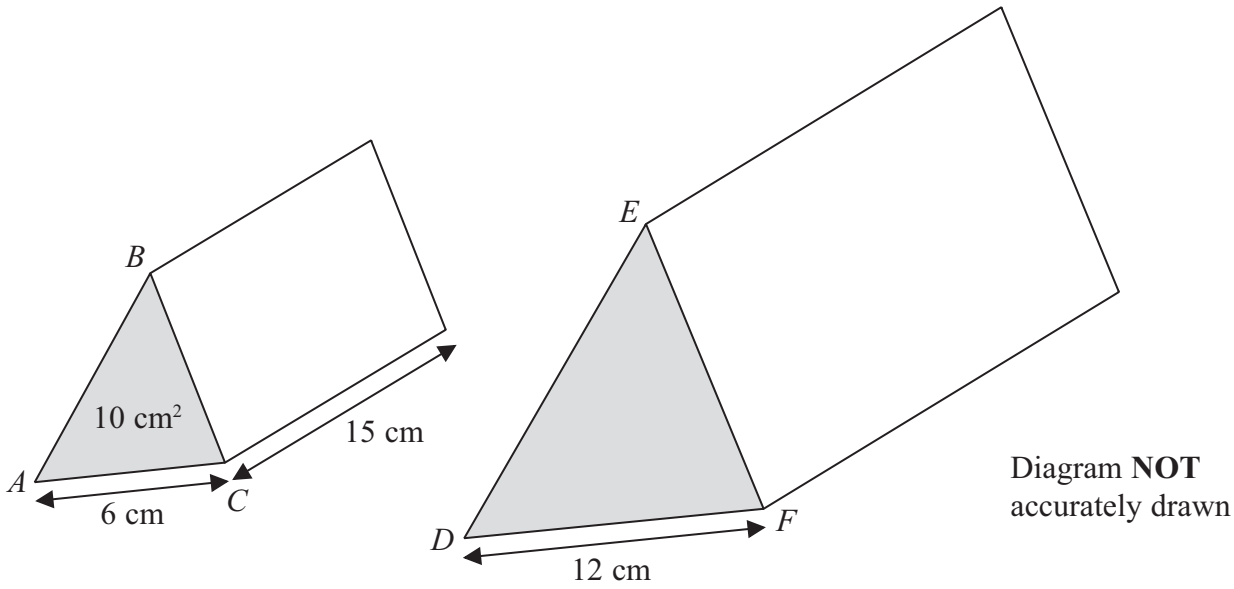


Diagram **NOT** accurately drawn

Prism P **Prism Q**

Prism **P** has triangle *ABC* as its cross section.
Prism **Q** has triangle *DEF* as its cross section.

AC = 6 cm
DF = 12 cm

The area of the cross section of prism **P** is 10 cm².
The length of prism **P** is 15 cm.

Work out the volume of prism **Q**.

.....

(Total for Question 22 is 4 marks)

23 Dan does an experiment to find the value of π.
He measures the circumference and the diameter of a circle.

He measures the circumference, C, as 170 mm to the nearest millimetre.
He measures the diameter, d, as 54 mm to the nearest millimetre.

Dan uses $\pi = \frac{C}{d}$ to find the value of π.

Calculate the upper bound and the lower bound for Dan's value of π.

upper bound = ...

lower bound = ...

(Total for Question 23 is 4 marks)

***8** The diagram shows the floor plan of Jill's dining room.

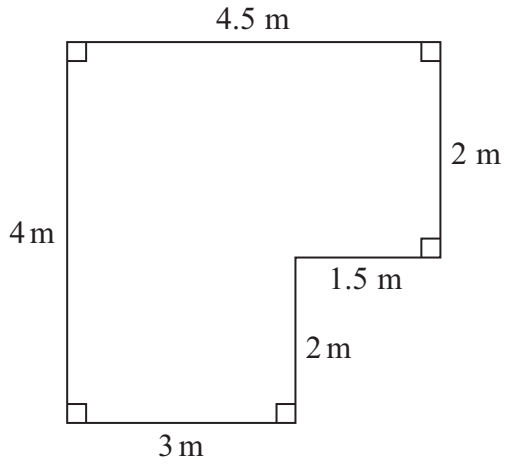


Diagram **NOT** accurately drawn

Jill is going to cover the floor with wooden floorboards.

The floorboards are sold in packs.
One pack of floorboards will cover 2.25 m^2.

Work out how many packs Jill needs.
You must show all your working.

(Total for Question 8 is 4 marks)

***4** The diagram shows a flower bed in the shape of a circle.

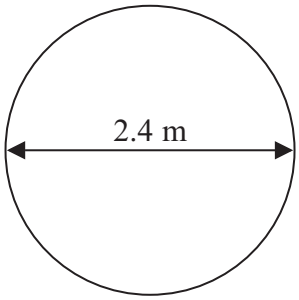


Diagram **NOT** accurately drawn

The flower bed has a diameter of 2.4 m.

Sue is going to put a plastic strip around the edge of the flower bed.
The plastic strip is sold in 2 metre rolls.

How many rolls of plastic strip does Sue need to buy?
You must show all your working.

(Total for Question 4 is 4 marks)

8 ABC is a triangle.

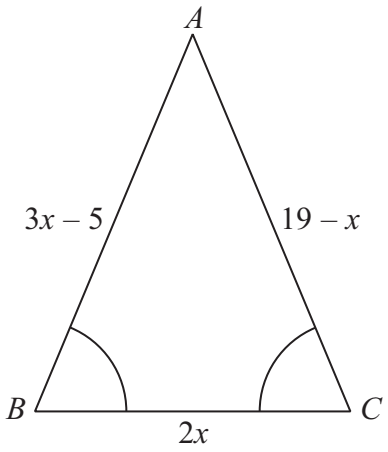


Diagram **NOT** accurately drawn

Angle ABC = angle BCA.

The length of side AB is $(3x - 5)$ cm.
The length of side AC is $(19 - x)$ cm.
The length of side BC is $2x$ cm.

Work out the perimeter of the triangle.
Give your answer as a number of centimetres.

..... cm

(Total for Question 8 is 5 marks)

Question 56

12 A circle has a diameter of 140 cm.

Work out the circumference of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 12 is 2 marks)

18 ABC is an isosceles triangle.

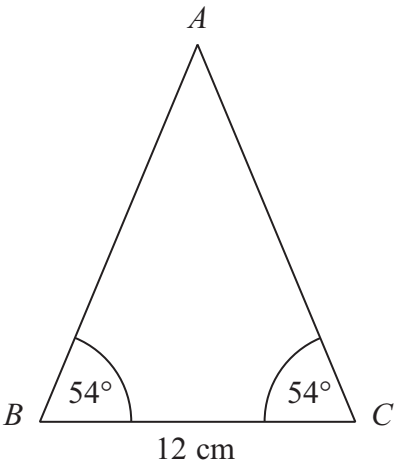


Diagram **NOT** accurately drawn

Work out the area of the triangle.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 18 is 4 marks)

22 The diagram shows a trapezium.

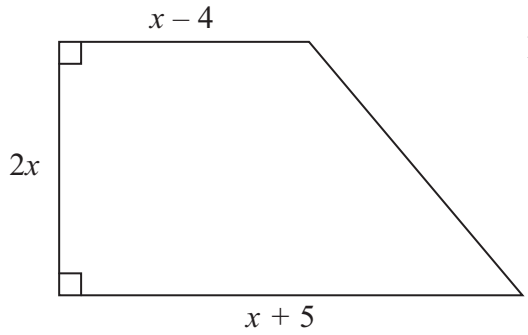


Diagram **NOT** accurately drawn

All the measurements are in centimetres.

The area of the trapezium is 351 cm^2.

(a) Show that $2x^2 + x - 351 = 0$

(2)

(b) Work out the value of x.

.....

(3)

(Total for Question 22 is 5 marks)

Question 59

13 The perimeter of a square is $\sqrt{120}$ cm.
Work out the area of the square.
Give your answer in its simplest form.

.....cm^2

(Total for Question 13 is 3 marks)

13 ABC is a triangle.

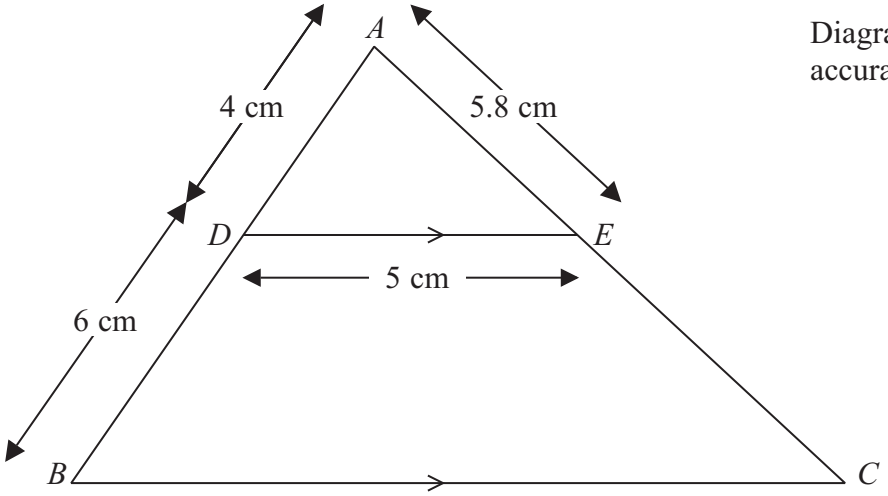


Diagram **NOT** accurately drawn

D is a point on AB and E is a point on AC.
DE is parallel to BC.
$AD = 4$ cm, $DB = 6$ cm, $DE = 5$ cm, $AE = 5.8$ cm.

Calculate the perimeter of the trapezium $DBCE$.

.....cm

(Total for Question 13 is 4 marks)

16 Jane has a flower bed in the shape of an equilateral triangle.
The perimeter of the flower bed is 15 metres.

(a) Work out the area of the flower bed.
Give your answer correct to 1 decimal place.

.....m^2

(3)

Jane has some containers in the shape of hemispheres with diameter 35 cm.

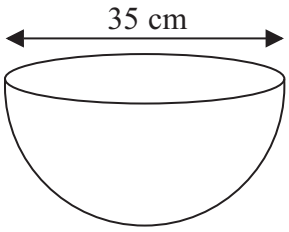


Diagram **NOT** accurately drawn

Jane is going to fill the containers completely with compost.
She has 80 litres of compost.
1 litre = 1000 cm^3.

(b) Work out how many containers Jane can fill completely with compost.

.....

(4)

(Total for Question 16 is 7 marks)

13 ABC is a triangle.

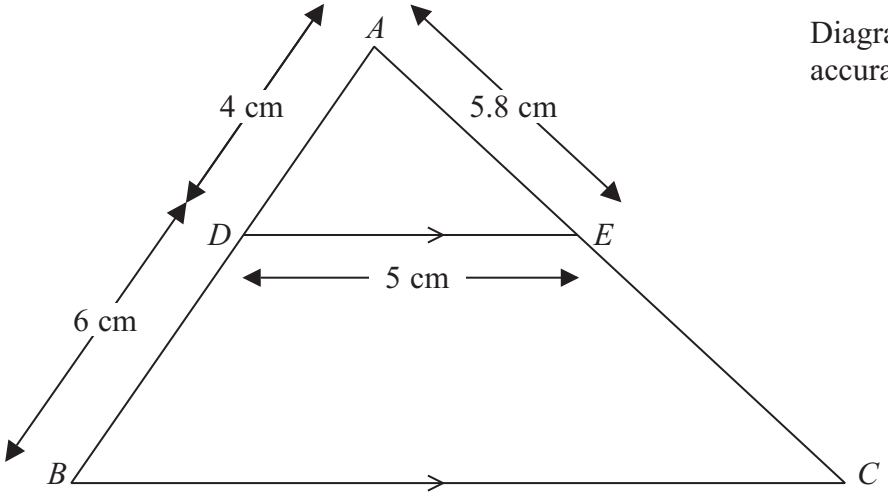


Diagram **NOT** accurately drawn

D is a point on AB and E is a point on AC.
DE is parallel to BC.
$AD = 4$ cm, $DB = 6$ cm, $DE = 5$ cm, $AE = 5.8$ cm.

Calculate the perimeter of the trapezium $DBCE$.

.....cm

(Total for Question 13 is 4 marks)

16 Jane has a flower bed in the shape of an equilateral triangle.
The perimeter of the flower bed is 15 metres.

(a) Work out the area of the flower bed.
Give your answer correct to 1 decimal place.

.....m^2

(3)

Jane has some containers in the shape of hemispheres with diameter 35 cm.

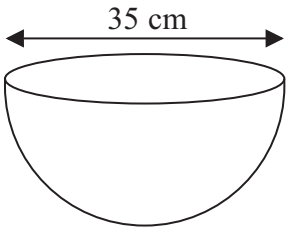


Diagram **NOT** accurately drawn

Jane is going to fill the containers completely with compost.
She has 80 litres of compost.
1 litre = 1000 cm^3.

(b) Work out how many containers Jane can fill completely with compost.

.....

(4)

(Total for Question 16 is 7 marks)

***7** The diagram shows the plan of a small field.

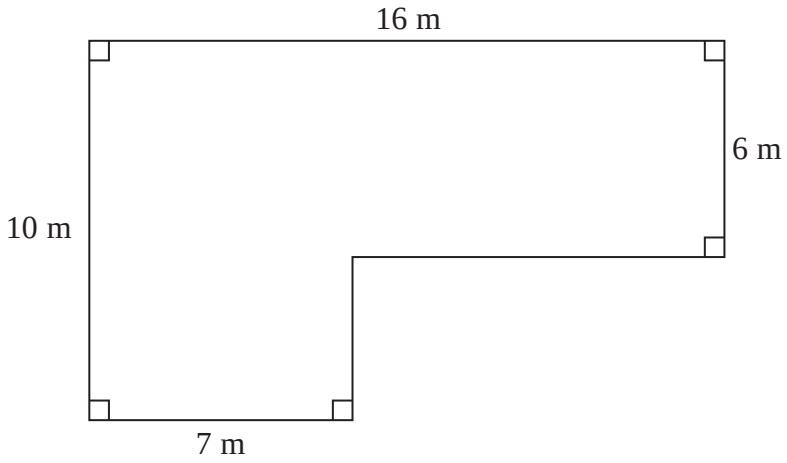


Diagram **NOT** accurately drawn

Kevin is going to keep some pigs in the field.
Each pig needs an area of 36 square metres.

Work out the greatest number of pigs Kevin can keep in the field.

(Total for Question 7 is 4 marks)

4 Here is a circle.

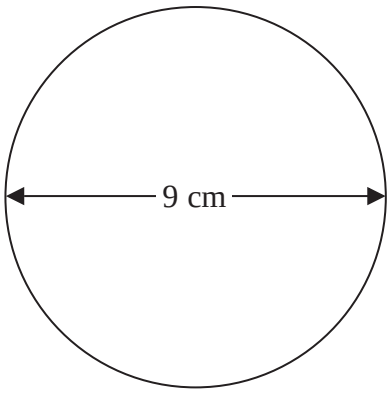


Diagram **NOT** accurately drawn

The diameter of the circle is 9 cm.

Work out the circumference of this circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 4 is 2 marks)

9 The diagram shows a trapezium.

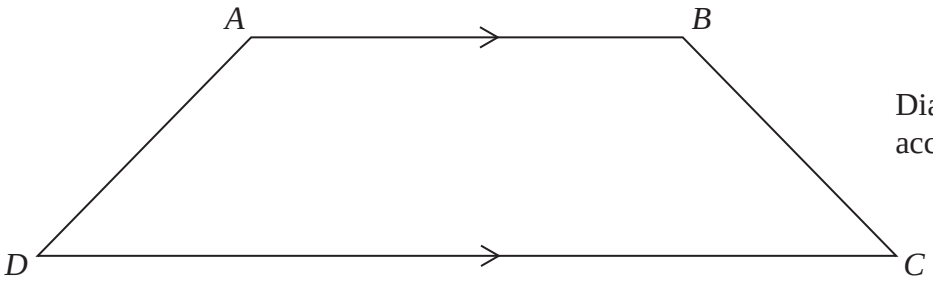


Diagram **NOT** accurately drawn

$AD = x$ cm.
BC is the same length as AD.
AB is twice the length of AD.
DC is 4 cm longer than AB.

The perimeter of the trapezium is 38 cm.

Work out the length of AD.

..... cm

(Total for Question 9 is 4 marks)

5 The diagram shows a tile.

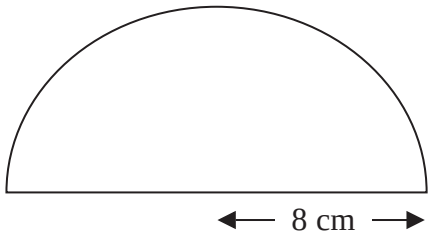


Diagram **NOT** accurately drawn

The tile is in the shape of a semicircle of radius 8 cm.

Work out the perimeter of the tile.
Give your answer correct to one decimal place.

..... cm

(Total for Question 5 is 3 marks)

7 The diagram shows the plan of a floor.

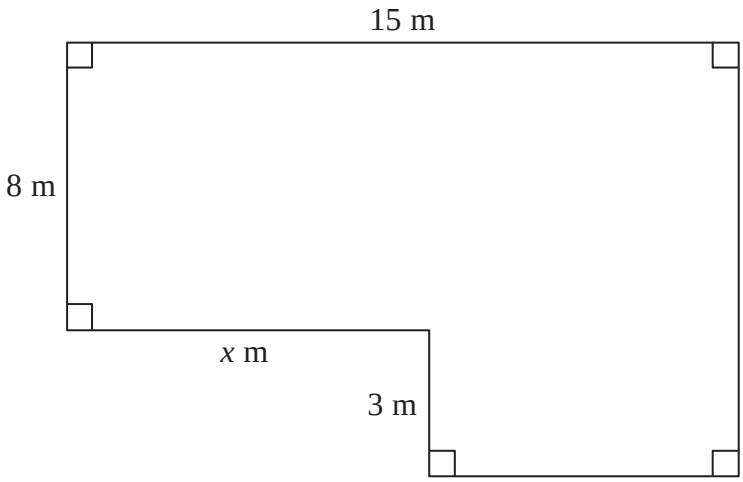


Diagram **NOT** accurately drawn

The area of the floor is 138 m^2.

Work out the value of x.

.....

(Total for Question 7 is 4 marks)

18

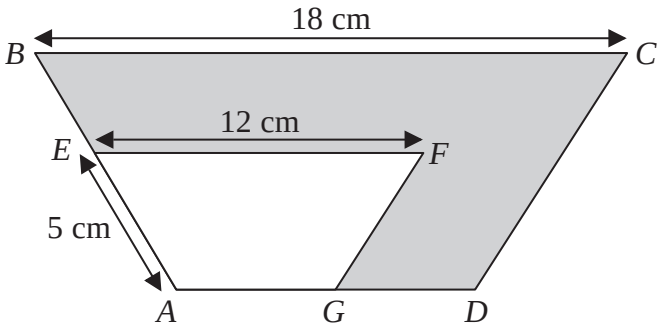


Diagram **NOT** accurately drawn

ABCD and *AEFG* are mathematically similar trapeziums.
AE = 5 cm
EF = 12 cm
BC = 18 cm

(a) Work out the length of *AB*.

..... cm
(2)

Trapezium *AEFG* has an area of 36 cm^2.

(b) Work out the area of the shaded region.

..... cm^2
(3)

(Total for Question 18 is 5 marks)

***11** Saphia is organising a conference.
People at the conference will sit at circular tables.



Diagram **NOT** accurately drawn

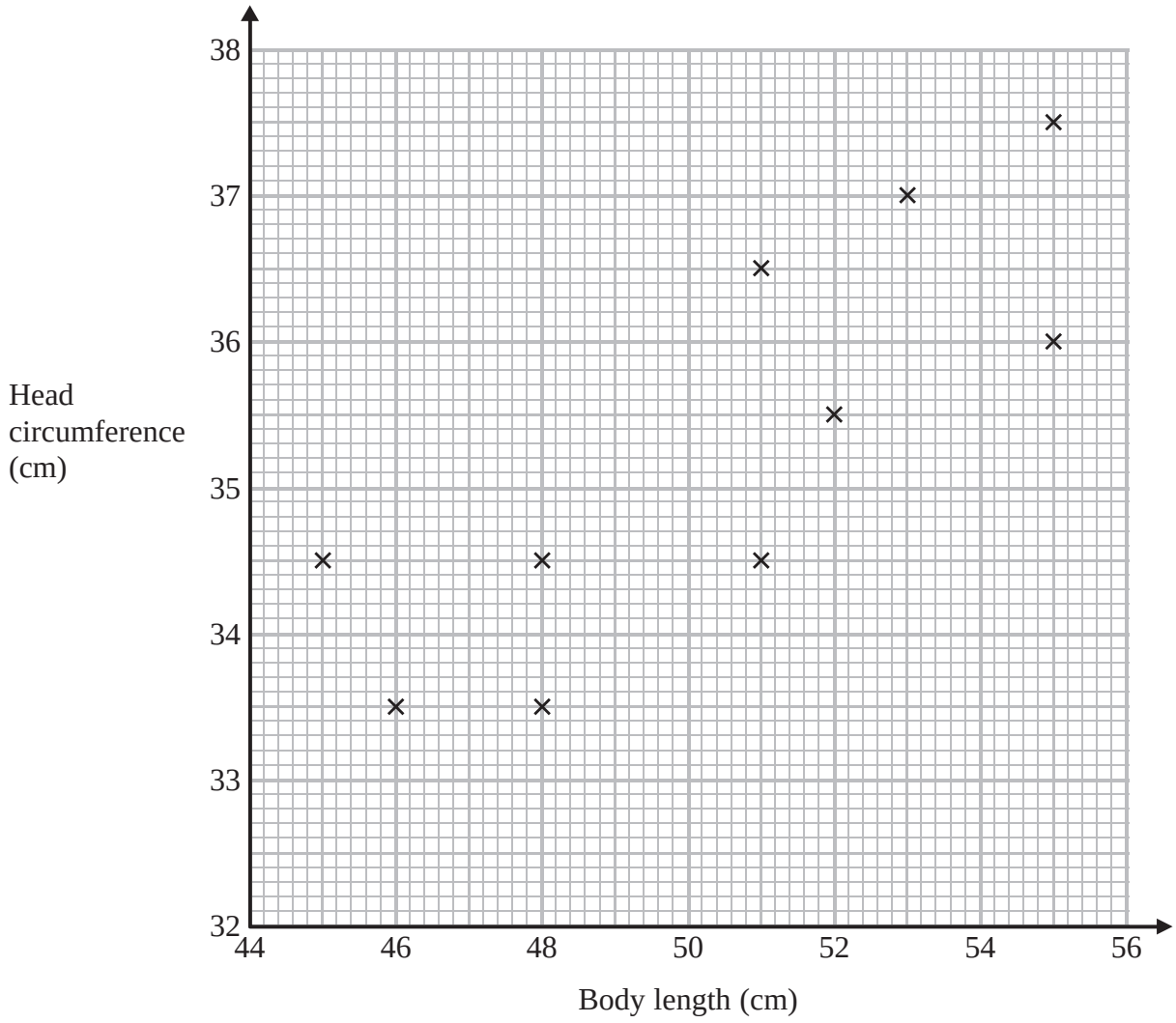
Each table has a diameter of 140 cm.
Each person needs 60 cm around the circumference of the table.

There are 12 of these tables in the conference room.
A total of 90 people will be at the conference.

Are there enough tables in the conference room?

(Total for Question 11 is 4 marks)

9 The scatter graph shows information about 10 newborn babies.
It shows each baby's body length and head circumference.



Another baby has a body length of 47 cm and head circumference 34 cm.

(a) Show this information on the scatter graph.

(1)

(b) What type of correlation does the scatter graph show?

.....

(1)

A baby has head circumference 35 cm.

(c) Estimate the body length of this baby.

..... cm

(2)

(Total for Question 9 is 4 marks)

2 A pattern is made using four identical rectangular tiles.

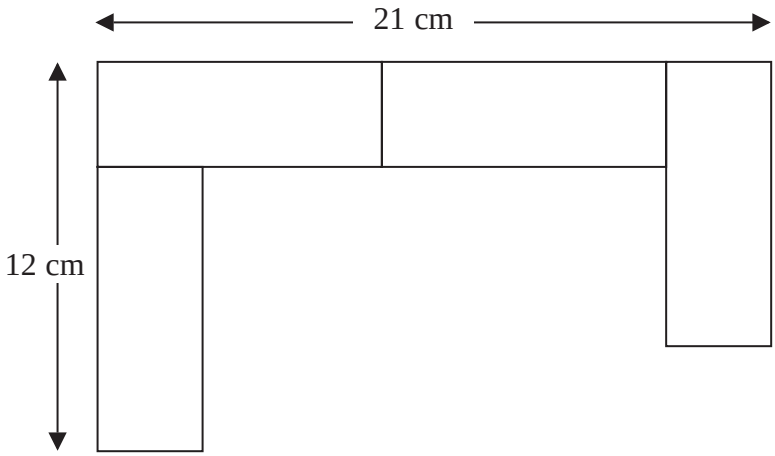


Diagram **NOT** accurately drawn

Find the total area of the pattern.

..... cm^2

(Total for Question 2 is 5 marks)

13 Here is a rectangle.

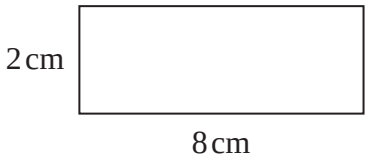


Diagram **NOT** accurately drawn

The 8-sided shape below is made from 4 of these rectangles and 4 congruent right-angled triangles.

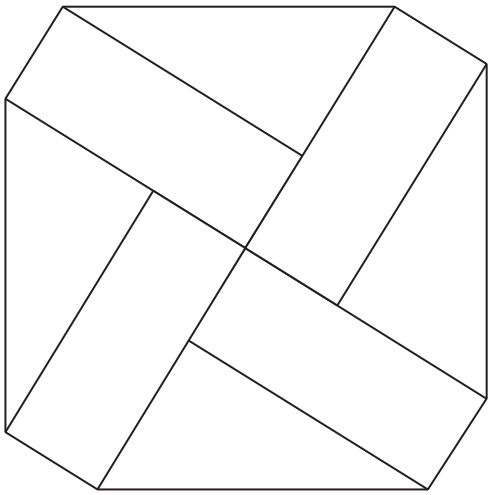


Diagram **NOT** accurately drawn

Work out the perimeter of the 8-sided shape.
You must show all your working.

..... cm

(Total for Question 13 is 5 marks)

***11** The diagram shows the top of Levi's birthday cake.

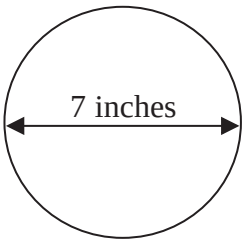


Diagram **NOT** accurately drawn

The top of the cake is in the shape of a circle.
The diameter of the circle is 7 inches.

A ribbon is going to be put around the side of the cake.
Ribbons are sold in 50 cm lengths.

1 inch is 2.54 cm.

Work out if one length of ribbon is long enough to go all the way around the cake.
You must show your working.

(Total for Question 11 is 4 marks)

13 Here is a shape.

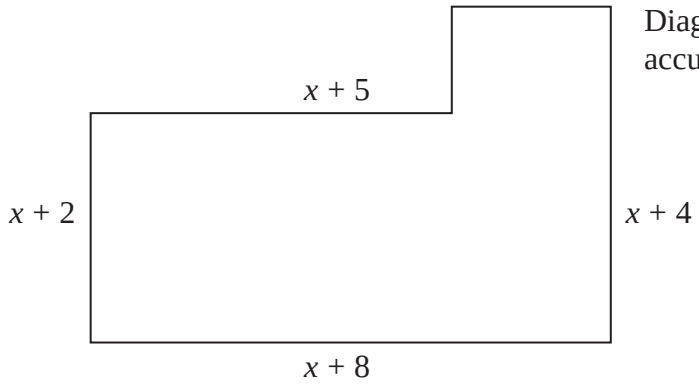


Diagram **NOT** accurately drawn

All the measurements are in centimetres.
All the corners are right angles.

The area of the shape is A cm^2.

Find a formula for A in terms of x.
Give your answer in its simplest form.

$A =$ .....

(Total for Question 13 is 4 marks)

13

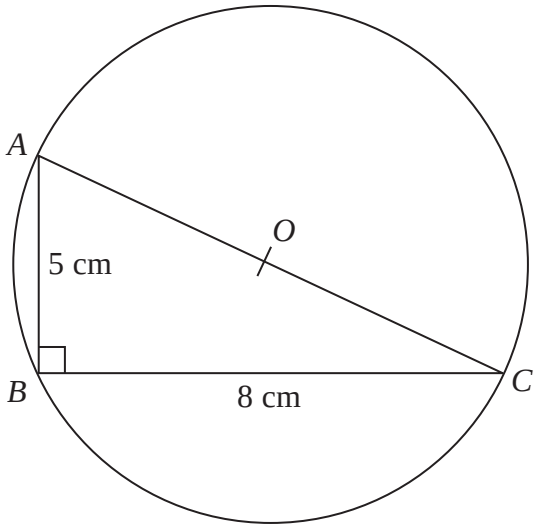


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
A, *B* and *C* are points on the circumference of a circle centre *O*.
AB = 5 cm
BC = 8 cm

AOC is a diameter of the circle.

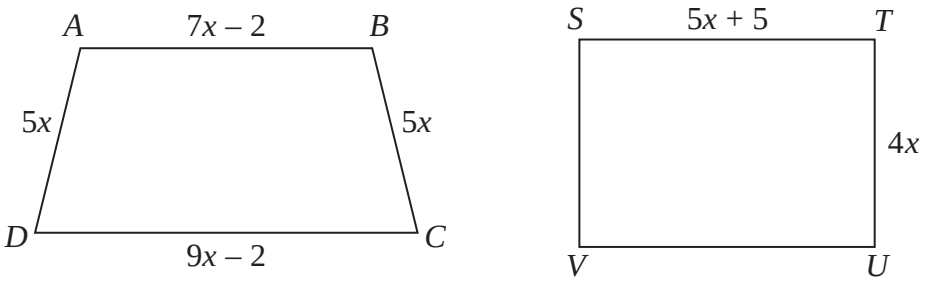
Calculate the circumference of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 13 is 4 marks)

16 *ABCD* is a trapezium.
STUV is a rectangle.

Diagram **NOT** accurately drawn



All measurements are in centimetres.

The two shapes have the same perimeter.

Work out the length of *ST*.

..... cm

(Total for Question 16 is 5 marks)

*7 Here is part of a field.

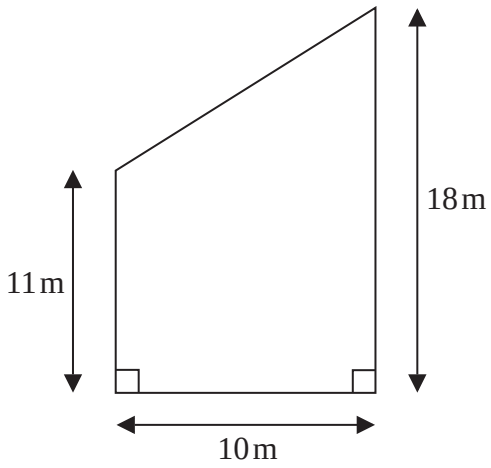


Diagram **NOT** accurately drawn

This part of the field is in the shape of a trapezium.
A farmer wants to put a fence all the way around the edge of this part of the field.

The farmer has 50 m of fence.

Does he have enough fence?
You must show all your working.

(Total for Question 7 is 5 marks)

2 Here is an equilateral triangle.

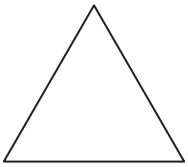
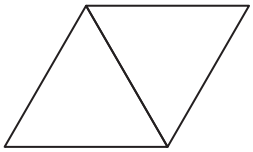


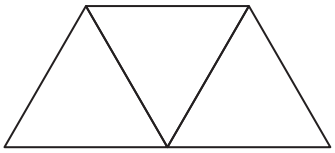
Diagram **NOT** accurately drawn

The equilateral triangle has a perimeter of 24 cm.

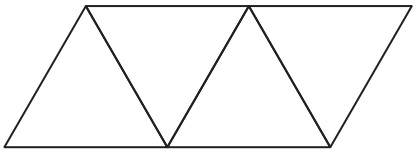
Some of these equilateral triangles are used to make this sequence of quadrilaterals.



quadrilateral 1



quadrilateral 2



quadrilateral 3

Find an expression for the perimeter, in centimetres, of quadrilateral n.

.....

(Total for Question 2 is 3 marks)

14

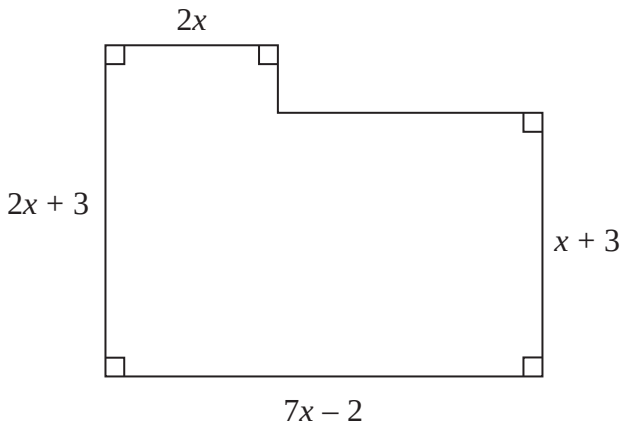


Diagram **NOT** accurately drawn

All the measurements in the diagram are in centimetres.

The area of the shape is A cm^2.

Find a formula for A in terms of x.
You must write your formula as simply as possible.

.....

(Total for Question 14 is 4 marks)

15 The diagram shows a pond.

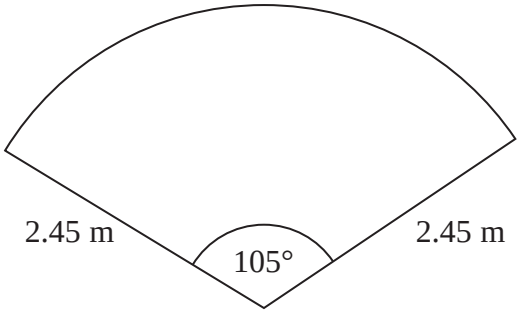


Diagram **NOT** accurately drawn

The pond is in the shape of a sector of a circle.

Toby is going to put edging on the perimeter of the pond.

Edging is sold in lengths of 1.75 metres.
Each length of edging costs £3.49

Work out the total cost of edging Toby needs to buy.

£ .....

(Total for Question 15 is 5 marks)

***17**

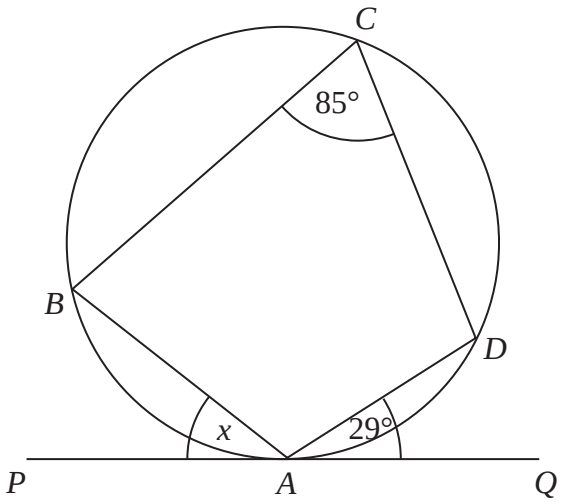


Diagram **NOT** accurately drawn

In the diagram,

the points *A*, *B*, *C* and *D* are on the circumference of a circle
the line *PAQ* is a tangent to the circle
angle *DAQ* = 29°
angle *BCD* = 85°

Work out the size of the angle marked *x*.
Give a reason for each stage of your working.

(Total for Question 17 is 3 marks)

1 The diagram shows a prism.

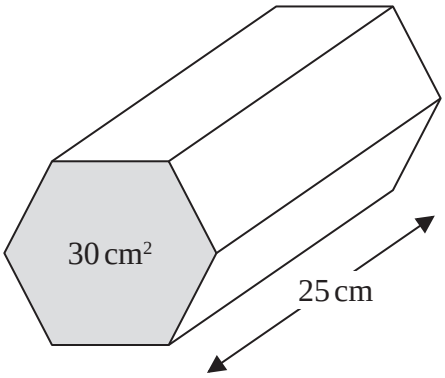


Diagram **NOT** accurately drawn

The area of the cross section of the prism is 30 cm^2.
The length of the prism is 25 cm.

Work out the volume of the prism.

.....

(Total for Question 1 is 3 marks)

12 The diagram shows a circle inside a square.

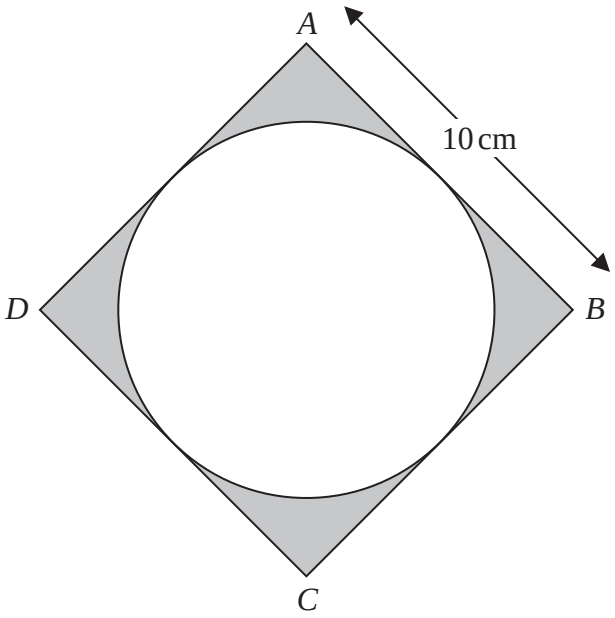


Diagram **NOT** accurately drawn

ABCD is a square of side 10 cm.
Each side of the square is a tangent to the circle.

Work out the total area of the shaded regions in terms of π.
Give your answer in its simplest form.

..... cm^2

(Total for Question 12 is 3 marks)

25 *ABD* is a right angled triangle.

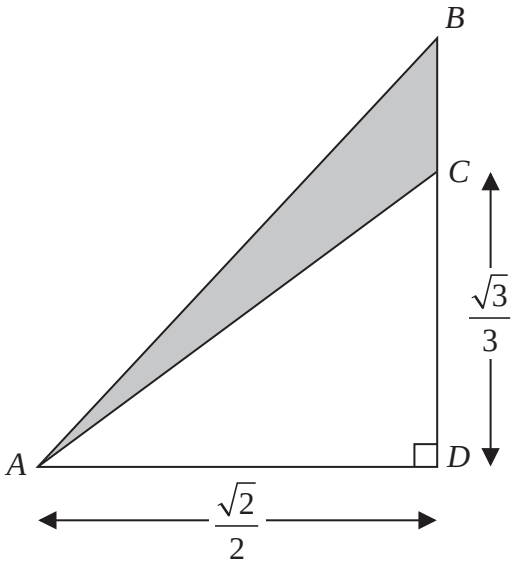


Diagram **NOT** accurately drawn

All measurements are given in centimetres.

C is the point on BD such that $CD = \frac{\sqrt{3}}{3}$

$AD = BD = \frac{\sqrt{2}}{2}$

Work out the exact area, in cm^2, of the shaded region.

.....cm^2

(Total for Question 25 is 3 marks)

3 The diagram shows a rectangle.

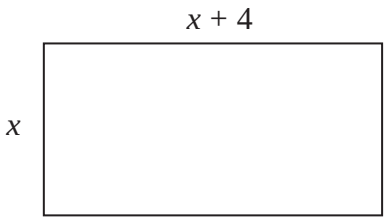


Diagram **NOT** accurately drawn

All measurements are given in centimetres.

The perimeter of the rectangle is 45 cm.

Work out the value of x.

x = ...

(Total for Question 3 is 3 marks)

22

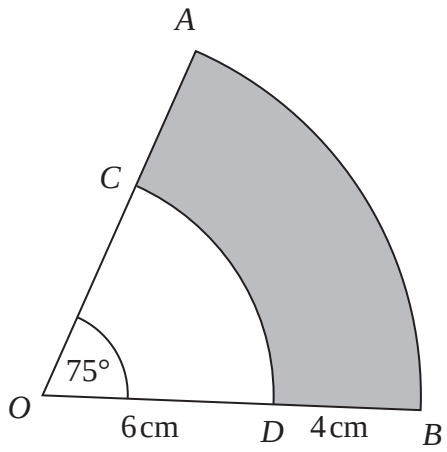


Diagram **NOT** accurately drawn

OAB is a sector of a circle, centre *O*.
OCD is a sector of a circle, centre *O*.
OCA and *ODB* are straight lines.

Angle *AOB* = 75°
OD = 6 cm
DB = 4 cm

Calculate the perimeter of the shaded region.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 22 is 3 marks)

5

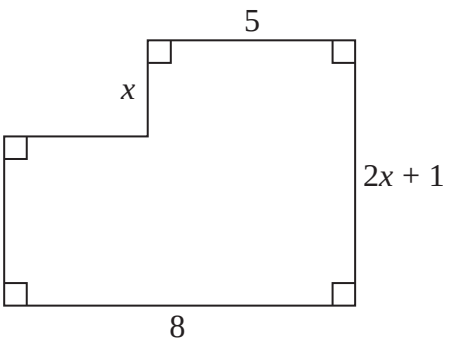


Diagram **NOT** accurately drawn

Here is a shape.
All the measurements are in metres.

The area of the shape is $A\text{m}^2$.

Find a formula for A in terms of x.

.....

(Total for Question 5 is 3 marks)

7 The diagram shows a path around a pond.

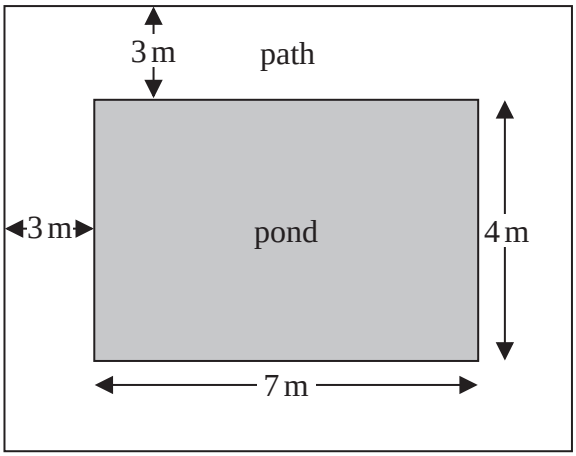


Diagram **NOT** accurately drawn

The pond is in the shape of a rectangle with length 7 m and width 4 m.
The path is 3 m wide.

Ali is going to cover the path with gravel.
One bag of gravel will cover 10 m^2 of the path.

How many bags of gravel does Ali need to buy?
You must show your working.

..... bags

(Total for Question 7 is 4 marks)

***26** The diagram shows a triangle *DEF* inside a rectangle *ABCD*.

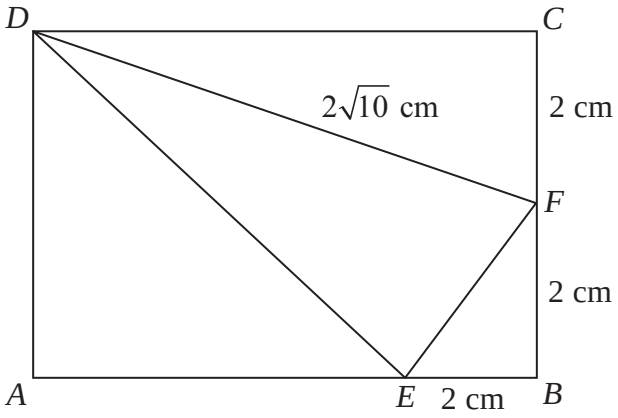


Diagram **NOT** accurately drawn

Show that the area of triangle *DEF* is 8 cm^2.
You must show all your working.

(Total for Question 26 is 4 marks)

11 The diagram shows a square *ABCD* inside a circle.

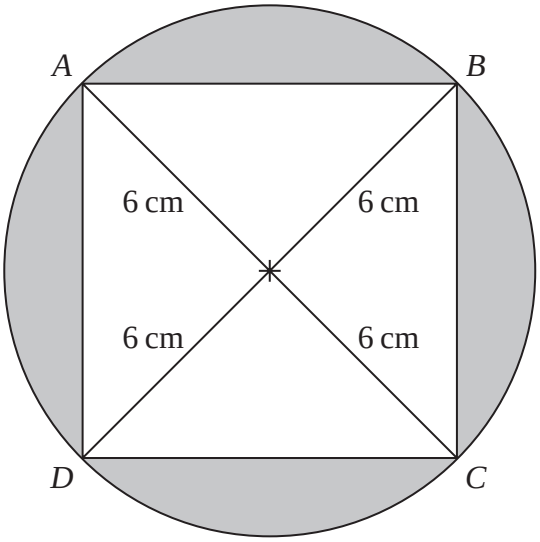


Diagram **NOT** accurately drawn

The points *A*, *B*, *C* and *D* lie on the circle.

The radius of the circle is 6 cm.

Work out the total area of the shaded regions.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 11 is 4 marks)

7 The table gives information about the areas, in cm^2, of some growths of mould in an experiment.

Area (a cm^2)	Frequency
$0 < a \leqslant 5$	4
$5 < a \leqslant 10$	7
$10 < a \leqslant 15$	9
$15 < a \leqslant 20$	15

(a) Write down the class interval that contains the median area.

.....

(1)

(b) Work out an estimate for the mean area.

..... cm^2

(4)

(Total for Question 7 is 5 marks)

9 Here is a rectangle.

Diagram **NOT** accurately drawn



The rectangle has a width of $(2x - 3)$ cm.
It has an area of $(10x^2 - x - 21)$ cm^2.

Work out the length of the rectangle when $x = 4$

..... cm

(Total for Question 9 is 3 marks)

16 Here is a trapezium.

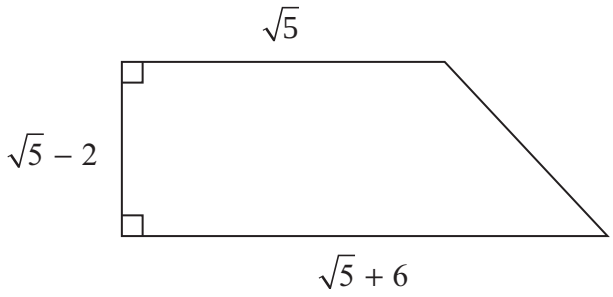


Diagram **NOT** accurately drawn

All measurements shown are in centimetres.

Work out the area of the trapezium.
Give your answer in cm^2 in the form $a\sqrt{5} + b$ where a and b are integers.

.....cm^2

(Total for Question 16 is 3 marks)

3

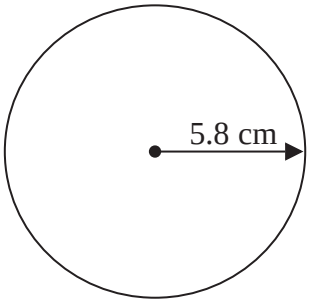


Diagram **NOT** accurately drawn

This circle has a radius of 5.8 cm.

Work out the area of the circle.
Give your answer to 1 decimal place.

..... cm^2

(Total for Question 3 is 2 marks)

15

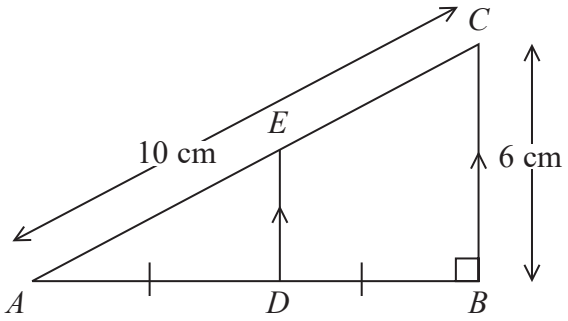


Diagram **NOT** accurately drawn

ADB and *AEC* are straight lines.
DE is parallel to *BC*.

Angle *ABC* = 90°
AC = 10 cm.
BC = 6 cm.

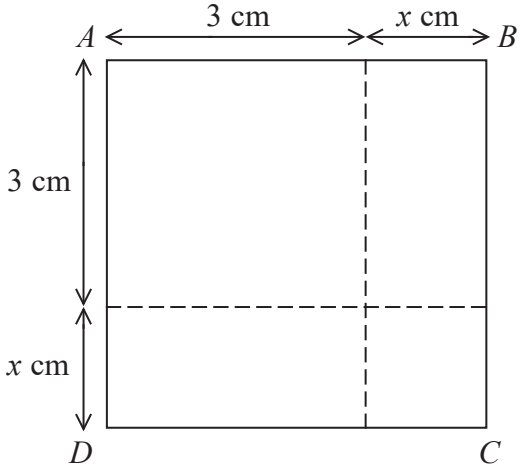
D is the midpoint of *AB*.

Work out the area of trapezium *BCED*.

.....cm^2

(Total for Question 15 is 4 marks)

4

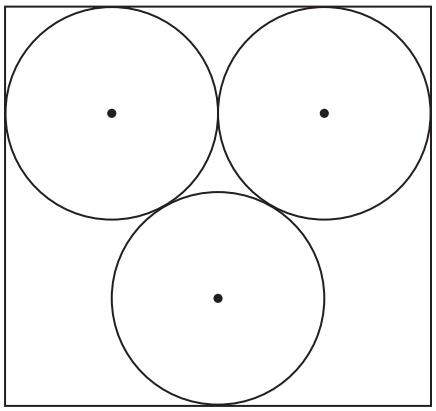


The area of square $ABCD$ is 10 cm^2.

Show that $x^2 + 6x = 1$

(Total for Question 4 is 3 marks)

21 The diagram shows 3 identical circles inside a rectangle.
Each circle touches the other two circles and the sides of the rectangle, as shown in the diagram.



The radius of each circle is 24 mm.

Work out the area of the rectangle.
Give your answer correct to 3 significant figures.

..... mm^2

(Total for Question 21 is 4 marks)

8 A square, with sides of length x cm, is inside a circle.
Each vertex of the square is on the circumference of the circle.

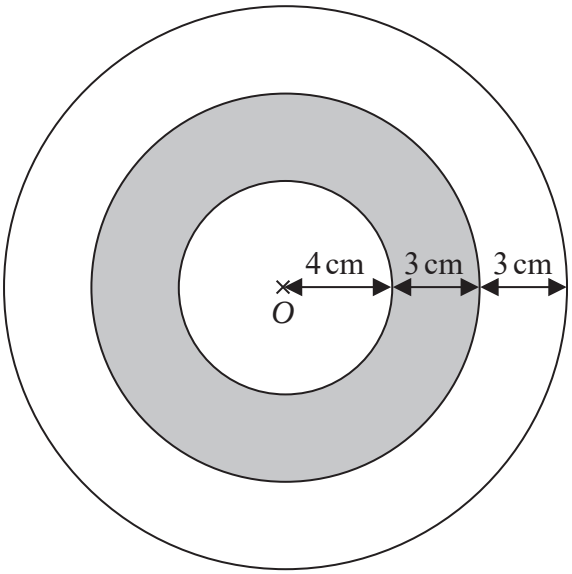
The area of the circle is 49 cm^2.

Work out the value of x.
Give your answer correct to 3 significant figures.

.....

(Total for Question 8 is 4 marks)

4 The diagram shows a logo made from three circles.



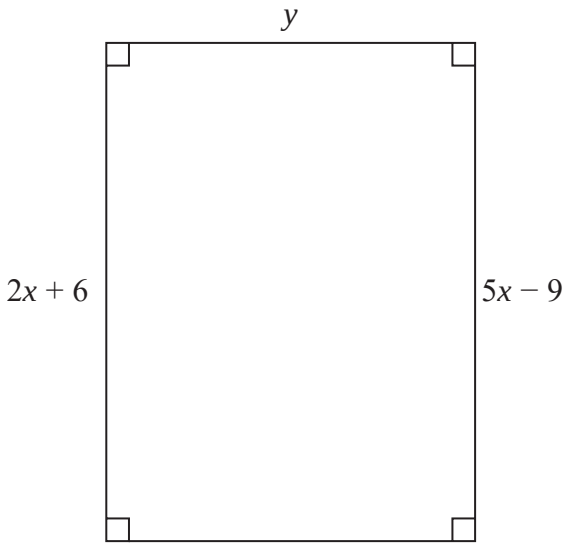
Each circle has centre O.

Daisy says that exactly $\frac{1}{3}$ of the logo is shaded.

Is Daisy correct?
You must show all your working.

(Total for Question 4 is 4 marks)

6 Here is a rectangle.



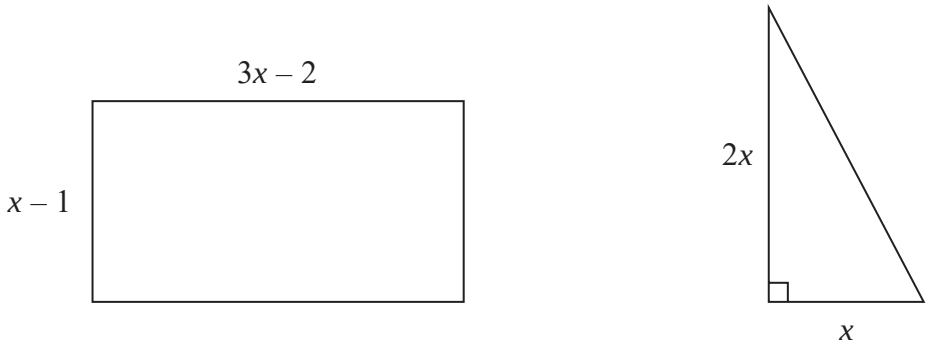
All measurements are in centimetres.

The area of the rectangle is 48 cm^2.

Show that $y = 3$

(Total for Question 6 is 4 marks)

23 Here is a rectangle and a right-angled triangle.



All measurements are in centimetres.
The area of the rectangle is greater than the area of the triangle.

Find the set of possible values of x.

.....

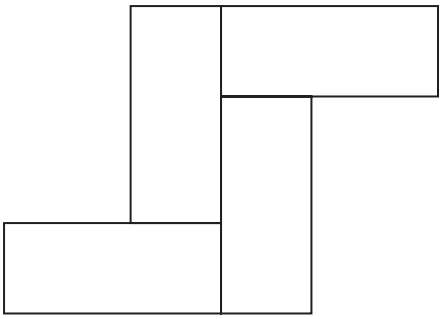
(Total for Question 23 is 5 marks)

6 Here is a rectangle.



The length of the rectangle is 7 cm longer than the width of the rectangle.

4 of these rectangles are used to make this 8-sided shape.



The perimeter of the 8-sided shape is 70 cm.

Work out the area of the 8-sided shape.

..... cm^2

(Total for Question 6 is 5 marks)

Question 104

June 2018 | 1MA1/1H | Original Q8

8 The perimeter of a right-angled triangle is 72 cm.
The lengths of its sides are in the ratio 3 : 4 : 5

Work out the area of the triangle.

.....cm^2

(Total for Question 8 is 4 marks)

Question 105

6 A force of 70 newtons acts on an area of $20\,cm^2$

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

The force is increased by 10 newtons.
The area is increased by $10\,cm^2$

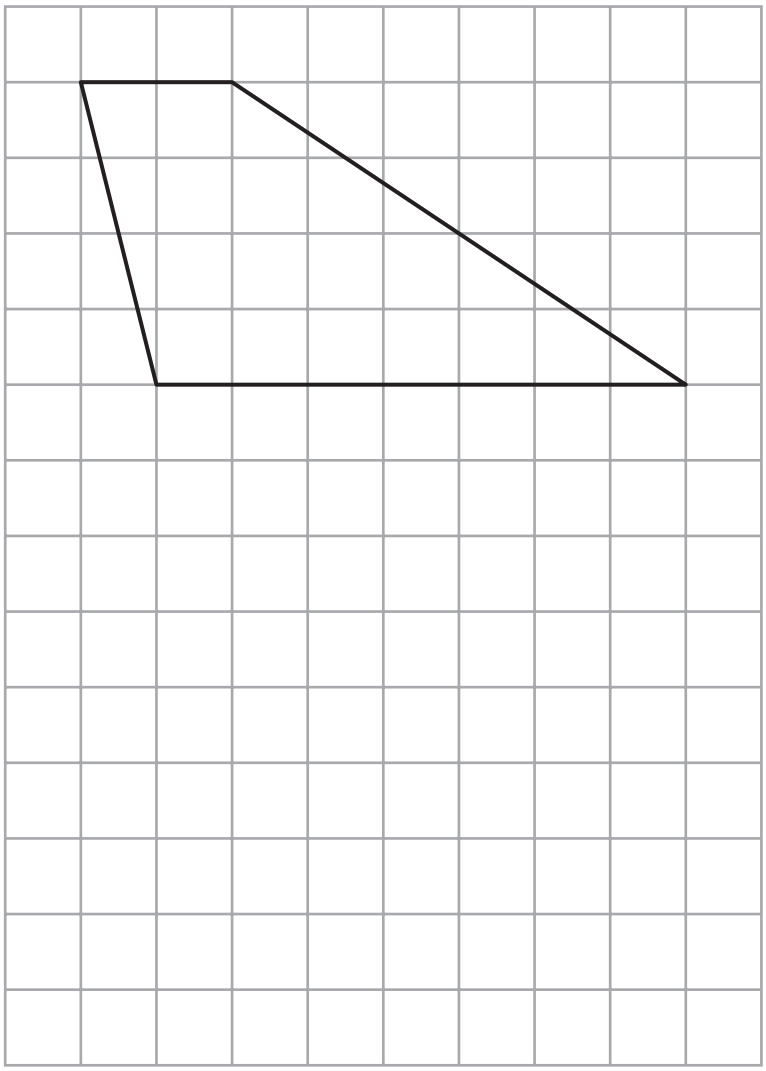
Helen says,

"The pressure decreases by less than 20%"

Is Helen correct?
You must show how you get your answer.

(Total for Question 6 is 3 marks)

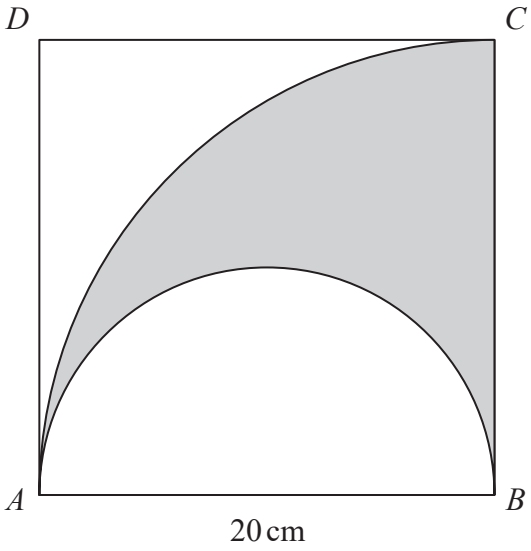
3 Here is a trapezium drawn on a centimetre grid.



On the grid, draw a triangle equal in area to this trapezium.

(Total for Question 3 is 2 marks)

7 The diagram shows a square $ABCD$ with sides of length 20 cm.
It also shows a semicircle and an arc of a circle.

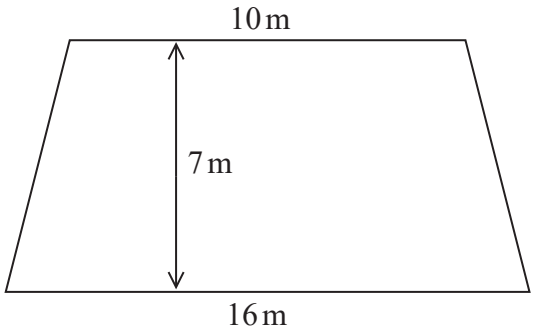


AB is the diameter of the semicircle.
AC is an arc of a circle with centre B.

Show that $\dfrac{\text{area of shaded region}}{\text{area of square}} = \dfrac{\pi}{8}$

(Total for Question 7 is 4 marks)

5 The diagram shows a floor in the shape of a trapezium.





£16.99

John is going to paint the floor.

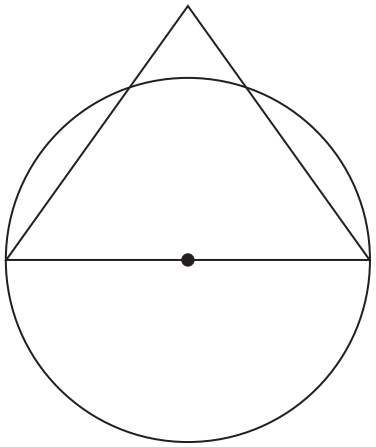
Each 5 litre tin of paint costs £16.99
1 litre of paint covers an area of 2 m^2

John has £160 to spend on paint.

Has John got enough money to buy all the paint he needs?
You must show how you get your answer.

(Total for Question 5 is 5 marks)

13 The diagram shows a circle and an equilateral triangle.



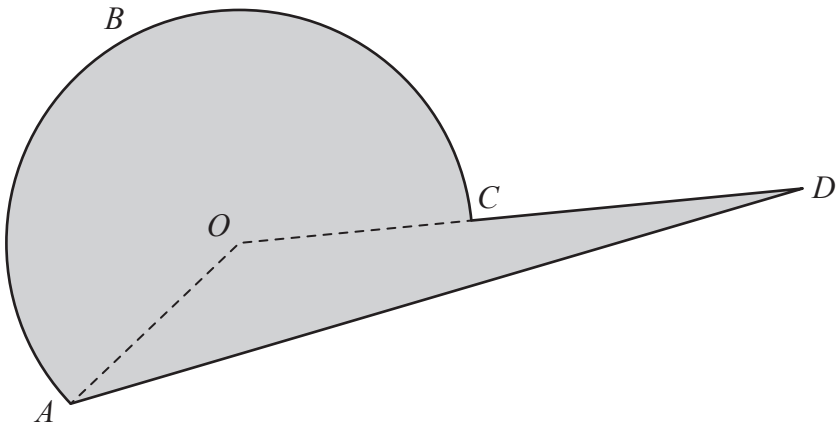
One side of the equilateral triangle is a diameter of the circle.
The circle has a circumference of 44 cm.

Work out the area of the triangle.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 13 is 3 marks)

16 Here is a shaded shape $ABCD$.



The shape is made from a triangle and a sector of a circle, centre O and radius 6 cm.
OCD is a straight line.

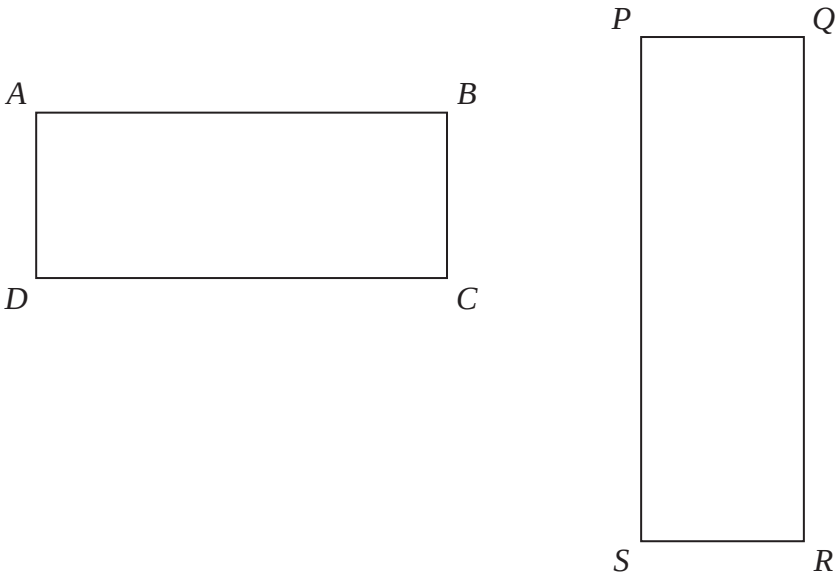
$AD = 14$ cm
Angle $AOD = 140°$
Angle $OAD = 24°$

Calculate the perimeter of the shape.
Give your answer correct to 3 significant figures.

.....cm

(Total for Question 16 is 5 marks)

7 Here are two rectangles.



$QR = 10\,\text{cm}$
$BC = PQ$

The perimeter of $ABCD$ is 26 cm
The area of $PQRS$ is $45\,\text{cm}^2$

Find the length of AB.

..... cm

(Total for Question 7 is 4 marks)

9 The circumference of circle **B** is 90% of the circumference of circle **A**.

(a) Find the ratio of the area of circle **A** to the area of circle **B**.

.....

(2)

Square **E** has sides of length e cm.
Square **F** has sides of length f cm.

The area of square **E** is 44% greater than the area of square **F**.

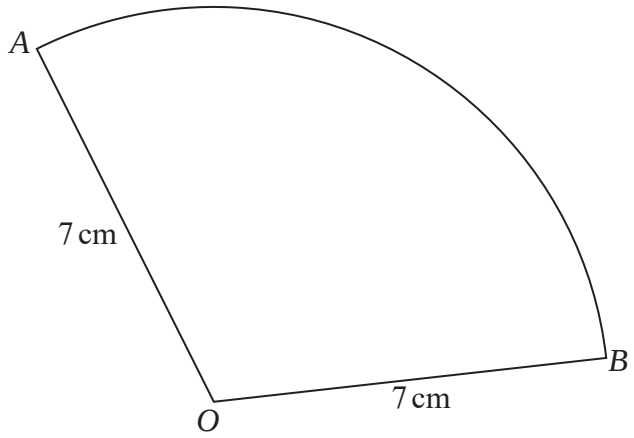
(b) Work out the ratio $e : f$

.....

(2)

(Total for Question 9 is 4 marks)

12 OAB is a sector of a circle with centre O and radius 7 cm.



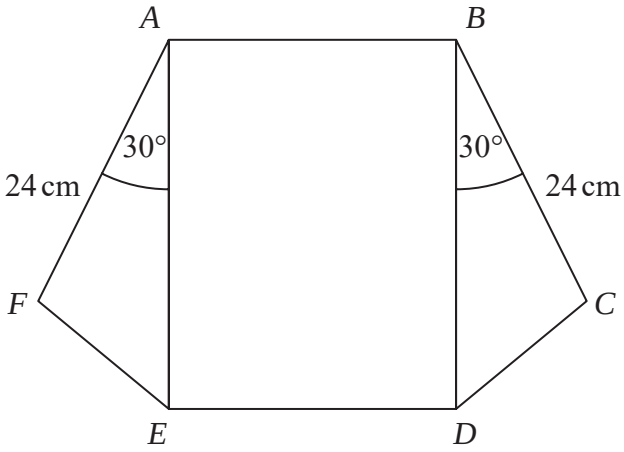
The area of the sector is 40 cm^2

Calculate the perimeter of the sector.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 12 is 4 marks)

14 The diagram shows a rectangle, *ABDE*, and two congruent triangles, *AFE* and *BCD*.



area of rectangle *ABDE* = area of triangle *AFE* + area of triangle *BCD*

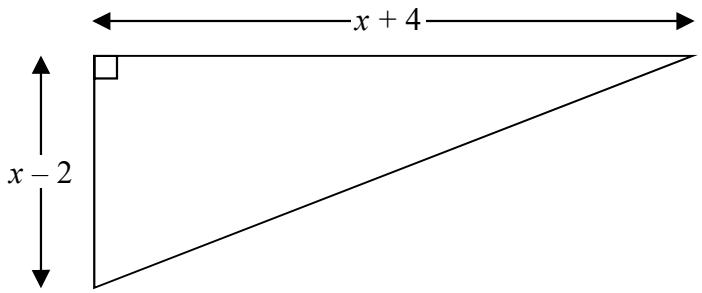
$$AB : AE = 1 : 3$$

Work out the length of *AE*.

..... cm

(Total for Question 14 is 4 marks)

14 The diagram shows a right-angled triangle.



All the measurements are in centimetres.

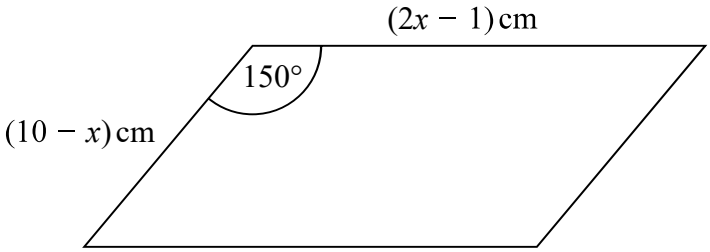
The area of the triangle is $27.5\,\text{cm}^2$

Work out the length of the shortest side of the triangle.
You must show all your working.

..... cm

(Total for Question 14 is 4 marks)

23 The diagram shows a parallelogram.



The area of the parallelogram is greater than $15\,\text{cm}^2$

(a) Show that $2x^2 - 21x + 40 < 0$

(3)

(b) Find the range of possible values of x.

.....

(3)

(Total for Question 23 is 6 marks)

25 The straight line **L** has equation $3x + 2y = 17$

The point A has coordinates (0, 2)
The straight line **M** is perpendicular to **L** and passes through A.

Line **L** crosses the y-axis at the point B.
Lines **L** and **M** intersect at the point C.

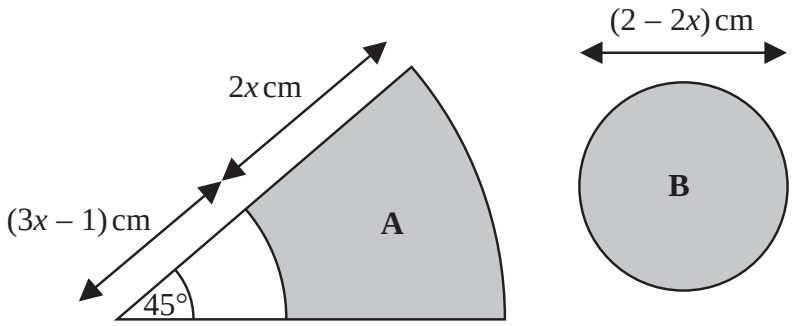
Work out the area of triangle ABC.
You must show all your working.

.....

(Total for Question 25 is 5 marks)

22 The diagram shows two shaded shapes, **A** and **B**.

Shape **A** is formed by removing a sector of a circle with radius $(3x - 1)$ cm from a sector of the circle with radius $(5x - 1)$ cm.
Shape **B** is a circle of diameter $(2 - 2x)$ cm.



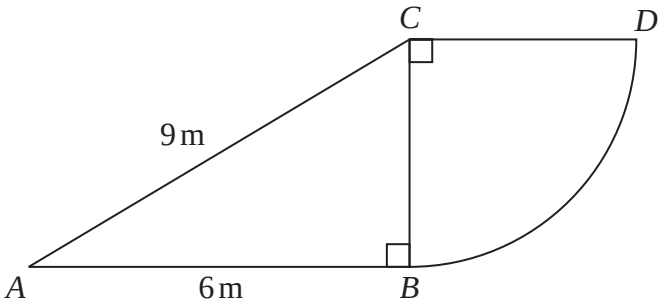
The area of shape **A** is equal to the area of shape **B**.

Find the value of x.
You must show all your working.

.....

(Total for Question 22 is 5 marks)

7 The diagram shows a right-angled triangle and a quarter circle.



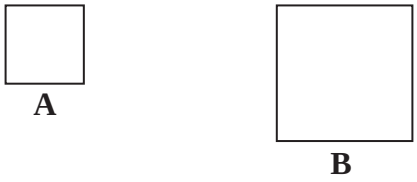
The right-angled triangle *ABC* has angle *ABC* = 90°
The quarter circle has centre *C* and radius *CB*.

Work out the area of the quarter circle.
Give your answer correct to 3 significant figures.
You must show all your working.

..... m^2

(Total for Question 7 is 4 marks)

14 Here are two squares, **A** and **B**.



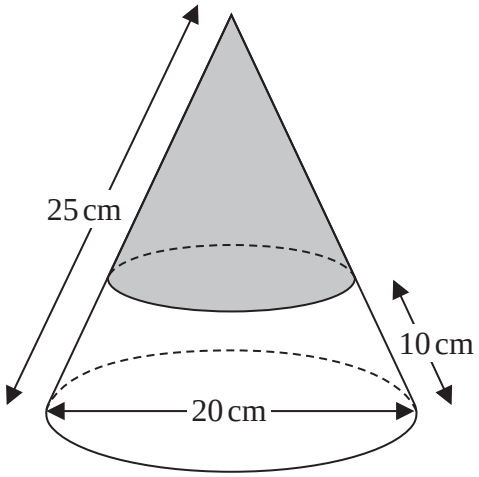
The length of each side of square **B** is 4 cm greater than the length of each side of square **A**.
The area of square **B** is 70 cm^2 greater than the area of square **A**.

Find the area of square **B**.
Give your answer correct to 3 significant figures.
You must show all your working.

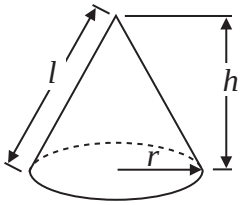
..... cm^2

(Total for Question 14 is 4 marks)

18 The diagram represents a solid cone.



Curved surface area of cone = πrl



The cone has a base diameter of 20 cm and a slant height of 25 cm.

A circle is drawn around the surface of the cone at a slant height of 10 cm above the base.
The curved surface of the cone above the circle is painted grey.

Work out the area of the curved surface of the cone that is **not** painted grey.
Give your answer as a multiple of π
You must show all your working.

..... cm^2

(Total for Question 18 is 4 marks)

4 Maisie knows that she needs 3 kg of grass seed to make a rectangular lawn 5 m by 9 m.

Grass seed is sold in 2 kg boxes.

Maisie wants to make a rectangular lawn 10 m by 14 m.
She has 5 boxes of grass seed.

(a) Has Maisie got enough grass seed to make a lawn 10 m by 14 m?
You must show all your working.

(4)

Maisie opens the 5 boxes of grass seed.

She finds that 4 of the boxes contain 2 kg of grass seed.
The other box contains 1 kg of grass seed.

(b) Does this affect whether Maisie has enough grass seed to make her lawn?
Give a reason for your answer.

.....

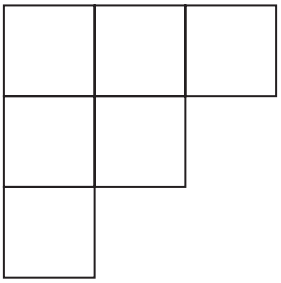
.....

.....

(1)

(Total for Question 4 is 5 marks)

10 The diagram shows a shape made from 6 identical squares.



The total area of the shape is 5406 cm^2

(a) Find an estimate for the length of one side of each square.
Give your answer correct to the nearest whole number.

..... cm

(3)

(b) Is your answer to part (a) an underestimate or an overestimate?
You must give a reason for your answer.

.....

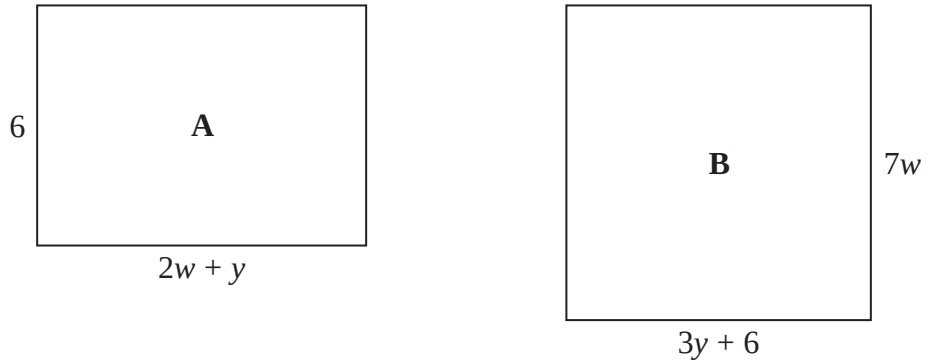
.....

.....

(1)

(Total for Question 10 is 4 marks)

11 The diagram shows two rectangles, **A** and **B**.



All measurements are in centimetres.

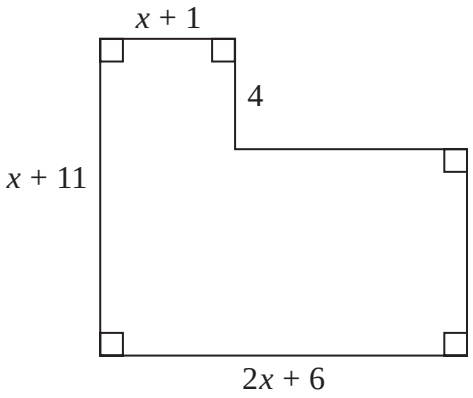
The area of rectangle **A** is equal to the area of rectangle **B**.

Find an expression for y in terms of w.

.....

(Total for Question 11 is 4 marks)

14 Here is a shape with all its measurements in centimetres.

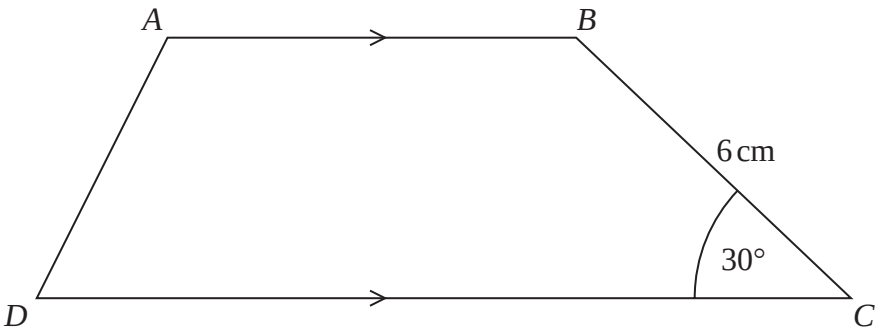


The area of the shape is A cm^2

Show that $A = 2x^2 + 24x + 46$

(Total for Question 14 is 3 marks)

18 Here is trapezium $ABCD$.



The area of the trapezium is $66\,cm^2$

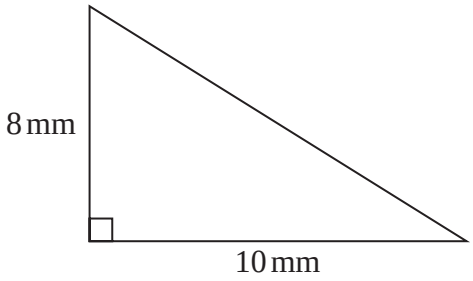
the length of AB : the length of $CD = 2 : 3$

Find the length of AB.

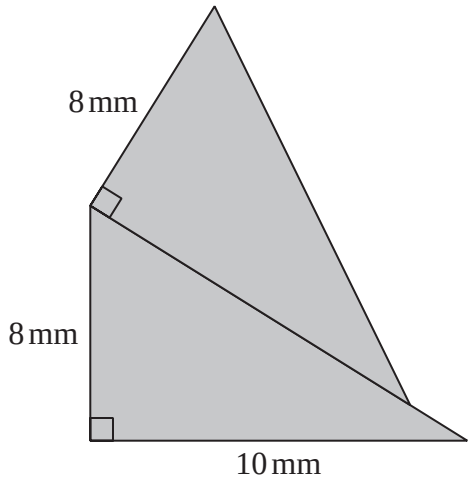
..... cm

(Total for Question 18 is 5 marks)

5 Here is a right-angled triangle.



The shaded shape below is made from two of these triangles.

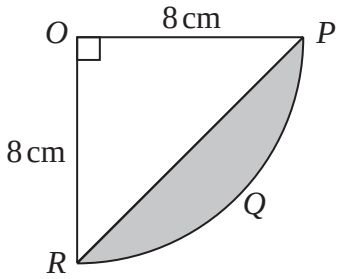


Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

..... mm

(Total for Question 5 is 4 marks)

7 The diagram shows a sector $OPQR$ of a circle, centre O and radius 8 cm.



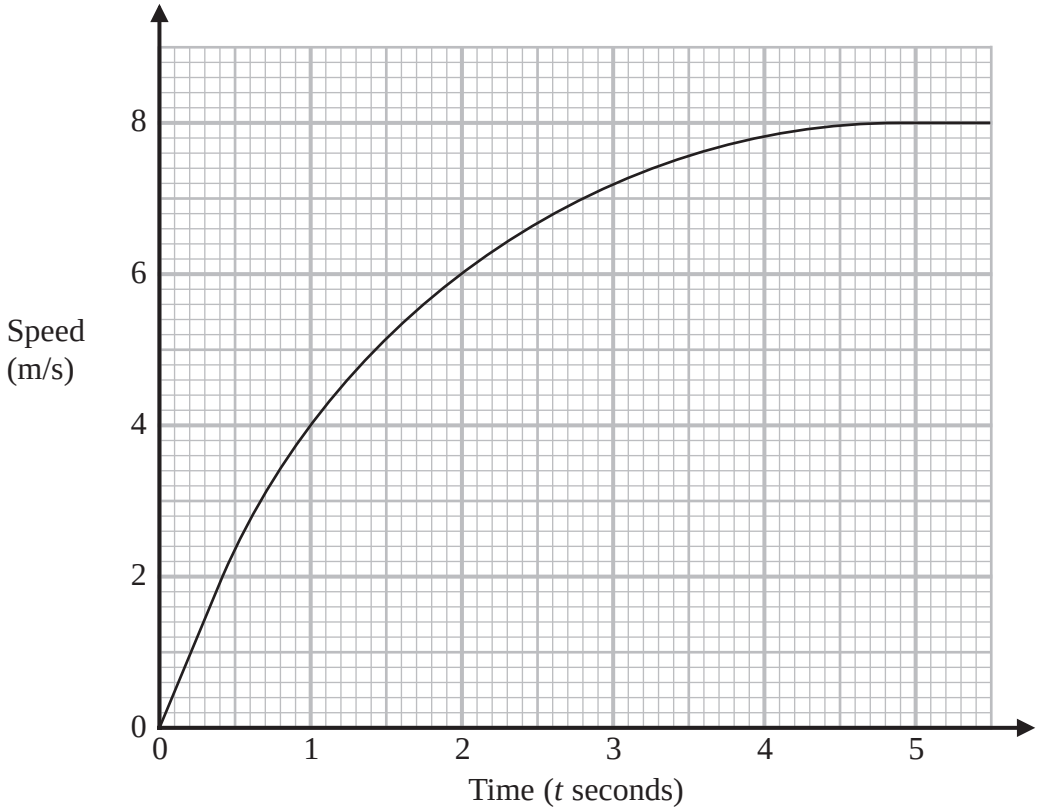
OPR is a triangle.

Work out the area of the shaded segment PQR.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 7 is 4 marks)

21 Here is a speed-time graph showing the speed, in metres per second, of an object t seconds after it started to move from rest.



(a) Using 3 trapeziums of equal width, work out an estimate for the area under the graph between $t = 1$ and $t = 4$

.....

(3)

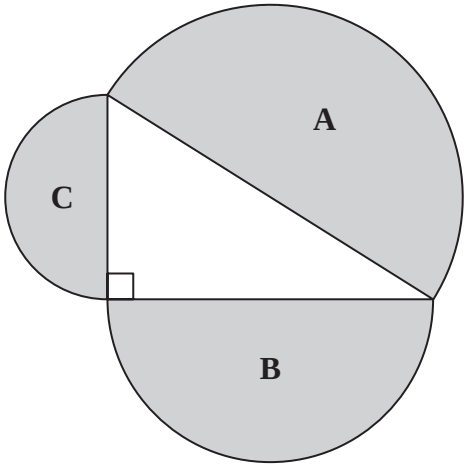
(b) What does this area represent?

.....

(1)

(Total for Question 21 is 4 marks)

13 A right-angled triangle is formed by the diameters of three semicircular regions, **A**, **B** and **C** as shown in the diagram.

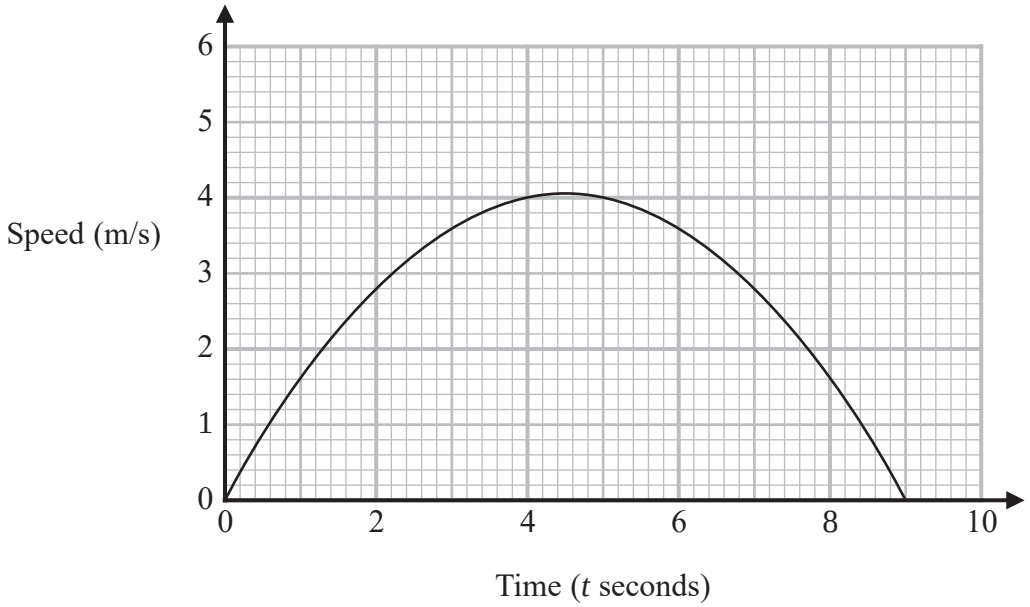


Show that

area of region **A** = area of region **B** + area of region **C**

(Total for Question 13 is 3 marks)

14 Here is a speed-time graph.



(a) Work out an estimate of the gradient of the graph at $t = 2$

.....

(3)

(b) What does the area under the graph represent?

.....

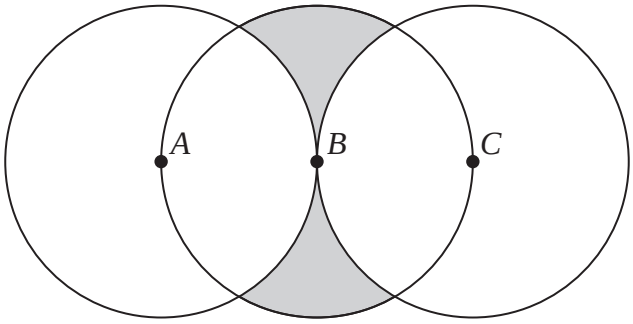
.....

(1)

(Total for Question 14 is 4 marks)

21 The diagram shows three circles, each of radius 4 cm.

The centres of the circles are A, B and C such that ABC is a straight line and $AB = BC = 4$ cm.



Work out the total area of the two shaded regions.
Give your answer in terms of π

..... cm^2

(Total for Question 21 is 5 marks)

4 Festival A will be in a rectangular field with an area of 80 000 m^2
The greatest number of people allowed to attend Festival A is 425

Festival B will be in a rectangular field 700 m by 2000 m.
The greatest number of people allowed to attend Festival B is 6750

The area per person allowed for Festival B is greater than the area per person allowed for Festival A.

(a) How much greater?
Give your answer correct to the nearest whole number.

..... m^2
(4)

Callum says,

"300 cm^2 is the same as 3 m^2 because there are 100 cm in 1 m so you divide by 100"

Callum's method is wrong.

(b) Explain why.

.....

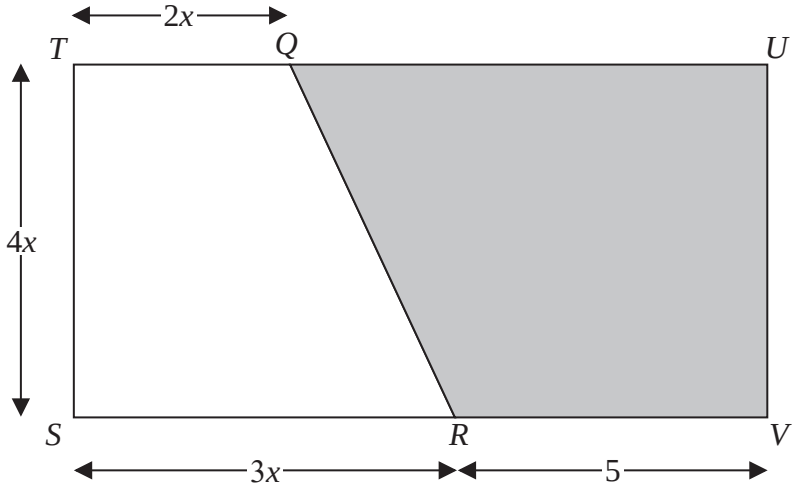
.....

.....

(1)

(Total for Question 4 is 5 marks)

7 The diagram shows rectangle *STUV*.
TQU and *SRV* are straight lines.
All measurements are in cm.

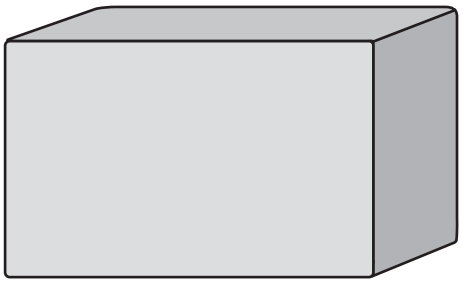


The area of trapezium *QUVR* is $A\,\text{cm}^2$

Show that $A = 2x^2 + 20x$

(Total for Question 7 is 3 marks)

7



$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

A storage tank exerts a force of 10 000 newtons on the ground.

The base of the tank in contact with the ground is a 4 m by 2 m rectangle.

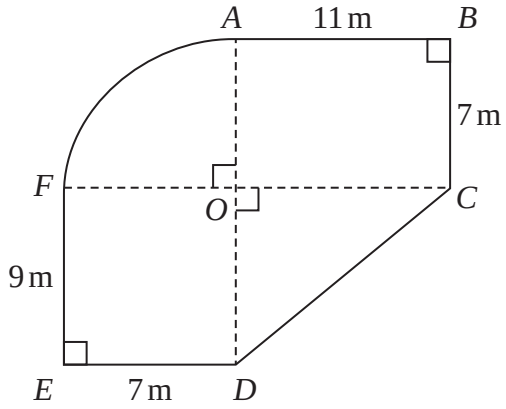
Work out the pressure on the ground due to the tank.

..... newtons / m^2

(Total for Question 7 is 2 marks)

4 The diagram shows a plan of Jason's garden.

ABCO and *DEFO* are rectangles.
CDO is a right-angled triangle.
AFO is a sector of a circle with centre *O* and angle *AOF* = 90°



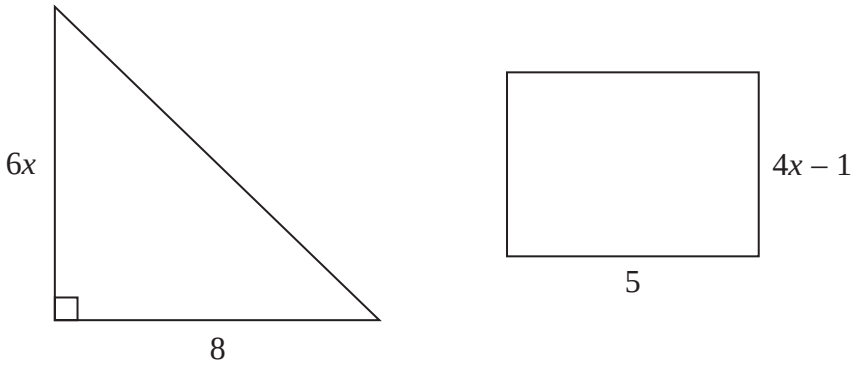
Jason is going to cover his garden with grass seed.
Each bag of grass seed covers 14 m^2 of garden.
Each bag of grass seed costs £10.95

Work out how much it will cost Jason to buy all the bags of grass seed he needs.

£.....

(Total for Question 4 is 5 marks)

5 Here is a triangle and a rectangle.



All measurements are in centimetres.

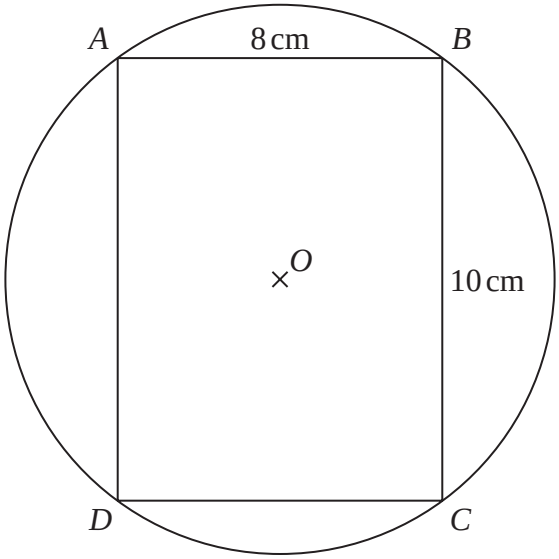
The area of the triangle is $10\,cm^2$ greater than the area of the rectangle.

Work out the value of x.

$x =$ .....

(Total for Question 5 is 4 marks)

12 The points *A*, *B*, *C* and *D* lie on a circle, centre *O*.
ABCD is a rectangle.



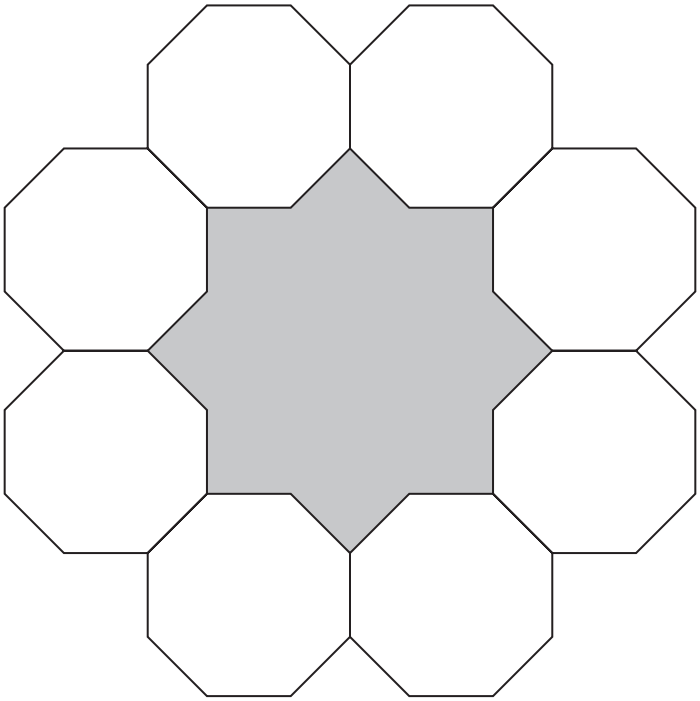
AB = 8 cm *BC* = 10 cm

Work out the circumference of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 12 is 4 marks)

24 The diagram shows 8 identical regular octagons joined to enclose a shaded shape.



Each octagon has sides of length a.

Find, in terms of a, an expression for the area of the shaded shape.
Give your answer in the form $p\left(2+\sqrt{2}\right)a^2$ where p is an integer.
You must show all your working.

.....

(Total for Question 24 is 5 marks)

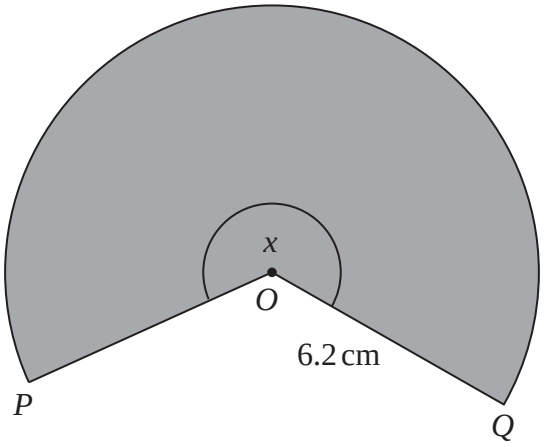
10 The circumference of a circle is 10 m.

Work out the area of the circle.
Give your answer in terms of π.

..... m^2

(Total for Question 10 is 3 marks)

12 The diagram shows a shaded sector POQ of a circle with centre O and radius 6.2 cm.



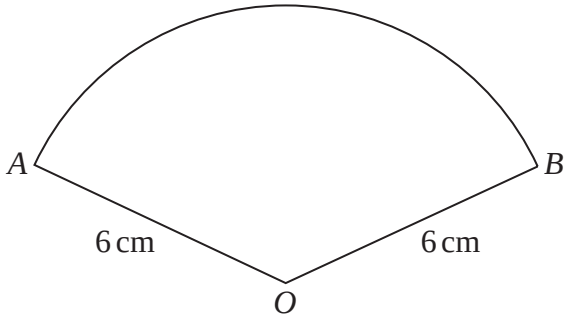
The area of the shaded sector is 82.6 cm^2

Calculate the size of angle x.
Give your answer correct to 3 significant figures.

.....°

(Total for Question 12 is 2 marks)

15 OAB is a sector of a circle with centre O and radius 6 cm.



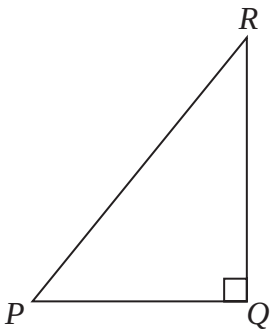
The length of the arc AB is 5π cm.

Work out, in terms of π, the area of the sector.
Give your answer in its simplest form.

..... cm^2

(Total for Question 15 is 4 marks)

8 A playground is in the shape of a right-angled triangle.



Dan makes a scale drawing of the playground.
He uses a scale of 1 cm represents 5 m

The area of the playground on the scale drawing is 28 cm^2

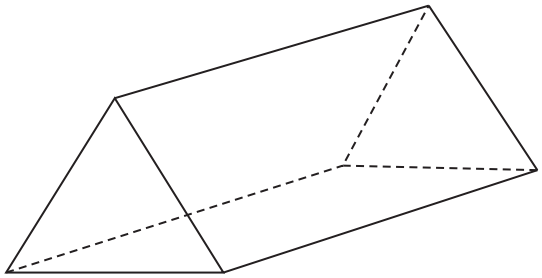
The real length of QR is 40 m

Work out the real length of PQ.

..... m

(Total for Question 8 is 3 marks)

8 The diagram shows a solid triangular prism on a horizontal floor.



$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

The face in contact with the floor is a rectangle of width 2 m.

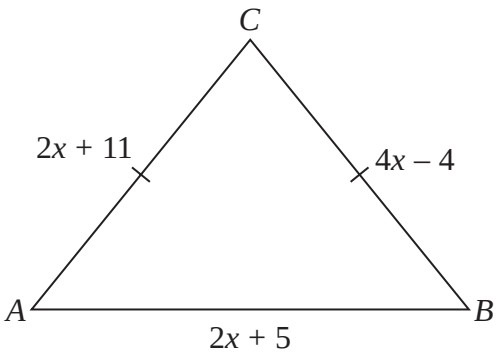
The pressure on the floor due to the prism is 80 newtons/m^2
The force exerted by the prism on the floor is 720 newtons.

Work out the length of the prism.

..... m

(Total for Question 8 is 3 marks)

7 The diagram shows triangle *ABC*.



In the diagram, all measurements are in centimetres.

$AC = BC$

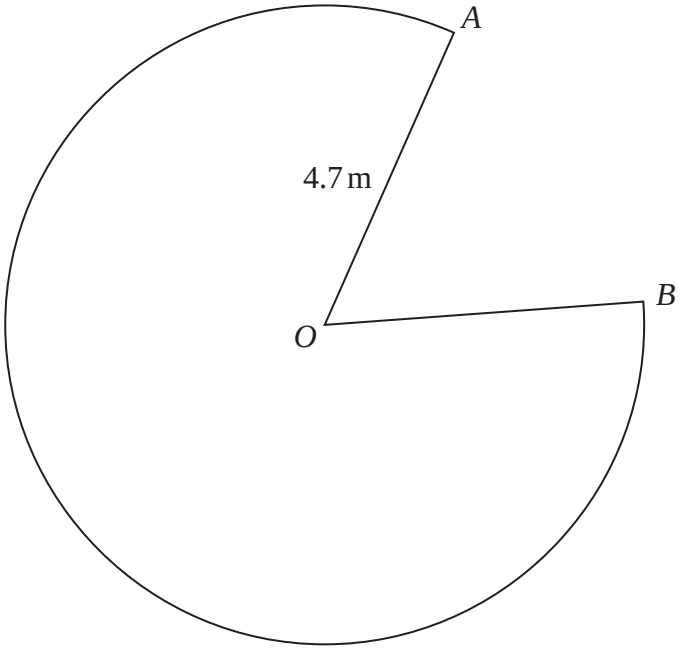
The perimeter of the triangle is 72 cm.

Work out the area of the triangle.

..... cm^2

(Total for Question 7 is 5 marks)

11 *OAB* is a sector of a circle with centre *O* and radius 4.7 m.



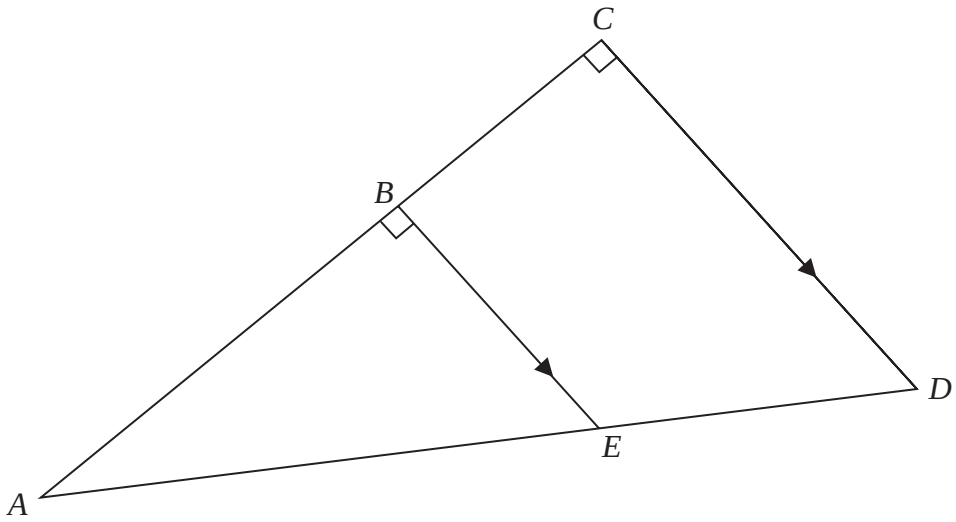
The sector has a perimeter of 34.3 m.

Find the size of the reflex angle *AOB*.
Give your answer correct to the nearest degree.

.....°

(Total for Question 11 is 3 marks)

13 *ABC* and *AED* are straight lines.
BE and *CD* are parallel.



BE = 4.2 cm
CD = 6.3 cm
AC = 10.8 cm

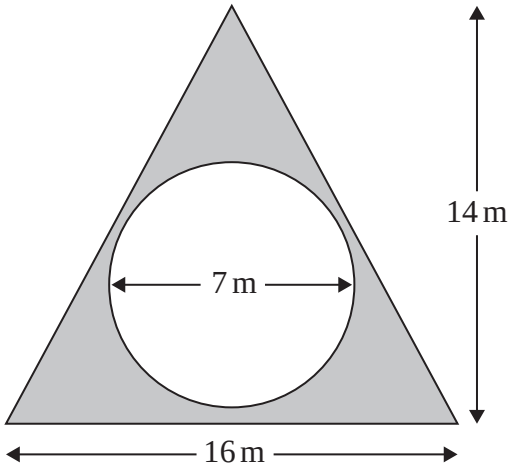
Work out the area of trapezium *BCDE*.

..... cm^2

(Total for Question 13 is 3 marks)

3 Here is a plan of part of Macsen's garden.

There is a circle inside a triangle.
The circle has a diameter of 7 m.



Macsen will cover the shaded area with gravel.

Gravel is sold in bags.
Each bag of gravel covers an area of 12.5 m^2

(a) Work out the number of bags of gravel Macsen will need.

..... bags

(4)

Macsen finds that each bag of gravel only covers an area of $11\,m^2$

(b) How does this affect your answer to part (a)?

.....

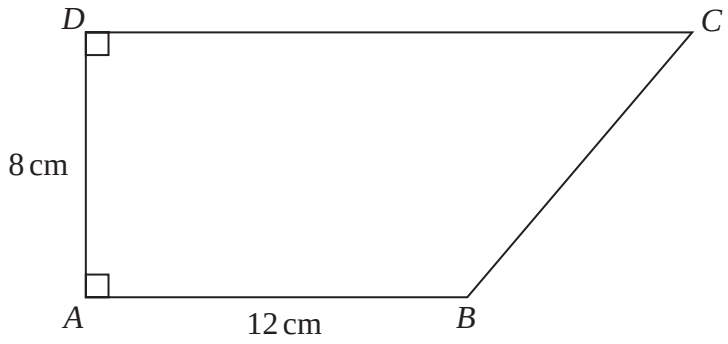
.....

.....

(1)

(Total for Question 3 is 5 marks)

8 The diagram shows trapezium $ABCD$.



$AB = 12\,\text{cm}$
$AD = 8\,\text{cm}$

The trapezium has an area of $112\,\text{cm}^2$

Work out the perimeter of the trapezium.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 8 is 5 marks)