EXAM PAPERS PRACTICE

GCSE OCR Math J560
3D Shapes

Answers

"We will help you to achieve A Star "

Answer 1

The diagram shows a prism.

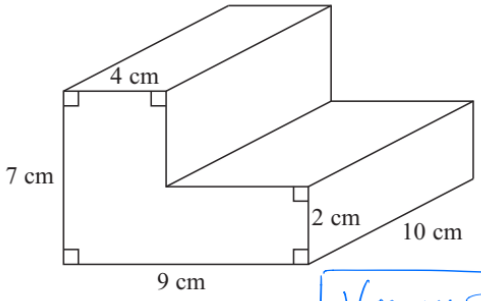


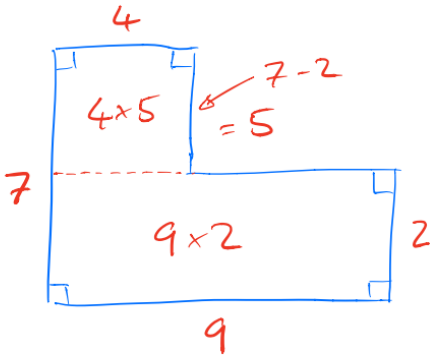
Diagram **NOT** accurately drawn

Work out the volume of the prism.

VOLUME OF PRISM

V = AREA OF CROSS-SECTION × LENGTH

CROSS-SECTION



$A = 4 \times 5 + 9 \times 2$

$= 20 + 18$

$= 38\ cm^2$

$V = 38 \times 10$

$V = 380\ cm^3$

Answer 2

Here is a plan of Martin's driveway.

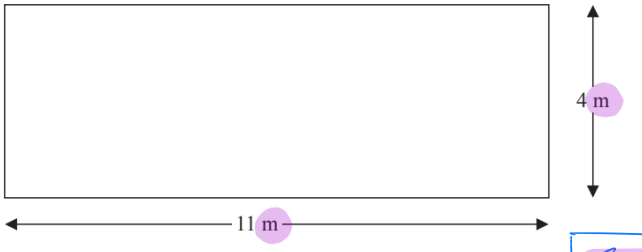


Diagram **NOT** accurately drawn

Martin is going to cover his driveway with gravel.
The gravel will be 6 cm deep.

Gravel is sold in bags.
There are 0.4 m^3 of gravel in each bag.
Each bag of gravel costs £38

Martin gets a discount of 30% off the cost of the gravel.

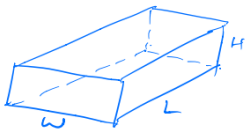
Work out the total amount of money Martin pays for the gravel.

N.B. UNITS

6cm = 0.06m

CUBOID

$V = L \times W \times H$



VOLUME NEEDED $= 11 \times 4 \times 0.06$
$= 2.64\ m^3$

NUMBER OF BAGS $= \frac{2.64}{0.4} = 6.6$ BAGS $\Rightarrow$ 7 BAGS

FULL COST $= 7 \times 38 = £266$

PERCENTAGE DECREASES (THE BEST WAY!)

TO DECREASE BY, SAY, 3%.

THINK: WE WANT 97%. SO WE MULTIPLY BY $\frac{97}{100}$ $(=0.97)$

WITH 30% DISCOUNT:

COST $= 266 \times \frac{70}{100}$
$= £186.20$

Answer 3

Here is a cuboid.

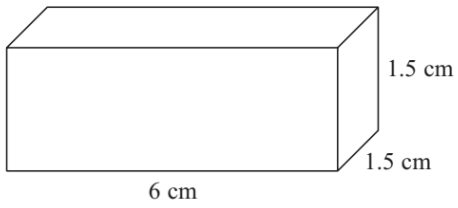
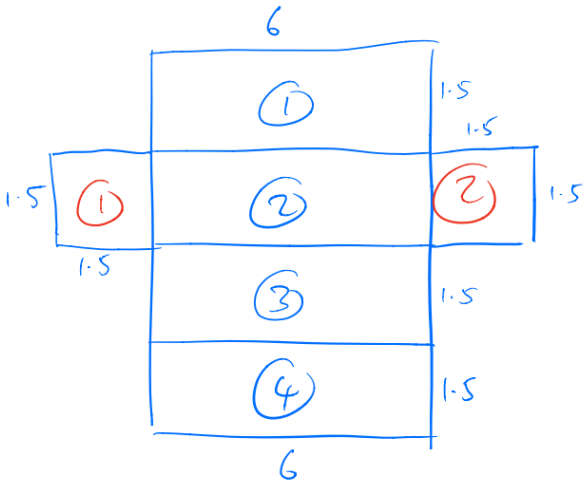


Diagram **NOT** accurately drawn

The cuboid is 6 cm by 1.5 cm by 1.5 cm.

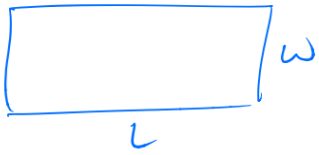
Work out the total surface area of the cuboid.



AREAS

RECTANGLE / SQUARE

$A = L \times W$



TSA = 4 × RECTANGLE + 2 × SQUARE

$= 4 \times 6 \times 1.5 + 2 \times 1.5 \times 1.5$

$= 40.5 \text{ cm}^2$

Answer 4

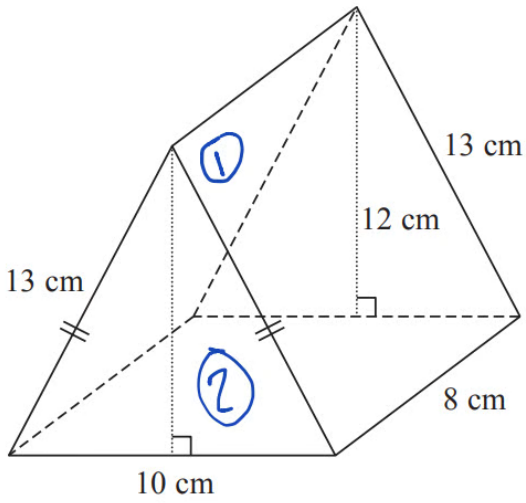


Diagram **NOT** accurately drawn

The diagram shows a prism.
The cross-section of the prism is an isosceles triangle.
The lengths of the sides of the triangle are 13 cm, 13 cm and 10 cm.
The perpendicular height of the triangle is 12 cm.
The length of the prism is 8 cm.

Work out the total surface area of the prism.

Total surface area of the two triangles (1) + SA of the two rectangles (2) + the SA of the base (3)

Area of a triangle is 0.5 x base x height : 0.5 (10) (12) = 60
Area of rectangle is width x height : 8x 13 = 104
SA of base : 8x10 = 80

Total SA = 2(60) + 2(104) + 80 = 408

408 ..... cm^2

Answer 5

The diagram shows a solid cylinder.

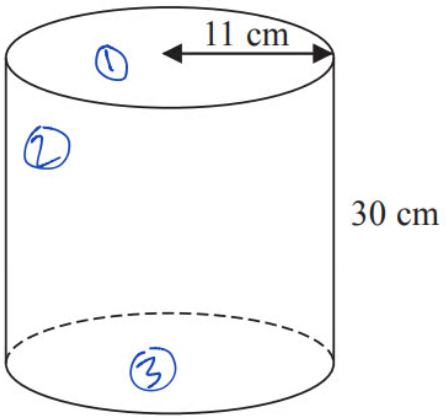


Diagram **NOT** accurately drawn

The cylinder has a height of 30 cm and a radius 11 cm.

(a) Work out the **total** surface area of the cylinder.
Give your answer correct to 2 significant figures.

Surface area of 1 + 3 :

$2\pi r = 2\ \pi\ (11)(11) = 242\pi$

Area of 2:
Circumference x height
$2\pi r \times h = 2\pi(11)(30) = 660\pi$

$2 + 1\&3 = (660 + 242)\pi = 902\pi$

2800(3sf) ..... cm^2

Answer 6

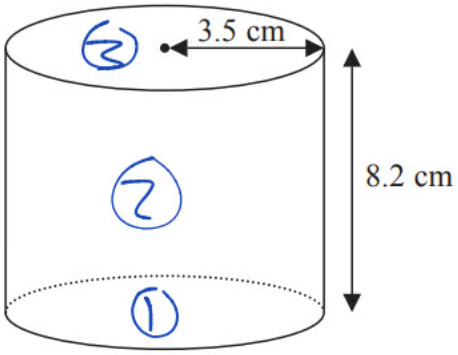


Diagram **NOT** accurately drawn

A solid cylinder has radius 3.5 cm and height 8.2 cm.

Work out the **total** surface area of the cylinder.
Give your answer correct to 3 significant figures.

Area = 1 + 2 + 3

1&3 are equal

1:

$\pi r^2 = \pi (3.5)^2 = 12.25$

Area 1 + 3 = 24.5π

Curved area = 2πr h

2π (3.5)(8.2) = 57.4π

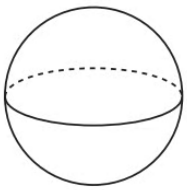
57.4π + 24.5π = 257 (3sf)

257 cm^2

Answer 7

A sphere has a surface area of 81π cm^2.

Work out the volume of the sphere.
Give your answer correct to 3 significant figures.



Surface area of a sphere = $4\pi r^2$

$81\pi = 4\pi r^2$

$\sqrt{81/4} = r$

$r = 9/2$

Volume of a sphere = $4/3\pi r^3$

$4/3\ (\pi)(91.125) = 381.70... = 382$(2sf)

382 ..... cm^3

Answer 8

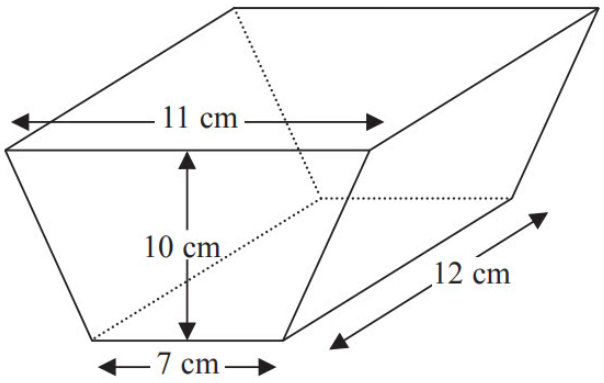


Diagram **NOT** accurately drawn

The diagram shows a solid prism.
The cross section of the prism is a trapezium.
The lengths of the parallel sides of the trapezium are 11 cm and 7 cm.
The perpendicular distance between the parallel sides of the trapezium is 10 cm.
The length of the prism is 12 cm.

(a) Work out the area of the trapezium.

Area of a trapezium is half (a+ b) x height

1/2 x (7+11) x10 =90

90 ..... cm^2

Answer 9

A cylinder has diameter 12 cm and length 30 cm.

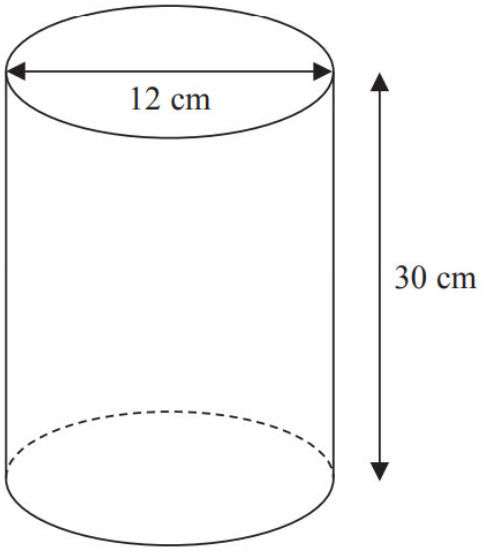


Diagram **NOT** accurately drawn

Work out the curved surface area of the cylinder.
Give your answer correct to 3 significant figures.

Curved surface is equal to circumference x height

Circumference = ∏ x Diameter = 12∏

Height = 30

12∏ X 30 = 360π = 1130.97

1130 (3sf) ..... cm²

Answer 10

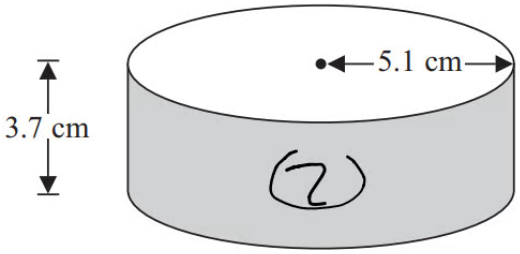


Diagram **NOT** accurately drawn

A solid cylinder has a radius of 5.1 cm and a height of 3.7 cm.

Work out the **total** surface area of the cylinder.
Give your answer correct to 3 significant figures.

$(1) = \pi r^2$

$(1)+(3) = 2\pi r^2 = 2\pi(5.1)^2$

$(2) = (2\pi r) \times h = 2\pi(5.1)(3.7)$

$((1)+(3))+(2) = 163.47.. + 118.56..$

or $\frac{2601}{50}\pi + \frac{1887}{50}\pi$

282 (351) ..... cm²

Answer 11

The diagram shows a prism.

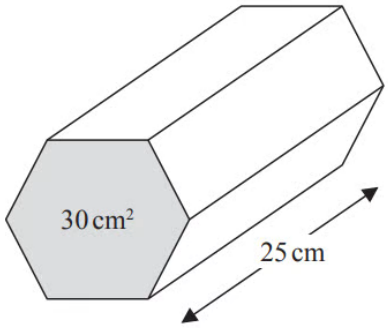


Diagram **NOT** accurately drawn

The area of the cross section of the prism is 30 cm².
The length of the prism is 25 cm.

Work out the volume of the prism.

VOLUME OF PRISM

V = AREA OF CROSS-SECTION × LENGTH

VOLUME = 30 × 25

= 750 cm³

25
× 3
75

Answer 12

Here is a triangular prism.

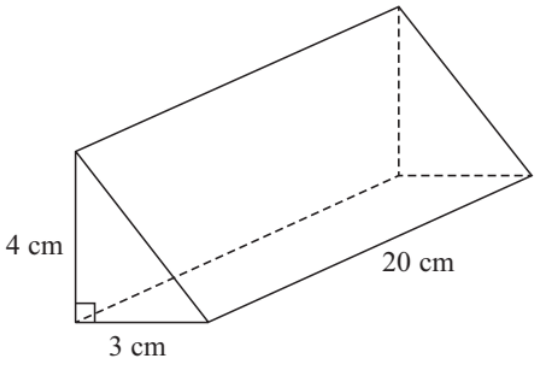


Diagram **NOT** accurately drawn

Work out the volume of this triangular prism.

△: AREA = $\frac{1}{2} \times 3 \times 4 = 6\ cm^2$

PRISM: $V = 6 \times 20$

$= 120\ cm^3$

PRISM

VOLUME = AREA OF CROSS SECTION × LENGTH

TRIANGLE

$A = \frac{1}{2}bh$

Answer 13

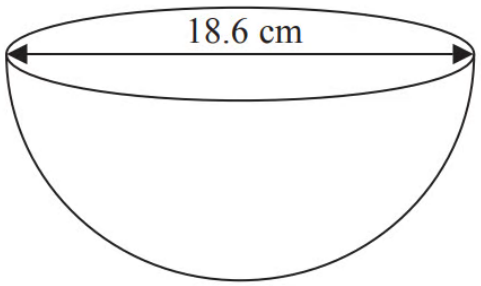


Diagram **NOT** accurately drawn

The diagram shows a hemisphere with a diameter of 18.6 cm.

Work out the volume of the hemisphere.
Give your answer correct to 3 significant figures.

Volume of a sphere $= 4/3\ \pi r^3$
Therefore volume of a hemi sphere $= 2/3\ \pi r^3$

$2/3\ \pi (9.3)^3 = 1684.6....$
$= 1680 (3sf)$

1680 (3sf) ..... cm^3

Answer 14

(b) The height of the cylinder is 30 cm, correct to the nearest centimetre.

(i) Write down the lower bound of the height of the cylinder.

29.5 cm

(ii) Write down the upper bound of the height of the cylinder.

30.5 cm