MATHEMATICS

Stage 4

Measurement and Space, Volume
Prisms
Cross Sections and Perspectives
Unit Conversion
Cylinders

Teacher: Chi Binh Le
Exam Equivalent Time: 178.5 minutes *(based on allocation ~1.25 min/mark)*

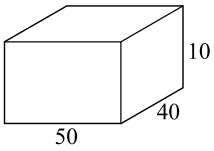
Questions

1. C Prisms (259470)

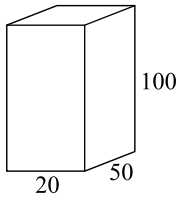
The measurements of the prisms below are all in centimetres.

Which prism has the capacity to hold exactly 2 litres of water?

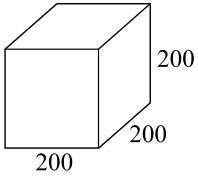
A.



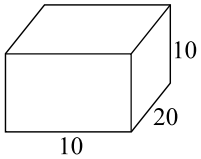
B.



C.

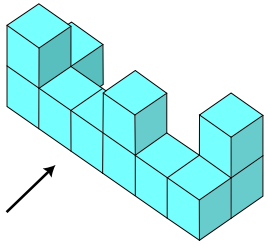


D.

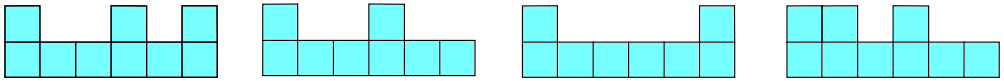


2. C Cross Sections and Perspectives (260422)

Simon looked at a stack of cubes from the direction of the arrow, shown in the diagram below.



Which is Simon's view of the cubes?



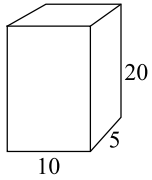
A. **B.** **C.** **D.**

3. C Prisms (259461)

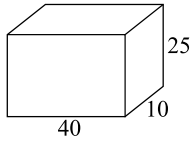
The measurements of the prisms below are all in centimetres.

Which prism has the capacity to hold exactly 1 litre of water?

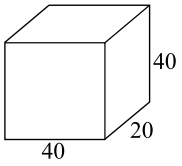
A.



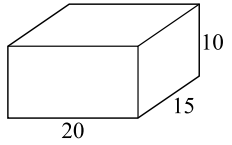
B.



C.



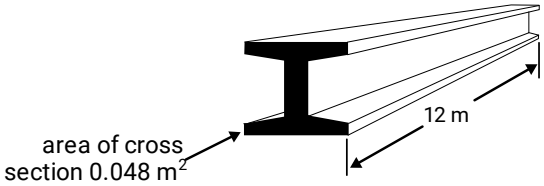
D.



4. C Cross Sections and Perspectives (259305)

A steel beam used for constructing a building has a cross-sectional area of 0.048 m^2 as shown.

The beam is 12 m long.



In cubic metres, the volume of this steel beam is closest to

A. 0.576

B. 2.5

C. 2.63

D. 57.6

5. C Unit Conversion (260777)

A factory worker pours 800 millilitre bottles of barbecue sauce into a container that can hold 9.6 litres in total.

Which one of these expressions shows how many bottles of barbecue sauce will be needed to fill the container?

A. 9.6×800

B. 9600×800

C. $9600 \div 800$

D. $800 \div 9.6$

6. C Unit Conversion (260759)

A glass of water containing 255 mL of water is poured into a jug that already contains 1.65 L of water in it.

How much water is now in the jug?

A. 256.65 mL

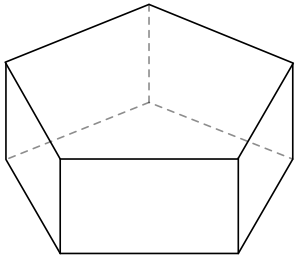
B. 420 mL

C. 1.805 mL

D. 1.905 mL

7. C Cross Sections and Perspectives (260378)

The diagram below represents a 3 dimensional object.



The object is a

A. pentagonal pyramid

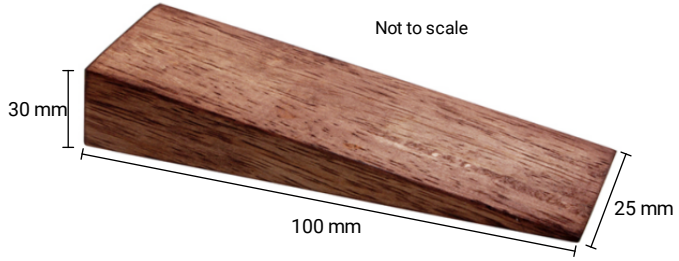
B. pentagonal prism

C. rectangular prism

D. rectangular pyramid

8. B Prisms (259492)

A timber door wedge is pictured below.



The wedge is in the shape of a triangular prism.

What is the volume of the wedge in cubic centimetres?

A. $7.5\ cm^3$

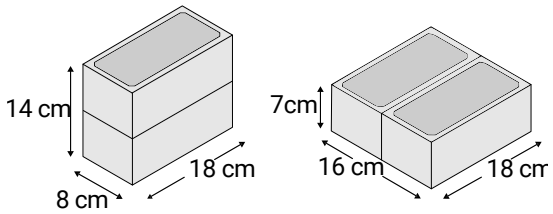
B. $37.5\ cm^3$

C. $75\ cm^3$

D. $375\ cm^3$

9. B Prisms (260436)

Two bricks can be joined to make three different rectangular prisms. Two of them are shown here.



What would be the measurements of the third prism?

A. 18 cm by 16 cm by 7 cm

B. 36 cm by 8 cm by 7 cm

C. 32 cm by 18 cm by 7 cm

D. 36 cm by 14 cm by 8 cm

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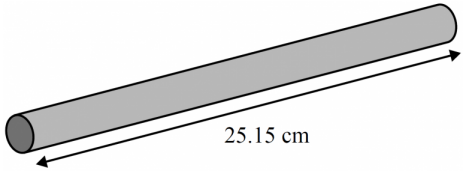
10. B+ Cylinders (259311)



The solid cylindrical rod shown above has a volume of 490.87 cm^3. The length is 25.15 cm.

The radius (in cm) of the cross-section of the rod, correct to one decimal place, is

A. 2.5

B. 5.0

C. 6.3

D. 19.6

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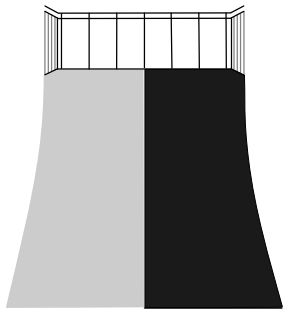
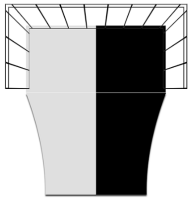
11. B+ Cross Sections and Perspectives (260387)

Peter takes a photo of a skateboard ramp from the north.

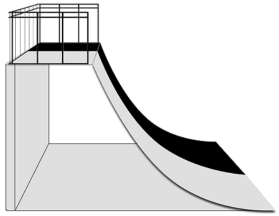


Which view could be from the west?

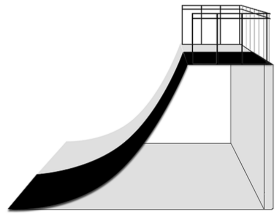
A.



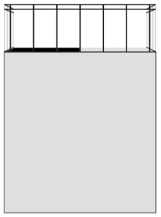
B.



C.



D.



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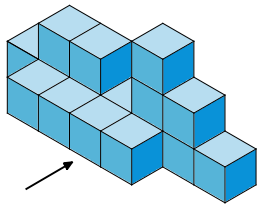
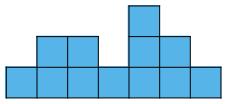
12. B+ Cross Sections and Perspectives (260721)

May looked at a stack of cubes from the direction of the arrow, shown in the diagram below.

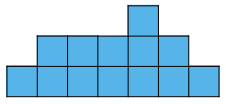


Which is May's view of the cubes?

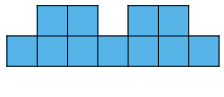
A.



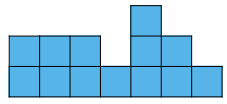
B.



C.

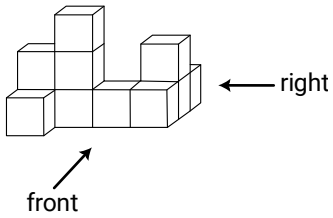


D.

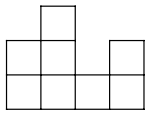


13. B+ Cross Sections and Perspectives (260393)

This object was made by gluing identical cubes together.

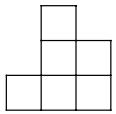


This is a view from the front.

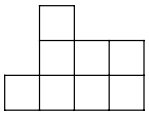


Which drawing shows a view from the right side?

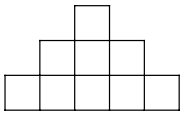
A.



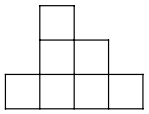
B.



C.



D.



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14. C Prisms (259608)

Find the side length of a cube with a volume of 27 cubic millimetres. ***(2 marks)***

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15. C Prisms (259610)

Find the side length of a cube with a volume of 117 649 cubic centimetres. ***(2 marks)***

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16. C Prisms (259612)

Find the side length of a cube with a volume of 0.343 cubic metres. ***(2 marks)***

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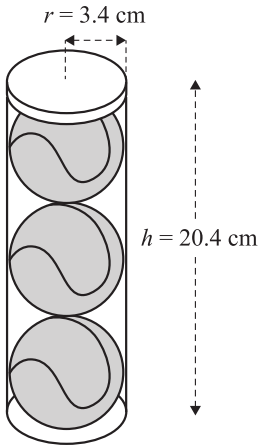
17. C Cylinders (259367)

Tennis balls are packaged in cylindrical containers.

Frank purchases a container of tennis balls that holds three standard tennis balls, stacked one on top of the other.

This container has a radius of 3.4 cm and a height of 20.4 cm, as shown in the diagram below.



a. Calculate the volume of the cylinder in cubic centimetres, correct to one decimal place. ***(2 marks)***

b. If one tennis ball has a volume of 164.6 cm³, how much unused volume, in cubic centimetres, surrounds the tennis balls in this container?
Round your answer to the nearest whole number. ***(1 mark)***

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18. C Prisms (259615)

A cooking vat in the shape of a cube has a volume of 1.331 cubic metres.

Calculate the side length of the vat. ***(2 marks)***

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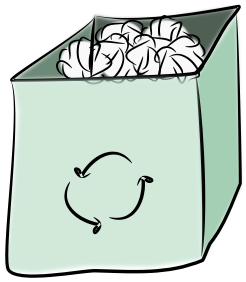
19. C Prisms (259617)

A paper recycling bag is in the shape of a cube with a side length of 0.5 metres.



Estimate the volume of the recycling bag in cubic metres. ***(2 marks)***

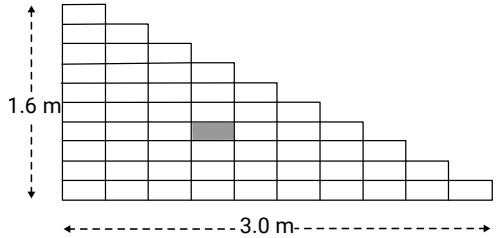
20. C Cross Sections and Perspectives (259387)

A concrete staircase leading up to the grandstand has 10 steps.

The staircase is 1.6 m high and 3.0 m deep.

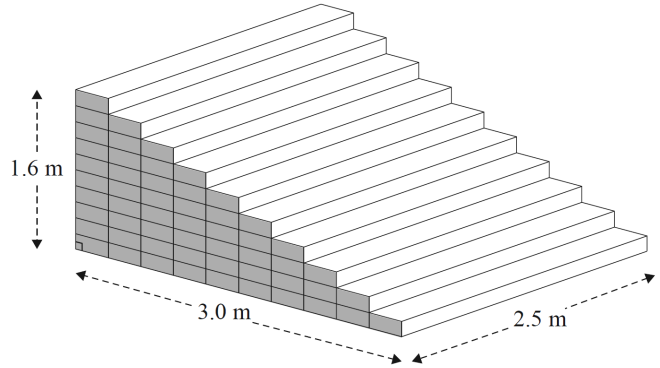
Its cross-section comprises identical rectangles.

One of these rectangles is shaded in the diagram below.



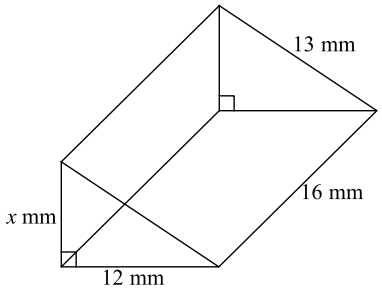
a. Find the area of the shaded rectangle in square metres. ***(2 marks)***

The concrete staircase is 2.5 m wide.



b. Find the volume of the solid concrete staircase in cubic metres. ***(2 marks)***

21. C Prisms (259769)



a. For the triangular prism above, use Pythagoras' Theorem to calculate the perpendicular height, x, of the triangular face. ***(2 marks)***

b. Using your answer from (a), calculate the volume of the prism in cubic millimetres. ***(2 marks)***

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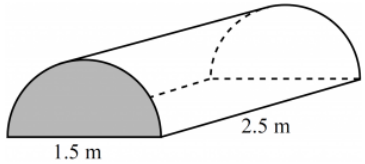
22. C Cylinders (259325)

A tent with semicircular ends is in the shape of a prism. The diameter of the ends is 1.5 m. The tent is 2.5 m long.



Calculate the total volume of the tent in cubic metres, correct to one decimal place. ***(2 marks)***

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23. C Cylinders (262512)

A right cylinder has a height of 7 metres and a radius of 4 metres. Calculate the volume of the cylinder, giving your answer as an exact value in terms of π. ***(2 marks)***

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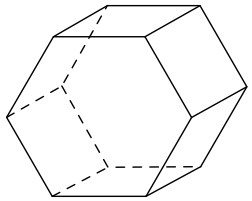
24. C Cross Sections and Perspectives (260726)

What is the name given to the prism below? ***(1 mark)***



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25. C Cylinders (262530)

A half-cylinder has a height of 12 centimetres and a radius of 9 centimetres. Calculate the volume of the half-cylinder, giving your answer as an exact value in terms of π. ***(2 marks)***

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26. C Cylinders (262526)

A right cylinder has a height of 100 millimetres and a radius of 1.1 millimetres. Calculate the volume of the cylinder, giving your answer as an exact value in terms of π. ***(2 marks)***

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27. C Cylinders (262542)

A half-cylinder has a height of 44 millimetres and a diameter of 20 millimetres. Calculate the volume of the half-cylinder in cubic centimetres, giving your answer as an exact value in terms of π. ***(2 marks)***

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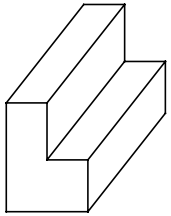
28. C Cross Sections and Perspectives (260730)

Sketch the uniform cross-section of the prism below? ***(1 mark)***



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29. C Cylinders (262536)

A quarter-cylinder has a height of 160 centimetres and a radius of 800 centimetres . Calculate the volume of the quarter-cylinder in cubic metres, giving your answer as an exact value in terms of π. ***(2 marks)***

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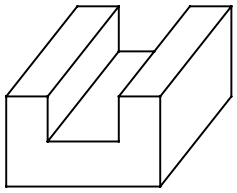
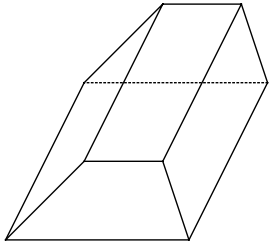
30. C Cross Sections and Perspectives (260736)

Sketch the uniform cross-section of the prism below? ***(1 mark)***



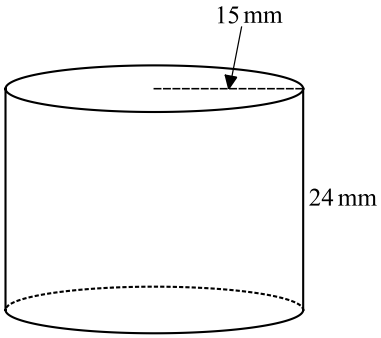
31. C Cross Sections and Perspectives (260740)

Sketch the uniform cross-section of the prism below? ***(1 mark)***



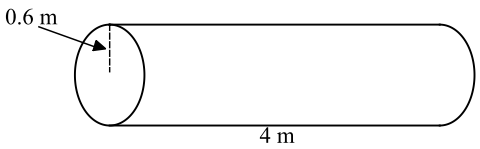
32. C Cylinders (261083)

Calculate the volume of the cylinder below in cubic millimetres. Give your answer correct to one decimal place. ***(2 marks)***



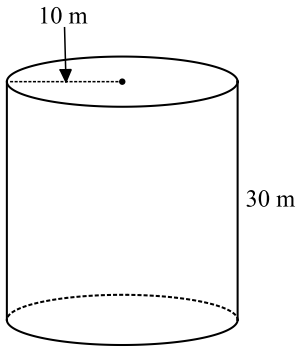
33. C Cylinders (261091)

Calculate the volume of the cylinder below in cubic metres. Give your answer correct to the nearest cubic metre. ***(2 marks)***



34. C Cylinders (261096)

Calculate the volume of the cylinder below in cubic metres. Give your answer correct to 2 decimal places. ***(2 marks)***

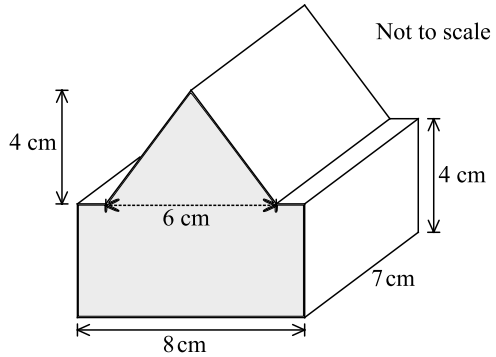


35. B Unit Conversion (260806)

Bronwyn's pool holds 35 000 litres of water. How many kilolitres of water does it take to fill her pool? ***(2 marks)***

36. B Prisms (260847)

Ben is designing blocks for a children's game. The block below is in the shape of a right prism and the dimensions are shown in the diagram.



Calculate the volume of the block in cubic centimetres. ***(3 marks)***

37. B Unit Conversion (260797)

Convert 7 300 000 litres to megalitres. ***(2 marks)***

38. B Unit Conversion (260761)

A class is making ice-cubes for a science experiment.

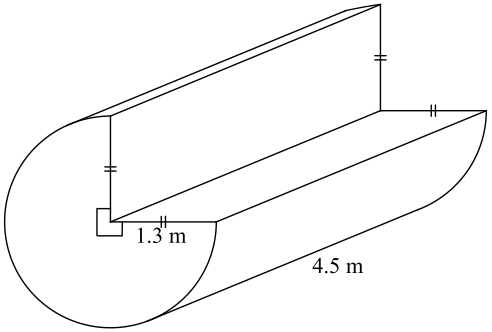
One ice-cube container requires 0.35 litres of water to fill it.

How many millilitres of water would a student need to fill up one container? ***(1 mark)***

---

39. B Cylinders (261121)

Calculate the volume of the figure below in cubic metres. Give your answer correct to 1 decimal place. ***(2 marks)***



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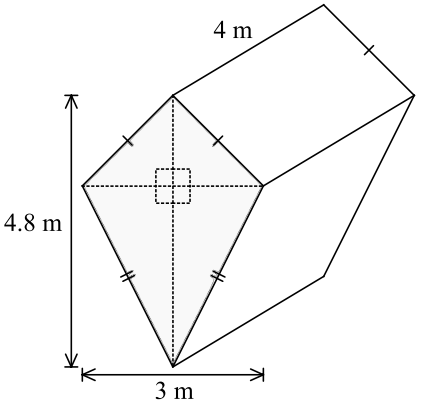
40. B Prisms (261017)



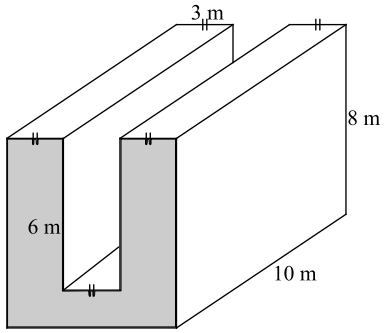
a. What shape best describes the uniform cross-section of this prism? ***(1 mark)***

b. Calculate the volume of the prism in cubic metres. ***(2 marks)***

---

41. B Prisms (260832)

Calculate the volume of the prism below in cubic metres. ***(2 marks)***



---

42. B Unit Conversion (260804)

Convert 2 100 000 millilitres to kilolitres. ***(2 marks)***

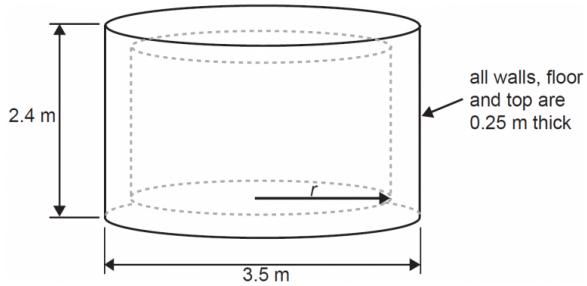
---

43. B Cylinders (259379)

A closed cylindrical water tank has external diameter 3.5 metres.

The external height of the tank is 2.4 metres.

The walls, floor and top of the tank are made of concrete 0.25 m thick.



a. What is the internal radius, r, of the tank? ***(1 mark)***

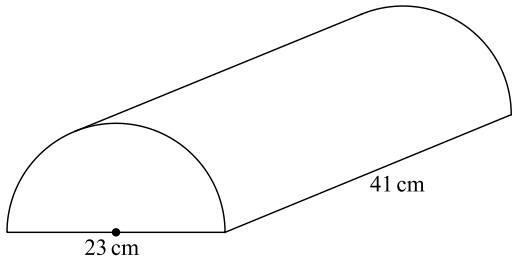
b. What is the internal height, h, of the tank? ***(1 mark)***

c. Determine the maximum amount of water this tank can hold.
Write your answer correct to the nearest cubic metre. ***(2 marks)***

---

44. B Cylinders (261128)

Geraldine created a large chocolate mould in the shape of a half cylinder using her 3D printer.



a. Calculate the volume of the mould, giving your answer to the nearest cubic centimetre. ***(2 marks)***

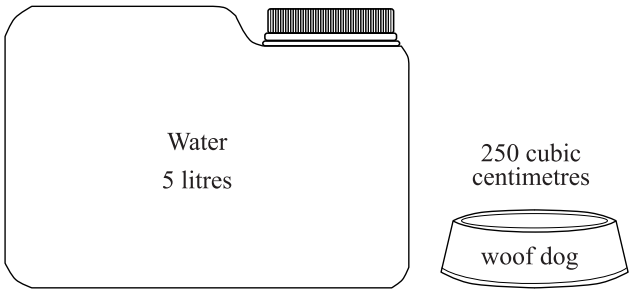
b. Calculate the capacity of the mould in litres. ***(1 mark)***

45. B Unit Conversion (260763)

A water container has 5 litres of water in it.

Kate pours water into her dog's bowl.

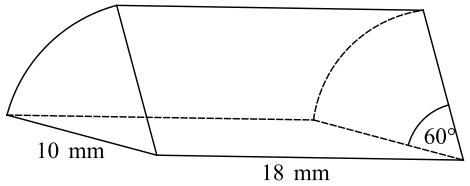
She pours the water into the 250 cubic centimetre bowl until it is full.



How much water is left in the container? ***(2 marks)***

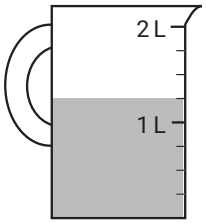
46. B Cylinders (261125)

Calculate the volume of the figure below in cubic millimetres. Give your answer correct to 1 decimal place. ***(2 marks)***



47. B Unit Conversion (260771)

A container has some water in it.



An extra 300 mL of water is added to the container.

How many millilitres (mL) of water will then be in the container? ***(2 marks)***

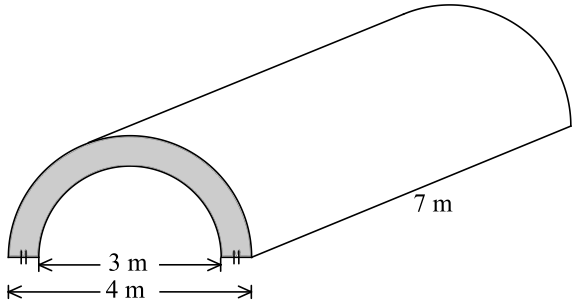
48. B Unit Conversion (260809)

Prospect dam in Sydney's water catchment area has a capacity of 33 330 ML. The dam's current volume is 30 767 ML.

Calculate the amount of water required for the dam to reach capacity. Give your answer in kilolitres. ***(2 marks)***

49. B Cylinders (261138)

A concrete half-pipe was constructed in a park. The pipe has a constant thickness 0.5 metres.

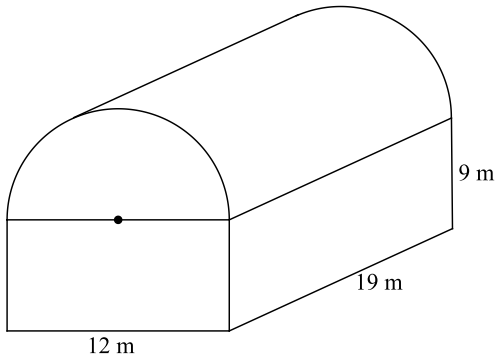


a. Calculate the volume of the concrete used to create the half-pipe, giving your answer to the nearest cubic metre. ***(2 marks)***

b. Calculate the capacity of the concrete used in kilolitres. ***(1 mark)***

50. B Cylinders (261580)

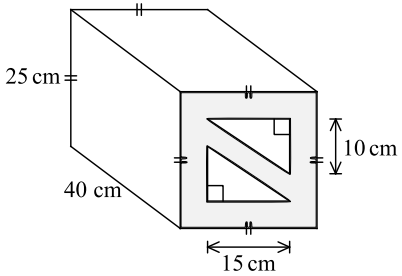
A large machinery storage shed has been constructed on a property. The shed is made up of a rectangular prism and a half cylinder.



Calculate the volume of the machinery shed, giving your answer to the nearest cubic metre. ***(2 marks)***

51. B+ Prisms (260875)

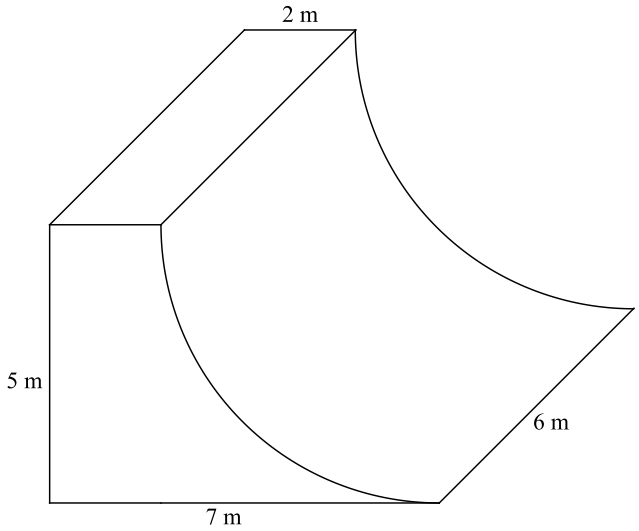
Callum has designed a brick with two identical triangular sections removed as shown in the diagram below.



Calculate the volume of the brick in cubic centimetres. ***(2 marks)***

52. B+ Cylinders (261591)

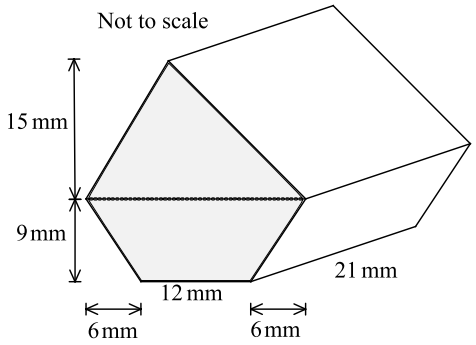
A a skateboard ramp has been constructed using a rectangular prism that has had a quarter-cylinder removed to create the curved surface.



Calculate the volume of the skateboard ramp, giving your answer correct to one decimal place. ***(2 marks)***

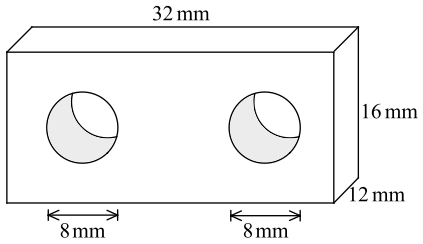
53. B+ Prisms (260851)

Calculate the volume of the composite prism below, giving your answer in cubic centimetres. ***(2 marks)***



54. B+ Cylinders (261597)

A piece of metal in the shape of a rectangular prism has had two cylindrical holes, each with a diameter of 8 millimetres, drilled through it.

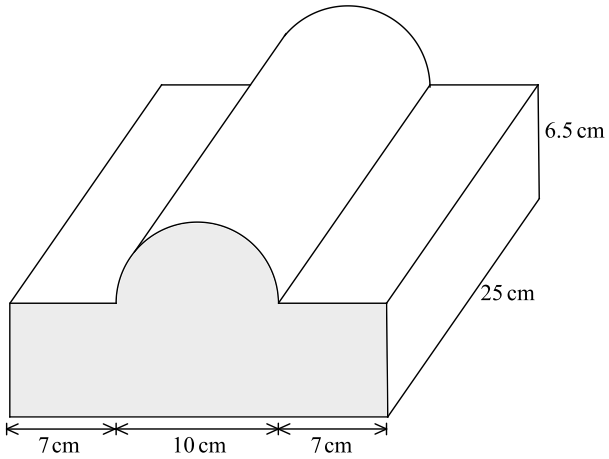


Calculate the volume of the remaining metal in cubic millimetres, giving your answer correct to one decimal place. ***(2 marks)***

---

55. B+ Cylinders (261606)

The 3D shape below is a composite prism consisting of a half-cylinder and a rectangular prism.



Calculate the volume of the of the prism in cubic centimetres, giving your answer correct to one decimal place. ***(2 marks)***

---

56. B+ Cylinders (262495)

A right cylinder has a volume of 50.27 cubic millimetres. Calculate the height of the cylinder if the radius is 2 millimetres.

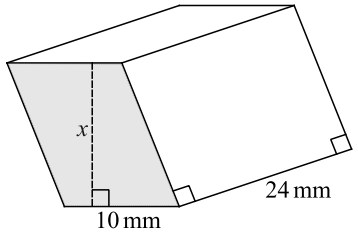
Give your answer to the nearest whole millimetre. ***(2 marks)***

---

57. A Prisms (261034)

The figure below is a prism with a parallelogram as the uniform cross-section.

Calculate the value of x, the perpendicular height of the cross-section, given the volume of the prism is 2880 cubic millimetres. ***(2 marks)***



---

58. A Cylinders (262506)

A right cylinder has a volume of 8482.3 cubic millimetres. Calculate the diameter of the cylinder if the height is 12 millimetres.

Give your answer to the nearest whole millimetre. ***(3 marks)***

---

59. A Cylinders (262516)

A right cylinder has a volume of **11 451** cubic metres. Calculate the radius of the cylinder if the height is 45 metres.

Give your answer to the nearest whole centimetre. ***(2 marks)***

---

60. A Cylinders (262497)

A right cylinder has a volume of **10 178.76** cubic centimetres. Calculate the radius of the cylinder if the height is 10 centimetres.

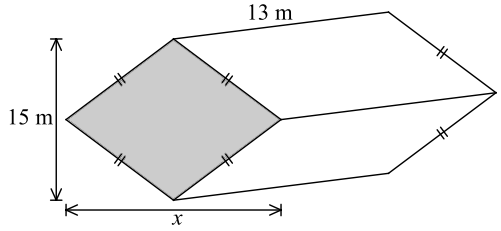
Give your answer to the nearest whole centimetre. ***(2 marks)***

---

61. A Prisms (261076)

The figure below is a prism with a rhombus as the uniform cross-section.

Calculate the value of x, the length of the diagonal in the cross-section, given the volume of the prism is 1950 cubic metres. ***(2 marks)***



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62. A+ Cylinders (262510)

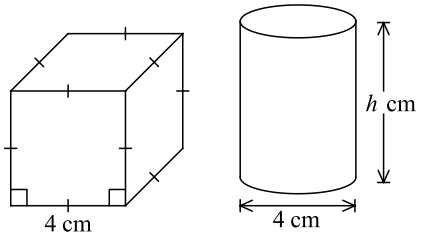
A right cylinder has a volume of 22 cubic metres. Calculate the diameter of the cylinder if the height is 7 metres.

Give your answer to the nearest whole metre. ***(3 marks)***

---

63. A+ Cylinders (262585)

The cube and cylinder below both have the same volume.



a. Calculate the volume of the cube in cubic centimetres. ***(2 marks)***

b. Calculate the height of the cylinder, h, in centimetres. Give your answer correct to 1 decimal place. ***(2 marks)***

Worked Solutions

1. C Prisms (259470)

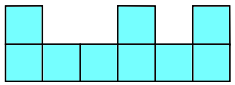
$1\text{ cm}^3 = 1\text{ mL} \implies 1000\text{ cm}^3 = 1000\text{ mL} = 1\text{ L}$

$\text{Option A: } = 50 \times 10 \times 40 = 20\,000\text{ cm}^3 \implies 20\text{ L}$
$\text{Option B: } = 20 \times 100 \times 50 = 100\,000\text{ cm}^3 \implies 100\text{ L}$
$\text{Option C: } = 200 \times 200 \times 200 = 8\,000\,000\text{ cm}^3 \implies 8000\text{ L}$
$\text{Option D: } = 10 \times 10 \times 20 = 2000\text{ cm}^3 \implies 2\text{ L} \checkmark$

$\Rightarrow D$

---

2. C Cross Sections and Perspectives (260422)



$\Rightarrow A$

---

3. C Prisms (259461)

$1\text{ cm}^3 = 1\text{ mL} \implies 1000\text{ cm}^3 = 1000\text{ mL} = 1\text{ L}$

$\text{Option A: } = 10 \times 20 \times 5 = 1000\text{ cm}^3 \implies 1\text{ L} \checkmark$
$\text{Option B: } = 40 \times 25 \times 10 = 10\,000\text{ cm}^3 \implies 10\text{ L}$
$\text{Option C: } = 40 \times 40 \times 20 = 32\,000\text{ cm}^3 \implies 32\text{ L}$
$\text{Option D: } = 20 \times 10 \times 15 = 3000\text{ cm}^3 \implies 3\text{ L}$

$\Rightarrow A$

---

4. C Cross Sections and Perspectives (259305)

$$\begin{aligned}\text{Volume} &= A \times h \\ &= 0.048 \times 12 \\ &= 0.576\text{ m}^3\end{aligned}$$

$\Rightarrow A$

---

5. C Unit Conversion (260777)

$9.6\text{ L} = 9600\text{ millilitres}$
$\text{Bottles of barbecue sauce} = 9600 \div 800$

$\Rightarrow C$

Worked Solutions

6. C Unit Conversion (260759)

$$1.65\text{ L} + 255\text{ mL} = 1.65\text{ L} + 0.255\text{ L}$$
$$= 1.905\text{ L}$$

$\Rightarrow D$

---

7. C Cross Sections and Perspectives (260378)

The shape has a uniform pentagonal cross-section

$\therefore$ It is a pentagonal prism

$\Rightarrow B$

---

8. B Prisms (259492)

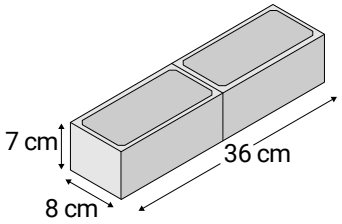
10 mm =1 cm

$$\text{Volume} = Ah$$
$$= \left(\frac{1}{2} \times 10 \times 3\right) \times 2.5$$
$$= 15 \times 2.5$$
$$= 37.5\text{ cm}^3$$

$\Rightarrow B$

---

9. B Prisms (260436)



36 cm by 8 cm by 7 cm

$\Rightarrow B$

---

10. B+ Cylinders (259311)

$V = \pi r^2 h$

Where length $= h = 25.15$ cm, $V = 490.87\text{ cm}^3$

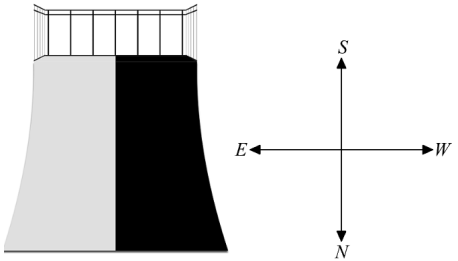
$$\therefore\ 490.87 = \pi \times r^2 \times 25.15$$
$$r^2 = \frac{490.87}{\pi \times 25.15}$$
$$= 6.2126\ldots$$
$$\therefore\ r = 2.492\ldots\text{ cm}$$
$$\approx 2.5\text{ cm (1 d.p.)}$$

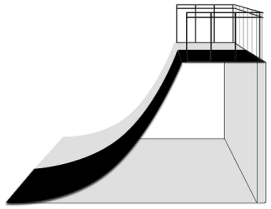
$\Rightarrow A$

---

11. B+ Cross Sections and Perspectives (260387)

View given is from the North so West will be from the right looking towards the view given.

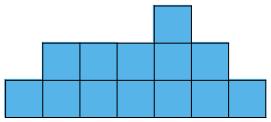




$\Rightarrow C$

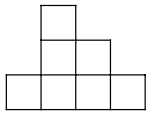
---

12. B+ Cross Sections and Perspectives (260721)



$\Rightarrow B$

13. B+ Cross Sections and Perspectives (260393)



$\Rightarrow D$

14. C Prisms (259608)

Let s be the side length of the cube

$$\begin{aligned}\text{Volume} &= Ah \\ 27 &= s \times s \times s \\ s^3 &= 27 \\ s &= \sqrt[3]{27} \\ &= 3\end{aligned}$$

$\therefore$ Side length of the cube is 3 millimetres.

15. C Prisms (259610)

Let s be the side length of the cube

$$\begin{aligned}\text{Volume} &= Ah \\ 117\,649 &= s \times s \times s \\ s^3 &= 117\,649 \\ s &= \sqrt[3]{117\,649} \\ &= 49\end{aligned}$$

$\therefore$ Side length of the cube is 49 centimetres.

16. C Prisms (259612)

Let s be the side length of the cube

$$\begin{aligned}\text{Volume} &= Ah \\ 0.343 &= s \times s \times s \\ s^3 &= 0.343 \\ s &= \sqrt[3]{0.343} \\ &= 0.7\end{aligned}$$

$\therefore$ Side length of the cube is 0.7 metres.

17. C Cylinders (259367)

a. $$\begin{aligned}\text{Volume} &= Ah \\ &= \pi \times 3.4^2 \times 20.4 \\ &= 740.86\ldots \\ &= 740.9 \text{ cm}^3 \text{ (to 1 d.p.)}\end{aligned}$$

b. $$\begin{aligned}\text{Unused volume} &= \text{cylinder volume} - \text{volume of balls} \\ &= 740.9 - 3 \times 164.6 \\ &= 247.1 \\ &= 247 \text{ cm}^3 \text{ (nearest cm}^3 text)\end{aligned}$$

18. C Prisms (259615)

Let s be the side length of the cube

$$\begin{aligned}\text{Volume} &= Ah \\ 1.331 &= s \times s \times s \\ s^3 &= 1.331 \\ s &= \sqrt[3]{1.331} \\ &= 1.1\end{aligned}$$

$\therefore$ Side length of the vat is 1.1 metres.

19. C Prisms (259617)

$$\begin{aligned}\text{Volume} &= Ah \\ V &= 0.5 \times 0.5 \times 0.5 \\ &= 0.125 \text{ m}^3\end{aligned}$$

20. C Cross Sections and Perspectives (259387)

a. Height of rectangle

$$= \frac{1.6}{10}$$
$$= 0.16 \text{ m}$$

Length of rectangle

$$= \frac{3.0}{10}$$
$$= 0.3 \text{ m}$$

$\therefore$ Area of rectangle $= 0.16 \times 0.3$

$$= 0.048 \text{ m}^2$$

b. 55 rectangles make up the cross-section:

$\therefore A = 55 \times 0.048$

$$= 2.64 \text{ m}^2$$

$\therefore V = Ah$

$$= 2.64 \times 2.5$$
$$= 6.6 \text{ m}^3$$

---

21. C Prisms (259769)

a. $a^2 + b^2 = c^2$

$x^2 + 12^2 = 13^2$

$x^2 = 13^2 - 12^2$

$x^2 = 25$

$x = \sqrt{25} = 5$

$\therefore$ The perpendicular height of the triangle is 5 mm

b. $V = Ah$

$$= \left(\frac{1}{2} \times 12 \times 5\right) \times 16$$
$$= 30 \times 16$$
$$= 480 \text{ mm}^3$$

---

22. C Cylinders (259325)

Diameter $= 1.5$ metres $\Rightarrow$ Radius $= \frac{1.5}{2} = 0.75$ metres

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

$= \frac{1}{2} \times \pi \times 0.75^2 \times 2.5$

$= 2.2089\ldots$

$\approx 2.2 \text{ m}^3$ (1 d.p.)

---

23. C Cylinders (262512)

$V = \pi r^2 h$

$= \pi \times 4^2 \times 7$

$= 112\pi$

$\therefore$ The exact volume of the cylinder is 112π m^3

---

24. C Cross Sections and Perspectives (260726)

The shape has a uniform hexagonal cross-section

$\therefore$ It is a hexagonal prism

---

25. C Cylinders (262530)

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

$= \frac{1}{2} \times \pi \times 9^2 \times 12$

$= 486\pi$

$\therefore$ The exact volume of the half-cylinder is 486π cm^3

---

26. C Cylinders (262526)

$V = \pi r^2 h$

$= \pi \times 1.1^2 \times 100$

$= 121\pi$

$\therefore$ The exact volume of the cylinder is 121π mm^3

---

27. C Cylinders (262542)

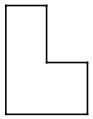
NOTE: change measurements to centimetres before calculations

$$V = \frac{1}{2}\pi r^2 h$$
$$= \frac{1}{2} \times \pi \times 10^2 \times 44$$
$$= 2200\pi$$

$\therefore$ The exact volume of the half-cylinder is 2200π cm^3

---

28. C Cross Sections and Perspectives (260730)



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29. C Cylinders (262536)

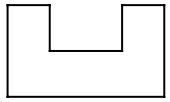
NOTE: change measurements to metres before calculations

$$V = \frac{1}{4}\pi r^2 h$$
$$= \frac{1}{4} \times \pi \times 8^2 \times 1.6$$
$$= 25.6\pi$$

$\therefore$ The exact volume of the quarter-cylinder is 25.6π m^3

---

30. C Cross Sections and Perspectives (260736)



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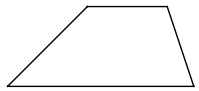
31. C Cross Sections and Perspectives (260740)



---

32. C Cylinders (261083)

$$V = \pi r^2 h$$
$$= \pi \times 15^2 \times 24$$
$$= 16\,964.600\ldots$$
$$\approx 16\,964.6 \text{ mm}^3 \text{ (1 d.p.)}$$

---

33. C Cylinders (261091)

$$V = \pi r^2 h$$
$$= \pi \times 0.6^2 \times 4$$
$$= 4.523\ldots$$
$$\approx 5 \text{ m}^3 \text{ (nearest cubic metre)}$$

---

34. C Cylinders (261096)

$$V = \pi r^2 h$$
$$= \pi \times 10^2 \times 30$$
$$= 9424.777\ldots$$
$$\approx 9424.78 \text{ m}^3 \text{ (2 d.p.)}$$

---

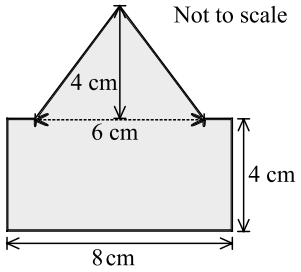
35. B Unit Conversion (260806)

$1 \text{ kL} = 1000 \text{ L}$

$$\therefore 35\,000 \text{ L} = \left(\frac{35\,000}{1\,000}\right) \text{kL}$$
$$= 35 \text{ kL}$$

---

36. B Prisms (260847)



$$\text{Area of cross-section} = \text{Rectangle} + \text{Triangle}$$
$$= (8 \times 6) + (\frac{1}{2} \times 6 \times 4)$$
$$= 48 + 12$$
$$= 60 \text{ cm}^2$$

$$V = A \times h$$
$$= 60 \times 7$$
$$= 420 \text{ cm}^3$$

---

37. B Unit Conversion (260797)

$$1 \text{ ML} = 1000 \text{ kL} = 1000 \times 1000 \text{ L} = 1\,000\,000 \text{ L}$$
$$\therefore 7\,300\,000 \text{ L} = \left(\frac{7\,300\,000}{1\,000\,000}\right) \text{ ML}$$
$$= 7.3 \text{ ML}$$

---

38. B Unit Conversion (260761)

Since there are 1000 mL in 1 litre,

$$\text{Volume} = 0.35 \times 1000$$
$$= 350 \text{ millilitres}$$

---

39. B Cylinders (261121)

Figure is $\frac{3}{4}$ of a cylinder

$$\therefore V = \frac{3}{4} \times \pi r^2 h$$
$$= \frac{3}{4} \times \pi \times 1.3^2 \times 4.5$$
$$= 17.918\ldots$$
$$\approx 17.9 \text{ m}^3 \text{ (1 d.p.)}$$

---

40. B Prisms (261017)

a. The uniform cross-section is a kite.

b. Area of kite cross-section

$$A = \frac{1}{2} \times x \times y$$
$$= \frac{1}{2} \times 3 \times 4.8$$
$$= 7.2 \text{ m}^2$$

$$V = A \times h$$
$$= 7.2 \times 4$$
$$= 28.8 \text{ m}^3$$

---

41. B Prisms (260832)

$$\text{Area of cross-section} = (9 \times 8) - (3 \times 6)$$
$$= 72 - 18$$
$$= 54 \text{ m}^2$$

$$V = A \times h$$
$$= 54 \times 10$$
$$= 540 \text{ m}^3$$

---

42. B Unit Conversion (260804)

$$1 \text{ kL} = 1000 \text{ L} = 1000 \times 1000 \text{ mL} = 1\,000\,000 \text{ mL}$$
$$\therefore 2\,100\,000 \text{ mL} = \left(\frac{2\,100\,000}{1\,000\,000}\right) \text{ kL}$$
$$= 2.1 \text{ kL}$$

43. B Cylinders (259379)

a. Internal radius (r)

$$= \frac{1}{2} \times (3.5 - 2 \times 0.25)$$
$$= 1.5 \text{ m}$$

b. Internal Height $(h) = 2.4 - (2 \times 0.25)$
$$= 1.9 \text{ m}$$

c. Volume $= \pi r^2 h$
$$= \pi \times 1.5^2 \times 1.9$$
$$= 13.430\ldots$$
$$= 13 \text{ m}^3 \text{ (nearest m}^3\text{)}$$

---

44. B Cylinders (261128)

a. diameter $= 23$ cm $\rightarrow$ radius $= 11.5$ cm

$$\therefore V = \frac{1}{2} \times \pi r^2 h$$
$$= \frac{1}{2} \times \pi \times 11.5^2 \times 41$$
$$= 8309.512\ldots$$
$$\approx 8310 \text{ cm}^3 \text{ nearest cm}^3)$$

b. 1 litre $= 1000 \text{ cm}^3$

$$\therefore 8310 \text{ cm}^3 = \left(\frac{8310}{1000}\right) \text{L}$$
$$= 8.31 \text{ L}$$

---

45. B Unit Conversion (260763)

$1 \text{ cm}^3 = 1 \text{ mL} \implies 250 \text{ cm}^3 = 250 \text{ mL}$
5 litres $= 5000$ mL
$\therefore$ Water left $= 5000 - 250$
$= 4750$ millilitres

---

46. B Cylinders (261125)

Figure is $\frac{60}{360} = \frac{1}{6}$ of a cylinder

$$\therefore V = \frac{1}{6} \times \pi r^2 h$$
$$= \frac{1}{6} \times \pi \times 10^2 \times 18$$
$$= 942.477\ldots$$
$$\approx 942.5 \text{ mm}^3 \text{ (1 d.p.)}$$

---

47. B Unit Conversion (260771)

Note: Each division in the jug is 250 mL
Water in jug $= 1250 + 300$
$= 1550$ mL

---

48. B Unit Conversion (260809)

Water to reach capacity
$= 33\,330 - 30\,767 = 2563$ ML
1 ML $= 1000$ kL
$\therefore 2563$ ML $= 2563 \times 1000$ kL
$= 2\,563\,000$ kL

---

49. B Cylinders (261138)

a. diameter large semi-circle $= 4$ m $\rightarrow$ R $= 2$ m
diameter small semi-circle $= 3$ m $\rightarrow$ r $= 1.5$ m

$$\therefore V = \frac{1}{2} \times \pi R^2 h - \frac{1}{2} \times \pi r^2 h$$
$$= \frac{1}{2} \times \pi \times 2^2 \times 7 - \frac{1}{2} \times \pi \times 1.5^2 \times 7$$
$$= 19.242\ldots$$
$$\approx 19 \text{ m}^3 \text{ (nearest m}^3\text{)}$$

b. 1 kL $= 1 \text{ m}^3$

$\therefore 19 \text{ m}^3 = 19$ kL

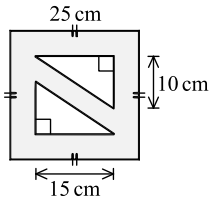
---

50. B Cylinders (261580)

Diameter semi-circle $= 12$ m $\rightarrow$ r $= 6$ m

$$\therefore V = \frac{1}{2} \times \pi r^2 h + l \times b \times h$$
$$= \frac{1}{2} \times \pi \times 6^2 \times 19 + 12 \times 9 \times 19$$
$$= 1074.424\cdots + 2052$$
$$= 3126.424\ldots$$
$$\approx 3126 \text{ m}^3 \text{ (nearest m}^3\text{)}$$

51. B+ Prisms (260875)

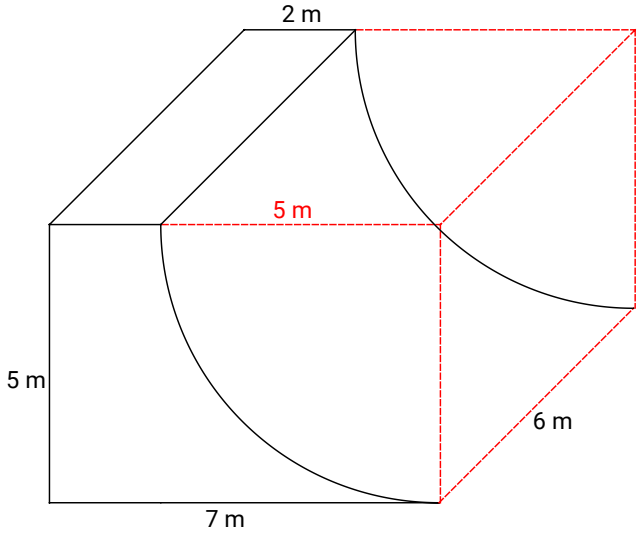


Area of cross-section (A) = Square $-$ 2 $\times$ Triangle

$$= (25 \times 25) - 2 \times \left(\frac{1}{2} \times 10 \times 15\right)$$
$$= 625 - 150$$
$$= 475 \text{ cm}^2$$

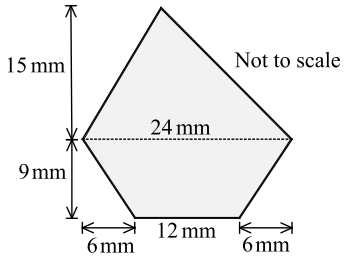
$$V = A \times h$$
$$= 475 \times 40$$
$$= 19\,000 \text{ cm}^3$$

52. B+ Cylinders (261591)



$$V = l \times b \times h - \frac{1}{4} \times \pi r^2 h$$
$$= 7 \times 5 \times 6 - \frac{1}{4} \times \pi \times 5^2 \times 6$$
$$= 210 - 117.809\ldots$$
$$= 92.190\ldots$$
$$\approx 92.2 \text{ m}^3 \text{ (1 d.p.)}$$

53. B+ Prisms (260851)



Convert measurements from mm to cm before calculations

Area of cross-section = Trapezium + Triangle

$$= \left(\frac{0.9}{2} \times (2.4 + 1.2)\right) + \left(\frac{1}{2} \times 2.4 \times 1.5\right)$$
$$= 1.62 + 1.8$$
$$= 3.42 \text{ cm}^2$$

$$V = A \times h$$
$$= 3.42 \times 2.1$$
$$= 7.182 \text{ cm}^3$$

---

54. B+ Cylinders (261597)

Diameter of cylinders = 8 mm $\longrightarrow$ $r = 4$ mm

Volume = rectangular prism − 2 × cylinders

$$\therefore V = l \times b \times h - 2 \times \pi r^2 h$$
$$= 32 \times 16 \times 12 - 2 \times \pi \times 4^2 \times 12$$
$$= 6144 - 1206.371\ldots$$
$$= 4937.628\ldots$$
$$\approx 4937.6 \text{ mm}^3 \text{ (1 d.p.)}$$

---

55. B+ Cylinders (261606)

Diameter of cylinders = 10 cm $\longrightarrow$ $r = 5$ cm

Volume = rectangular prism + ½ cylinder

$$\therefore V = l \times b \times h + \frac{1}{2} \times \pi r^2 h$$
$$= 24 \times 6.5 \times 25 + \frac{1}{2} \times \pi \times 5^2 \times 25$$
$$= 3900 + 981.747\ldots$$
$$= 4881.747\ldots$$
$$\approx 4881.7 \text{ cm}^3 \text{ (1 d.p.)}$$

---

56. B+ Cylinders (262495)

$$V = \pi r^2 h$$
$$50.27 = \pi \times 2^2 \times h$$
$$50.27 = 4\pi \times h$$
$$h = \frac{50.27}{4\pi}$$
$$= 4.00\ldots$$
$$\approx 4 \text{ mm (nearest whole millimetre)}$$

$\therefore$ The height of the cylinder is approximately 4 mm

---

57. A Prisms (261034)

The uniform cross-section is a parallelogram.

$$\therefore A = b \times h$$
$$= 10 \times x$$
$$= 10x \text{ mm}^2$$

$$V = A \times h$$
$$2880 = 10x \times 24$$
$$2880 = 240x$$
$$\therefore x = \frac{2880}{240}$$
$$= 12 \text{ mm}$$

---

58. A Cylinders (262506)

$$
\begin{aligned}
V &= \pi r^2 h \\
8482.3 &= \pi \times r^2 \times 12 \\
8482.3 &= 12\pi \times r^2 \\
r^2 &= \frac{8482.3}{12\pi} \\
r^2 &= 224.999\ldots \\
r &= \sqrt{224.999} = 14.999\ldots \\
r &\approx 15 \text{ mm (nearest whole mm)}
\end{aligned}
$$

$\therefore$ The diameter of the cylinder is approximately 30 mm

---

59. A Cylinders (262516)

$$
\begin{aligned}
V &= \pi r^2 h \\
11\,451 &= \pi \times r^2 \times 45 \\
11\,451 &= 10\pi \times r^2 \\
r^2 &= \frac{11\,451}{45\pi} \\
r^2 &= 80.999\ldots \\
r &= \sqrt{80.999} = 8.999\ldots \\
r &\approx 9 \text{ m (nearest whole m)}
\end{aligned}
$$

$\therefore$ The radius of the cylinder is approximately 9 m

---

60. A Cylinders (262497)

$$
\begin{aligned}
V &= \pi r^2 h \\
10\,178.76 &= \pi \times r^2 \times 10 \\
10\,178.76 &= 10\pi \times r^2 \\
r^2 &= \frac{10\,178.76}{10\pi} \\
r^2 &= 323.999\ldots \\
r &= \sqrt{323.9999} = 17.999\ldots \\
r &\approx 18 \text{ cm (nearest whole centimetre)}
\end{aligned}
$$

$\therefore$ The radius of the cylinder is approximately 18 cm

---

61. A Prisms (261076)

The uniform cross-section is a rhombus.

$$
\begin{aligned}
\therefore\ A &= \frac{1}{2} \times x \times y \\
&= \frac{1}{2} \times x \times 15 \\
&= 7.5x \text{ m}^2
\end{aligned}
$$

$$
\begin{aligned}
V &= A \times h \\
1950 &= 7.5x \times 13 \\
1950 &= 97.5x \\
\therefore\ x &= \frac{1950}{97.5} \\
&= 20 \text{ m}
\end{aligned}
$$

---

62. A+ Cylinders (262510)

$$
\begin{aligned}
V &= \pi r^2 h \\
22 &= \pi \times r^2 \times 7 \\
22 &= 7\pi \times r^2 \\
r^2 &= \frac{22}{7\pi} \\
r^2 &= 1.000\ldots \\
r &= \sqrt{1.000} = 1.000\ldots \\
r &\approx 1 \text{ m (nearest whole m)}
\end{aligned}
$$

$\therefore$ The diameter of the cylinder is approximately 2 m

---

63. A+ Cylinders (262585)

a. $V = l \times b \times h$

$= 4^3$

$= 64$

$\therefore$ The volume of the cube is 64 cm^3

b. Diameter $= 4$ cm $\longrightarrow$ Radius $= 2$ cm

$V = \pi r^2 h$

$64 = \pi \times 2^2 \times h$

$64 = 4\pi h$

$\therefore \ h = \dfrac{64}{4\pi}$

$= 5.092\cdots \approx 5.1 \text{ (1 d.p.)}$

$\therefore$ The height of the cylinder is approximately 5.1 cm