

3D Pythagoras & Trigonometry

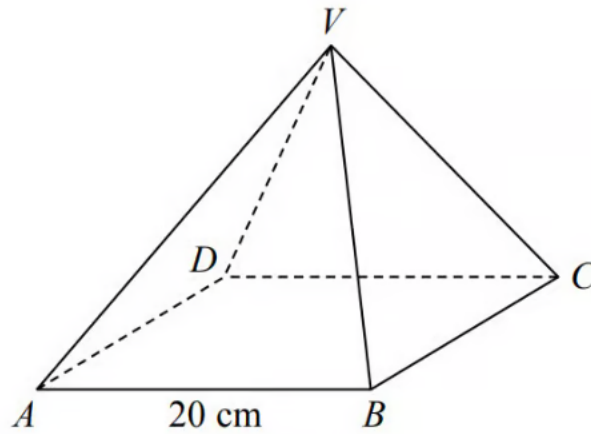
Question Paper

Course	Edexcel IGCSE Maths
Section	4. Geometry & Trigonometry
Topic	3D Pythagoras & Trigonometry
Difficulty	Very Hard

Time allowed: 70
Score: /52
Percentage: /100

Question 1

$VABCD$ is a solid pyramid.



$ABCD$ is a square of side 20 cm .

The angle between any sloping edge and the plane $ABCD$ is 55°

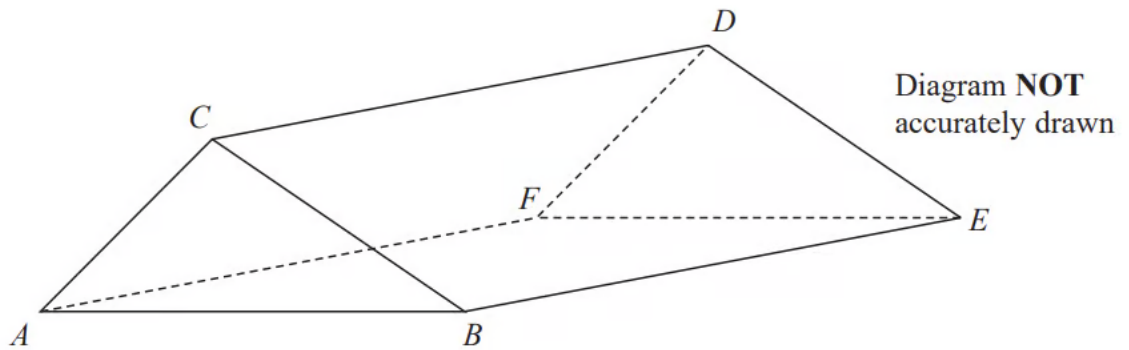
Calculate the surface area of the pyramid.

Give your answer correct to 2 significant figures.

[5 marks]

Question 2

The diagram shows the prism $ABCDEF$ with cross section triangle ABC .



Angle $BEC = 40^\circ$ and angle ACB is obtuse.
 $AC = 6$ cm and $CE = 13$ cm

The area of triangle ABC is 22 cm^2

Calculate the length of AB .

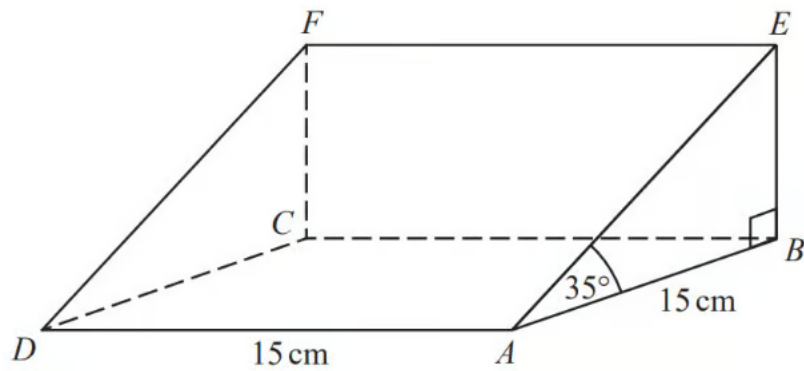
Give your answer correct to one decimal place.

.....cm

[6 marks]

Question 3

The diagram shows a triangular prism.



The base, $ABCD$, of the prism is a square of side length 15 cm .

Angle ABE and angle CBE are right angles.

Angle $EAB = 35^\circ$

M is the point on DA such that

$$DM:MA = 2:3$$

Calculate the size of the angle between EM and the base of the prism.

Give your answer correct to 1 decimal place.

[4 marks]

Question 4

The diagram shows a solid prism $ABCDEFGH$.

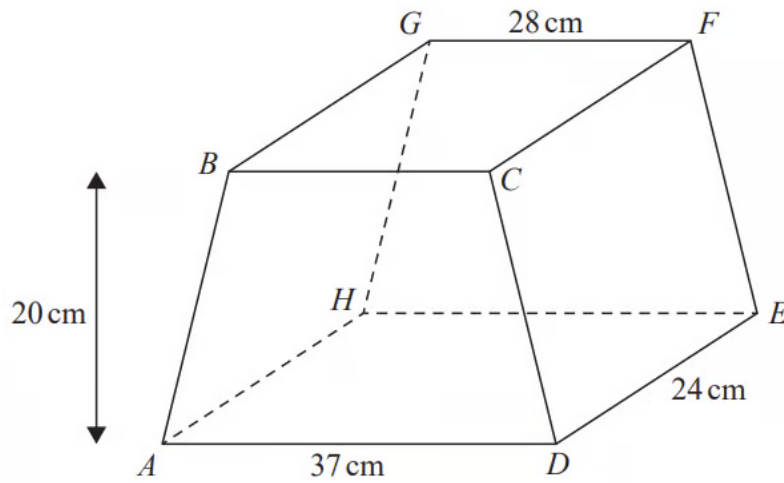


Diagram **NOT** accurately drawn

The trapezium $ABCD$, in which AD is parallel to BC , is a cross section of the prism.

The base $ADEH$ of the prism is a horizontal plane.

$ADEH$ and $BCFG$ are rectangles.

The midpoint of BC is vertically above the midpoint of AD so that $BA = CD$.

$$AD = 37 \text{ cm} \quad GF = 28 \text{ cm} \quad DE = 24 \text{ cm}$$

The perpendicular distance between edges AD and BC is 20 cm.

Calculate the size of the angle between AF and the plane $ADEH$.

Give your answer correct to one decimal place.

[3 marks]

Question 5

The diagram shows the prism $ABCDEFGHJK$ with horizontal base $AEFG$

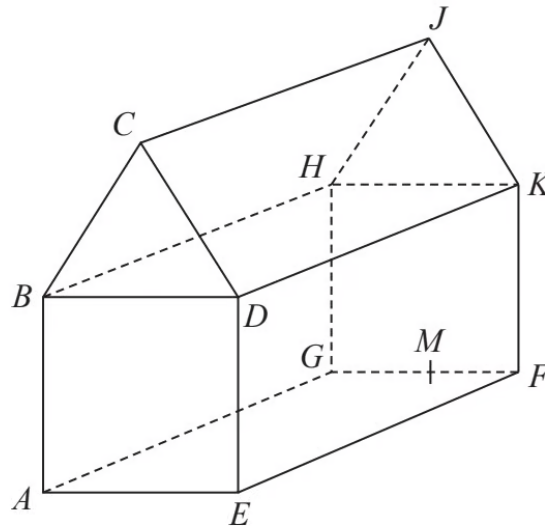


Diagram **NOT** accurately drawn

$ABCDE$ is a cross section of the prism where

$ABDE$ is a square

BCD is an equilateral triangle

$EF = 2 \times AE$

M is the midpoint of GF so that JM is vertical.

Angle $MAJ = y^\circ$

Given that $\tan y^\circ = T$

find the value of T , giving your answer in the form $\frac{\sqrt{p} + \sqrt{q}}{17}$ where p and q are integers.

$T = \dots\dots\dots$

[5 marks]

Question 6

The diagram shows a solid pyramid $ABCDE$ with a horizontal base.

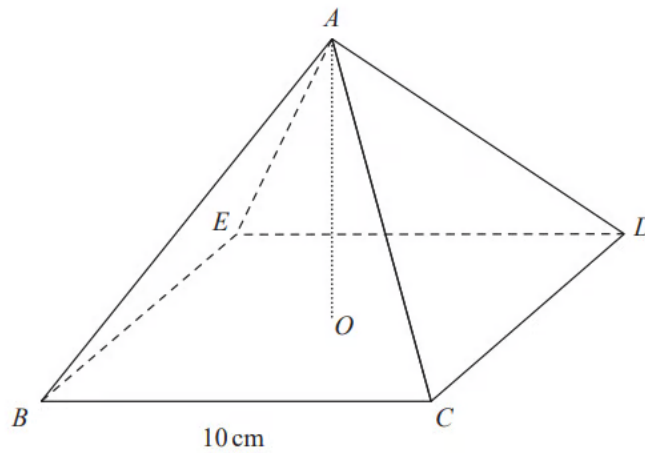


Diagram **NOT**
accurately drawn

The base, $BCDE$, of the pyramid is a square of side 10 cm.

The vertex A of the pyramid is vertically above the centre O of the base so that $AB = AC = AD = AE$

The **total** surface area of the pyramid is 360 cm^2

Work out the size of the angle between AC and the base $BCDE$.

Give your answer correct to 3 significant figures.

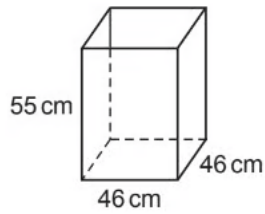
[6 marks]

Question 7a

Alvin has a crate in the shape of a cuboid.

The crate is open at the top.

The internal dimensions of the crate are 46cm long by 46cm wide by 55cm high.



Alvin has a stick of length 95cm.

Alvin places the stick in the crate so that the shortest possible length extends out above the top of the crate.

Calculate the length of the stick that extends out of the crate.

..... cm

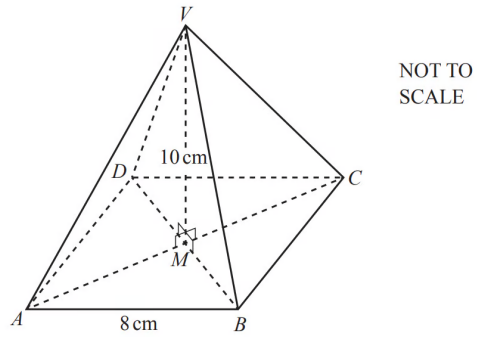
[4 marks]

Question 7b

Calculate the angle the stick makes with the base of the crate.

[3 marks]

Question 8

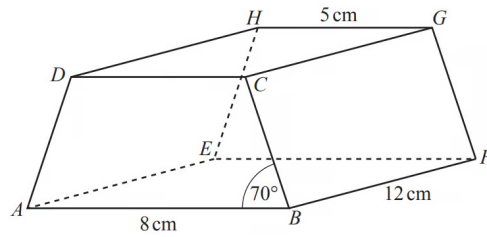


The diagram shows a pyramid with a square base $ABCD$ of side length 8 cm. The diagonals of the square, AC and BD , intersect at M . V is vertically above M and $VM = 10$ cm.

Calculate the angle between VA and the base.

[4 marks]

Question 9



NOT TO SCALE

The diagram shows a prism with a rectangular base, $ABFE$.
 The cross-section, $ABCD$, is a trapezium with $AD = BC$.
 $AB = 8$ cm, $GH = 5$ cm, $BF = 12$ cm and angle $ABC = 70^\circ$.

The perpendicular from G onto EF meets EF at X .

i)
 Show that $EX = 6.5$ cm.

[1]

ii)
 Calculate AX .

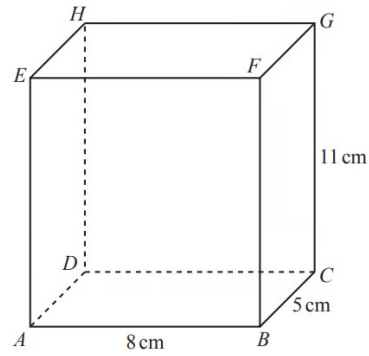
$AX = \dots\dots\dots$ cm [2]

iii)
 Calculate the angle between the diagonal AG and the base $ABFE$.

[2]

[5 marks]

Question 10



NOT TO
SCALE

$ABCDEFGH$ is a cuboid.

$AB = 8$ cm, $BC = 5$ cm and $CG = 11$ cm.

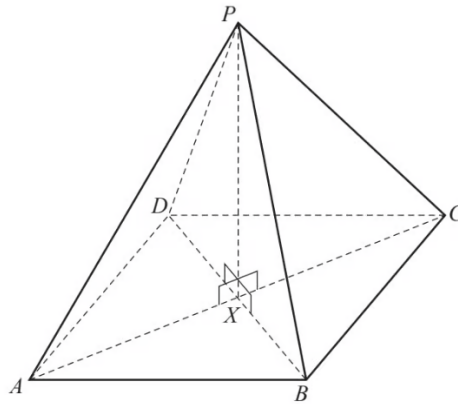
Ivana has a pencil of length 13 cm.

Does this pencil fit completely inside the cuboid?

Show how you decide.

[4 marks]

Question 11



NOT TO
SCALE

The diagram shows a pyramid with a square base $ABCD$.
 $DB = 8$ cm.
 P is vertically above the centre, X , of the base and $PX = 5$ cm.

Calculate the angle between PB and the base $ABCD$.

[3 marks]