High School Mathematics Test 2014

Year 8

Volume

Non Calculator Section

Skills and Knowledge Assessed:

- Draw different views of prisms and solids formed from combinations of prisms (ACMMG161)
- Choose appropriate units of measurement for area and volume and convert from one unit to another (ACMMG195)
- Develop the formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume (ACMMG198)
- Calculate the surface area and volume of cylinders and solve related problems (ACMMG217) Extension

Name_____

Answer all questions in the spaces provided on this test paper by:

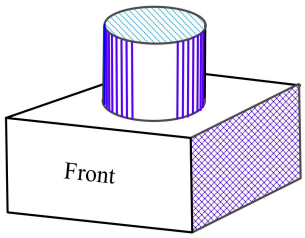
Writing the answer in the box provided.

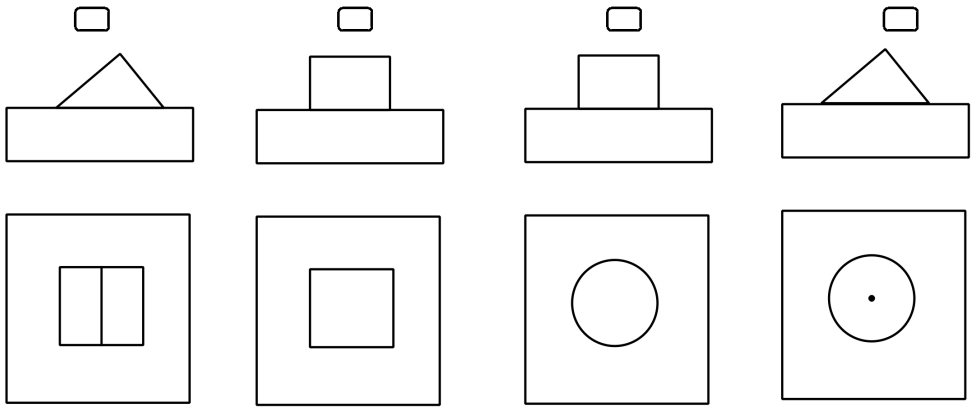
or

Shading in the bubble for the correct answer from the four choices provided.

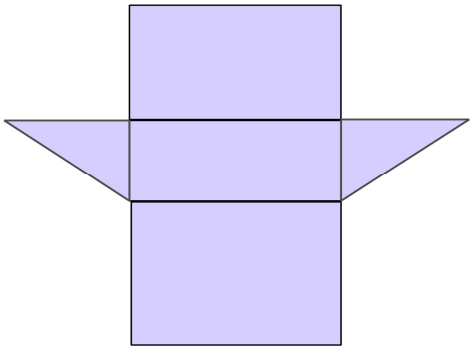
*Show any working out on the test paper. Calculators are **not** allowed.*

1. For the solid shown, which diagram below correctly shows its front view (elevation) and top view (plan).

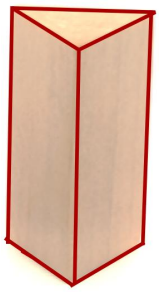




2. Draw a three dimensional sketch of the prism whose net is shown below.

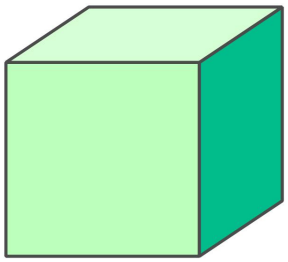


3. What name describes the solid shown?



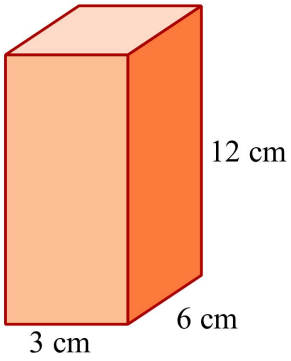
- ☐ Rectangular Prism.
- ☐ Rectangular Pyramid.
- ☐ Triangular Prism.
- ☐ Triangular Pyramid.

4. What is the volume of the cube shown?



Volume = ☐ cm^3

5. What is the volume of the rectangular prism?



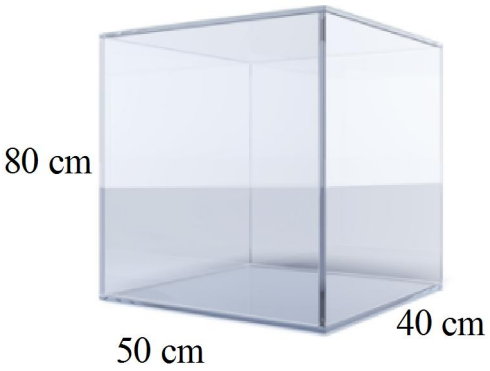
Volume = ☐ cm^3

6. Jimmy buys the glass aquarium shown and fills it to within 10 cm of the top.

How many litres of water are needed?

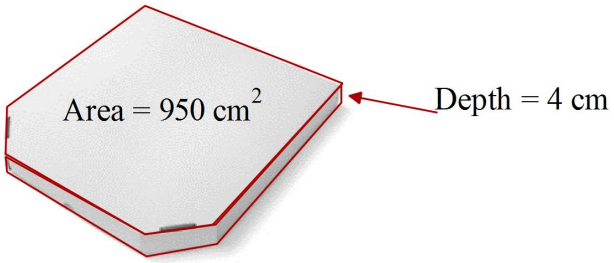
($1000\ cm^3$ holds one litre.)

- ☐ 70 litres.
- ☐ 80 litres.
- ☐ 140 litres.
- ☐ 160 litres.



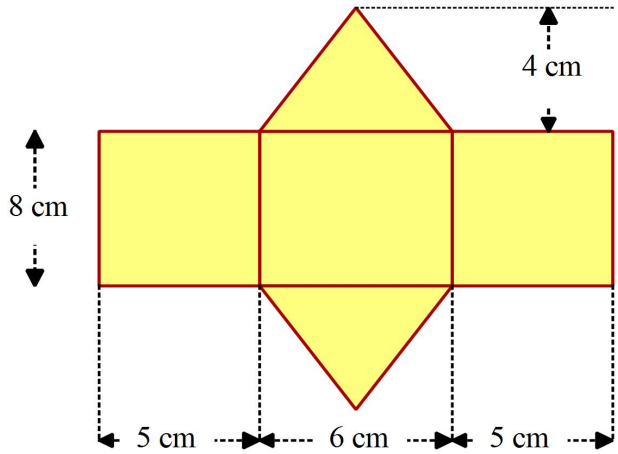
7. Josie buys a pizza in the box shown.

What is the volume of the box?



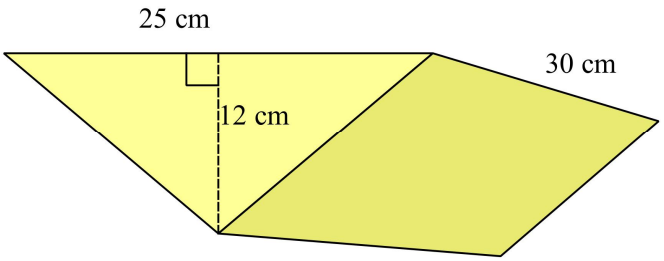
Volume = ☐ cm^3

8. What is the volume of the prism whose net is shown here?



Volume = ☐ cm^3

9. What is the volume of the triangular prism shown?



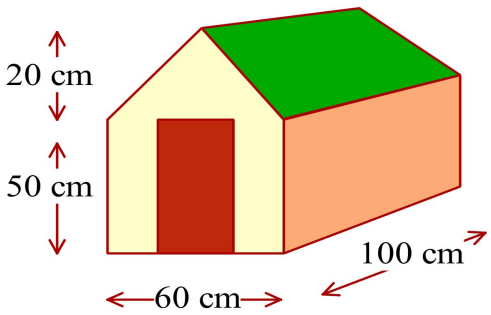
- ☐ 900 cm^3
- ☐ 4 500 cm^3
- ☐ 9 000 cm^3
- ☐ 18 000 cm^3

10. Each of these hexagonal boxes has a depth of 12 cm and the hexagonal top of each has an area of 90 cm^2.

What is the total volume of all the boxes shown?

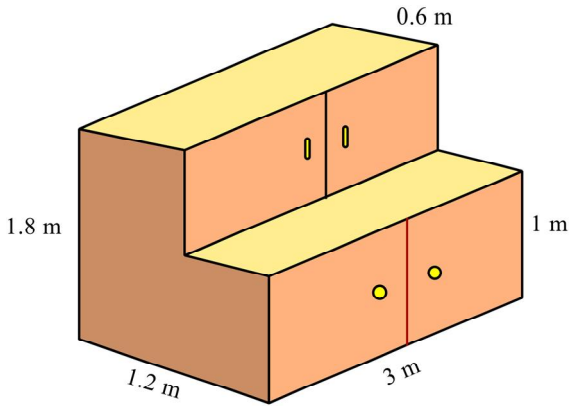
Volume = ☐ cm^3

11. A dog kennel has the dimensions shown.
Calculate the volume of the kennel in cm^3.



Volume = ☐ cm^3.

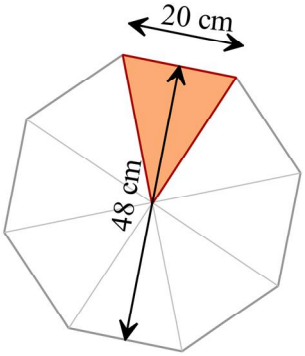
12. A storage cabinet is in the shape shown.
What volume of storage does the cabinet provide?



Volume of Storage = ☐ m^3.

13. A gift box is in the shape of an octagonal prism that has 20 cm edges, measures 48 cm across and is 20 cm deep.

The octagon can be thought of as 8 isosceles triangles as shown.



Find the volume of the box.

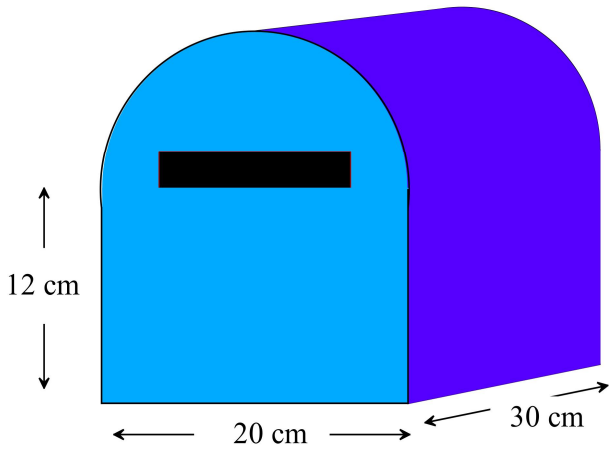
Volume = ☐ cm^3

14. Find the volume of the cylinder in terms of π.

Volume = ☐ cm^3

15. A letter box is a prism with its cross section shown below.

What is the volume of the lunch box?



- ☐ $50\pi + 240\ cm^3$
- ☐ $150\pi + 720\ cm^3$
- ☐ $1500\pi + 7200\ cm^3$
- ☐ $3000\pi + 7200\ cm^3$

High School
Mathematics Test 2014

Year 8

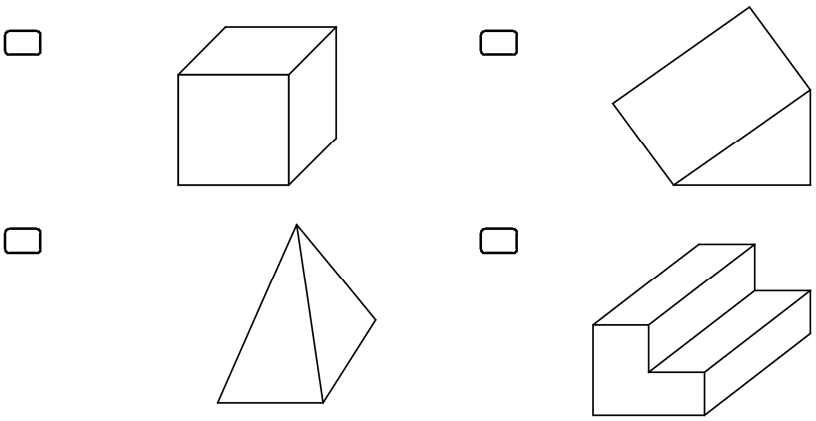
Volume

Calculator Allowed Short Answer Section

Name_____

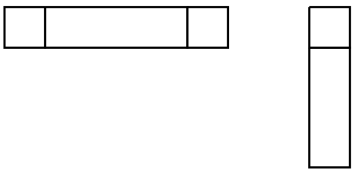
Answer all questions in the spaces provided on this test paper by:
Writing the answer in the box provided.
or
Shading in the bubble for the correct answer from the four choices provided.
Show any working out on the test paper. Calculators are allowed.

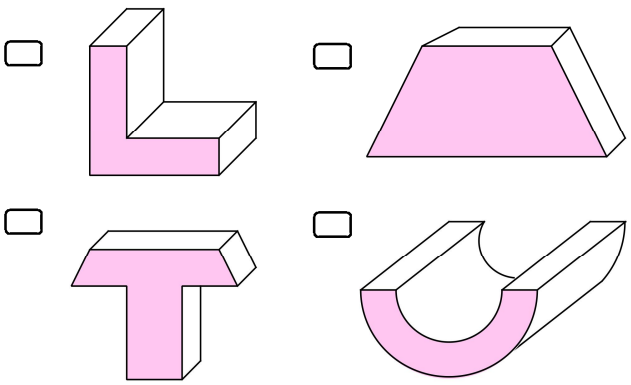
1. Which solid below is **not** a prism?



2. Which of the solids shown would have the top and side view below?

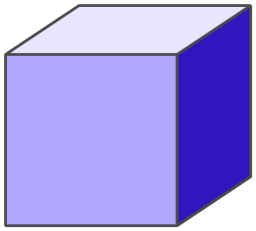
Top View *Side View*





3. The cube shown has a volume of 42.875 cm^3.

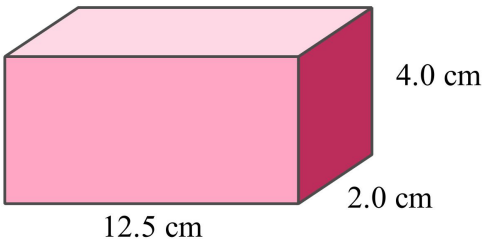
What is the length of its edge?



Length = ☐ cm.

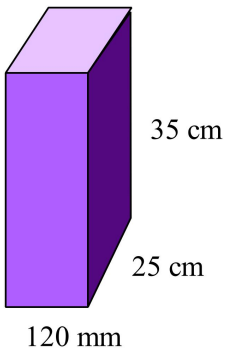
4. What is the volume of the rectangular prism?

- ☐ 25.0 cm
- ☐ 50.0 cm
- ☐ 100.0 cm
- ☐ 125.0 cm



5. What is the volume of the prism shown in cm^3?

- ☐ 105 cm^3
- ☐ 1 050 cm^3
- ☐ 10 500 cm^3
- ☐ 105 000 cm^3



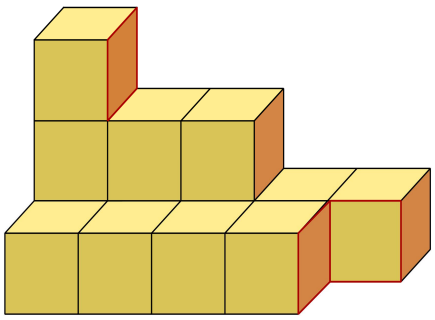
6. A prism has a volume of 6.5 m^3. What is its volume in cm^3?

650 cm^3	65 000 cm^3	650 000 cm^3	6 500 000 cm^3
☐	☐	☐	☐

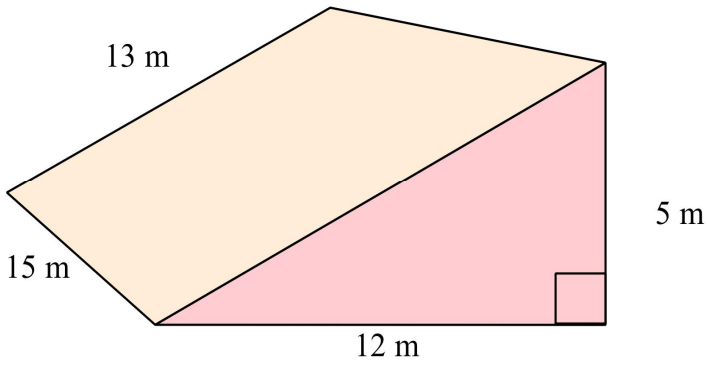
7. Each of the cubes used in this design measure 2 cm on each side.

What is the total volume of the design?

- ☐ 13 cm^3
- ☐ 26 cm^3
- ☐ 52 cm^3
- ☐ 104 cm^3

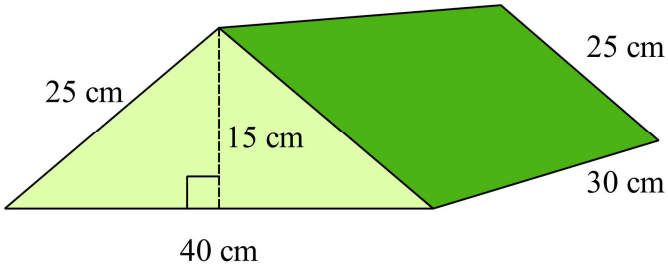


8. Which calculation could be used to find the volume of the triangular prism shown?



- ☐ $\frac{1}{2} \times 5 \times 12 \times 15$
- ☐ $\frac{1}{2} \times 5 \times 12 \times 13$
- ☐ $\frac{1}{2} \times 12 \times 13 \times 15$
- ☐ $\frac{1}{2} \times 12 \times 13 \times 15$

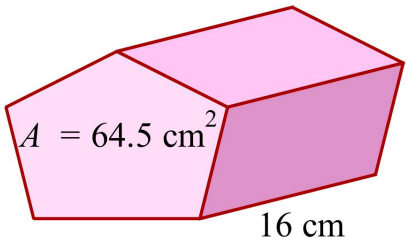
9. Find the volume of the triangular prism shown.



Volume = ☐ cm^3

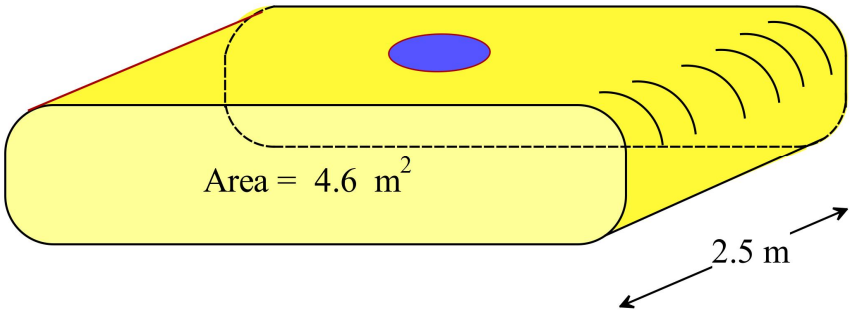
10. The area of the pentagonal base of this prism is 64.5 cm^2.

What is the volume of the prism?



Volume = ☐ cm^3

11. The water tank is designed to go under a deck and has the dimensions shown below.
Using the relationship: 1 cubic metre holds 1 kilolitre; find the capacity of the tank in litres.

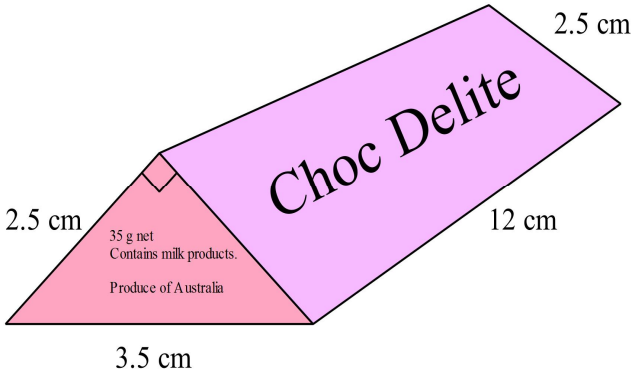


Capacity = ☐ litres.

12. Choc Delites are sold in a packet which is a triangular prism.

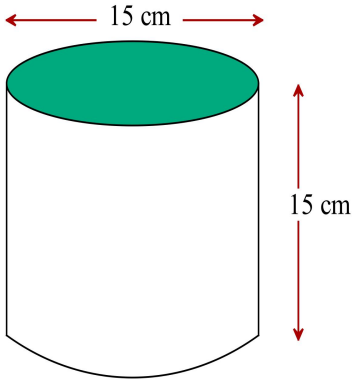
What is the volume of the packet shown?

- ☐ 35 cm^3
- ☐ 37.5 cm^3
- ☐ 52.5 cm^3
- ☐ 131.25 cm^3

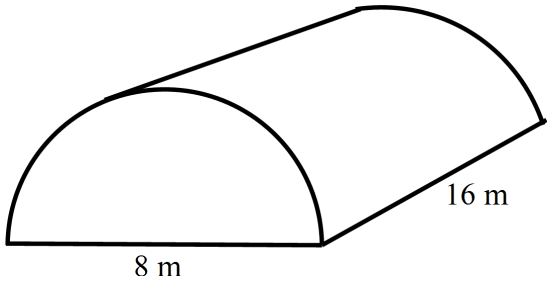


13. What is the volume of the cylinder to the nearest cm^3?

Volume = ☐ cm^3.



14. A storage hut is in the shape of a half cylinder.
The diameter of the semicircle is 8 metres and the length of the hut is 16 metres.
What volume does the hut hold?



Volume = ☐ m^3

15. The petroleum storage tanks are cylinders which have a diameter of 80 metres and a height of 40 metres.

The top curved section is only used to contain vapour.

A cubic metre holds one kilolitre.

How many megalitres of petroleum would the three tanks hold?

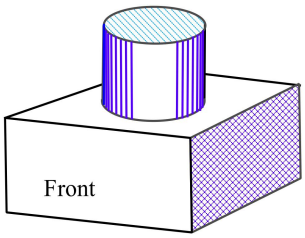
Capacity of three tanks = ☐ Megalitres

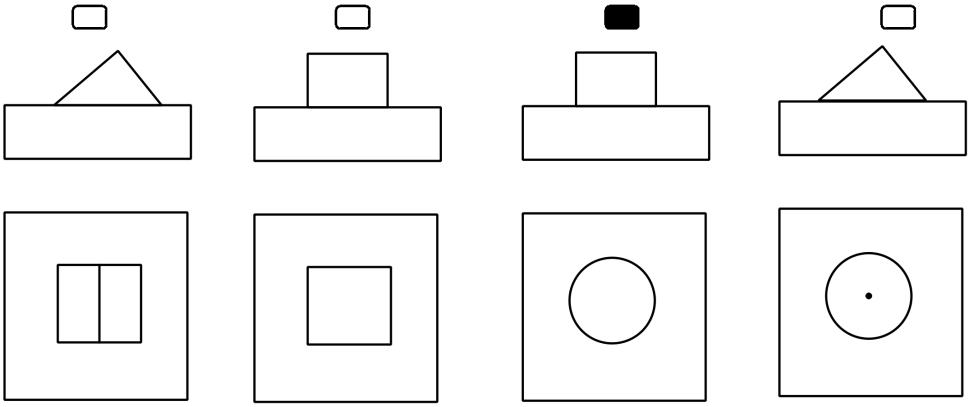
High School
Mathematics Test 2014

Volume
ANSWERS

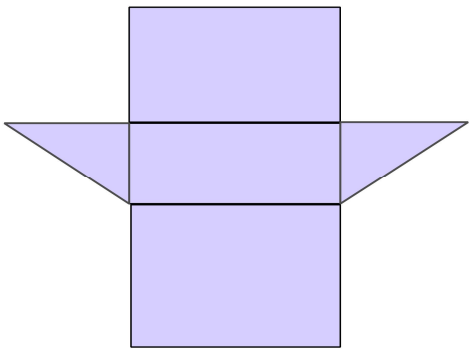
Non Calculator Section (1 mark each)

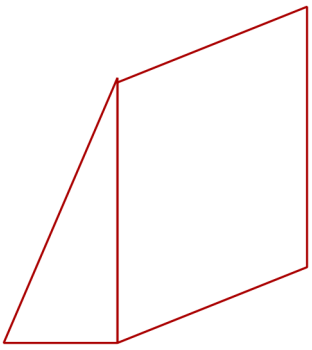
1. For the solid shown, which diagram below correctly shows its front view (elevation) and top view (plan).



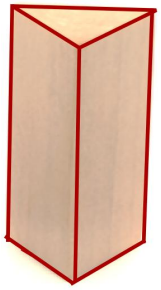


2. Draw a three dimensional sketch of the prism whose net is shown below.





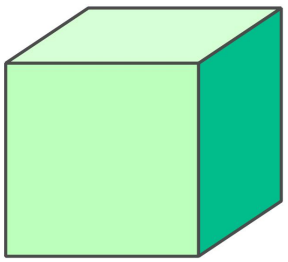
3. What name describes the solid shown?



- ☐ Rectangular Prism.
- ☐ Rectangular Pyramid.
- ■ Triangular Prism.
- ☐ Triangular Pyramid.

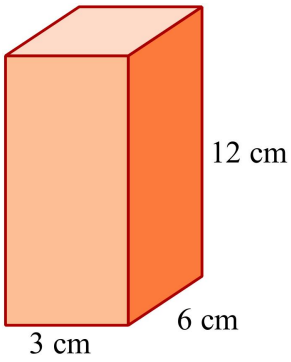
4. What is the volume of the cube shown?

$V = 9^3 = 729$



Volume = 927 cm^3

5. What is the volume of the rectangular prism?



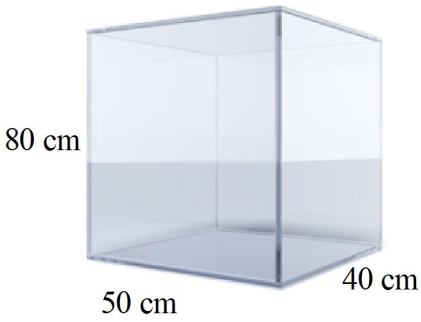
Volume = 216 cm^3

$V = 3 \times 6 \times 12 = 216$

6. Jimmy buys the glass aquarium shown and fills it to within 10 cm of the top.

How many litres of water are needed?

(1000 cm^3 holds one litre.)



- ☐ 70 litres.
- ☐ 80 litres.
- ■ 140 litres.
- ☐ 160 litres.

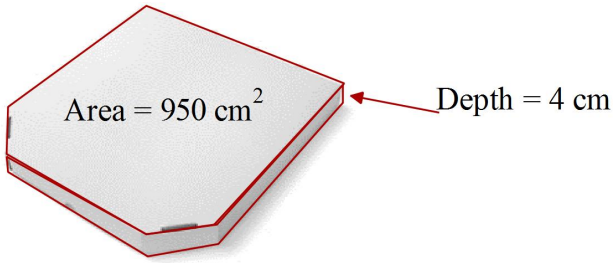
$V = 50 \times 40 \times 70 = 140\,000\ cm^3 = 140$ litres

☐ ☐

☐ ☐

7. Josie buys a pizza in the box shown.

What is the volume of the box?



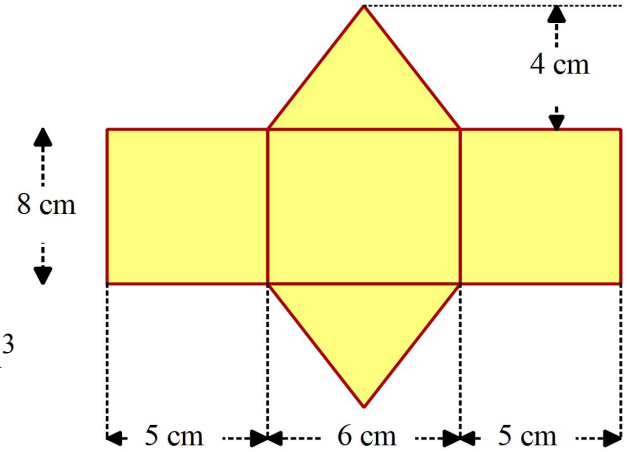
$V = 950 \times 4 = 3\,800 \text{ cm}^3$

Volume = 3 800 cm^3

8. What is the volume of the prism whose net is shown here?

$V = \frac{1}{2} \times 6 \times 4 \times 8$

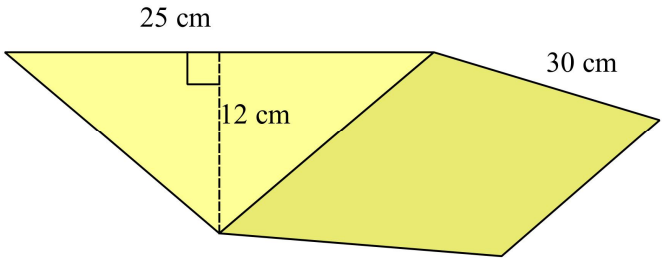
$= 96 \text{ cm}^3$



Volume = 96 cm^3

9. What is the volume of the triangular prism shown?

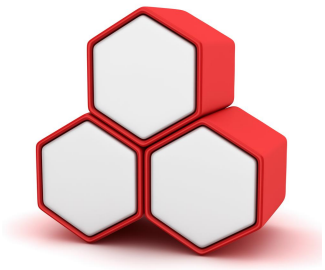
- ☐ 900 cm^3
- ■ 4 500 cm^3
- ☐ 9 000 cm^3
- ☐ 18 000 cm^3



$V = \frac{1}{2} \times 12 \times 25 \times 30 = 4\,500 \text{ cm}^3$

10. Each of these hexagonal boxes has a depth of 12 cm and the hexagonal top of each has an area of 90 cm^2.

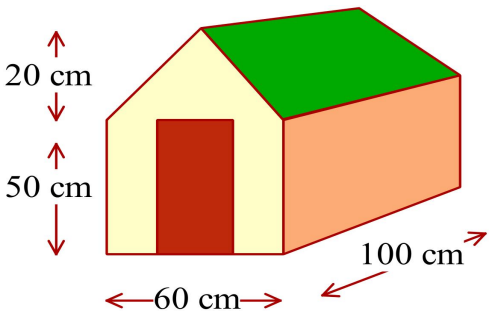
What is the total volume of all the boxes shown?



Volume = 3240 cm^3

Volume 1 box = $90 \times 12 = 1080$
Volume 3 boxes = $3 \times 1080 = 3240$

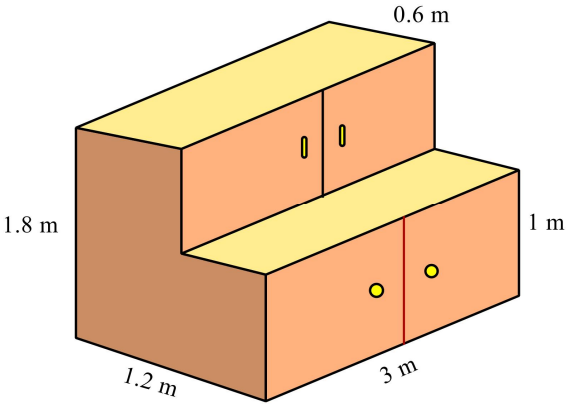
11. A dog kennel has the dimensions shown.
Calculate the volume of the kennel in cm^3.



$$\text{Area} = 50 \times 60 + \frac{1}{2} \times 60 \times 20$$
$$= 3000 + 600 = 3600$$
$$\text{Volume} = 3600 \times 100$$
$$= 360\,000 \text{ cm}^3$$

Volume = 360 000 cm^3.

12. A storage cabinet is in the shape shown.
What volume of storage does the cabinet provide?



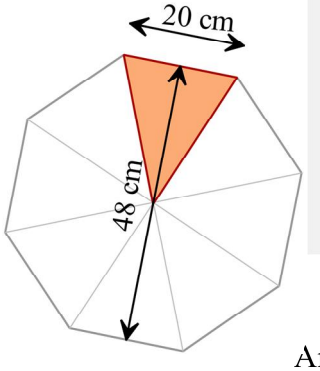
$$\text{Area} = 0.6 \times 1.8 + 1 \times 0.6$$
$$= 1.08 + 0.6 = 1.68$$
$$\text{Volume} = 1.68 \times 3$$
$$= 5.04 \text{ m}^3$$

Volume of Storage = 5.04 m^3.

13. A gift box is in the shape of an octagonal prism that has 20 cm edges, measures 48 cm across and is 15 cm deep.

The octagon can be thought of as 8 isosceles triangles as shown.

Find the volume of the box.



Area $= \frac{1}{2} \times 20 \times 24 \times 8 = 1920$

Volume $= 1920 \times 15$

$= 28\,800 \text{ cm}^3$

Volume $=$ 28 800 cm^3

14. Find the volume of the cylinder in terms of π.

Area $= \pi \times 6^2 = 36\pi$

Volume $= 36\pi \times 20$

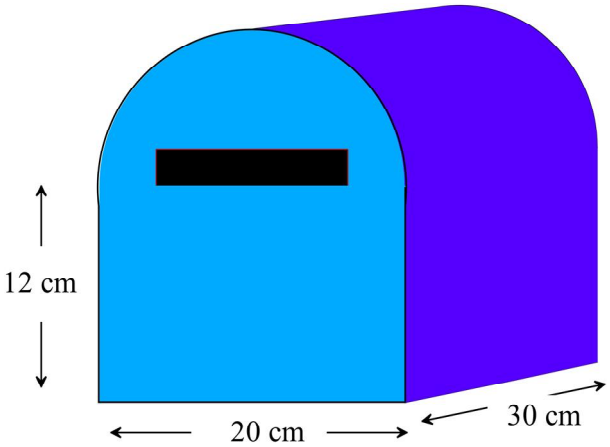
$= 720\pi \text{ cm}^3$

Volume $=$ 720π cm^3

15. A letter box is a prism with its cross section shown below.

What is the volume of the lunch box?

- ☐ $50\pi + 240 \text{ cm}^3$
- ☐ $150\pi + 720 \text{ cm}^3$
- ■ $1500\pi + 7200 \text{ cm}^3$
- ☐ $3000\pi + 7200 \text{ cm}^3$



Area $= \frac{1}{2} \times \pi \times 10^2 + 12 \times 20$

$= 50\pi + 240$

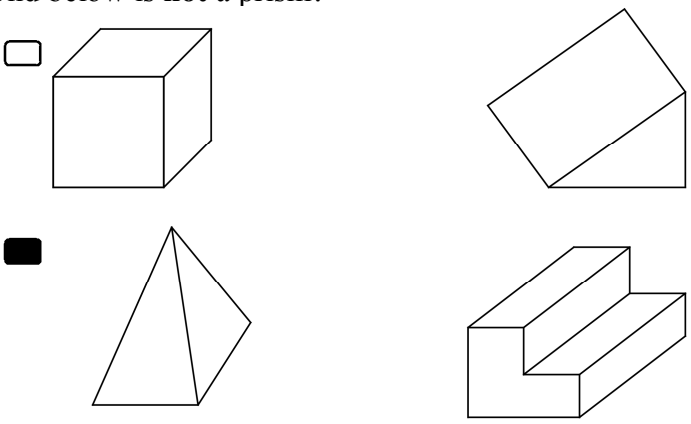
Volume $= A \times 30$

$= 1500\pi + 7200 \text{ cm}^3$

High School
Mathematics Test 2014

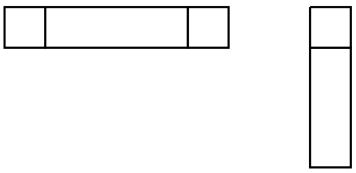
Calculator Allowed Short Answer Section (1 mark each)

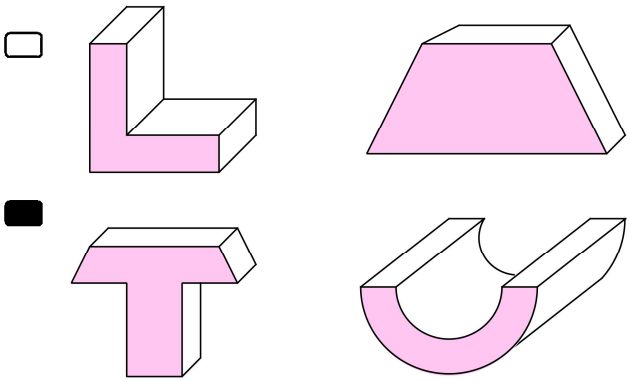
1. Which solid below is **not** a prism?



2. Which of the solids shown would have the top and side view below?

Top View *Side View*



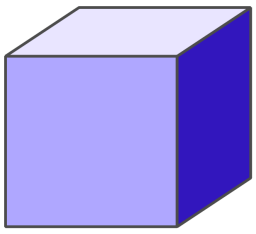


3. The cube shown has a volume of 42.875 cm^3.

What is the length of its edges?

$L = \sqrt[3]{42.875} = 3.5$

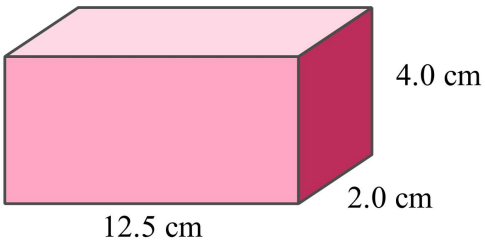
Length = 3.5 cm.



4. What is the volume of the rectangular prism?

- ☐ 25.0 cm
- ☐ 50.0 cm
- ■ 100.0 cm
- ☐ 125.0 cm

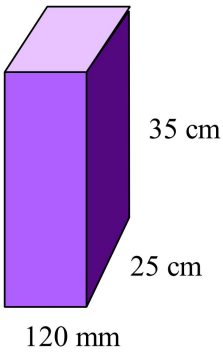
Area = 12.5 × 2.0 = 25
Volume = 25 × 4 = 100



5. What is the volume of the prism shown in cm^3?

- ☐ 105 cm^3
- ☐ 1 050 cm^3
- ■ 10 500 cm^3
- ☐ 105 000 cm^3

Area = 12 × 25 = 300
Volume = 300 × 35 = 10 500 cm^3



6. A prism has a volume of 6.5 m^3. What is its volume in cm^3?

$1\ m^3 = 100 \times 100 \times 100 = 1\ 000\ 000\ cm^3$
$6.5\ m^3 = 6.5 \times 1\ 000\ 000 = 6\ 500\ 000\ cm^3$

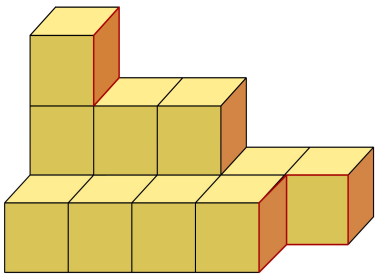
650 cm^3	65 000 cm^3	650 000 cm^3	6 500 000 cm^3
☐	☐	☐	■

7. Each of the cubes used in this design measure 2 cm on each side.

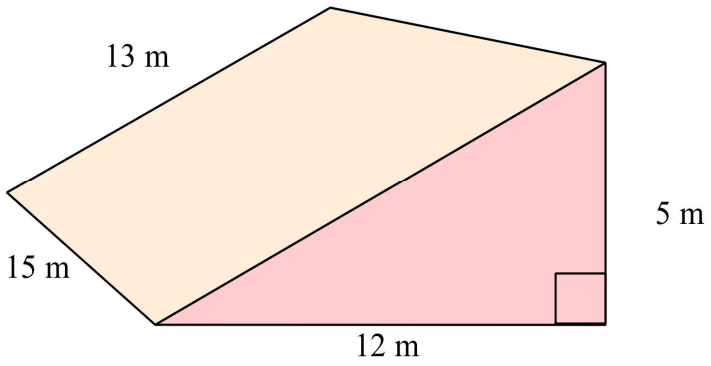
What is the total volume of the design?

- ☐ 13 cm^3
- ☐ 26 cm^3
- ☐ 52 cm^3
- ■ 104 cm

There are 13 cubes.
Volume of 1 cube = 2 × 2 × 2 = 8 cm^3
Volume of all cubes = 13 × 8 = 104 cm^3

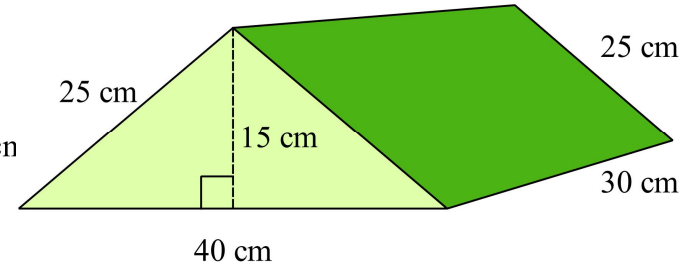


8. Which calculation could be used to find the volume of the triangular prism shown?



- [x] $\frac{1}{2} \times 5 \times 12 \times 15$
- [ ] $\frac{1}{2} \times 5 \times 12 \times 13$
- [ ] $\frac{1}{2} \times 12 \times 13 \times 15$
- [ ] $\frac{1}{2} \times 12 \times 13 \times 15$

9. Find the volume of the triangular prism shown.



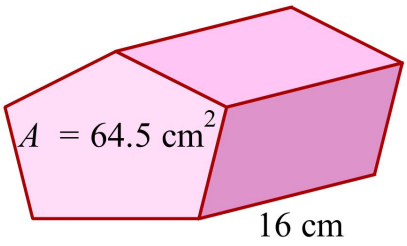
Area $= \frac{1}{2} \times 40 \times 15 = 300$

Volume $= 300 \times 30 = 9\,000$ cn

Volume = 9 000 cm^3

10. The area of the pentagonal base of this prism is 64.5 cm^2.

What is the volume of the prism?

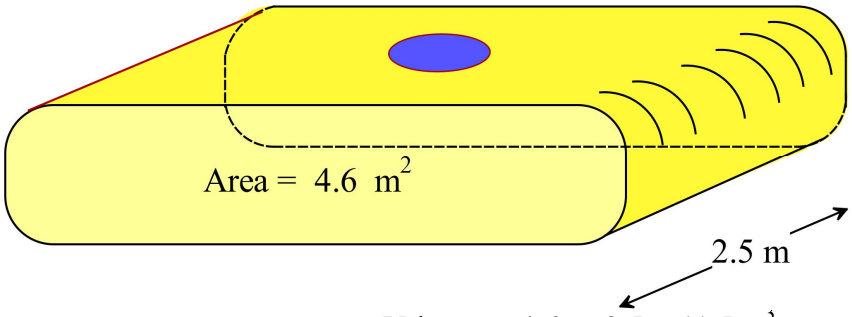


Area = 64.5

Volume $= 64.5 \times 16 = 1032\ cm^3$

Volume = 1 032 cm^3

11. The water tank is designed to go under a deck and has the dimensions shown below.
Using the relationship: 1 cubic metre holds 1 kilolitre; find the capacity of the tank in litres.



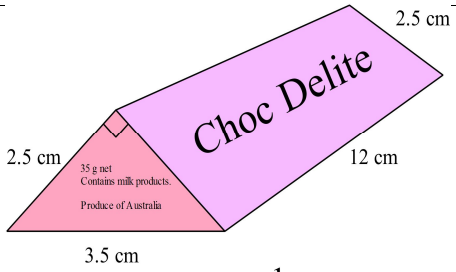
Capacity = 11 500 litres.

Volume = $4.6 \times 2.5 = 11.5\ m^3$
Capacity = 11.5 kl = 11 500 litres

12. Choc Delites are sold in a packet which is a triangular prism.

What is the volume of the packet shown?

- ☐ 35 cm^3
- ■ 37.5 cm^3
- ☐ 52.5 cm^3
- ☐ 131.25 cm^3



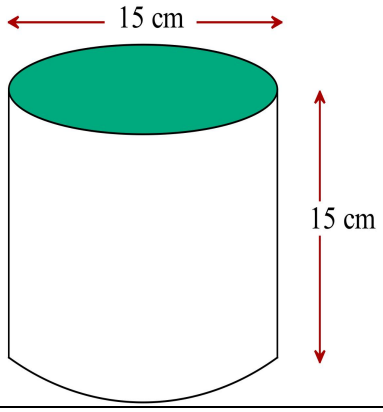
$$\text{Area} = \frac{1}{2} \times 2.5 \times 2.5 = 3.125$$

Volume = $3.125 \times 12 = 37.5\ m^3$

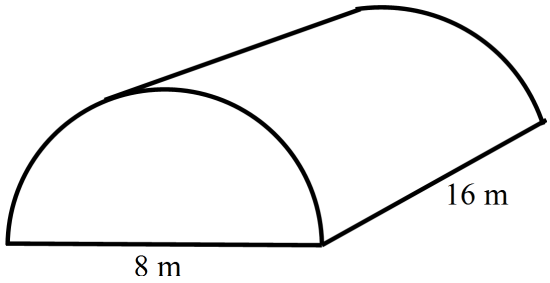
13. What is the volume of the cylinder to the nearest cm^3?

Volume = 2651 cm^3.

Area = $\pi \times 7.5^2 = 176.7\ cm^2$
Volume = $176.7 \times 15 = 2650.7 cm^3$



14. A storage hut is in the shape of a half cylinder.
The diameter of the semicircle is 8 metres and the length of the hut is 16 metres.
What volume does the hut hold?



Volume = 402.1 m^3

$\text{Area} = \frac{1}{2} \times \pi \times 4^2 = 25.1\ m^2$

$\text{Volume} = 25.1 \times 16 = 402.1 m^3$

15. The petroleum storage tanks are cylinders which have a diameter of 80 metres and a height of 40 metres.

The top curved section is only used to contain vapour.

A cubic metre holds one kilolitre.

How many megalitres of petroleum would the three tanks hold?

$\text{Area} = \pi \times 40^2 = 5026.5\ m^2$

$\text{Volume 1 tank} = 5026.5 \times 40 = 201\,062 m^3$

Capacity 1 tank = 201 062 kl = 201 Ml

Capacity 3 tanks = 3 × 201 = 603 Ml

Capacity of three tanks = 201 Megalitres