Name:

Exam Style Questions

Volume of a Pyramid

Corbettmaths

Equipment needed: Calculator, pen

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 360

Answers and Video Solutions

3. A square-based pyramid has a base with side length 15cm.
The perpendicular height of the pyramid is 10cm.
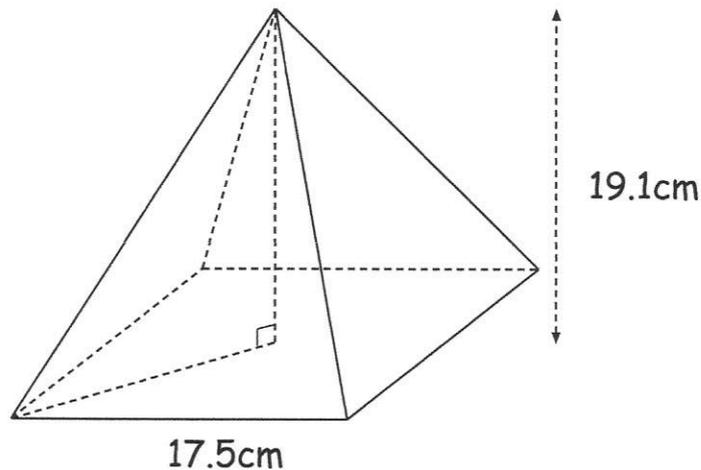
Calculate the volume of the pyramid.

$$V = \frac{1}{3}AL$$

$$= \frac{1}{3}(15 \times 15) \times 10$$

$$= \frac{1}{3}(225) \times 10$$

$$= 75 \times 10$$

$$= 750$$

$$\begin{array}{r} 15 \\ \times 15 \\ \hline 75 \\ +150 \\ \hline 225 \end{array}$$

$$\begin{array}{r} 075 \\ 3\overline{)2^22^15} \end{array}$$

.........750......... cm³

(3)

4. Below is a square based pyramid.

19.1cm

17.5cm

Find the volume of the pyramid.

$$V = \frac{1}{3}AL$$

$$= \frac{1}{3}(17.5 \times 17.5) \times 19.1$$

$$= 1949.7916$$

.........1949.8......... cm³

to 1dp (3)

5. ABCDE is a pyramid.
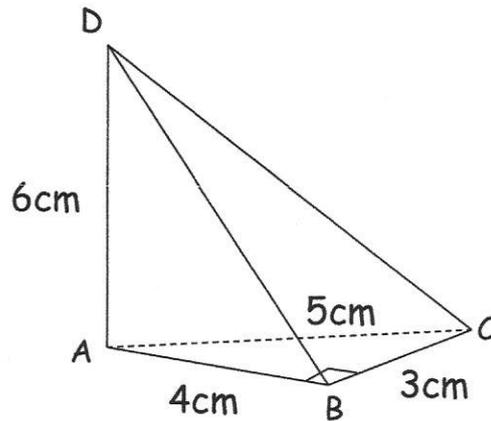M is the midpoint of AC.

E

D

145cm

C

M

A

90cm

130 cm

B
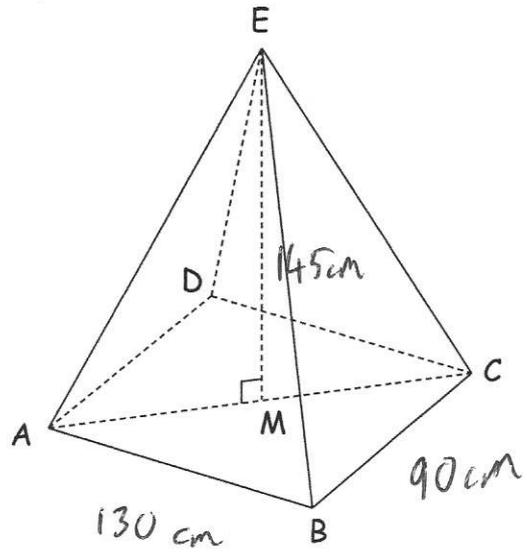
AB = 1.3m
BC = 90cm
ME = 1.45m

Work out the volume of the pyramid.

$$V = \frac{1}{3} Ah$$
$$= \frac{1}{3} (130 \times 90) \times 145$$
$$= 565500 \, cm^3$$

565500
.........................cm³

(3)

6. A triangular-based pyramid, ABCD, is shown below.

D

6cm

5cm ----- C

A

4cm   B   3cm

AB = 4cm   AC = 5cm   BC = 3cm   AD = 6cm

ABC is a right angle.

Calculate the volume of the pyramid.

Area of base $= \frac{1}{2}(3 \times 4)$

$= 6 \, cm^2$

$V = \frac{1}{3} \times 6 \times 6$

$= 12 \, cm^3$

12 ....cm³

(3)

7. Calculate the volume of a pyramid having a square base of side 2.9cm and
perpendicular height of 5cm.

$V = \frac{1}{3}(2.9 \times 2.9) \times 5$

$= 14.0166...$

14.017 ....cm³

to 3dp   (3)

8. Shown is a solid that is made of a pyramid and a cuboid.
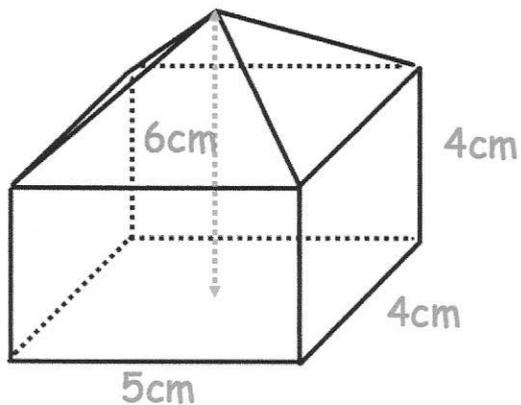
Calculate the volume of the solid.

$$\text{Cuboid}: \quad 5 \times 4 \times 4 = 80 \, cm^3$$

$$\text{Pyramid}: \quad \frac{1}{3} \times (5 \times 4) \times 2$$

$$= 13.333\cdots$$

$$80 + 13.33\cdots$$

..........93.33..........cm³

(4)

9. Shown is a pyramid with volume 126cm³

h

7cm

9cm
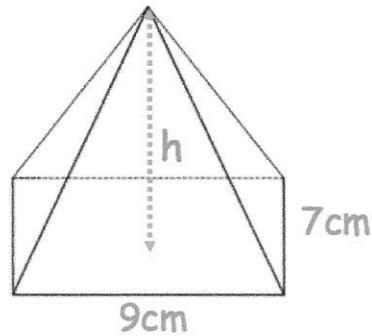
Work out the perpendicular height of the pyramid, h.

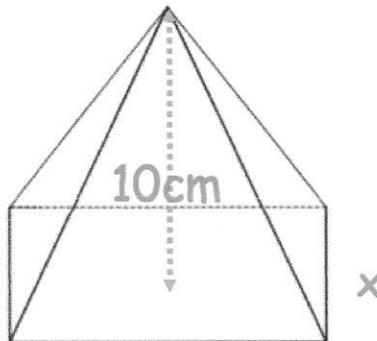$$V = \frac{1}{3}Ah$$

$$126 = \frac{1}{3}(9 \times 7) \times h$$

$$126 = \frac{1}{3}(63) \times h$$

$$126 = 21 \times h$$

$$h = 6$$

..........6.......... cm

(3)

10. Shown is a square-based pyramid with volume 270cm³

10cm

x

Find the length of the side marked x.

$$V = \frac{1}{3}Ah$$

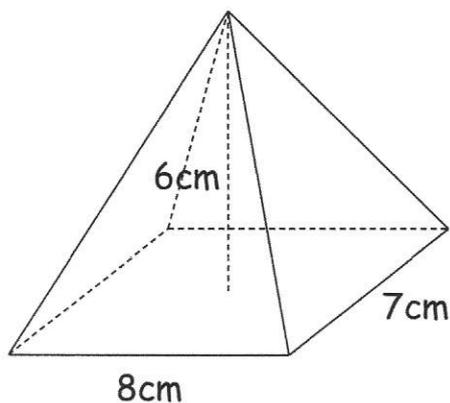$$270 = \frac{1}{3} \times x^2 \times 10$$

$$27 = \frac{1}{3} \times x^2$$

$$81 = x^2$$

$$x = 9$$

..........9.......... cm

(3)

11. A solid wooden paperweight is shown below.
The paperweight is a rectangular based pyramid.
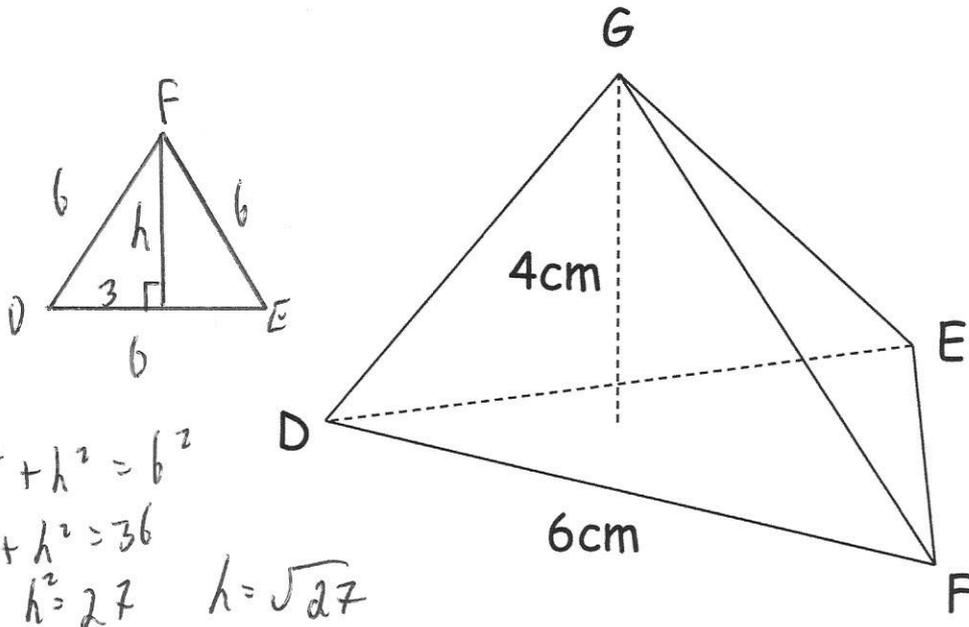

The density of the wood is 0.65g/cm³

Find the mass of the paperweight.

$$V = \frac{1}{3} \times (8 \times 7) \times 6$$

$$= 112 \, cm^3$$

$$m = d \times v$$

$$= 0.65 \times 112$$

$$= 72.8g$$

..........72.8..........g

(4)

12. DEFG is a triangle based pyramid.
The base DEF is an equilateral triangle with side 6cm.
The perpendicular height of the pyramid is 4cm.

$3^2 + h^2 = 6^2$

$9 + h^2 = 36$

$h^2 = 27 \qquad h = \sqrt{27}$

Calculate the volume of the pyramid.

Area of DEF $= \frac{1}{2} \times 6 \times \sqrt{27}$

$= 9\sqrt{3} \ cm^2 \ (or \ 15.588\ldots)$

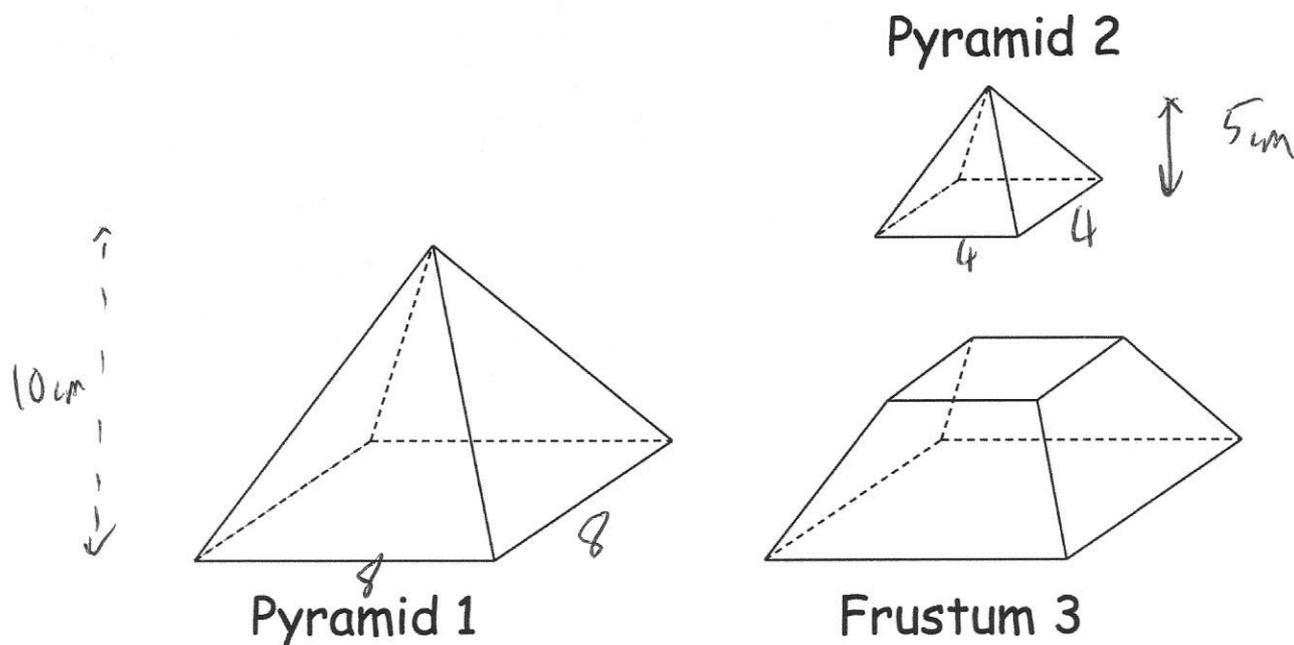$V = \frac{1}{3} A h$

$= \frac{1}{3} \times 9\sqrt{3} \times 4$

$= 12\sqrt{3}$

$= 20.7846\ldots \ cm^3$

20.785 cm³

to 3dp (4)

13. A square based pyramid 1 is divided into two parts:
a square based pyramid 2 and a frustum 3, as shown.

Pyramid 2

$5 cm$

4

4

$10 cm$

8

8

Pyramid 1

Frustum 3

Pyramid 1 has a base of side length 8cm.
Pyramid 2 has a base of side length 4cm.
The perpendicular height of pyramid 1 is 10cm.

Calculate the volume of frustum 3.

$$\text{Pyramid } 1 = \frac{1}{3} \times (8 \times 8) \times 10$$

$$= 213.\dot{3} \, cm^3$$

$$\text{Pyramid } 2 = \frac{1}{3} \times (4 \times 4) \times 5$$

$$= 26.\dot{6} \, cm^3$$
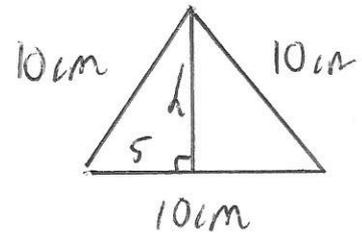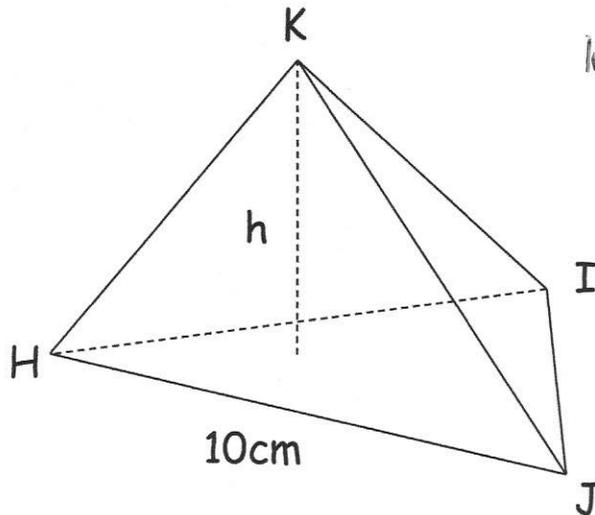
$$213.\dot{3} - 26.\dot{6} = 186.6\dot{6} \, cm^3$$

186.67 ....cm³

to 2dp   **(4)**

14. HIJK is a triangle based pyramid.

The base HIJ is an equilateral triangle with side 10cm

The volume of the pyramid is 300cm³

$h^2 + 5^2 = 10^2$

$h^2 = 75$

$h = \sqrt{75}$

Calculate the perpendicular height, h, of the pyramid.

Area of $HIJ = \frac{1}{2} \times 10 \times \sqrt{75}$

$= 25\sqrt{3} \text{ cm}^2$

$= 43.301... \text{ cm}^2$

Volume $= 300 \text{ cm}^3$

$300 = \frac{1}{3} \times 25\sqrt{3} \times h$
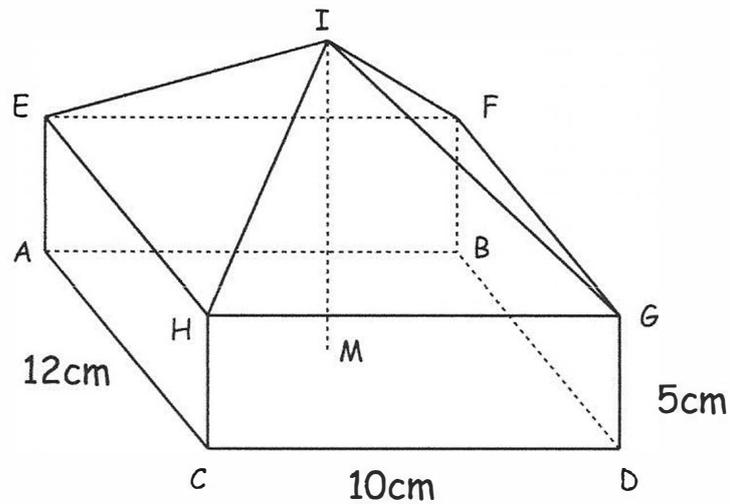
$900 = 25\sqrt{3} \, h$

$h = 12\sqrt{3}$

$= 20.7846...$

20.785 .... cm

to 3dp (4)

15. Hannah created a glass paperweight.

The apex of the pyramid, I, is directly above the centre, M, of ABDC.

The density of the glass is 2.6g/cm³
The mass of the paperweight is 1705.6g

Find the height of the paperweight, IM.

$Cuboid : 12 \times 10 \times 5 = 600 cm^3$

$Pyramid : \frac{1}{3} \times (12 \times 10) \times h$
$= 40h$

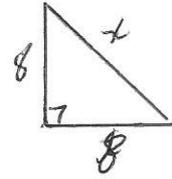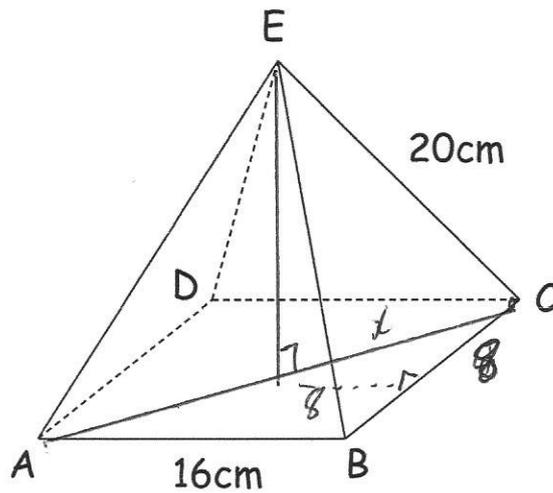$1705.6 \div 2.6 = 656 cm^3$

$656 - 600 = 56$

$40h = 56$
$h = 1.4$

IM = 5 + 1.4

6.4

..........................cm

(5)

16. ABCDE is a square based pyramid.

E

20cm

D

C

x

8
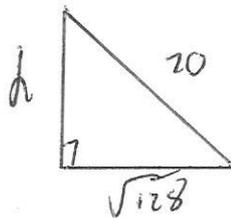
A   16cm   B

7

8

$8^2 + 8^2 = x^2$

$64 + 64 = x^2$

$x^2 = 128$

$x = 8\sqrt{2}$

AB = 16cm   CE = 20cm

The point E is directly over the centre of the base ABCD.

Work out the volume of the pyramid.

h 20

7

$\sqrt{128}$

$h^2 + \left(\sqrt{128}\right)^2 = 20^2$

$h^2 + 128 = 400$

$h^2 = 272$

$h = \sqrt{272}$

$V = \frac{1}{3} \times 16^2 \times \sqrt{272}$

$= 1407.353\ldots$

1407.35 ......cm³

(4)