Higher tier unit 13a check in test

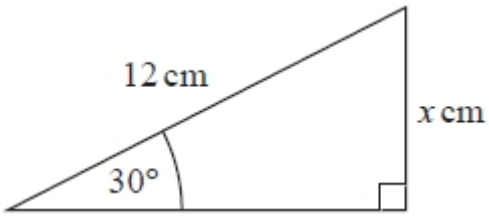
Non-calculator

Q1. Write down the exact value of cos 30°.

Q2. Write down the exact value of sin 45°.

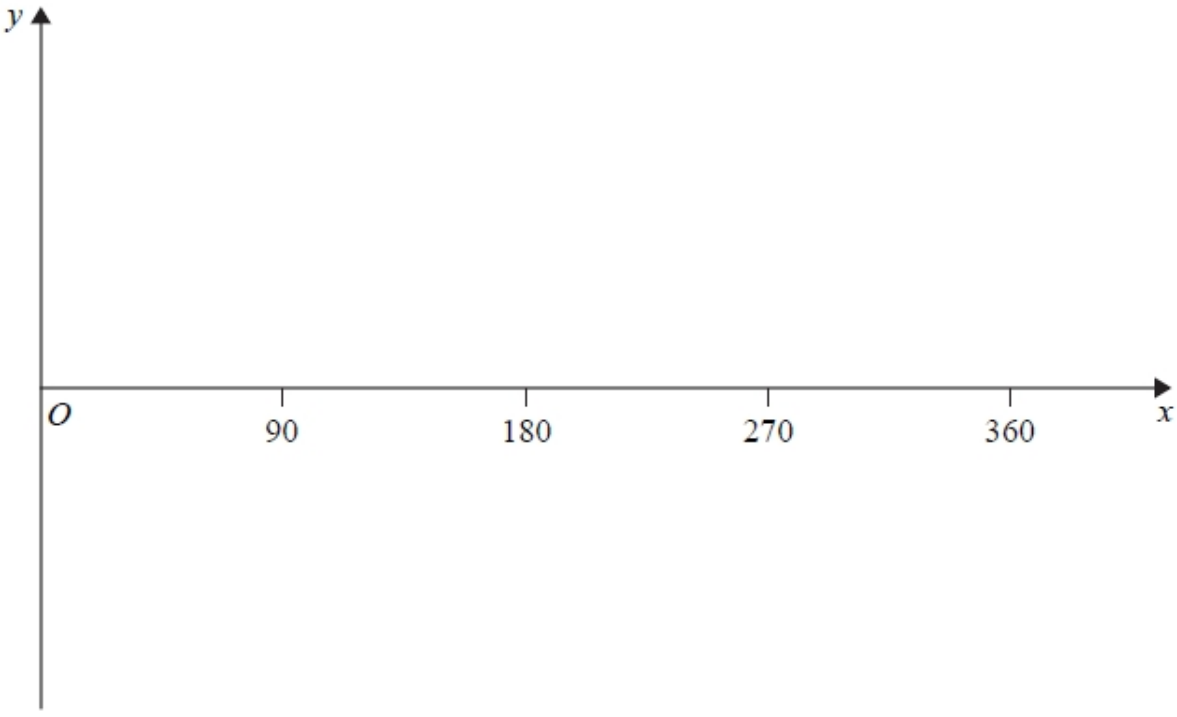
Q3. Write down the exact value of tan 60°.

Q4.



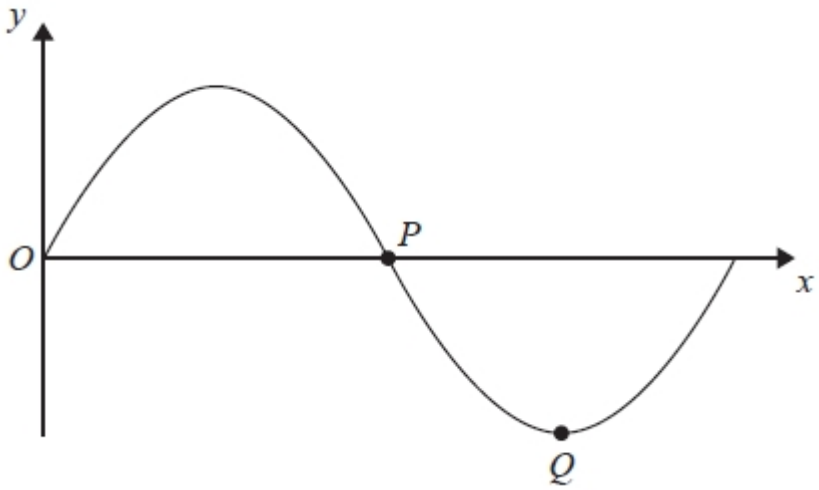
Work out the value of x.

Q5. Sketch the graph of $y = \cos x^{\circ}$ for $0 \leq x \leq 360$



[Q6–7 linked]

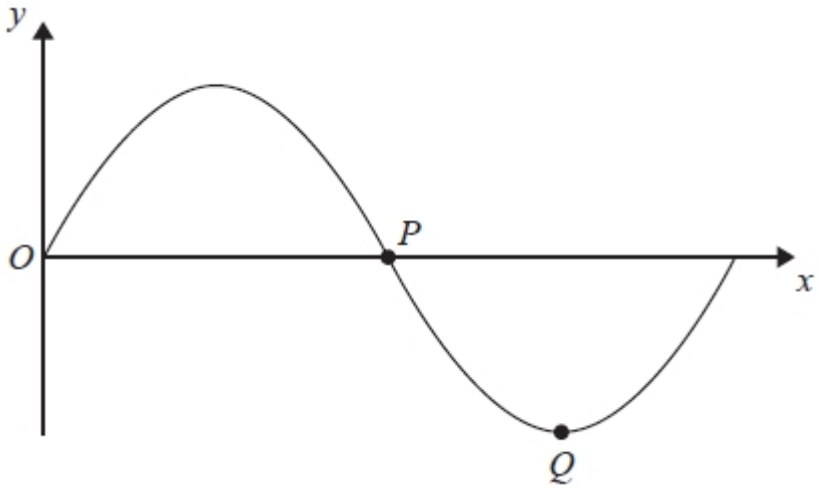
Q6. The diagram shows part of a sketch of the curve $y = \sin x°$.



Write down the coordinates of the point P.

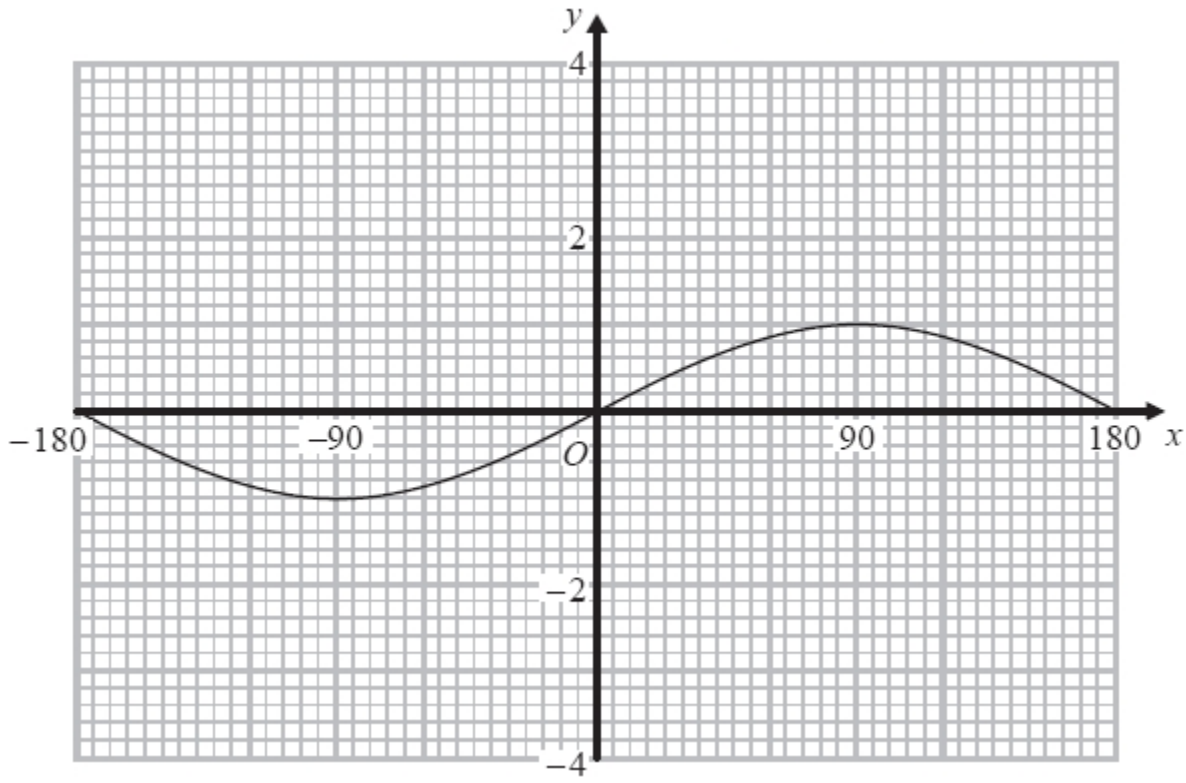
Q7. Write down the coordinates of the point Q in the diagram in question 6.

Q8. The diagram shows part of a sketch of the curve $y = \sin x°$.



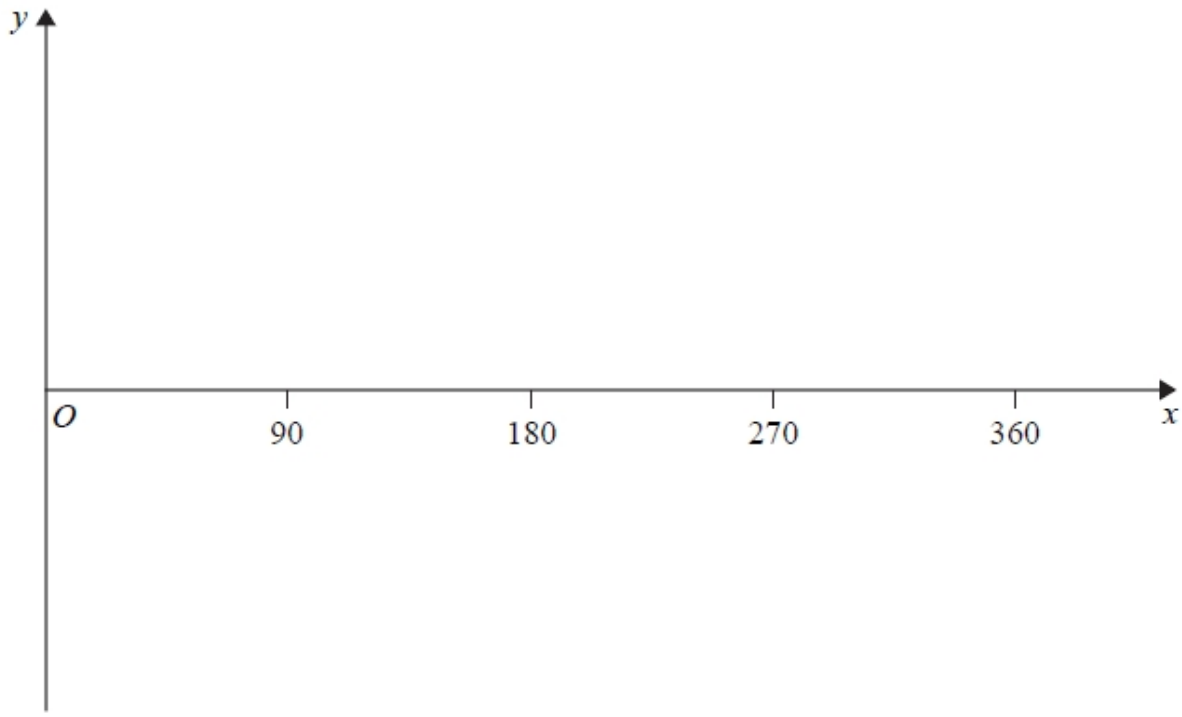
On the grid above, sketch the graph of $y = -\sin x°$.

Q9. Here is the graph of $y = \sin x°$ for $-180 \leq x \leq 180$



On the grid above, sketch the graph of $y = \sin x° + 2$ for $-180 \leq x \leq 180$

Q10. Sketch the graph of $y = \cos (x + 2)$ for $0 \leq x \leq 360$



Topics listed in objectives

- Recognise, sketch and interpret graphs of the trigonometric functions (in degrees) $y = \sin x$, $y = \cos x$ and $y = \tan x$ for angles of any size.
- Know the exact values of $\sin\theta$ and $\cos\theta$ for $\theta = 0°, 30°, 45°, 60°$ and $90°$ and exact value of $\tan\theta$ for $\theta = 0°, 30°, 45°$ and $60°$ and find them from graphs.
- Apply to the graph of $y = f(x)$ the transformations $y = -f(x)$, $y = f(-x)$ for sine, cosine and tan functions $f(x)$.
- Apply to the graph of $y = f(x)$ the transformations $y = f(x) + a$, $y = f(x + a)$ for sine, cosine and tan functions $f(x)$.

Answers

Q1. $\frac{\sqrt{3}}{2}$

Q2. $\frac{\sqrt{2}}{2}$

Q3. $\sqrt{3}$

Q4. 6 cm

Q5. Sketch through (0, 1), (90, 0), (180, –1), (270, 0), (360, 1)

Q6. (180, 0)

Q7. (270, –1)

Q8. reflection in x-axis

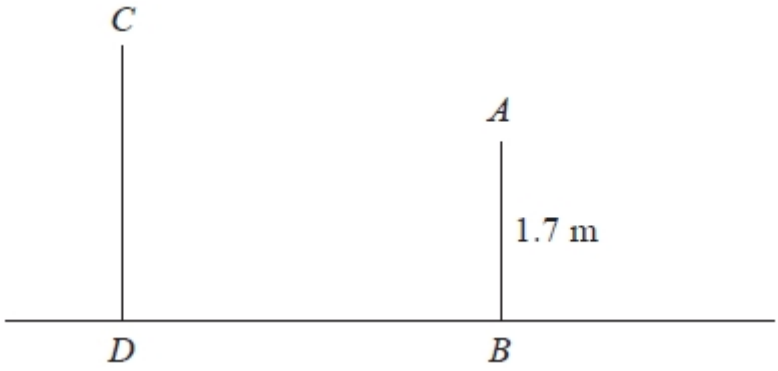
Q9. Sketch translated two units up the y-axis

Q10. Sketch translated two units left along the x-axis

Higher tier unit 13b check in test

Calculator

Q1. The diagram shows two vertical posts, *AB* and *CD*, on horizontal ground.



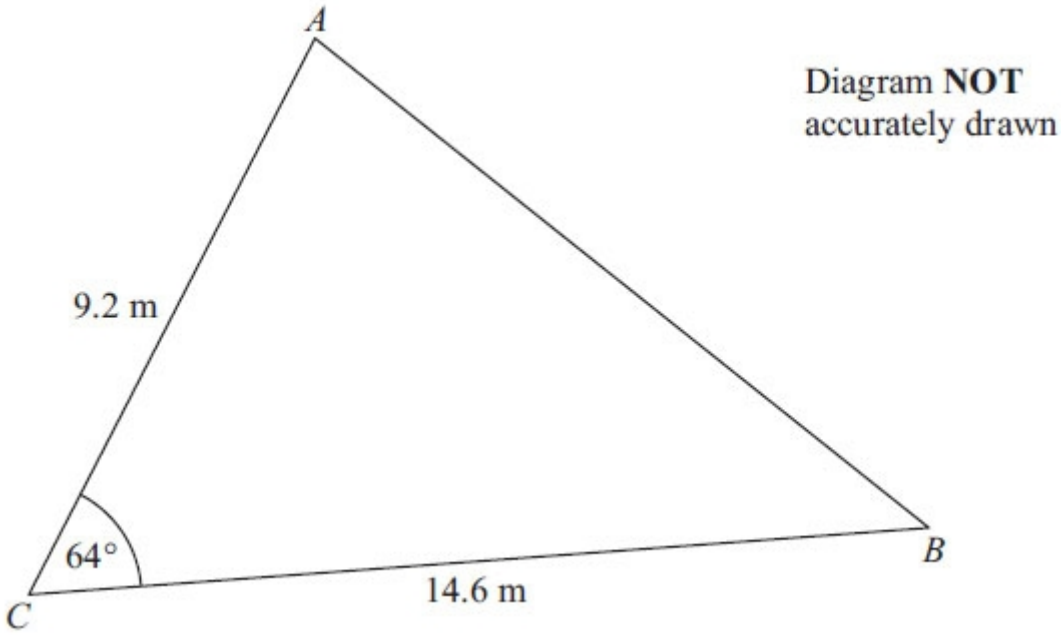
AB = 1.7 m
CD : *AB* = 1.5 : 1

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

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

[Q2–3 linked]

Q2. Calculate the area of the triangle *ABC*.
Give your answer correct to 3 significant figures.



Q3. Calculate the length of *AB* in the diagram in question 2.
Give your answer correct to 3 significant figures.

Q4. *ABC* is a triangle.

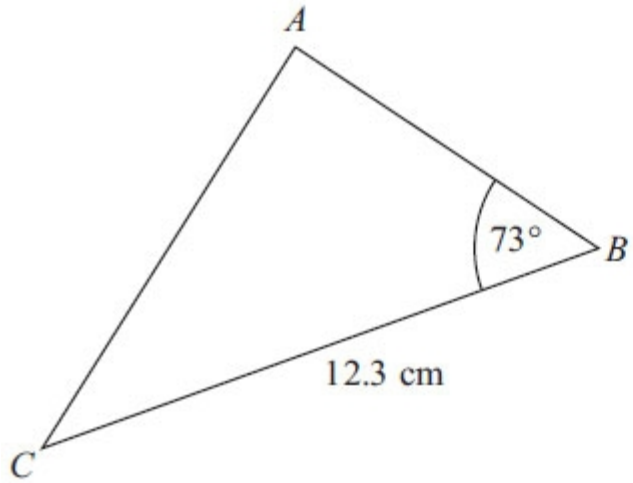


Diagram **NOT** accurately drawn

The area of triangle *ABC* is 50 cm^2.

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

Q5. The diagram shows a cuboid *ABCDEFGH*.
AB = 8 cm, *AF* = 6 cm and *FC* = 16 cm.

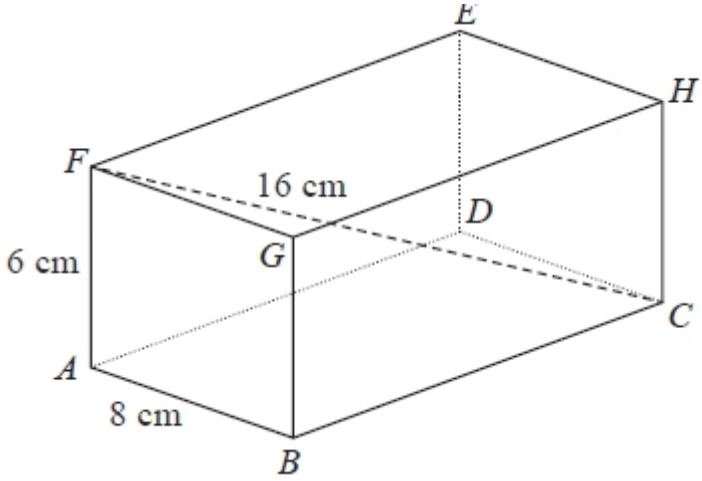
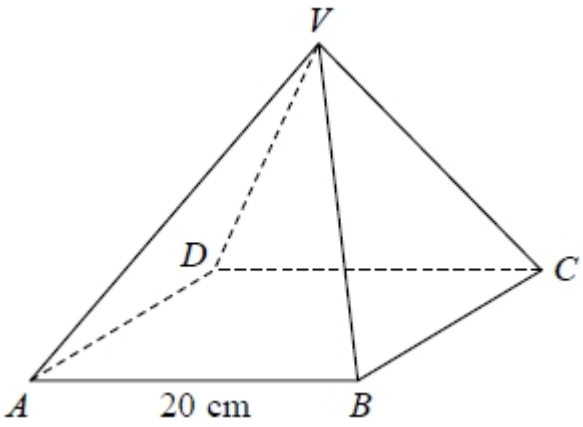


Diagram **NOT** accurately drawn

Find the size of the angle between the line *FC* and the plane *ABGF*.
Give your answer correct to 1 decimal place.

Q6. *VABCD* is a solid pyramid.



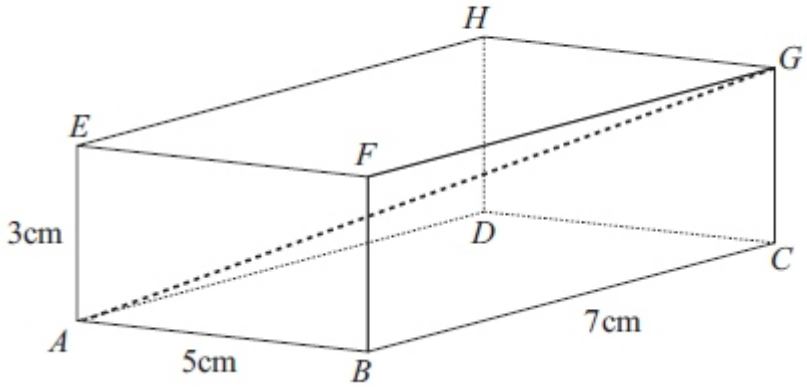
ABCD is a square of side 20 cm.
The angle between any sloping edge and the plane *ABCD* is 55°

Calculate the surface area of the pyramid.
Give your answer correct to 2 significant figures.

Q7. The diagram shows a cuboid *ABCDEFGH*.

AB = 5cm
BC = 7cm
AE = 3cm

Diagram **NOT** accurately drawn



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

Q8. There is a coastguard station at point A and at point B.
B is due East of A.
The distance from A to B is 12 km.

There is a rowing boat at point R.
R is on a bearing of 160° from A.
R is on a bearing of 220° from B.

There is a speedboat at point T.
T is 5 km due South of A.

Work out the shortest distance from T to R.
Give your answer correct to 1 decimal place.

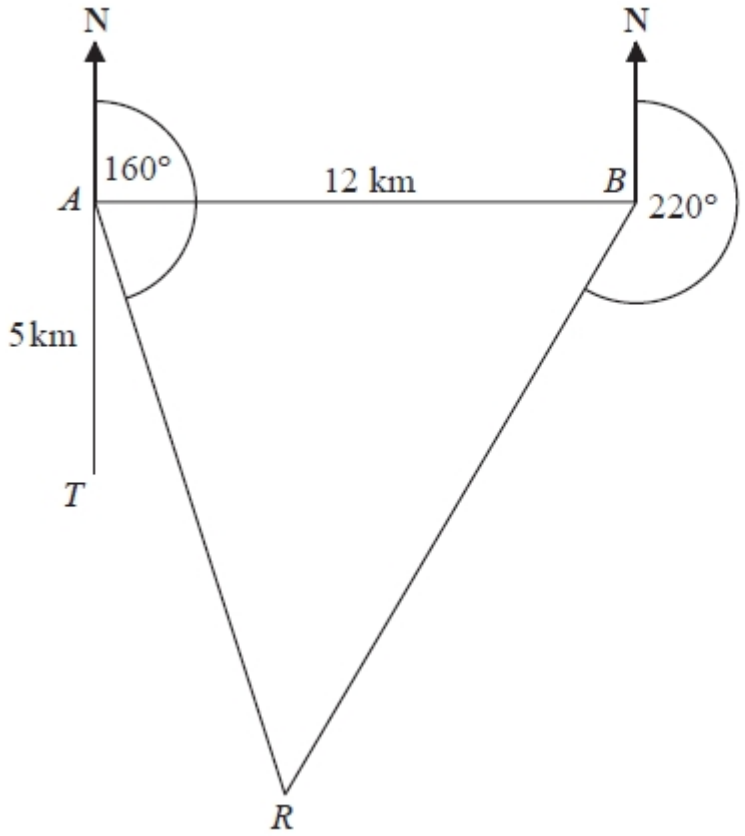


Diagram **NOT** accurately drawn

Q9. *ABC* is a triangle.

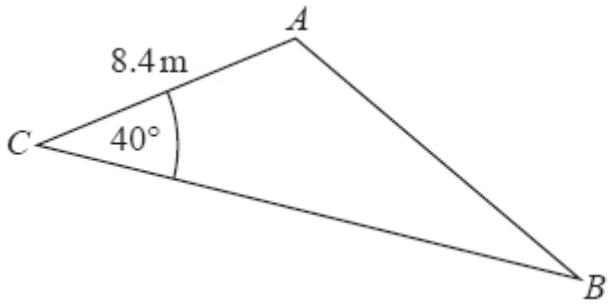


Diagram **NOT** accurately drawn

AC = 8.4m
Angle *ACB* = 40°
The area of the triangle = 100m^2.

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

Q10. *ABCDE* is a square-based pyramid.

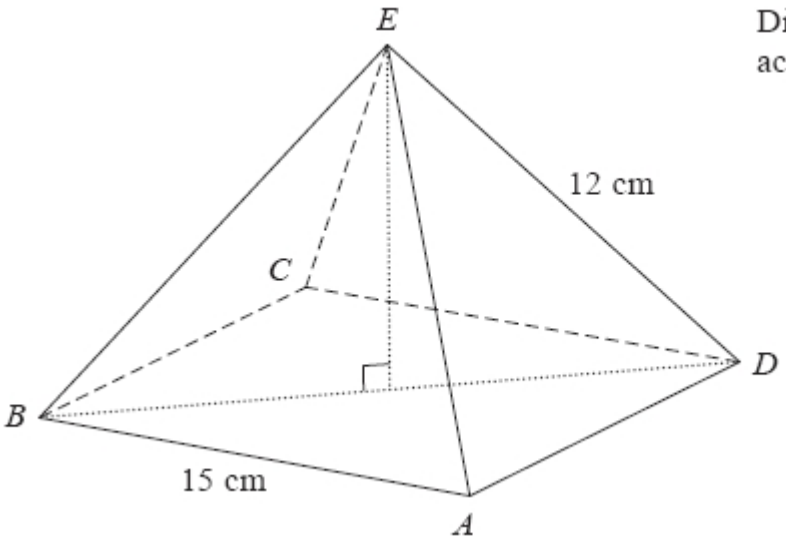


Diagram **NOT** accurately drawn

AE = *BE* = *CE* = *DE* = 12 cm
AB = 15 cm

Calculate the size of angle *DEB*.
Give your answer to the nearest degree.

Topics listed in objectives

- Know and apply Area = $\frac{1}{2}ab \sin C$ to calculate the area, sides or angles of any triangle.
- Know the sine and cosine rules, and use to solve 2D problems (including involving bearings).
- Use the sine and cosine rules to solve 3D problems.
- Understand the language of planes, and recognise the diagonals of a cuboid.
- Solve geometrical problems on coordinate axes.
- Understand, recall and use trigonometric relationships and Pythagoras' Theorem in right-angled triangles, and use these to solve problems in 3D configurations.
- Calculate the length of a diagonal of a cuboid.
- Find the angle between a line and a plane.

Answers

Q1. 0.664 m
Q2. 60.4 m²
Q3. 13.4 m
Q4. 12.7 cm
Q5. 51.3°
Q6. 1300 cm²
Q7. 9.11 cm
Q8. 6.2 km
Q9. 31.1 m
Q10. 124°