Name:

Exam Style Questions

3D Pythagoras

Corbettmaths

Equipment needed: Pen, Calculator

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

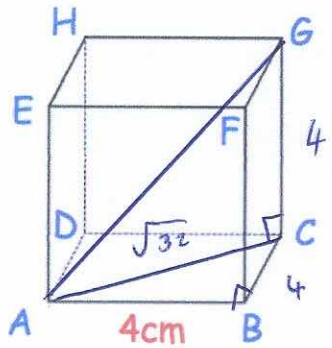
Video Tutorial

www.corbettmaths.com/contents

Video 259

Answers and Video Solutions

1. Shown is a cube with side length 4cm.



$AC^2 = AB^2 + BC^2$

$AC^2 = 4^2 + 4^2$

$AC^2 = 32$

$AC = \sqrt{32}$

Calculate the length AG

$AG^2 = AC^2 + CG^2$

$AG^2 = (\sqrt{32})^2 + 4^2$

$AG^2 = 32 + 16$

$AG^2 = 48$

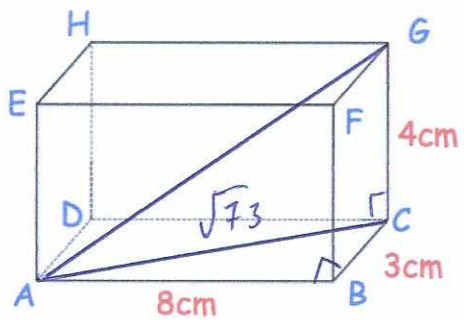
$AG = \sqrt{48}$

6.928

.....cm

(3)

2. Shown below is a cuboid.
AB = 8cm, BC = 3cm and CG = 4cm



$AC^2 = AB^2 + BC^2$

$AC^2 = 9 + 64$

$AC^2 = 73$

$AC = \sqrt{73}$

Find the length AG

$AG^2 = AC^2 + CG^2$

$AG^2 = 73 + 16$

$AG^2 = 89$

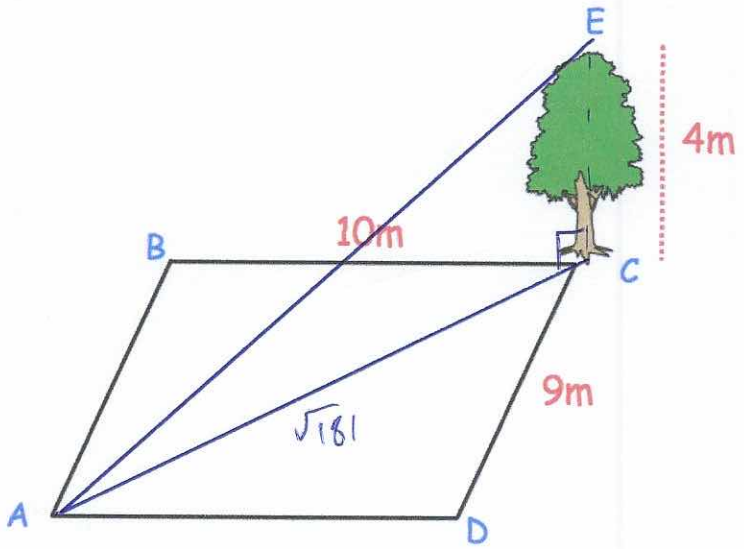
$AG = \sqrt{89}$

9.434

.....cm

(3)

3. A tree is located in the corner of a rectangular field.



The field is 10 metres long and 9 metres wide.
The tree is 4 metres tall.

Calculate the length AE

$AC^2 = 9^2 + 10^2$

$AC^2 = 81 + 100$

$AC^2 = 181$

$AC = \sqrt{181}$ $(13.4536...)$

$AE^2 = 4^2 + (\sqrt{181})^2$

$AE^2 = 197$

$AE = \sqrt{197}$

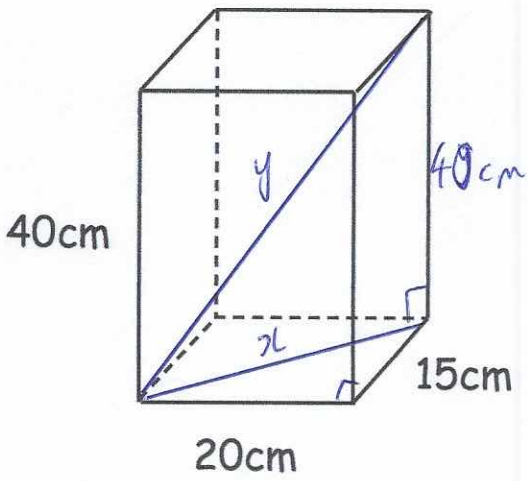
$= 14.035...$

14.036

.....m

(3)

4. Shown below is an open box.



Tim wants to put a 46cm metal rod inside the box.

Will the metal rod fit inside the box?
Explain your answer.

$15^2 + 20^2 = x^2$

$x^2 = 625$

$x = 25$

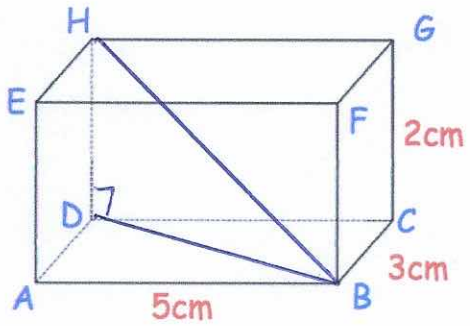
$25^2 + 40^2 = y^2$

$y^2 = 2225$

$y = 47.1699...$

Yes, a 46cm rod would fit in the box. **(4)**

5. Shown below is a cuboid



Calculate the length of diagonal BH.
Give your answer as a surd.

$BD^2 = 3^2 + 5^2$

$= 9 + 25$

$= 34$

$BD = \sqrt{34}$

$BH^2 = (\sqrt{34})^2 + 2^2$

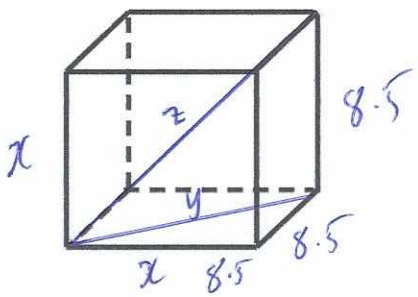
$BH^2 = 34 + 4$

$BH = \sqrt{38}$

$\sqrt{38}$ .....cm

(3)

6.



The surface area of a cube is 433.5cm²

Find the length of the length of the diagonal of the cube.

$433.5 \div 6 = 72.25$

$x^2 = 72.25$

$x = 8.5$

$y^2 = 8.5^2 + 8.5^2$

$y^2 = 144.5$

$y = 12.0208...$

$z^2 = 8.5^2 + y^2$

$z^2 = 72.25 + 144.5$

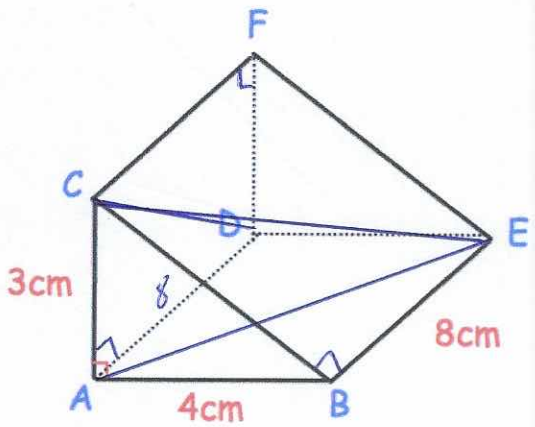
$z^2 = 216.75$

$z = 14.722...$

14.72 .....cm

(4)

7. Shown below is a triangular prism.
Triangle ABC is a right angled triangle.



Find the length of

(a) BC

$BC^2 = 3^2 + 4^2$

$BC^2 = 25$

$BC = 5$

5 .....cm **(2)**

(b) CD

$CD^2 = 3^2 + 8^2$

$CD^2 = 73$

$CD = \sqrt{73}$

8.544 .....cm **(2)**

(c) CE

$CE^2 = 5^2 + 8^2$

$CE^2 = 89$

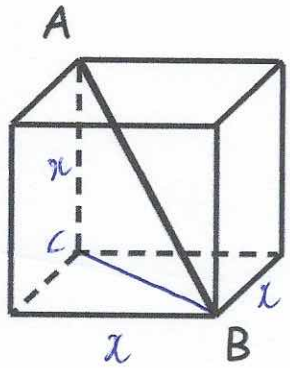
$CE = \sqrt{89}$

$CE = 9.43398...$

9.43 .....cm **(2)**

* could find AE and AC and then CE
↑ $\sqrt{80}$ ↑ c

8. AB is the diagonal of a cube.



AB = 8cm

Work out the volume of the cube.

$BC^2 = x^2 + x^2$

$BC^2 = 2x^2$

$BC = \sqrt{2x^2}$

$AB^2 = x^2 + BC^2$

$AB^2 = 3x^2$

$3x^2 = 64$

$x^2 = \frac{64}{3}$

$x = 4.6188...$

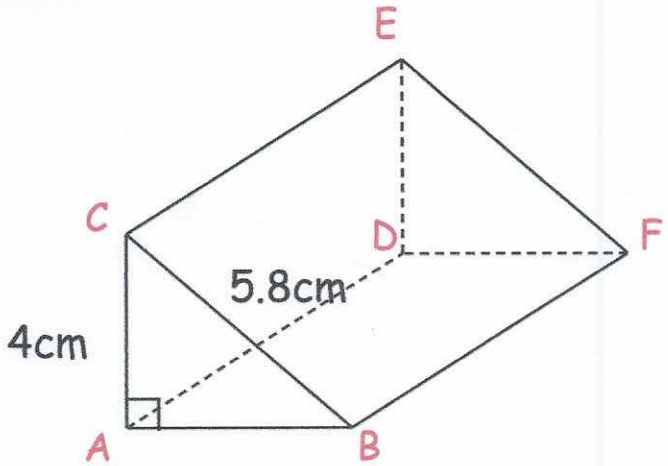
$4.6188... \times 4.6188... \times 4.6188...$

$= 98.534...$

98.534 .....cm³

(4)

9. Shown below is a triangular prism.



The volume of the prism is 151.2cm²

(a) Work out the length of BF

$V = \frac{1}{2}bhL$

$151.2 = \frac{1}{2}(4.2 \times 4) \times BF$

$302.4 = 16.8 \times BF$

$BF = 18$

$AB^2 + 4^2 = 5.8^2$

$AB^2 = 17.64$

$AB = 4.2$

18 .....cm

(3)

(a) Work out the length of BE

$BC^2 + BF^2 = BE^2$

$5.8^2 + 18^2 = BE^2$

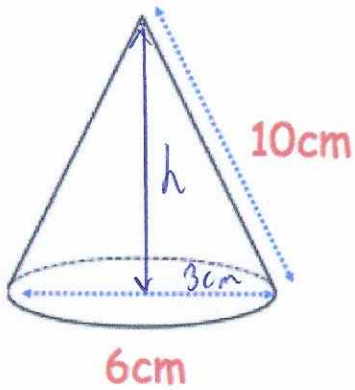
$357.64 = BE^2$

$BE = 18.911...$

18.911 .....cm

(2)

10.



$V = \frac{1}{3}\pi r^2 h$

Calculate the volume of the cone.

$3^2 + h^2 = 10^2$

$h^2 = 91$

$h = \sqrt{91}$

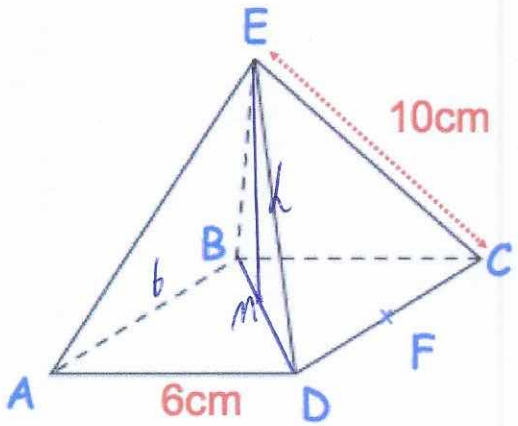
$V = \frac{1}{3} \times \pi \times 3^2 \times \sqrt{91}$

$= 89.90665161$

89.9 .....cm³

(4)

11. Shown is a square based pyramid, ABCDE.



F is the midpoint of CD
AD = 6cm and CE = 10cm

Calculate the length of

(a) BD

$BD^2 = 6^2 + 6^2$

$BD^2 = 72$

$BD = \sqrt{72}$

8.485

.....cm

(2)

(b) EF

height

½ of BD

$ME^2 = 10^2 - (4.2426...)^2$

$ME = 9.055...$

$MF = 3$

$EF^2 = MF^2 + ME^2$

$EF^2 = 9 + 82$

$= 91$

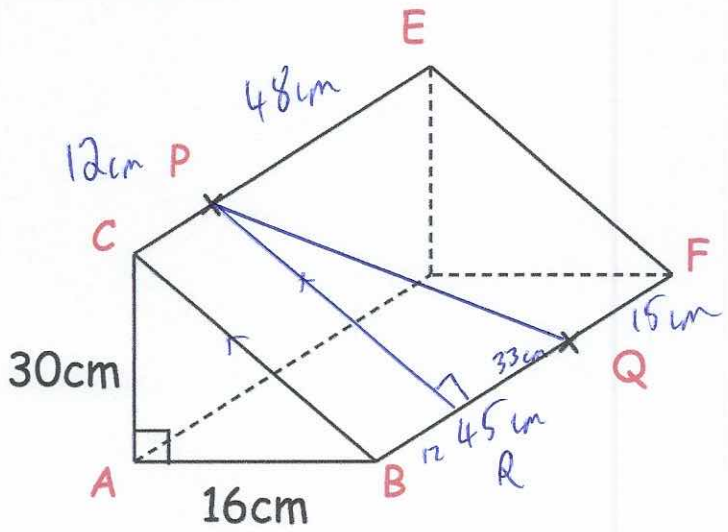
$EF = \sqrt{91}$

9.539

.....cm

(4)

12. Shown below is a triangular prism.



AB = 16cm AC = 30cm BF = 60cm

45 - 12 = 33

P lies on CE such that CP : CE = 1 : 5
Q lies on BF such that BQ : QF = 3 : 1

60 ÷ 5 = 12

3 + 1 = 4

60 ÷ 4 = 15

Work out the length of PQ

$BC^2 = 16^2 + 30^2$

$BC^2 = 1156$

$BC = 34cm$

$PR = 34cm$

$RQ = 33cm$

$PQ^2 = PR^2 + RQ^2$

$PQ^2 = 34^2 + 33^2$

$PQ^2 = 2245$

$PQ = 47.381..$

47.38

.....cm

(5)