GCSE · Edexcel · Maths

4 hours 61 questions

Exam Questions

Pythagoras & Trigonometry

Pythagoras Theorem / SOHCAHTOA / Angles of Elevation & Depression / Exact Trig Values

Easy (14 questions)	/37
Medium (18 questions)	/66
Hard (16 questions)	/72
Very Hard (13 questions)	/63
Total Marks	**/238**

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Easy Questions

1 XYZ is a right-angled triangle.

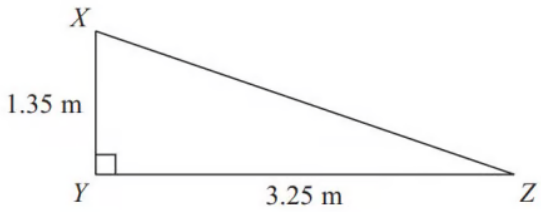


Diagram **NOT** accurately drawn

Calculate the length of XZ. Give your answer correct to 3 significant figures.

(3 marks)

2 Here is a right-angled triangle.

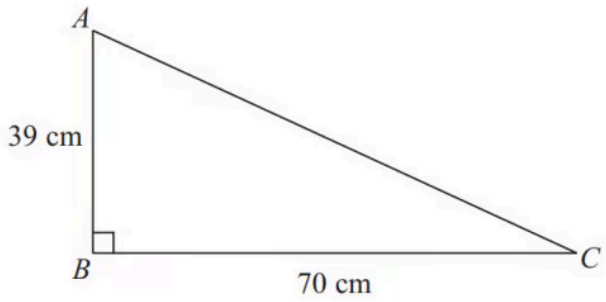


Diagram **NOT** accurately drawn

Work out the length of AC. Give your answer correct to 1 decimal place.

(3 marks)

3

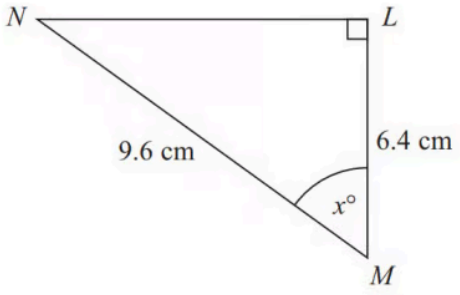


Diagram **NOT** accurately drawn

LMN is a right-angled triangle. MN = 9.6 cm. LM = 6.4 cm.

Calculate the size of the angle marked $x°$. Give your answer correct to 1 decimal place.

(3 marks)

4

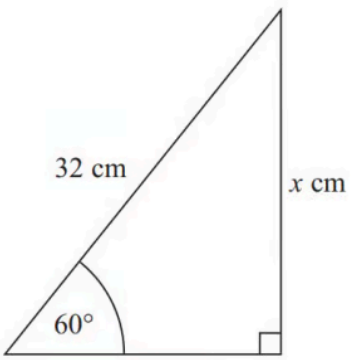


Diagram **NOT** accurately drawn

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

(3 marks)

5

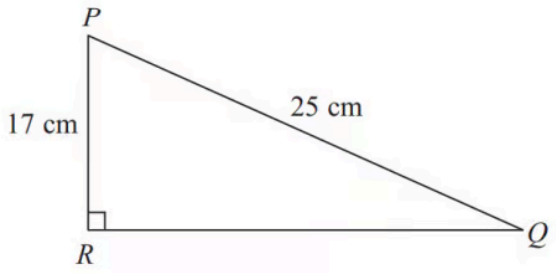


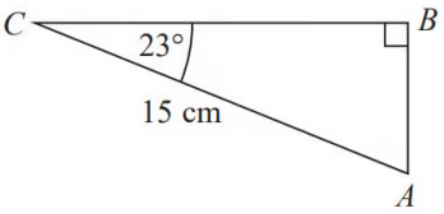
Diagram **NOT** accurately drawn

PQR is a right-angled triangle. PR = 17 cm PQ = 25 cm

Work out the size of angle RPQ. Give your answer correct to 1 decimal place.

(3 marks)

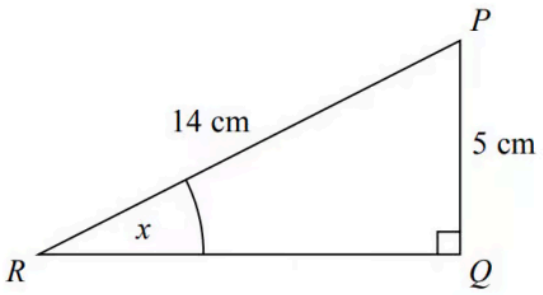
6 ABC is a right-angled triangle.



Calculate the length of AB. Give your answer correct to 3 significant figures.

(2 marks)

7 PQR is a right-angled triangle.



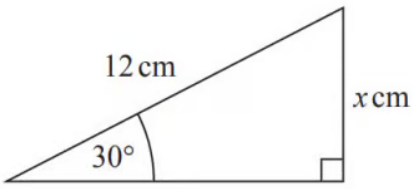
Work out the size of the angle marked x. Give your answer correct to 1 decimal place.

(2 marks)

8 (a) Write down the exact value of cos30°

(1 mark)

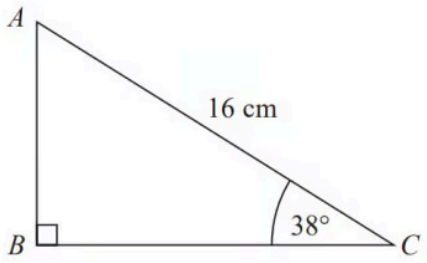
(b)



Given that sin30° = 0.5, work out the value of x.

(2 marks)

9 ABC is a right-angled triangle.



Calculate the length of AB. Give your answer correct to 2 decimal places.

(2 marks)

10 The diagram shows triangle *ABC*

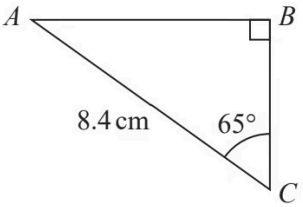


Diagram **NOT** accurately drawn

Work out the length of the side *AB* Give your answer correct to 3 significant figures.

..... cm

(3 marks)

11 The diagram shows a rectangle and a diagonal of the rectangle.

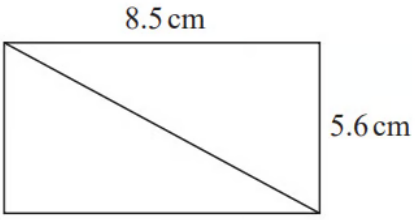


Diagram **NOT** accurately drawn

Work out the length of the diagonal of the rectangle.
Give your answer correct to 1 decimal place.

.....cm

(3 marks)

12 The diagram shows a right-angled triangle.

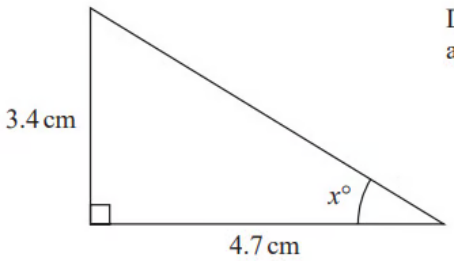


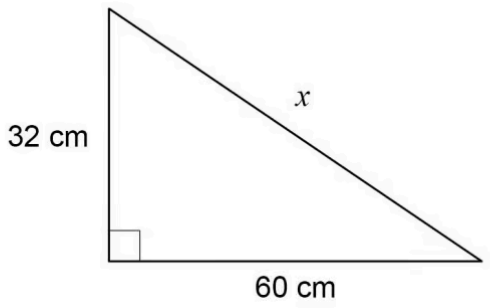
Diagram **NOT** accurately drawn

Calculate the value of x. Give your answer correct to one decimal place.

x = ...

(3 marks)

13 Use Pythagoras' theorem to work out the value of x.



Not drawn accurately

(3 marks)

14 Write down the value of sin 45°.

(1 mark)

Medium Questions

1

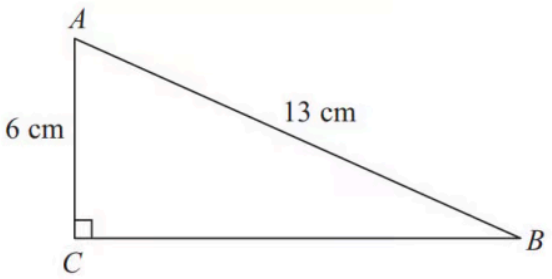


Diagram **NOT** accurately drawn

ABC is a right-angled triangle. AC = 6 cm AB = 13 cm

Work out the length of BC. Give your answer correct to 3 significant figures.

(3 marks)

2 Here is a rectangle.

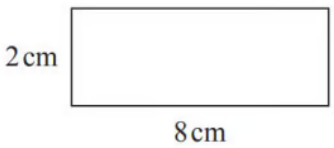


Diagram **NOT** accurately drawn

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

angled triangles.

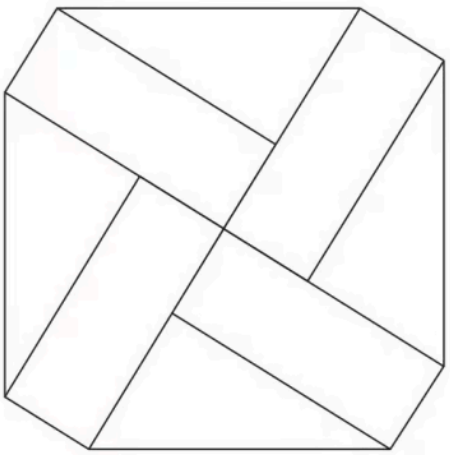
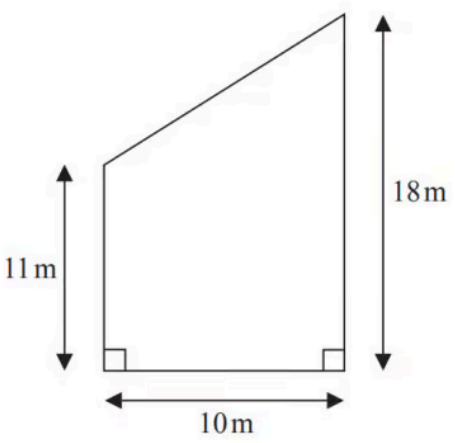


Diagram **NOT** accurately drawn

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

(5 marks)

3 Here is part of a field.



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 50m of fence.

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

(5 marks)

4 The diagram shows a rectangular framework.

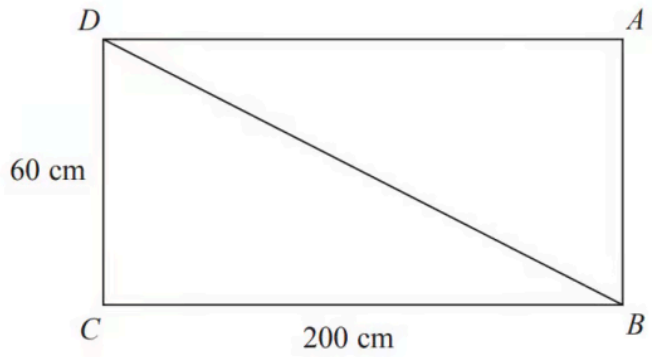


Diagram **NOT** accurately drawn

The framework is made from 5 metal rods. The metal rods have a weight of 0.9 kg per metre.

Work out the total weight of the framework. Give your answer, in kg, correct to 3 significant figures.

(4 marks)

5 Triangle ABC has perimeter 20 cm.

AB = 7 cm. BC = 4 cm.

By calculation, deduce whether triangle ABC is a right-angled triangle.

(4 marks)

6 The diagram shows a ladder leaning against a vertical wall.

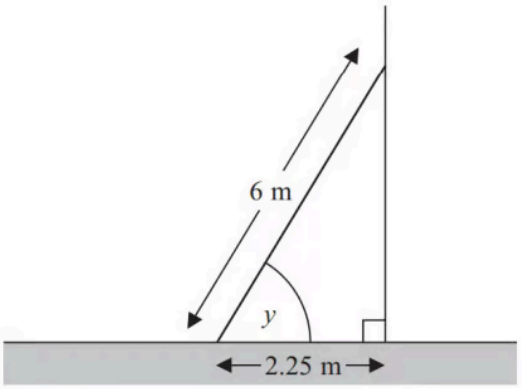


Diagram **NOT** accurately drawn

The ladder stands on horizontal ground.

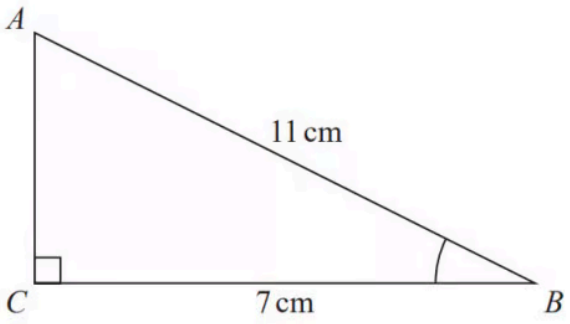
The length of the ladder is 6 m. The bottom of the ladder is 2.25 m from the bottom of the wall.

A ladder is safe to use when the angle marked y is about 75°.

Is the ladder safe to use? You must show all your working.

(3 marks)

7 (a) ABC is a right-angled triangle.



Work out the size of angle ABC. Give your answer correct to 1 decimal place.

(2 marks)

(b) The length of the side AB is reduced by 1 cm.

The length of the side BC is still 7 cm. Angle ACB is still 90°

Will the value of cos ABC increase or decrease? You must give a reason for your answer.

(1 mark)

8 (a) The diagram shows the positions of three turbines A, B and C.

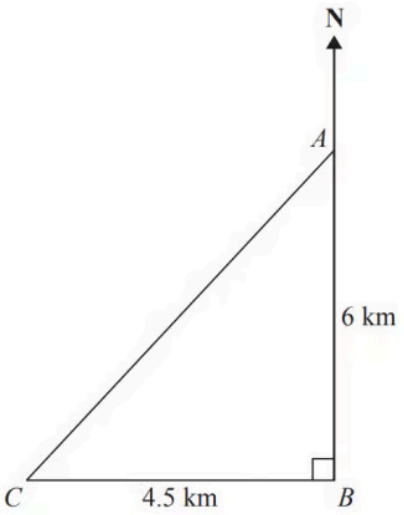


Diagram **NOT** accurately drawn

A is 6 km due north of turbine B. C is 4.5 km due west of turbine B.

Calculate the distance AC.

(3 marks)

(b) Calculate the bearing of C from A. Give your answer correct to the nearest degree.

(4 marks)

9 ABC is an isosceles triangle.

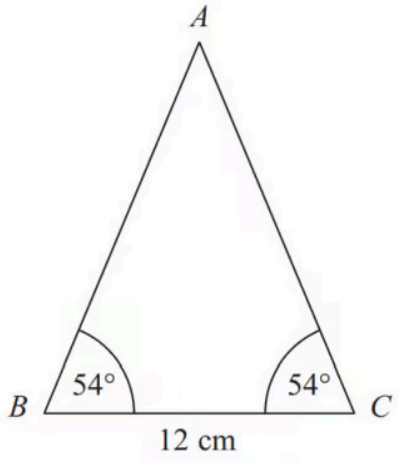


Diagram **NOT** accurately drawn

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

(4 marks)

10 Find the exact value of $\tan 30° \times \sin 60°$

Give your answer in its simplest form.

(2 marks)

11

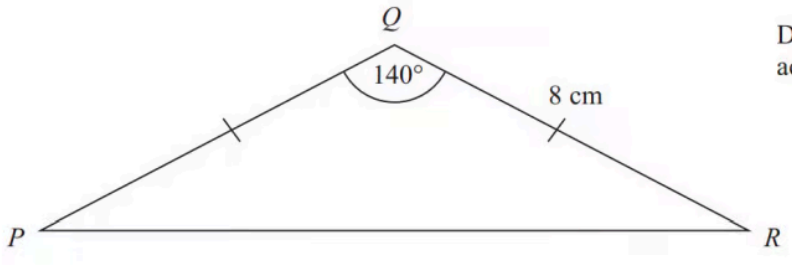


Diagram **NOT** accurately drawn

Calculate the length of PR. Give your answer correct to 3 significant figures.

(3 marks)

12 The diagram shows isosceles triangle ABC

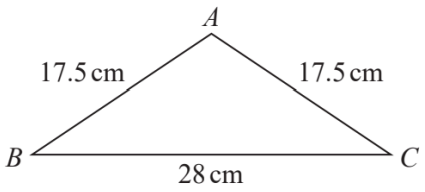


Diagram **NOT** accurately drawn

$AB = AC = 17.5$ cm $\qquad BC = 28$ cm

Calculate the area of triangle ABC

..... cm^2

(4 marks)

13 The diagram shows two vertical phone masts, AB and CD, on horizontal ground.

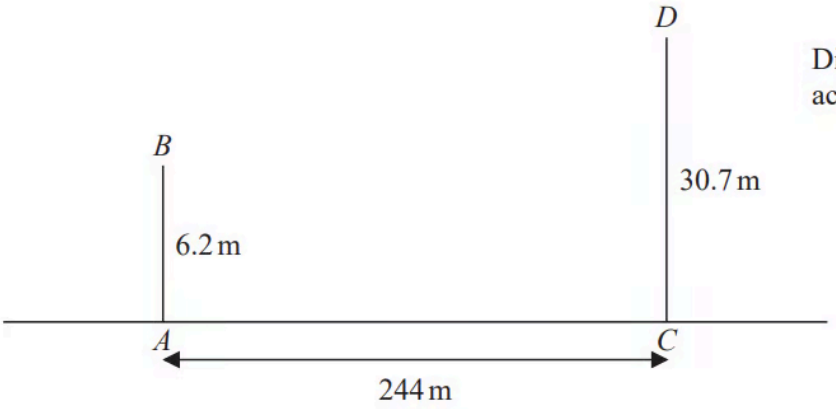


Diagram **NOT** accurately drawn

$AB = 6.2$ m $\quad AC = 244$ m $\quad CD = 30.7$ m

Work out the size of the angle of depression of B from D Give your answer correct to one decimal place.

(3 marks)

14 The diagram shows a trapezium.

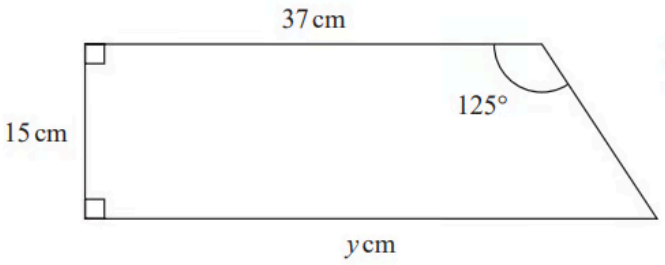


Diagram **NOT** accurately drawn

Work out the value of y. Give your answer correct to 1 decimal place.

$y =$

(4 marks)

15

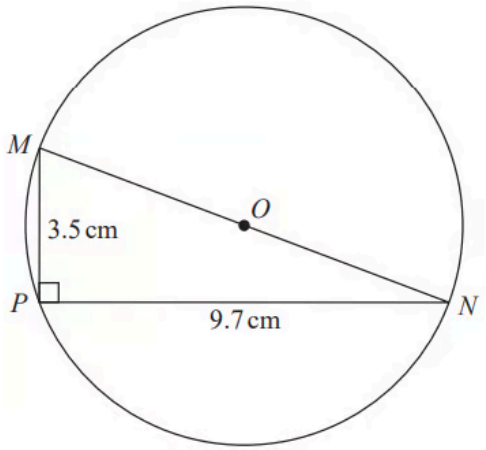


Diagram **NOT** accurately drawn

M, N and P are points on a circle, centre O.
MON is a diameter of the circle.

$MP = 3.5\ cm$
$PN = 9.7\ cm$

Angle $MPN = 90°$

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

..... cm

(1 mark)

16 From point A, Stanley walks 200m due east to point B. From B, he then walks 160 m due south to point C.

Work out the length of AC.
Give your answer correct to 3 significant figures.

.....metres

(3 marks)

17 $ABCD$ is a trapezium.

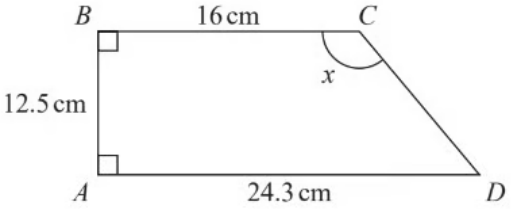


Diagram **NOT** accurately drawn

Work out the size of angle x.
Give your answer correct to 1 decimal place.

(4 marks)

18 The diagram shows an isosceles triangle.

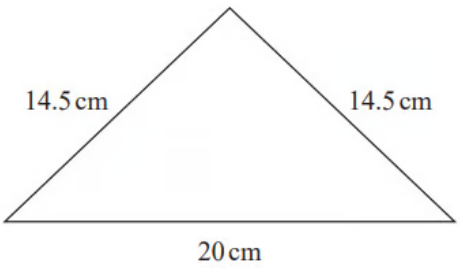


Diagram **NOT** accurately drawn

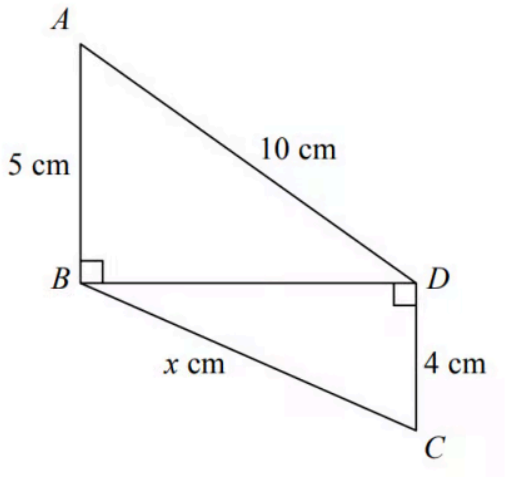
Work out the area of the triangle.

.....cm^2

(4 marks)

Hard Questions

1 Triangles ABD and BCD are right-angled triangles.



Work out the value of x.
Give your answer correct to 2 decimal places.

(4 marks)

2 The diagram shows a quadrilateral $ABCD$.

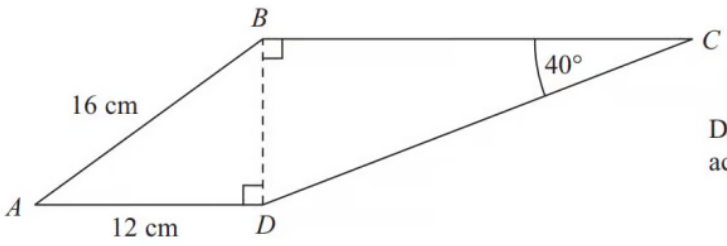


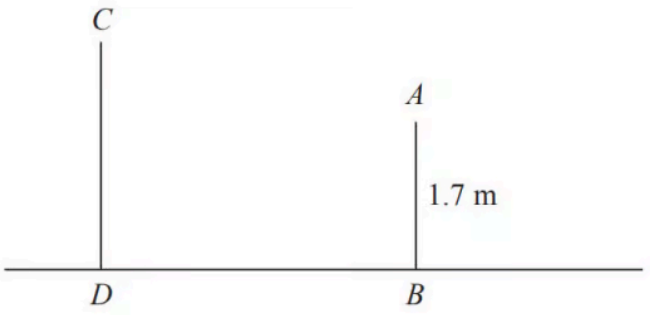
Diagram **NOT** accurately drawn

$AB = 16$ cm.
$AD = 12$ cm.
Angle $BCD = 40°$.
Angle ADB = angle $CBD = 90°$.

Calculate the length of CD.
Give your answer correct to 3 significant figures.

(5 marks)

3 The diagram shows two vertical posts, AB and CD, on horizontal ground.



AB = 1.7 m
CD : AB = 1.5 : 1

The angle of elevation of C from A is 52°.

Calculate the length of BD.
Give your answer correct to 3 significant figures.

(4 marks)

4 $ABCD$ is a trapezium.

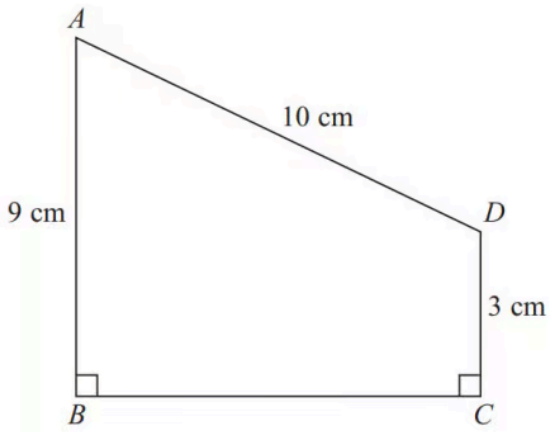


Diagram **NOT** accurately drawn

$AD = 10$ cm
$AB = 9$ cm
$DC = 3$ cm
Angle ABC = angle $BCD = 90°$

Calculate the length of AC.
Give your answer correct to 3 significant figures.

(5 marks)

5

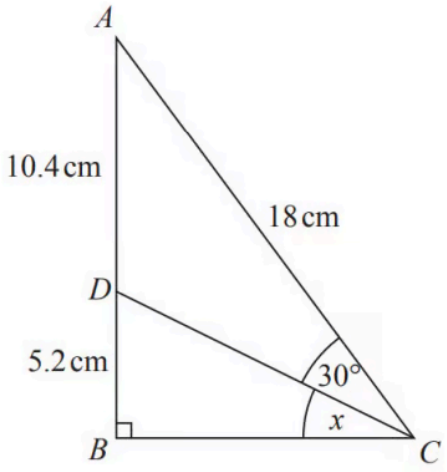


Diagram **NOT** accurately drawn

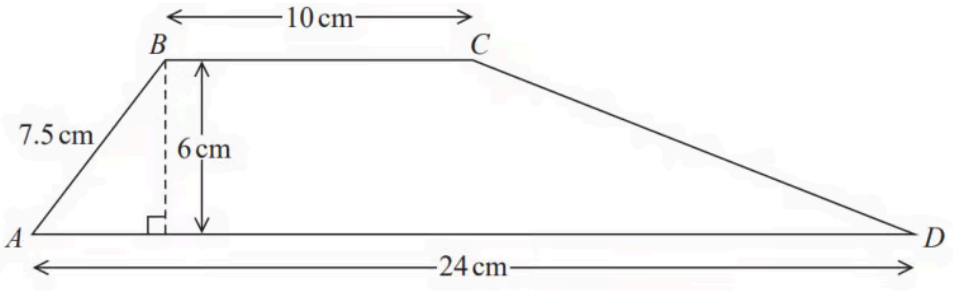
ABC is a right-angled triangle.
D is a point on AB.

Angle ACD = 30°
AD = 10.4 cm
DB = 5.2 cm
AC = 18 cm

Work out the size of the angle marked x.
Give your answer correct to 1 decimal place.

(4 marks)

6 $ABCD$ is a trapezium.



Work out the size of angle CDA.
Give your answer correct to 1 decimal place.

(5 marks)

7

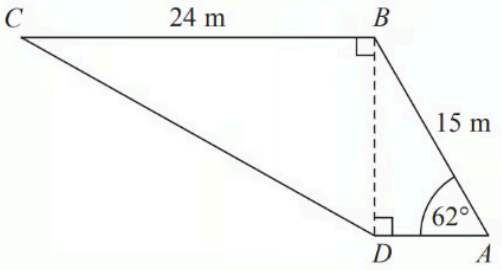


Diagram **NOT** accurately drawn

AB = 15 m
BC = 24 m
Angle BAD = 62°

Work out the size of angle BCD.
Give your answer correct to 1 decimal place.

(5 marks)

8 The diagram shows a triangle DEF inside a rectangle $ABCD$.

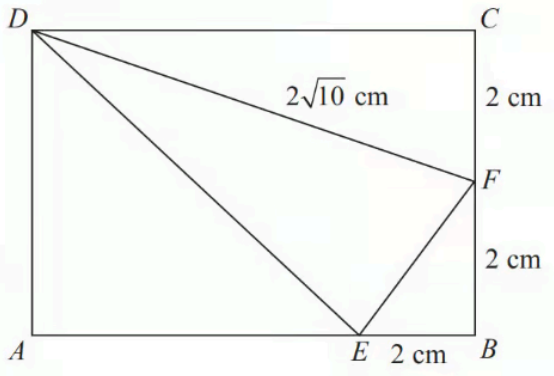
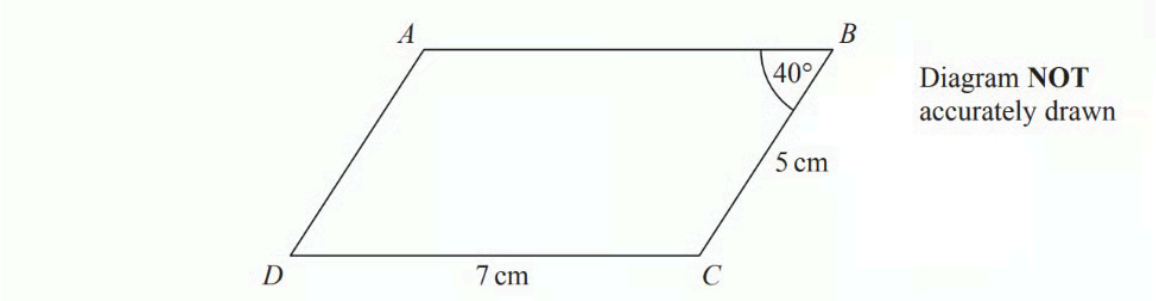


Diagram **NOT** accurately drawn

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

(4 marks)

9 Here is a parallelogram.



DC = 7cm
CB = 5 cm
Angle ABC is 40°

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

(3 marks)

10 The diagram shows a right-angled triangle.

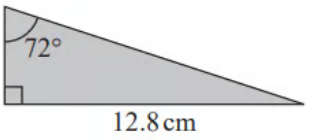


Diagram **NOT** accurately drawn

Five of these triangles are put together to make a shape.

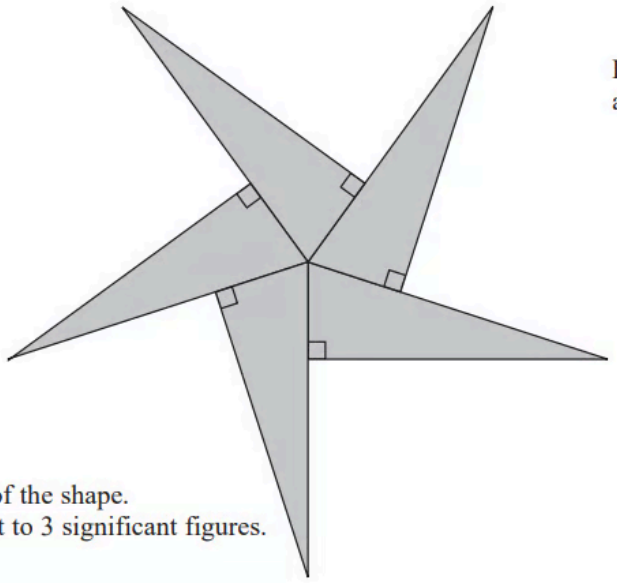


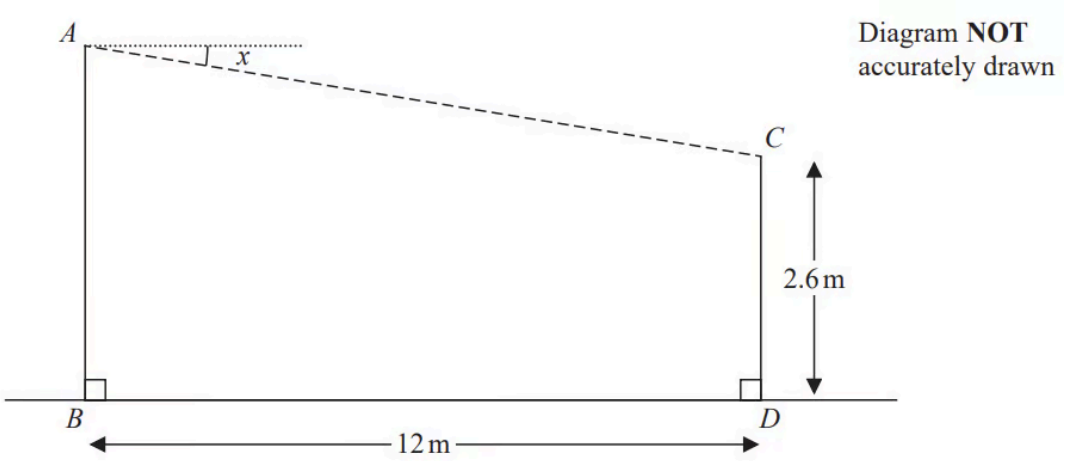
Diagram **NOT** accurately drawn

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

..... cm

(5 marks)

11 A zip wire is shown as the dashed line AC in the diagram.



The zip wire is supported by two vertical posts AB and CD standing on horizontal ground.

$$CD = 2.6 \text{ m} \qquad BD = 12 \text{ m}$$

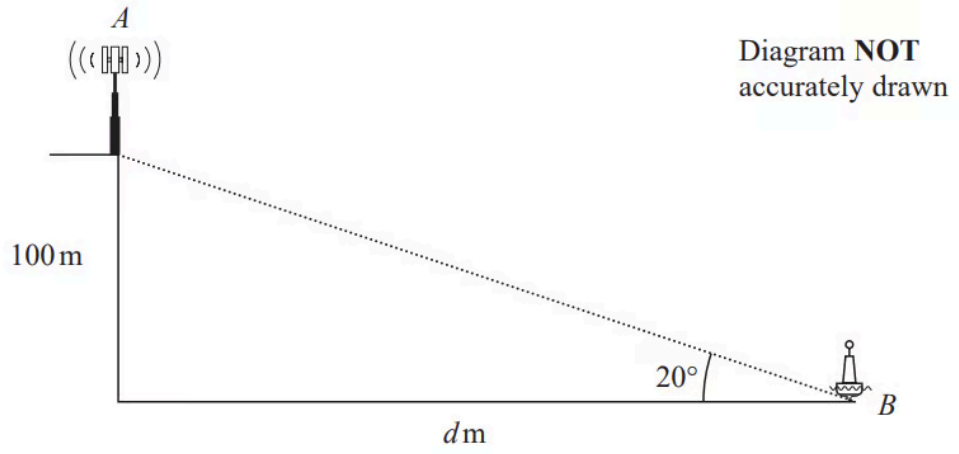
The zip wire makes an angle x with the horizontal, as shown in the diagram.
The design of the zip wire requires the angle x to be at least 5°

Work out the least possible height of the post AB
Give your answer correct to 3 significant figures.

(3 marks)

12 (a) The diagram shows a vertical cliff with a vertical radio mast on top of the cliff and a buoy

in the sea.



The height of the cliff is 100 metres.
The buoy is at the point B that is d metres from the base of the cliff.
The angle of elevation from B to the top of the cliff is 20°

Calculate the value of d.
Give your answer correct to 3 significant figures.

d = ...

(3 marks)

(b) The point A at the top of the radio mast is vertically above the top of the cliff.
The angle of elevation from B to A is 25°

Calculate the height of the radio mast.
Give your answer correct to 3 significant figures.

..... m

(3 marks)

13 The diagram shows a shaded shape $ABCD$ made from a semicircle ABC and a right-angled triangle ACD.

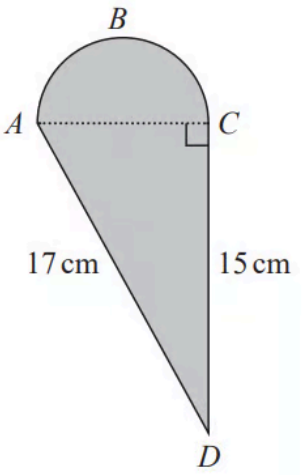


Diagram **NOT** accurately drawn

AC is the diameter of the semicircle ABC.

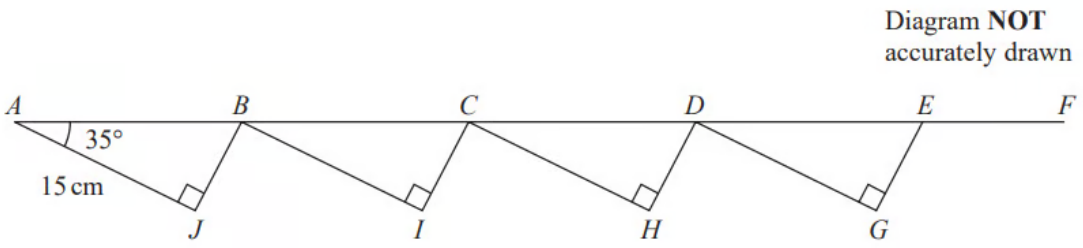
Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

.....cm

(5 marks)

14 The diagram shows four congruent right-angled triangles ABJ, BCI, CDH and DEG.

The diagram also shows the straight line $ABCDEF$.



$AJ = 15\text{cm}$
Angle $BAJ = 35°$

$AF = 80\text{cm}$

Work out the length of EF.
Give your answer correct to 3 significant figures.

..... cm

(5 marks)

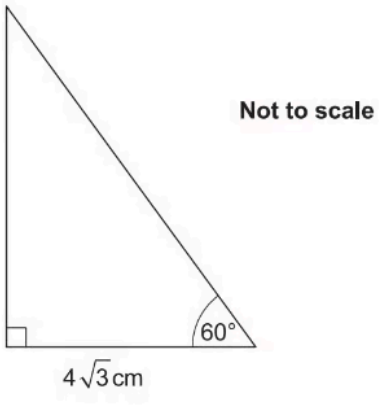
15 Show that the value of $5\sin 30° \times \cos 30° \times 8\tan 30°$ is an integer.

(4 marks)

16 (a) Write down the exact value of tan 60°.

(1 mark)

(b) Find the exact area of this triangle.



..... cm^2

(4 marks)

Very Hard Questions

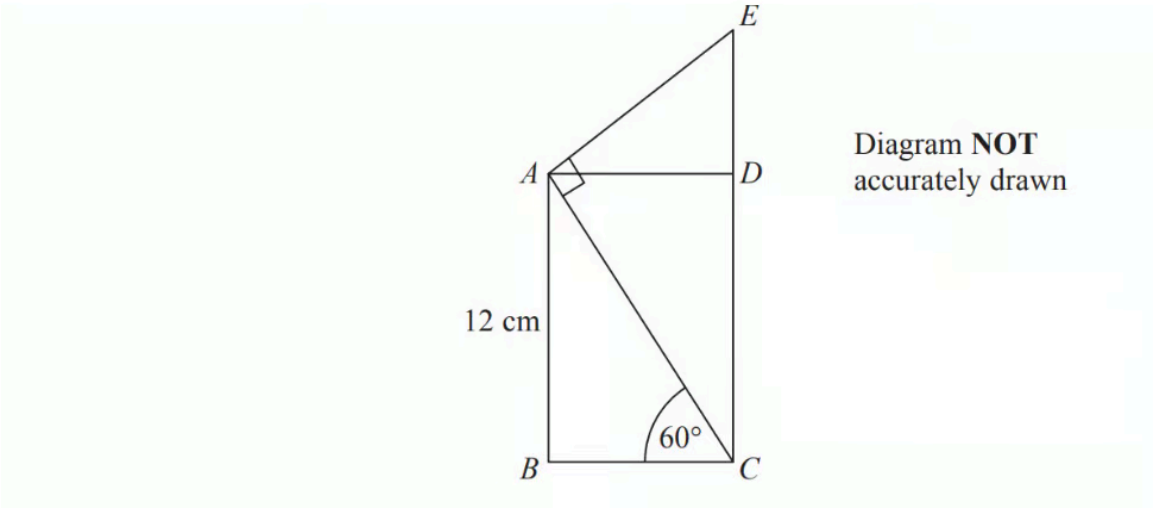
1 A square, with sides of length x cm, is inside a circle.
Each vertex of the square is on the circumference of the circle.

The area of the circle is 49 cm^2.

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

(4 marks)

2



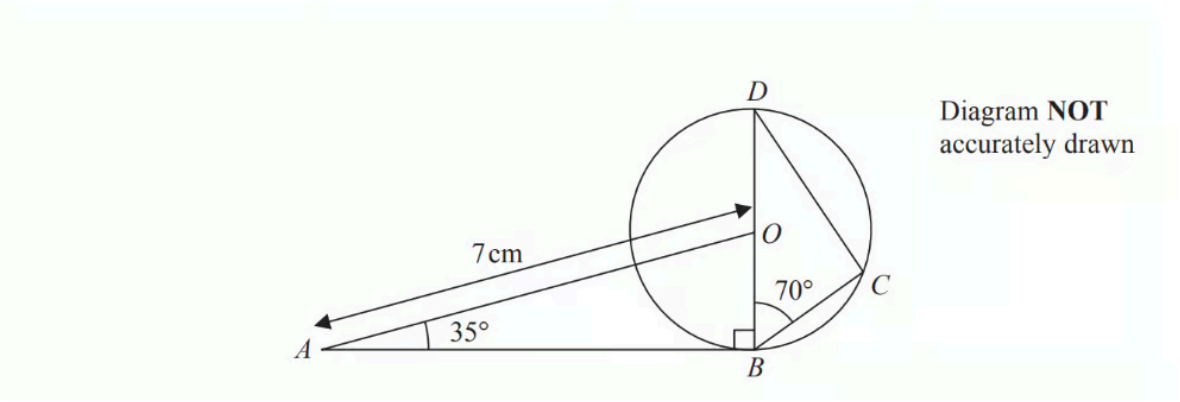
$ABCD$ is a rectangle.
CDE is a straight line.

AB = 12 cm
Angle ACB= 60°
Angle EAC = 90°

Calculate the length of CE.
You must show all your working.

(4 marks)

3 (a)



B, C and D are points on the circumference of a circle, centre O. BOD is a diameter of the circle.

$AO = 7\text{cm}$ Angle $ABO = 90°$ Angle $OAB = 35°$ Angle $DBC = 70°$

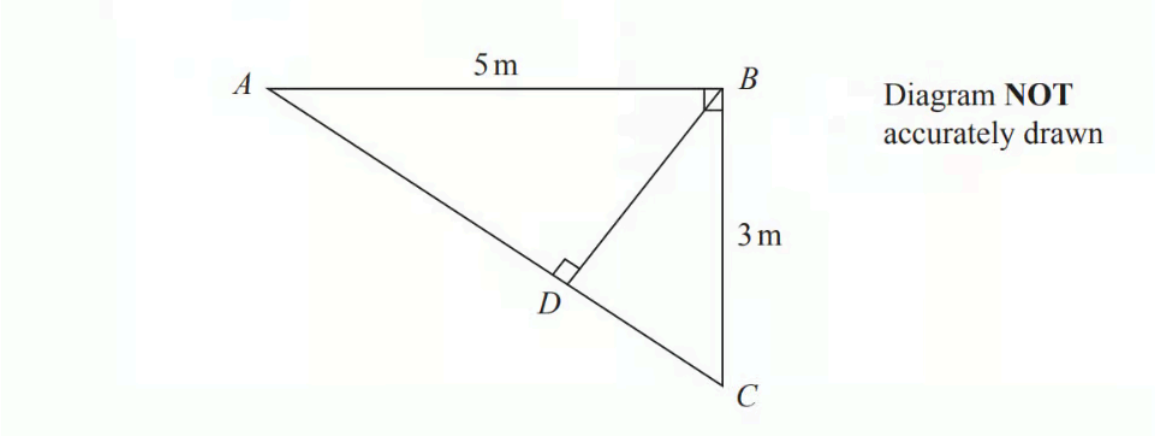
Explain why angle BCD is $90°$

(1 mark)

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

(4 marks)

4 The diagram represents a metal frame.



The frame is made from four metal bars, AB, AC, BC and BD.

Angle ABC = angle ADB = 90°
AB = 5 m
BC = 3 m

Work out the total length of the four metal bars of the frame. Give your answer correct to 3 significant figures.

(5 marks)

5 The table shows some values of x and y that satisfy the equation $y = a\cos x° + b$

x	0	30	60	90	120	150	180
y	3	$1+\sqrt{3}$	2	1	0	$1-\sqrt{3}$	-1

Find the value of y when $x = 45$

(4 marks)

6 Here is triangle ABD.

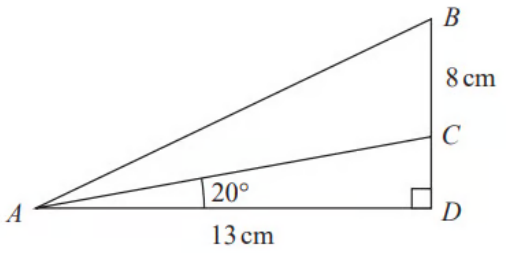


Diagram **NOT** accurately drawn

The point C lies on BD.

$AD = 13\text{cm}$ $BC = 8\text{cm}$ angle $ADB = 90°$ angle $CAD = 20°$

Calculate the size of angle BAC.
Give your answer correct to 1 decimal place.

(5 marks)

7 In the diagram, ABC is a right-angled triangle and DEF is a semicircular arc.

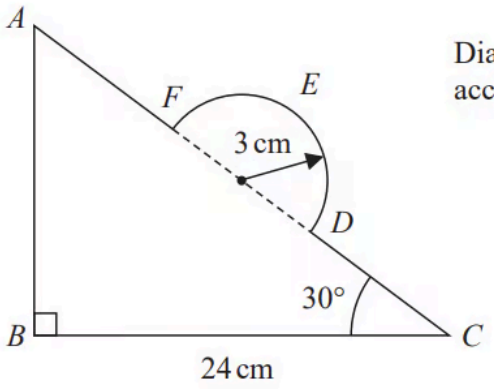


Diagram **NOT** accurately drawn

In triangle ABC

$BC = 24$ cm	angle $ABC = 90°$	angle $BCA = 30°$

The points D and F lie on AC so that DF is the diameter of the semicircular arc DEF
The radius of the semicircular arc is 3cm.

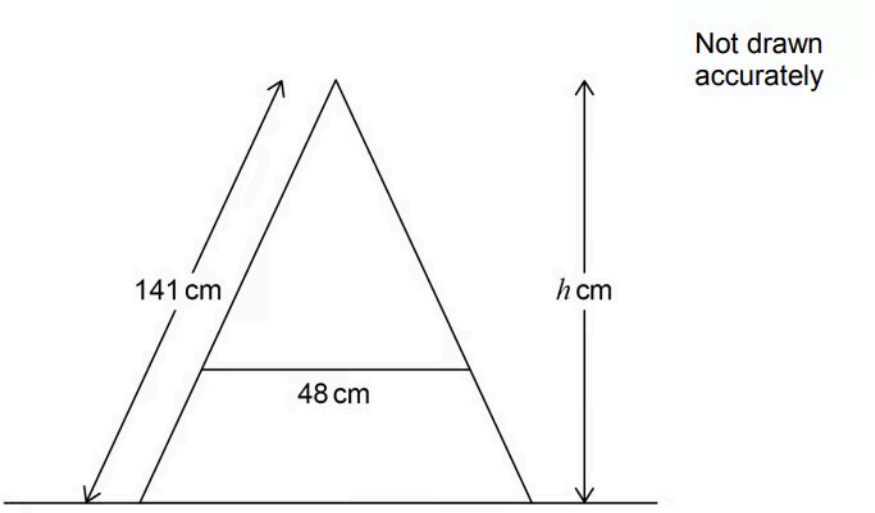
Work out the length of $AFEDC$
Give your answer correct to 2 significant figures.

(5 marks)

8 The diagram shows the side view of a step ladder with a horizontal strut of length 48 cm.

The strut is one third of the way up the ladder.

The symmetrical cross section of the ladder shows two similar triangles.



Work out the vertical height, h cm, of the ladder.

.....cm

(5 marks)

9 Simplify $\dfrac{2\sin 45° - \tan 45°}{4\tan 60°}$

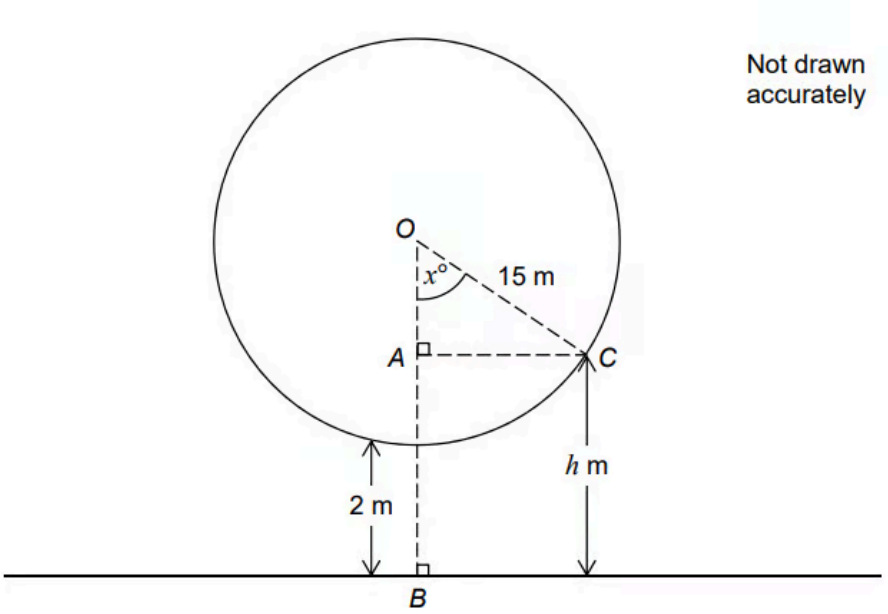
Give your answer in the form $\dfrac{\sqrt{a} - \sqrt{b}}{c}$ where a, b and c are integers.

(4 marks)

10 (a) A Big Wheel is modelled as a circle with centre O and radius 15 metres.

The wheel turns in an anticlockwise direction.

The lowest point on the wheel is always 2 metres above horizontal ground.



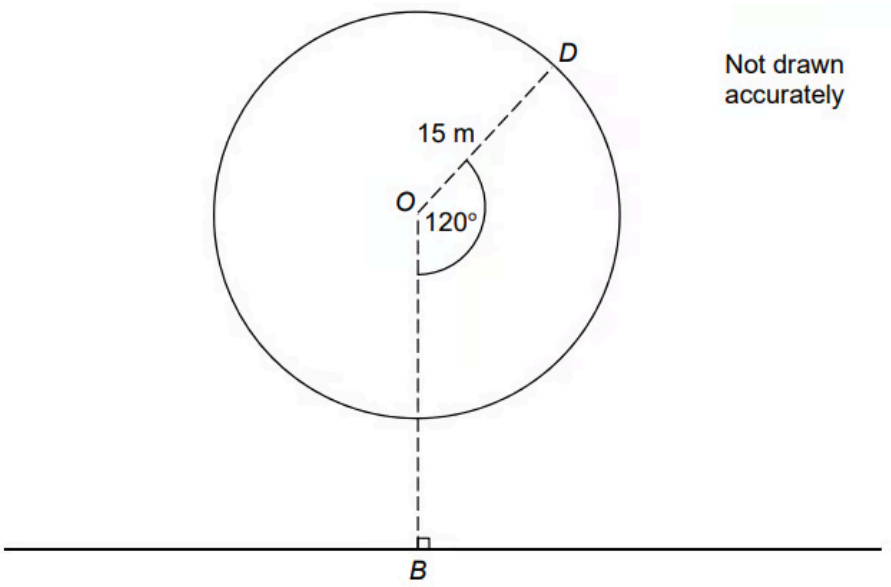
C is a point on the wheel, h metres above horizontal ground.

Angle $COB = x°$
Show that $h = 17 - 15\cos x°$

(2 marks)

(b) D is a point on the wheel.

Angle $DOB = 120°$



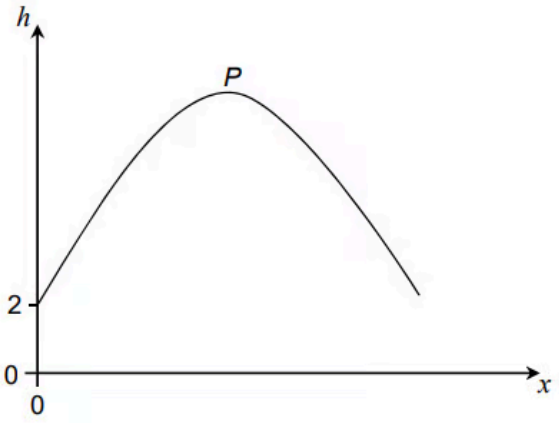
Work out the height of D above horizontal ground.

..... metres

(2 marks)

(c) Here is a sketch of the graph $h = 17 - 15\cos x°$ for one **complete** turn of the wheel.

P is the highest point on the graph.



Work out the coordinates of P.

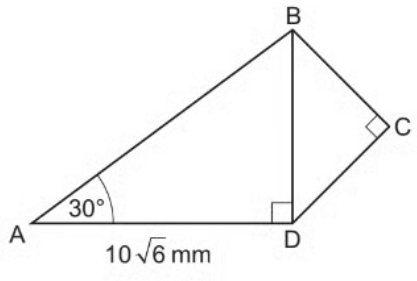
(2 marks)

11 ADB and BCD are right-angled triangles.
BC = CD.

$AD = 10\sqrt{6}$ mm

Angle BAD = 30°.

$$\tan 30° = \frac{1}{\sqrt{3}}$$



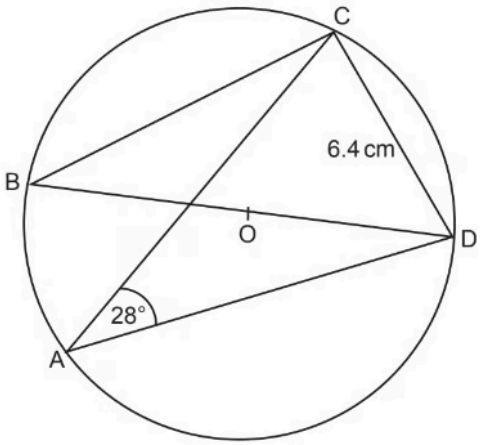
Not to scale

Work out the length of BC.

.....mm

(6 marks)

12 A, B, C and D are points on the circumference of a circle, centre O.



Not to scale

Angle CAD = 28° and CD = 6.4cm.
BD is a diameter of the circle.

Calculate the area of the circle.

..... cm^2

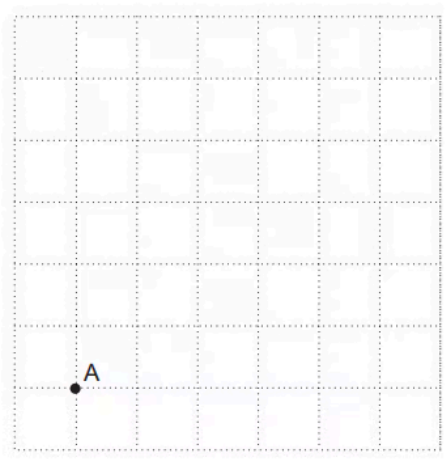
(5 marks)

13 (a) Show that $\sqrt{20} = 2\sqrt{5}$.

(2 marks)

(b) The point A is shown on the unit grid below.
The point B is $2\sqrt{5}$ units from A and lies on the intersection of two grid lines.

Mark **one** possible position for B.



(3 marks)