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GCSE MATHS

Geometry and measures

Edexcel 1MA1 | Subtopic collection Topic 39

Right-angled trigonometry

Higher tier

Past paper question booklet

58	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.

10.

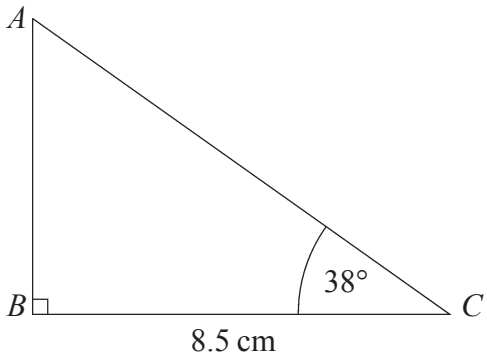


Diagram **NOT** accurately drawn

The diagram shows triangle ABC.
$BC = 8.5$ cm.
Angle $ABC = 90°$.
Angle $ACB = 38°$.

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

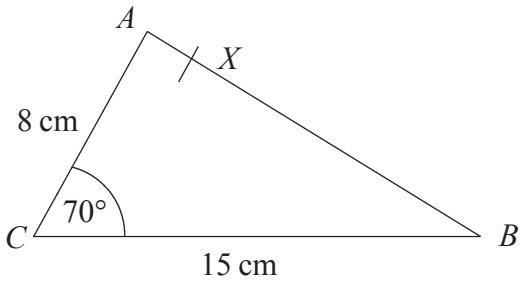
.....cm
(3)

Page Total

14.

Diagram **NOT** accurately drawn

Leave blank



In triangle ABC,
$AC = 8$ cm,
$CB = 15$ cm,
Angle $ACB = 70°$.

(a) Calculate the area of triangle ABC.
Give your answer correct to 3 significant figures.

.....cm^2
(2)

X is the point on AB such that angle $CXB = 90°$.

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

.....cm
(4)

Page Total

21. The depth, D metres, of the water at the end of a jetty in the afternoon can be modelled by this formula

$$D = 5.5 + A \sin 30(t - k)°$$

where

t hours is the number of hours after midday,
A and k are constants.

Yesterday the low tide was at 3 p.m.
The depth of water at low tide was 3.5 m.

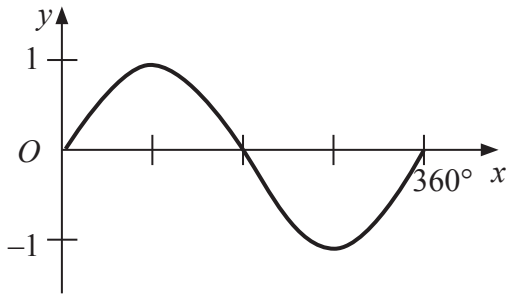
Find the value of A and k.

$A =$ .....

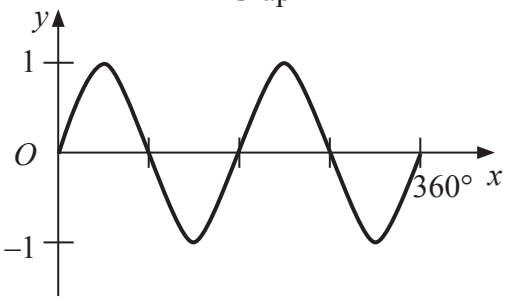
$k =$ .....

(4)

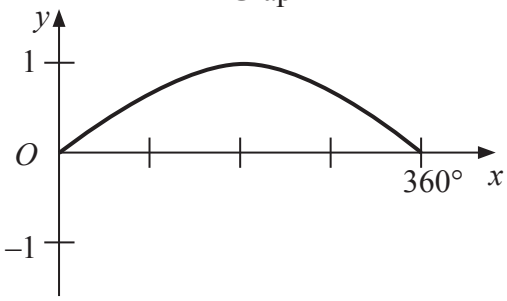
24. Here is the graph of $y = \sin x$, where $0° \leqslant x \leqslant 360°$



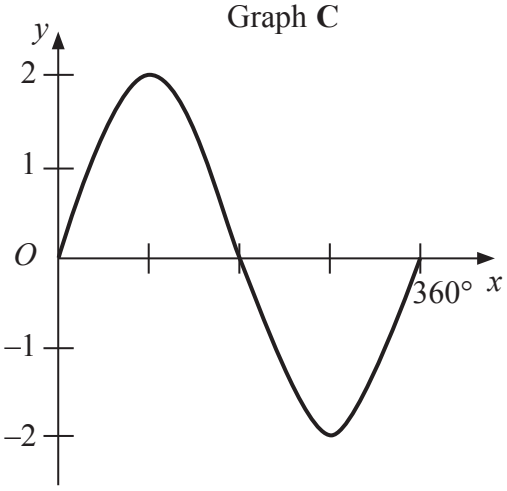
Graph **A**



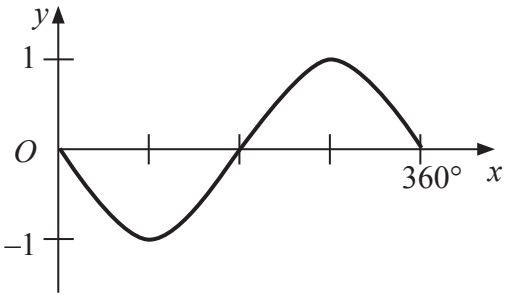
Graph **B**



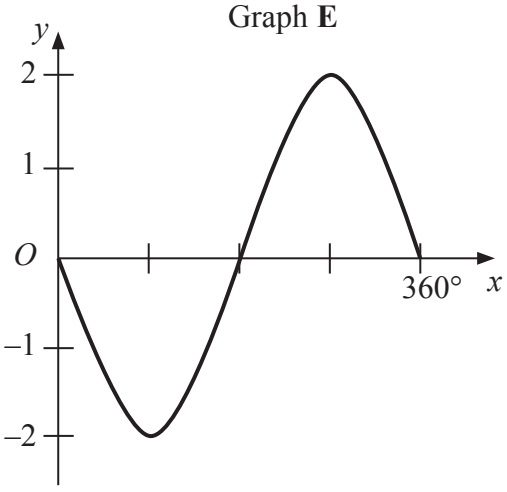
Graph **C**



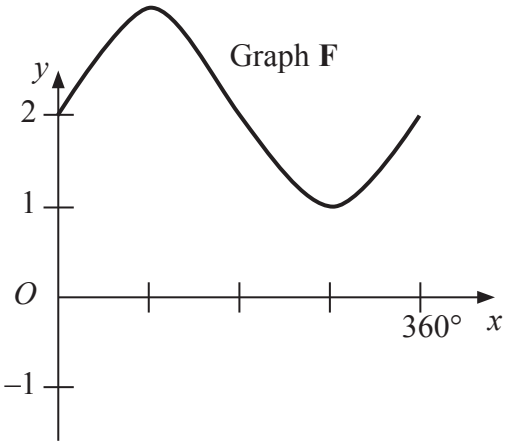
Graph **D**



Graph **E**



Graph **F**



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Match each of the graphs **A**, **B**, **C**, **D**, **E** and **F** to the equations in the table.

Equation	Graph
$y = 2 \sin x$	
$y = -\sin x$	
$y = \sin 2x$	
$y = \sin x + 2$	
$y = \sin \frac{1}{2}x$	
$y = -2 \sin x$	

Q24

(Total 4 marks)

Blank

20. Here is a right-angled triangle.

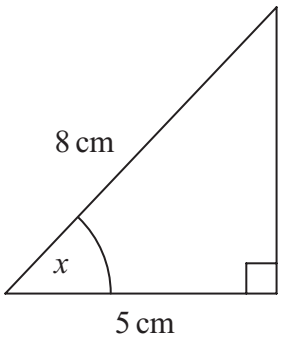


Diagram **NOT** accurately drawn

(a) Calculate the size of the angle marked x.
Give your answer correct to 1 decimal place.

x = ... °

(3)

Here is another right-angled triangle.

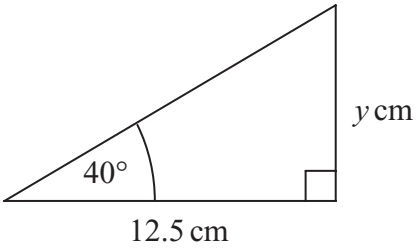


Diagram **NOT** accurately drawn

(b) Calculate the value of y.
Give your answer correct to 1 decimal place.

y = ...

(3)

Q20

(Total 6 marks)

23.

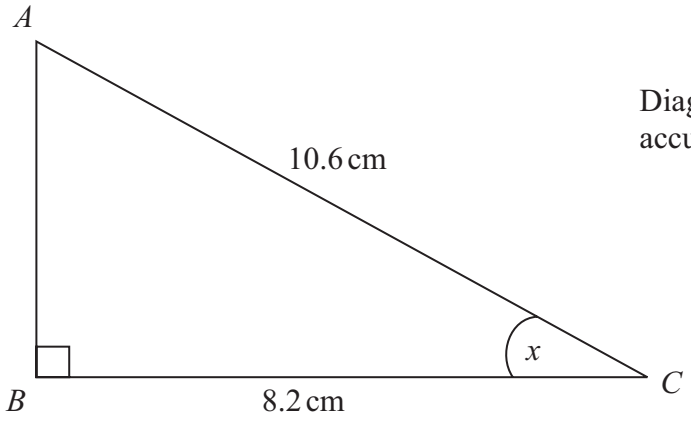


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
AC = 10.6 cm.
BC = 8.2 cm.

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

..... °

Q23

(Total 3 marks)

20.

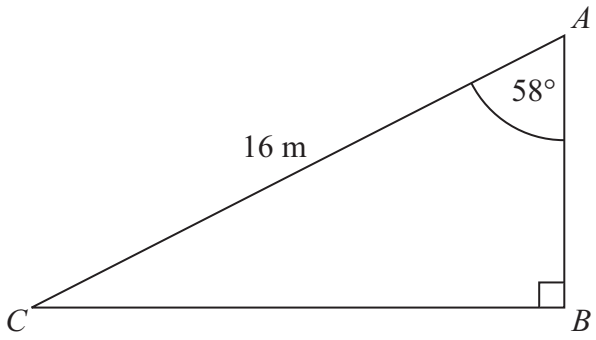


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
AC = 16 m.
Angle *CAB* = 58°

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

..... m

(Total 3 marks)

Q20

21.

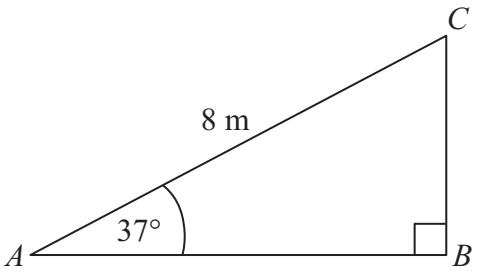


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
AC = 8 m.
Angle *CAB* = 37°.

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

..... m

(Total 3 marks)

Q21

13. Use your calculator to work out

$$\sqrt{\frac{920 - 170\tan 65°}{0.012 + 0.034}}$$

(a) Write down all the figures on your calculator display.
You must write your answer as a decimal.

.....

(2)

(b) Give your answer to part (a) correct to 3 significant figures.

.....

(1)

Q13

(Total 3 marks)

25.

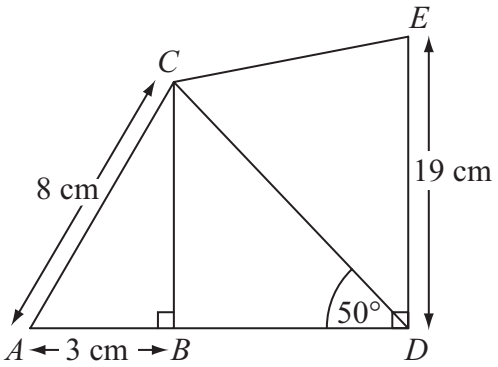


Diagram **NOT** accurately drawn

$AC = 8$ cm.
$AB = 3$ cm.
$DE = 19$ cm.
Angle ABC = angle CBD = angle $BDE = 90°$.
Angle $BDC = 50°$.

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

..... cm
(4)

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

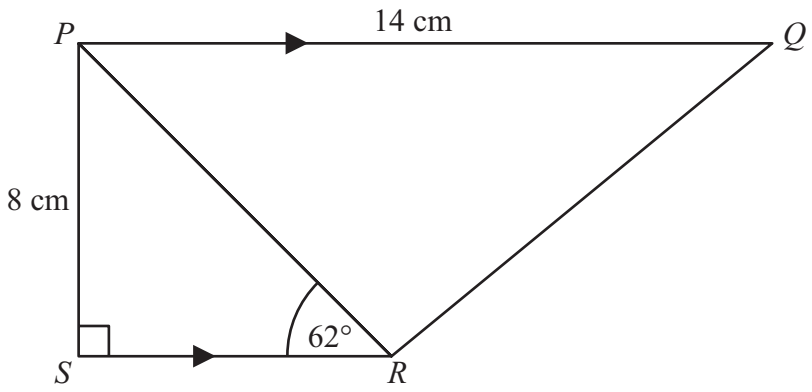
..... cm
(3)

(Total 7 marks)

Q25

20.

Diagram **NOT** accurately drawn



PQRS is a trapezium.
PQ is parallel to *SR*.
Angle *PSR* = 90°.
Angle *PRS* = 62°.
PQ = 14 cm.
PS = 8 cm.

(a) Work out the length of *PR*.
Give your answer correct to 3 significant figures.

..... cm
(3)

(b) Work out the length of *QR*.
Give your answer correct to 3 significant figures.

..... cm
(4)

Q20

(Total 7 marks)

16

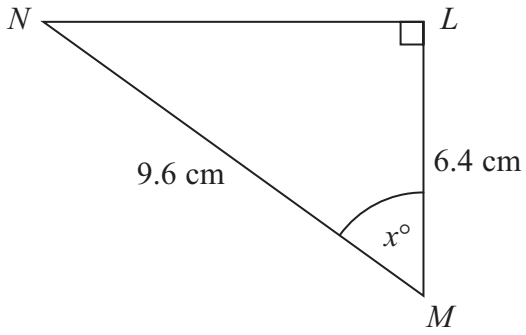


Diagram **NOT** accurately drawn

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.

.....°

(Total for Question 16 is 3 marks)

18 The diagram shows a quadrilateral $ABCD$.

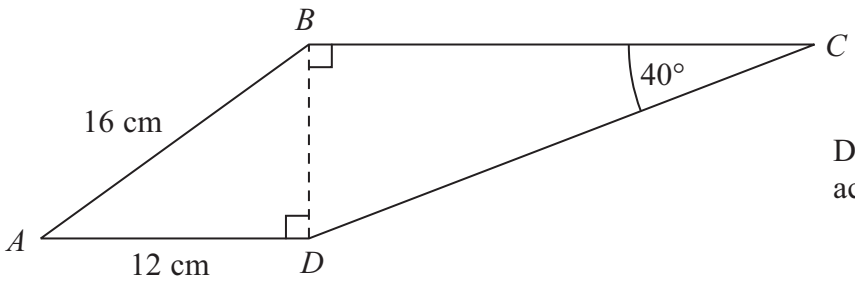


Diagram **NOT** accurately drawn

$AB = 16$ 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.

..... cm

(Total for Question 18 is 5 marks)

14

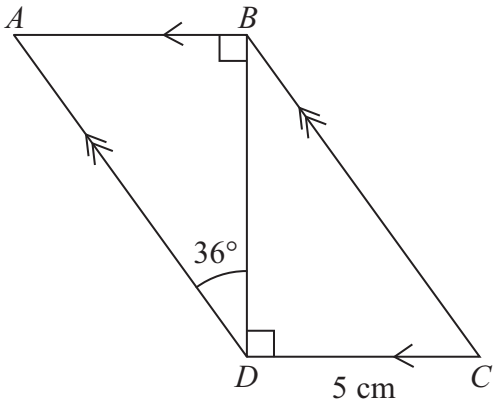


Diagram **NOT** accurately drawn

ABCD is a parallelogram.

DC = 5 cm
Angle *ADB* = 36°

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

..... cm

(Total for Question 14 is 4 marks)

13

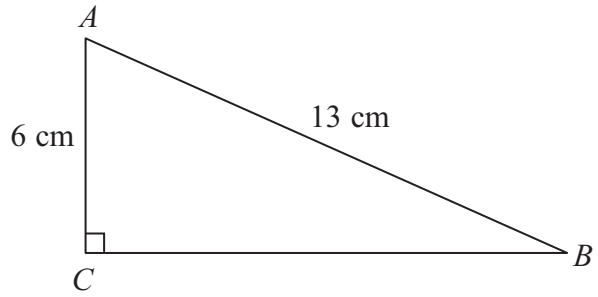


Diagram **NOT** accurately drawn

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

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

..... cm

(3)

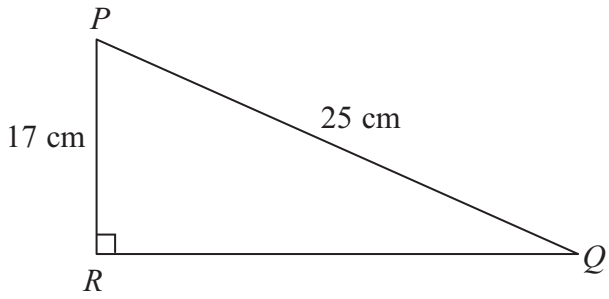


Diagram **NOT** accurately drawn

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

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

.....°

(3)

(Total for Question 13 is 6 marks)

17 Calculate the value of $\sqrt{\dfrac{\tan 60° + 1}{\tan 60° - 1}}$

Write down all the figures on your calculator display.
You must give your answer as a decimal.

.....

(Total for Question 17 is 2 marks)

20

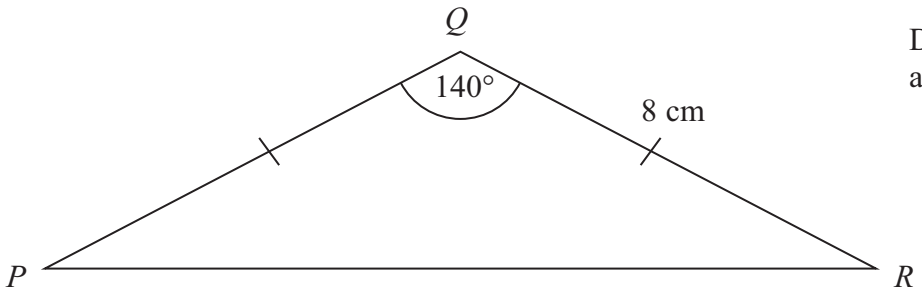


Diagram **NOT** accurately drawn

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

..... cm

(Total for Question 20 is 3 marks)

***20** The diagram shows a ladder leaning against a vertical wall.

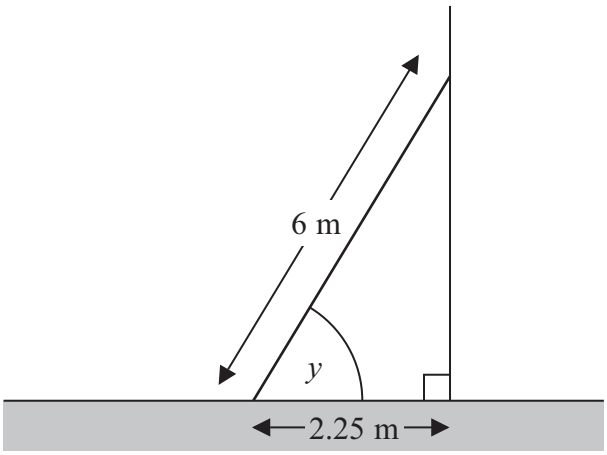


Diagram **NOT** accurately drawn

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.

(Total for Question 20 is 3 marks)

10 *GHJ* is a right-angled triangle.

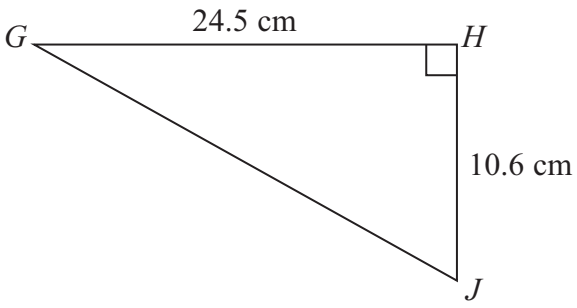


Diagram **NOT** accurately drawn

(a) Calculate the length of *GJ*.
Give your answer correct to one decimal place.

..... cm
(3)

LMN is a different right-angled triangle.

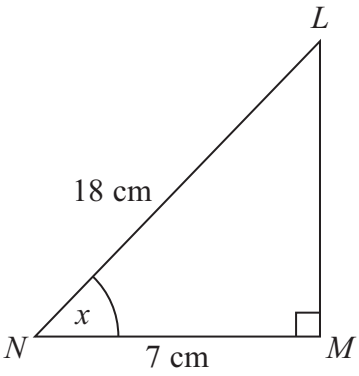


Diagram **NOT** accurately drawn

(b) Calculate the size of the angle marked *x*.
Give your answer correct to one decimal place.

°
.....
(3)

(Total for Question 10 is 6 marks)

18 ABC is an isosceles triangle.

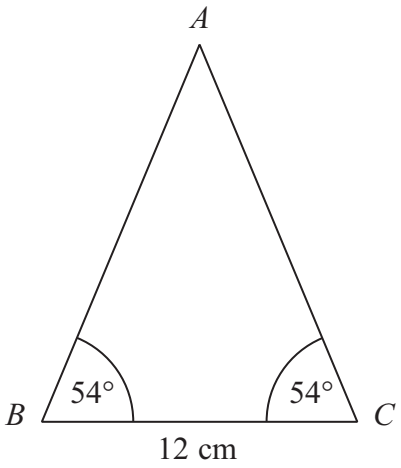


Diagram **NOT** accurately drawn

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

..... cm^2

(Total for Question 18 is 4 marks)

11

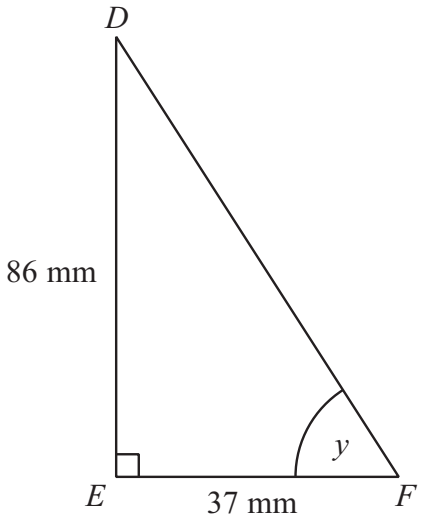


Diagram **NOT** accurately drawn

DEF is a right-angled triangle.
DE = 86 mm
EF = 37 mm

Calculate the size of the angle marked *y*.
Give your answer correct to 1 decimal place.

.....°

(Total for Question 11 is 3 marks)

11

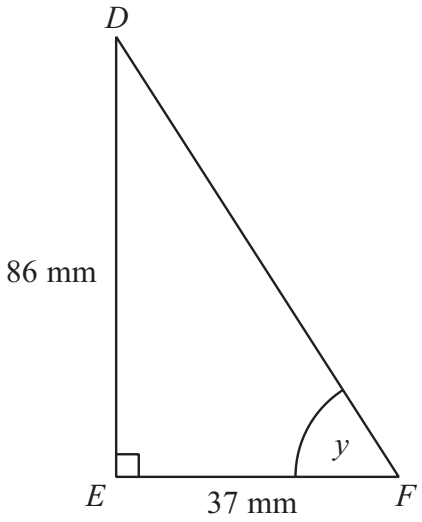


Diagram **NOT** accurately drawn

DEF is a right-angled triangle.
DE = 86 mm
EF = 37 mm

Calculate the size of the angle marked *y*.
Give your answer correct to 1 decimal place.

.....°

(Total for Question 11 is 3 marks)

11

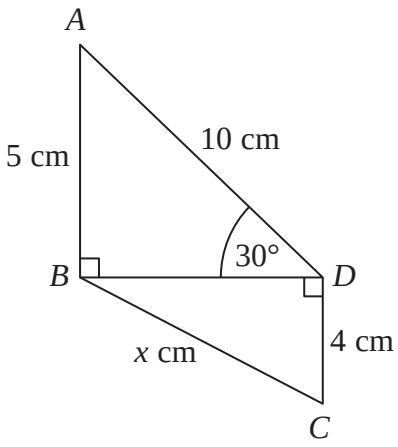


Diagram **NOT** accurately drawn

In the diagram,

triangles *ABD* and *BCD* are right-angled triangles
AB = 5 cm
AD = 10 cm
CD = 4 cm
Angle *ADB* = 30°

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

.....cm

(Total for Question 11 is 4 marks)

19

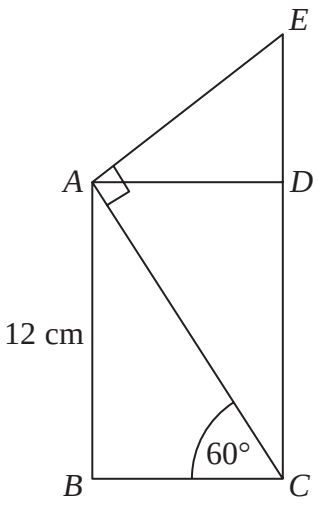


Diagram **NOT** accurately drawn

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.

..... cm

(Total for Question 19 is 4 marks)

21

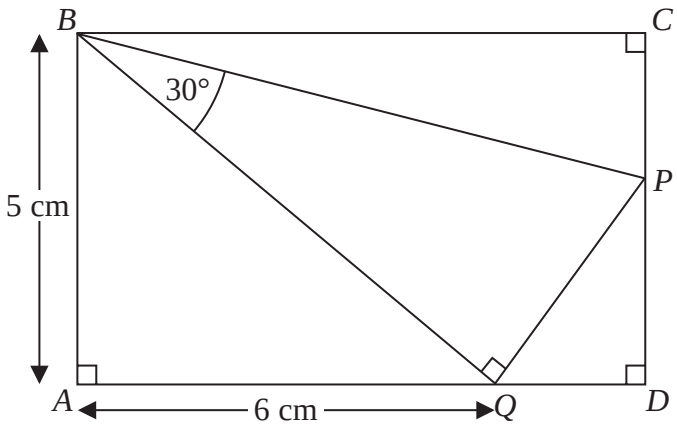


Diagram **NOT** accurately drawn

In the diagram,

ABCD is a rectangle
P lies on the line *CD*
Q lies on the line *AD*
PQB is a right-angled triangle

Work out the length of *BC*.
Give your answer correct to 3 significant figures.
You must show your working.

.....cm

(Total for Question 21 is 5 marks)

17

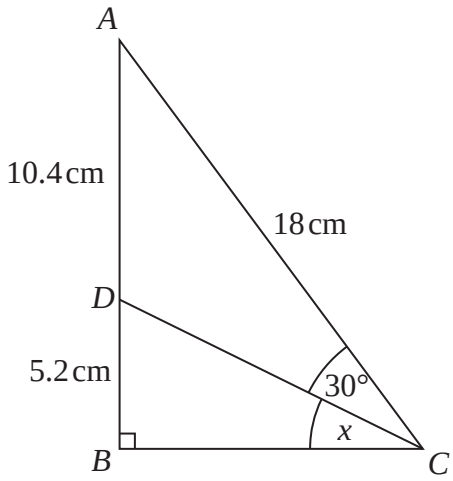


Diagram **NOT** accurately drawn

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.

.....°

(Total for Question 17 is 4 marks)

10

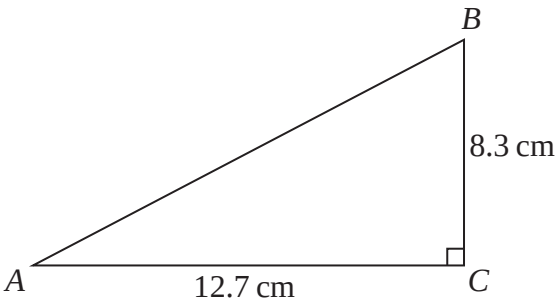


Diagram **NOT** accurately drawn

(a) Calculate the length of *AB*.
Give your answer correct to one decimal place.

..... cm

(3)

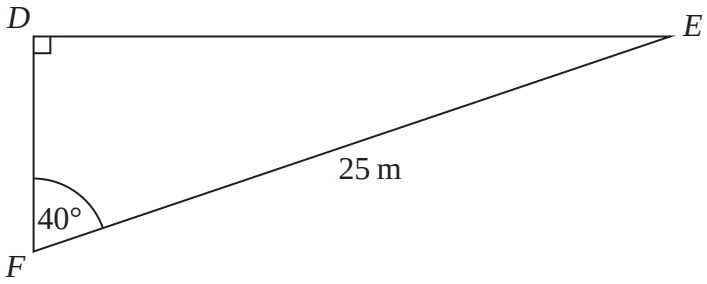


Diagram **NOT** accurately drawn

(b) Calculate the length of *DE*.
Give your answer correct to three significant figures.

..... m

(3)

(Total for Question 10 is 6 marks)

15

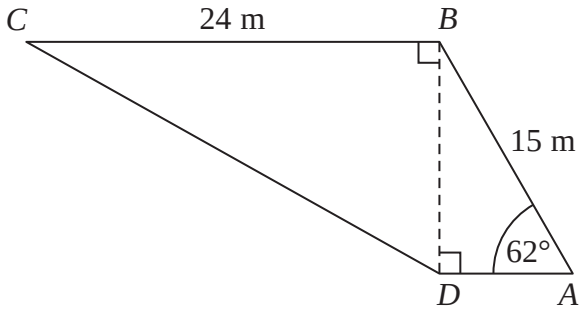


Diagram **NOT** accurately drawn

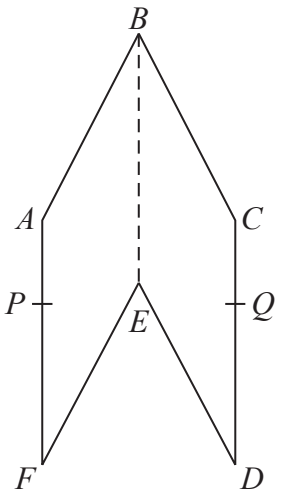
AB = 15 m
BC = 24 m
Angle *BAD* = 62°

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

.....°

(Total for Question 15 is 5 marks)

22 The diagram shows a hexagon $ABCDEF$.



$ABEF$ and $CBED$ are congruent parallelograms where $AB = BC = x$ cm.
P is the point on AF and Q is the point on CD such that $BP = BQ = 10$ cm.

Given that angle $ABC = 30°$,

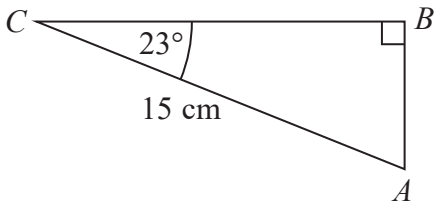
prove that $\cos PBQ = 1 - \dfrac{(2 - \sqrt{3})}{200}x^2$

(Total for Question 22 is 5 marks)

Question 30

June 2017 | 1MA1/3H | Original Q7

7 ABC is a right-angled triangle.

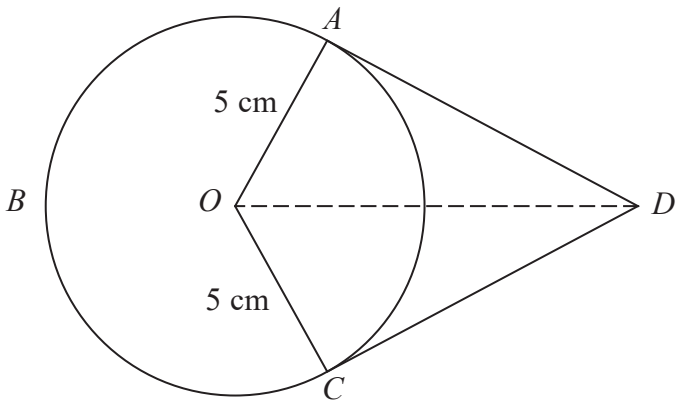


Calculate the length of AB.
Give your answer correct to 3 significant figures.

.....cm

(Total for Question 7 is 2 marks)

18



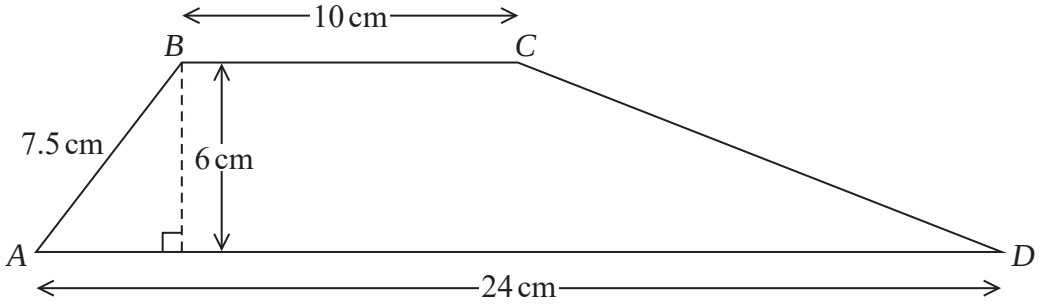
A, *B* and *C* are points on a circle of radius 5 cm, centre *O*.
DA and *DC* are tangents to the circle.
DO = 9 cm

Work out the length of arc *ABC*.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 18 is 5 marks)

7 *ABCD* is a trapezium.



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

.....°

(Total for Question 7 is 5 marks)

Question 33

8 Use your calculator to work out $\sqrt{\dfrac{\sin 25° + \sin 40°}{\cos 25° - \cos 40°}}$

(a) Write down all the figures on your calculator display.

.....

(2)

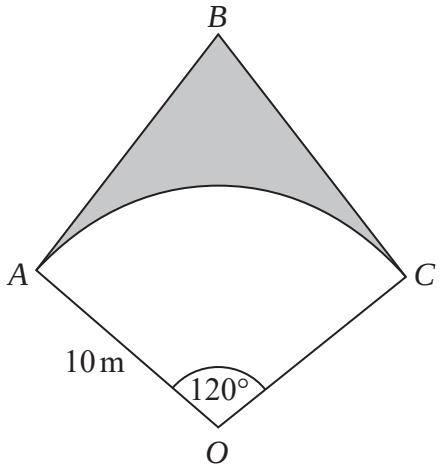
(b) Write your answer to part (a) correct to 2 decimal places.

.....

(1)

(Total for Question 8 is 3 marks)

20



OAC is a sector of a circle, centre *O*, radius 10 m.

BA is the tangent to the circle at point *A*.
BC is the tangent to the circle at point *C*.

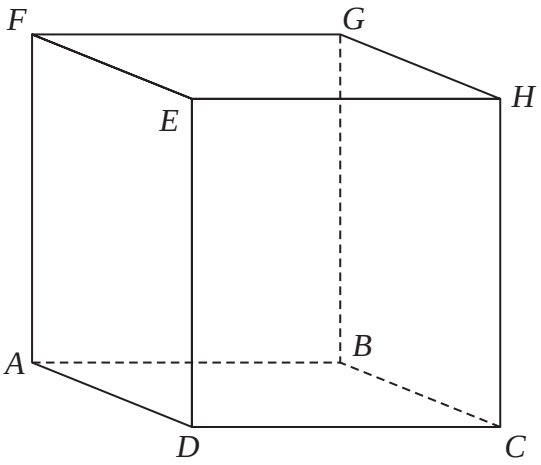
Angle *AOC* = 120°

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

..... m^2

(Total for Question 20 is 5 marks)

18 *ABCDEFGH* is a cuboid.



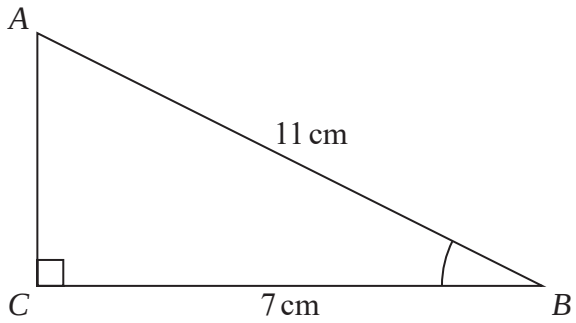
$AB = 7.3$ cm
$CH = 8.1$ cm
Angle $BCA = 48°$

Find the size of the angle between AH and the plane $ABCD$.
Give your answer correct to 1 decimal place.

.....°

(Total for Question 18 is 4 marks)

5 *ABC* is a right-angled triangle.



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

.....°

(2)

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°

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

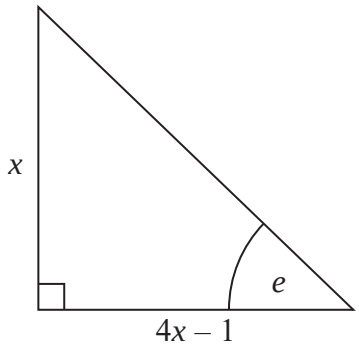
.....

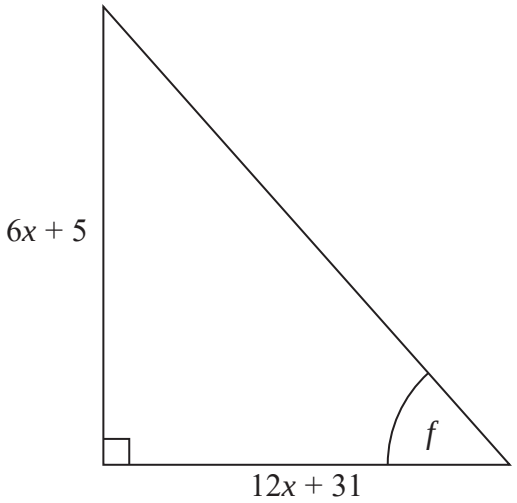
.....

(1)

(Total for Question 5 is 3 marks)

19 Here are two right-angled triangles.





Given that

$$\tan e = \tan f$$

find the value of x.

You must show all your working.

.....

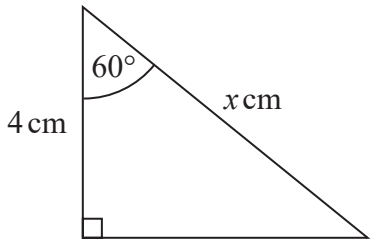
(Total for Question 19 is 5 marks)

8 (a) Write down the exact value of tan 45°

.....

(1)

Here is a right-angled triangle.



cos 60° = 0.5

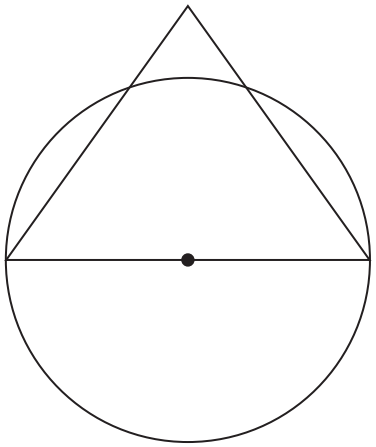
(b) Work out the value of x.

.....

(2)

(Total for Question 8 is 3 marks)

13 The diagram shows a circle and an equilateral triangle.



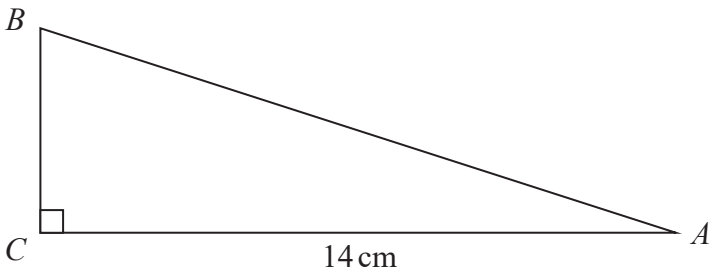
One side of the equilateral triangle is a diameter of the circle.
The circle has a circumference of 44 cm.

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

.....cm^2

(Total for Question 13 is 3 marks)

6 ABC is a right-angled triangle.



$AC = 14$ cm.
Angle $C = 90°$

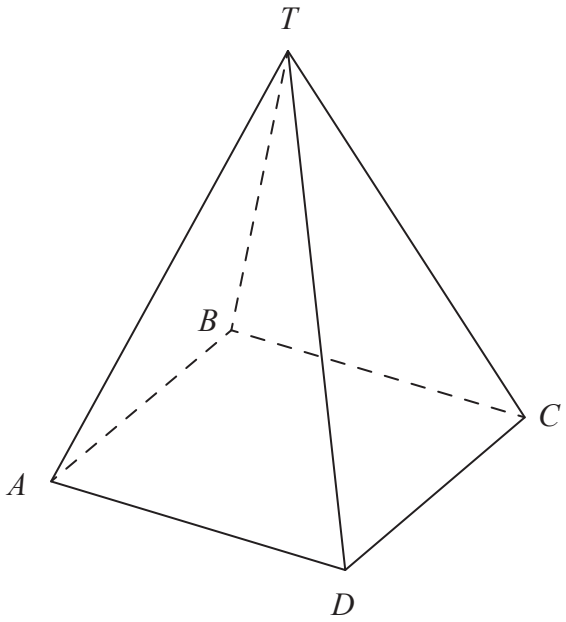
size of angle B : size of angle $A = 3 : 2$

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

.....cm

(Total for Question 6 is 4 marks)

12 Here is a pyramid with a square base $ABCD$.



$AB = 5\,\text{m}$

The vertex T is 12 m vertically above the midpoint of AC.

Calculate the size of angle TAC.

.....°

(Total for Question 12 is 4 marks)

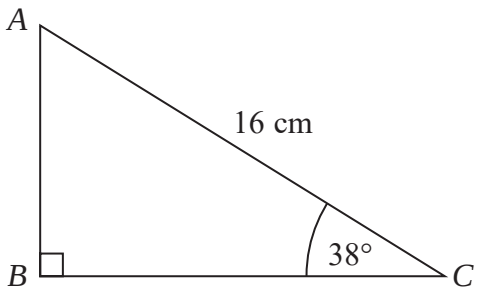
Question 42

14 Find the exact value of $\tan 30° \times \sin 60°$
Give your answer in its simplest form.

.....

(Total for Question 14 is 2 marks)

5 *ABC* is a right-angled triangle.



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

.....cm

(Total for Question 5 is 2 marks)

Question 44

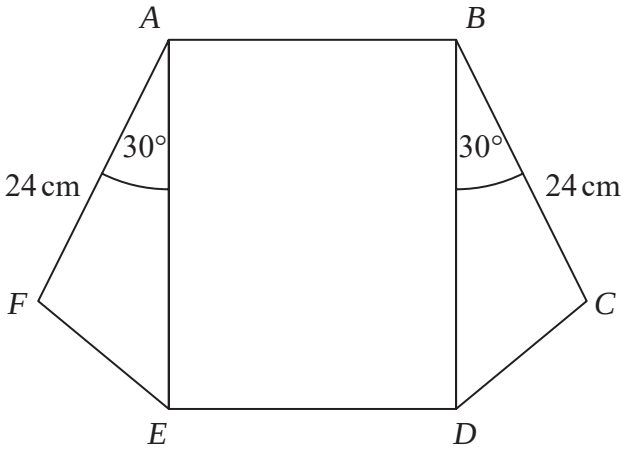
7 Work out $\sqrt{\dfrac{2.5 \times \sin 43°}{8.2^2 - 50.5}}$

Give your answer correct to 3 significant figures.

.....

(Total for Question 7 is 2 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*

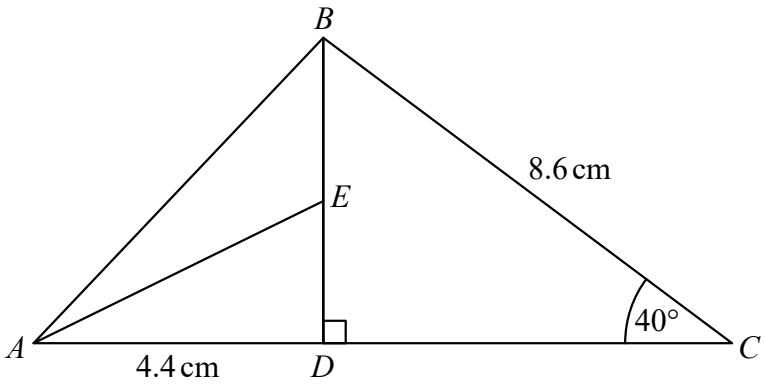
$$AB : AE = 1 : 3$$

Work out the length of *AE*.

..... cm

(Total for Question 14 is 4 marks)

12 The diagram shows triangle ABC.



ADC and DEB are straight lines.

$AD = 4.4$ cm
$BC = 8.6$ cm
E is the midpoint of DB.

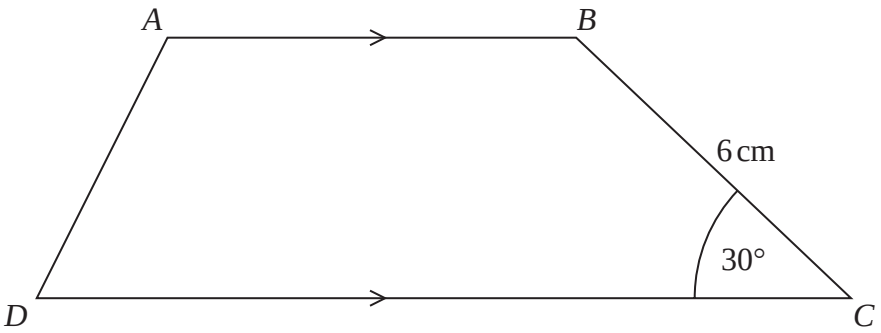
Angle $CDB = 90°$
Angle $DCB = 40°$

Work out the size of angle EAD.
Give your answer correct to 1 decimal place.
You must show all your working.

.....°

(Total for Question 12 is 4 marks)

18 Here is trapezium $ABCD$.



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

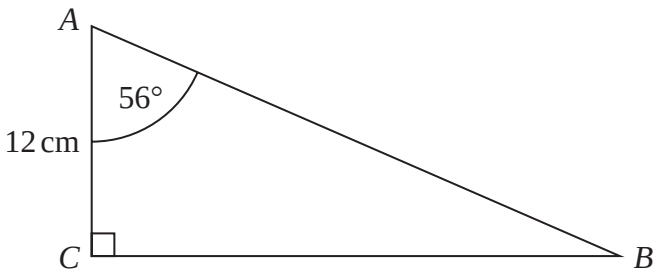
the length of AB : the length of $CD = 2 : 3$

Find the length of AB.

..... cm

(Total for Question 18 is 5 marks)

6 *ABC* is a right-angled triangle.

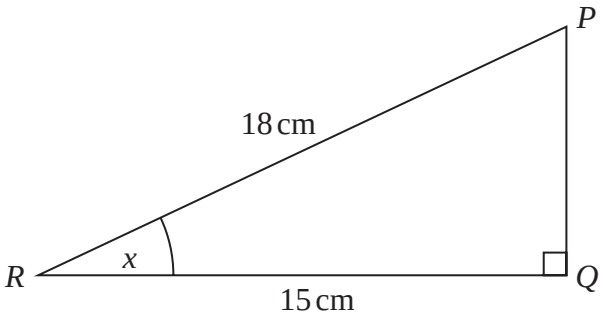


(a) Work out the length of *BC*.
Give your answer correct to 1 decimal place.

..... cm

(2)

PQR is a right-angled triangle.



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

.....°

(2)

(Total for Question 6 is 4 marks)

8 Use your calculator to work out

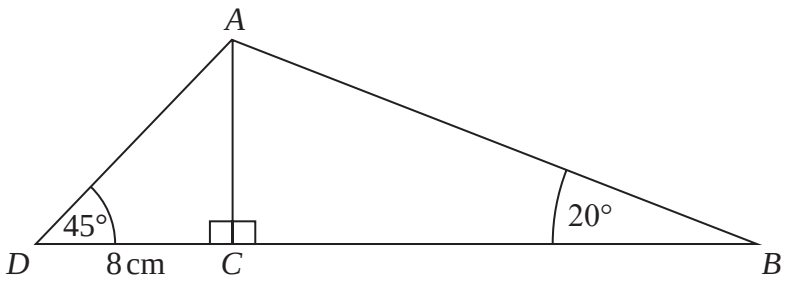
$$\frac{\sqrt[3]{1.57^4 + \tan 60°}}{7.2^{\frac{1}{2}}}$$

Give your answer correct to 3 significant figures.

.....

(Total for Question 8 is 2 marks)

12 *ABC* and *ACD* are right-angled triangles.



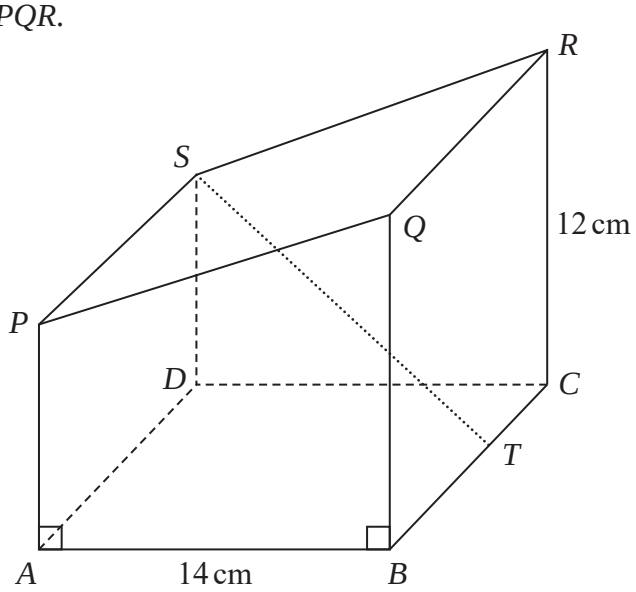
DC = 8 cm
Angle *ADC* = 45°
Angle *ABC* = 20°

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

..... cm

(Total for Question 12 is 3 marks)

18 Here is a prism *ABCDSPQR*.



The base *ABCD* of the prism is a square of side 14 cm
T is the point on *BC* such that $BT : TC = 4 : 3$

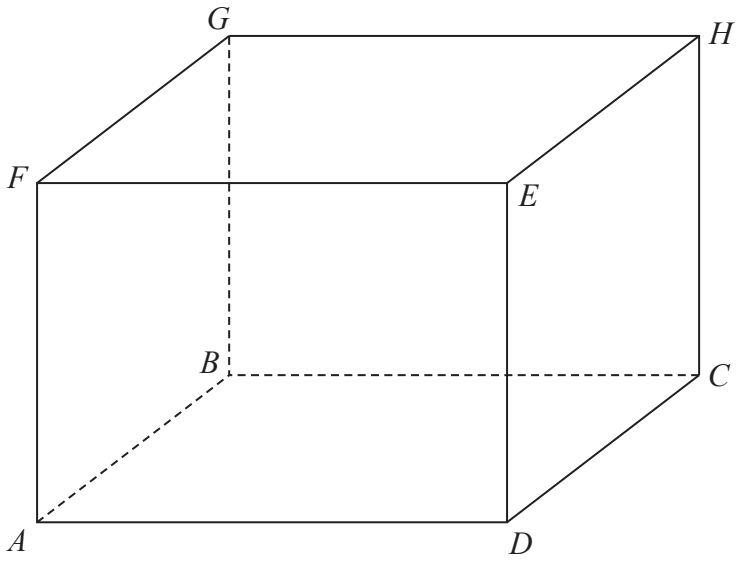
The cross section of the prism is in the shape of a trapezium of area 147 cm^2
$CR = 12$ cm

Find the size of the angle between the line *ST* and the base *ABCD*.
Give your answer correct to 1 decimal place.

.....°

(Total for Question 18 is 5 marks)

22 *ABCDEFGH* is a cuboid.



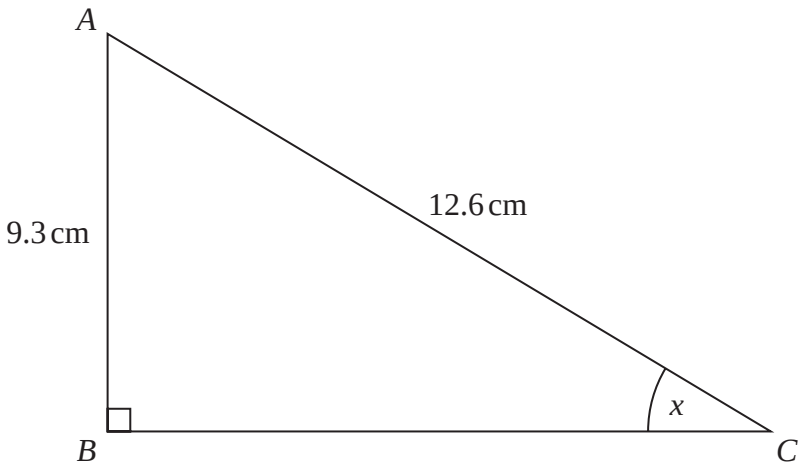
$AF = 6.8\,\text{cm}$
$FC = 13.6\,\text{cm}$

Work out the size of the angle between FC and the plane $ABCD$.

.....°

(Total for Question 22 is 2 marks)

19 *ABC* is a right-angled triangle.



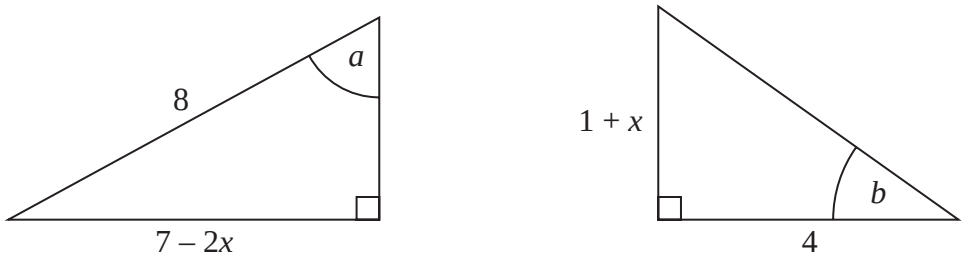
AB = 9.3 cm correct to the nearest mm.
AC = 12.6 cm correct to the nearest mm.

Calculate the lower bound for the size of the angle marked *x*.
You must show all your working.

.....°

(Total for Question 19 is 3 marks)

10 The diagram shows two right-angled triangles.



All lengths are measured in centimetres.

Given that

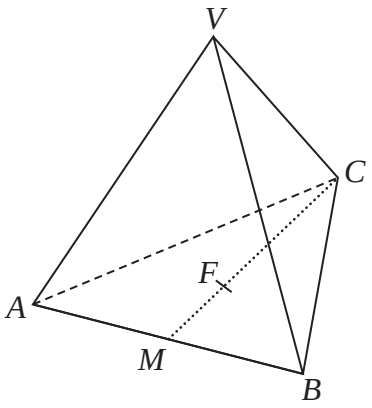
$$\sin a = \tan b$$

work out the value of x.

$x =$ .....

(Total for Question 10 is 3 marks)

20 *VABC* is a solid pyramid.
ABC is an equilateral triangle.



M is the midpoint of *AB*.
F is the point on *MC* such that $MF : FC = 1 : 2$

The vertex *V* is vertically above *F*.
$VA = VB = VC$

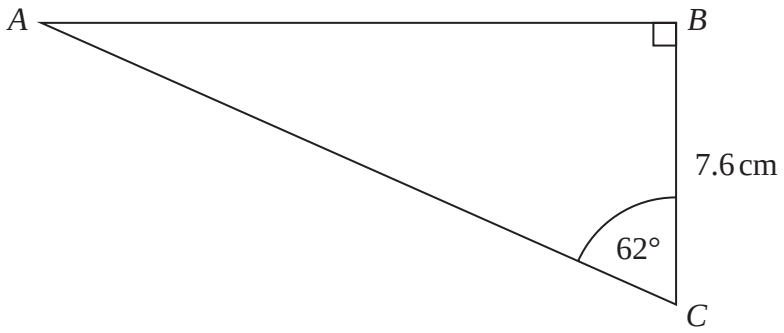
$VF = 8\,\text{cm}$ Angle $VCM = 52°$

Work out the side length of the equilateral triangle *ABC*.
Give your answer correct to 1 decimal place.

..... cm

(Total for Question 20 is 3 marks)

8 *ABC* is a right-angled triangle.

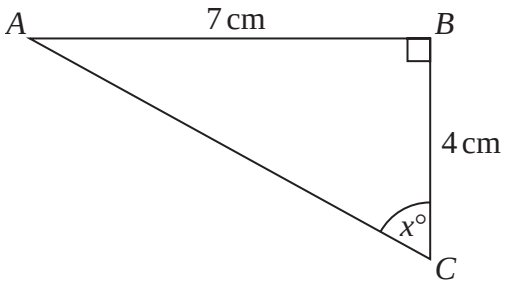


Calculate the length of *AB*.
Give your answer correct to 1 decimal place.

..... cm

(Total for Question 8 is 2 marks)

7 *ABC* is a right-angled triangle.



Calculate the value of x.
Give your answer correct to 1 decimal place.

x = ...

(Total for Question 7 is 2 marks)

Question 58

10 Use your calculator to work out $\dfrac{\left(1.8^3 \times \cos 35°\right)^2}{\sqrt[3]{17.4 - \tan 85°}}$

Give your answer correct to 3 significant figures.

.....

(Total for Question 10 is 2 marks)