Topic test 2

Surface area and volume

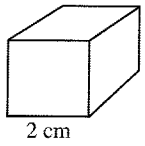
- Time allowed: 45 minutes
- Part A: 20 multiple-choice questions (40 marks)
- Part B: 16 free-response questions (60 marks)

Name: _____

Part A

20 multiple-choice questions
2 marks each: 40 marks
Circle the correct answer.

1 Find the surface area of this cube.



A 18 cm^2 **B** 24 cm^2
C 8 cm^2 **D** 12 cm^2

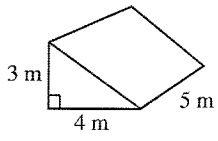
2 Find the volume of the above cube.

A 6 cm^3 **B** 8 cm^3
C 24 cm^3 **D** 12 cm^3

3 How many faces has a triangular prism?

A 9 **B** 5
C 6 **D** 4

4 Find the volume of this prism.

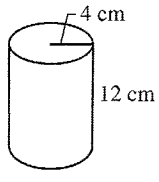


A 6 m^3 **B** 12 m^3
C 30 m^3 **D** 60 m^3

5 Find the surface area of the above prism.

A 60 m^2 **B** 35 m^2
C 30 m^2 **D** 72 m^2

6 Find the capacity of this cylinder.



A 150.8 mL **B** 1508 mL
C 60.32 mL **D** 603.2 mL

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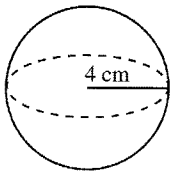

A 50.27 cm^3 **B** 67.02 cm^3
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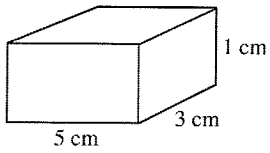

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9 How many litres in a cubic metre?

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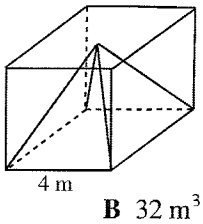

A 43 m^3 **B** 32 m^3
C 56 m^3 **D** 48 m^3

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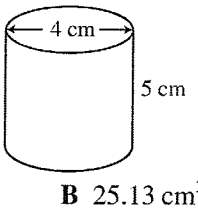

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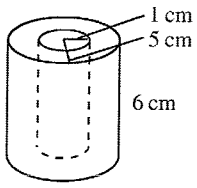

A 113.10 cm^3 **B** 301.59 cm^3
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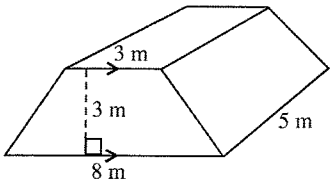
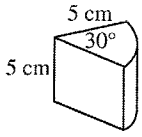


A 82.5 m^3 **B** 165 m^3
C 180 m^3 **D** 127.5 m^3

14 This fraction of a cylinder has a base with sector angle 30°. Find its volume.

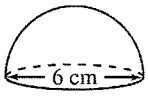


A 6.54 cm^3 **B** 65.45 cm^3
C 32.72 cm^3 **D** 13.09 cm^3

15 A cube has a surface area of 240 cm^2. What is the length of one side?

A 6.21 cm **B** 6.32 cm
C 15.4 cm **D** 20 cm

16 Find the volume of this hemisphere.



A 56.55 cm^3 **B** 113.10 cm^3
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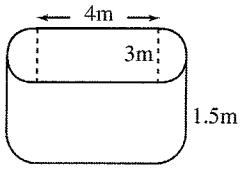

A 28.60 m^3 **B** 33.21 m^3
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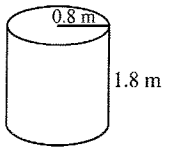
18 Find the surface area of this water tank that has the shape of an open cylinder.



A 11.06 m^2 **B** 4.52 m^2
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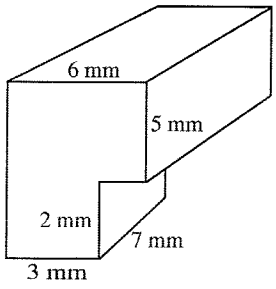


A 112 mm^3 **B** 245 mm^3
C 252 mm^3 **D** 1260 mm^3

Part B

16 free-response questions
60 marks
Show working where appropriate.
Round answers to two decimal places where appropriate.

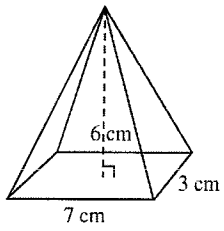
21 (3 marks)

a Draw the net of a cylinder.

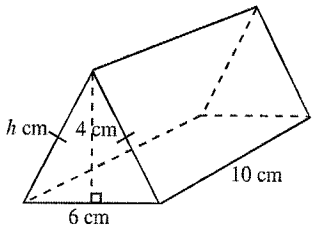
b Hence explain why the surface area of a cylinder is given by the formula $SA = 2\pi r^2 + 2\pi rh$.

Topic test 2: Surface area and volume *continued*

22 (2 marks) Find the volume of this pyramid.



23 (7 marks) For this triangular prism, find:

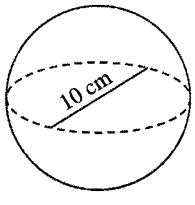


a its volume

b the value of h

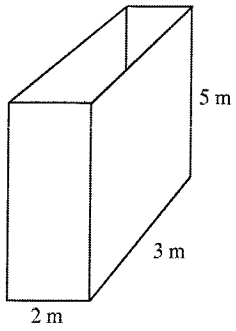
c its surface area

24 (2 marks) Find the volume of this sphere.



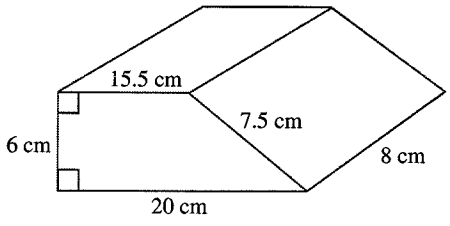
25 (4 marks) This box has no lid.

a Find its surface area.

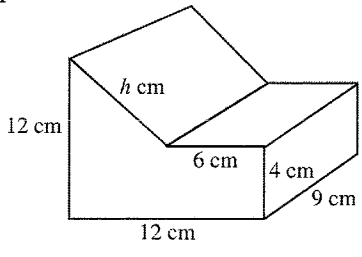


b Find its capacity in litres.

26 (5 marks) Find the surface area of this prism.

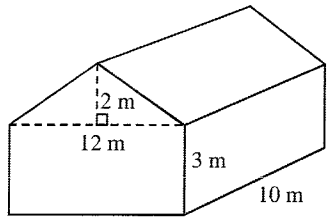


27 (5 marks) Find h and hence the surface area of this prism.

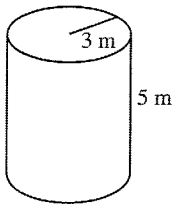


Topic test 2: Surface area and volume *continued*

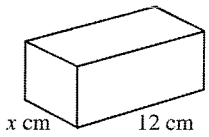
28 (4 marks) Find the volume of this prism.



29 (2 marks) Find the curved surface area of this cylinder.

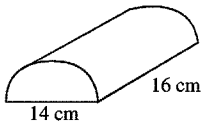


30 (2 marks) Find the value of x if this square prism has a volume of 192 cm^3.



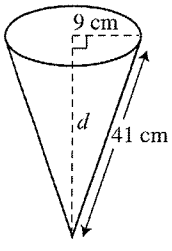
31 (6 marks) A cake has the shape of half a cylinder.

a Find its volume.

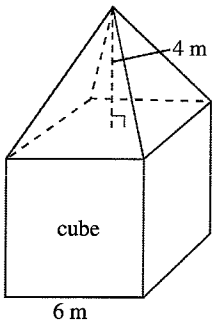


b Find its surface area.

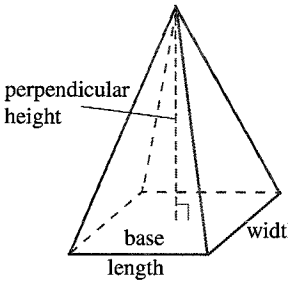
32 (4 marks) Find d and the volume of this cone.



33 (4 marks) Find the volume of this solid.



34 (3 marks) If this rectangular prism has a volume of 120 cm^3, then write a possible value for its base length, base width and perpendicular height.

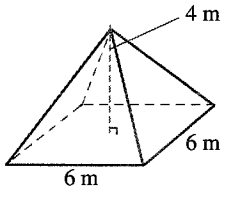


Base length = _____ cm

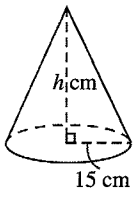
Base width = _____ cm

Perp. height = _____ cm

35 (5 marks) Find the surface area of this square pyramid.



36 (2 marks) A cone has a volume of 4500 cm^3. If its circular base has a radius of 15 cm, find the height of the cone correct to two decimal places.



END OF TEST.

Use the back of this page for extra working space.

Tue

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Name: SOLUTIONS

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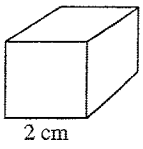

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3 How many faces has a triangular prism?

A 9 **B** 5
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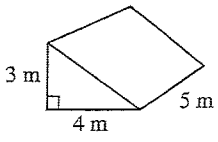

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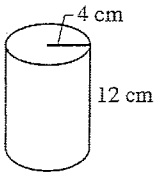

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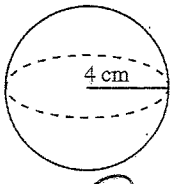

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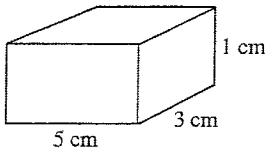

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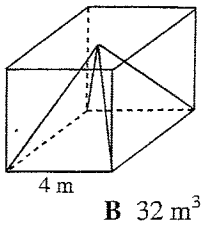

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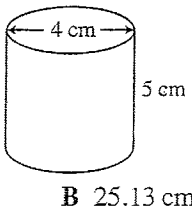

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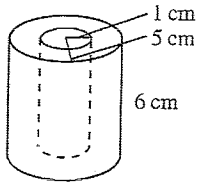

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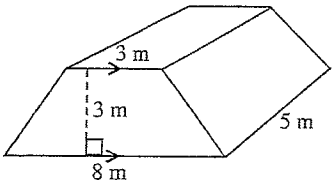

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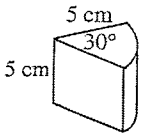

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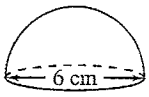

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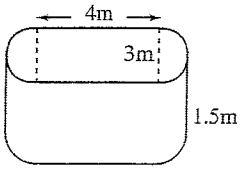

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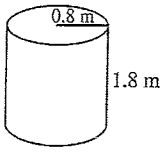

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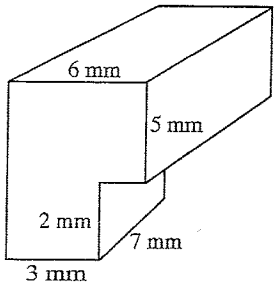

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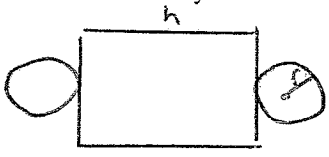
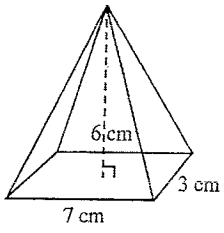


b Hence explain why the surface area of a cylinder is given by the formula $SA = 2\pi r^2 + 2\pi rh$.

2 circles + rectangle
$2\pi r \times h$

Topic test 2: Surface area and volume *continued*

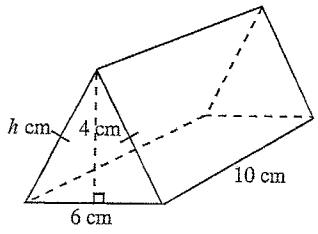
22 (2 marks) Find the volume of this pyramid.



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

$= \frac{1}{3}(7 \times 3) \cdot 6 = 42 \text{ cm}^2$

23 (7 marks) For this triangular prism, find:



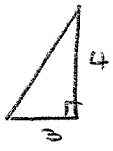
a its volume

$V = Bh_p$

$= \frac{1}{2}bh \times h_p$

$= \frac{1}{2} \times 6 \times 4 \times 10 = 120 \text{ cm}^2$

b the value of h



$h^2 = 3^2 + 4^2$

$h = 5$

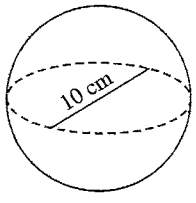
c its surface area

$SA = 2 \times \frac{1}{2} \times 6 \times h + 6 \times 10 + 2 \times 5 \times 10$

$= 24 + 60 + 100$

$= 184 \text{ cm}^2$

24 (2 marks) Find the volume of this sphere.



$V = \frac{4}{3}\pi r^3 \quad (r = 5)$

$= 1832.60 \text{ cm}^3$

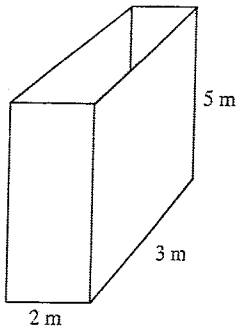
25 (4 marks) This box has no lid.

a Find its surface area.

$SA = 2(2 \times 5) + 2(3 \times 5) + 2 \times 3$

$= 20 + 30 + 6$

$= 56 \text{ m}^2$

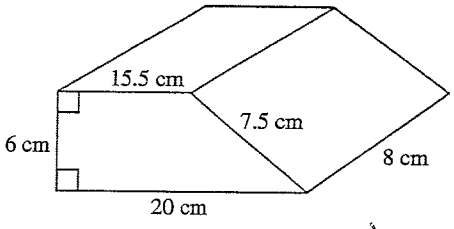


b Find its capacity in litres.

$V = 2 \times 3 \times 5$

$= 30 \text{ m}^3$

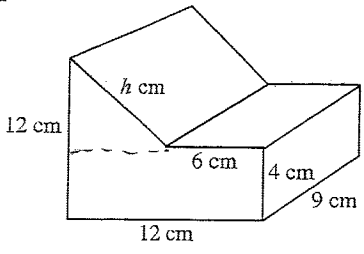
26 (5 marks) Find the surface area of this prism.



$SA = 2\left(\frac{6}{2}(20 + 15.5)\right) + 15.5 \times 8 + 6 \times 8 + 7.5 \times 8 + 20 \times 8$

$= 605 \text{ cm}^2$

27 (5 marks) Find h and hence the surface area of this prism.



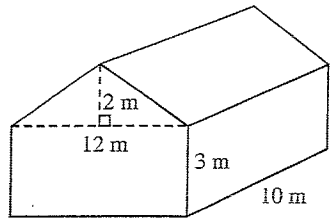
$h = 10$

$SA = 2(12 \times 4 + \frac{1}{2} \times 6 \times 8) + 9 \times 12 + 4 \times 9 + 6 \times 9 + 10 \times 9 + 12 \times 9$

$= 144 + 108 + 36 + 54 + 90 + 108$

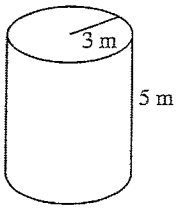
$= 540 \text{ cm}^2$

28 (4 marks) Find the volume of this prism.



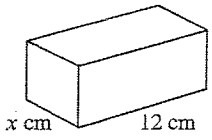
$V = Ah = (3 \times 12 + \frac{1}{2} \times 12 \times 2)10$
$= 480 \text{ m}^3$

29 (2 marks) Find the curved surface area of this cylinder.



$SA_c = 2\pi rh$
$= 30\pi$
$= 94.25 \text{ m}^2$

30 (2 marks) Find the value of x if this square prism has a volume of 192 cm^3.

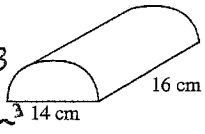


$V = 12x^2 = 192$
$\therefore x^2 = 16$
$x = 4 \text{ cm}$

31 (6 marks) A cake has the shape of half a cylinder.

a Find its volume.

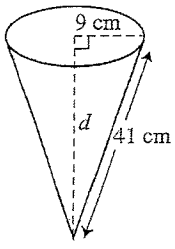
$V = \frac{1}{2}\pi r^2 h$
$= \frac{1}{2} \pi \times 49 \times 16 \text{ cm}^3$
$= 1231.5 \text{ cm}^3$



b Find its surface area.

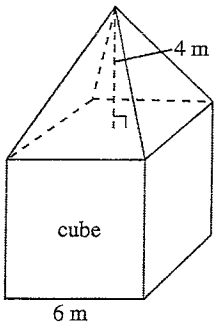
$SA = \pi rh + 2(\frac{1}{2}\pi r^2)$
$= 7 \times 16\pi + 49\pi = 505.8 \text{ cm}^2$

32 (4 marks) Find d and the volume of this cone.



$d^2 = 41^2 - 9^2$
$d = 40$
$V = \frac{1}{3}\pi r^2 h$
$= \frac{1}{3}\pi \times 81 \times 40$
$= 3392.92 \text{ cm}^3$

33 (4 marks) Find the volume of this solid.

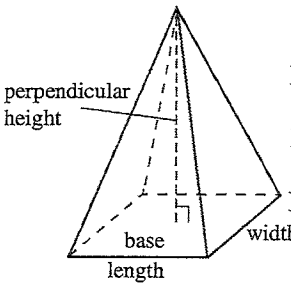


$V = 6^3 + \frac{1}{3} \times 6^2 \times 4$
$= 216 + 48$
$= 264 \text{ m}^3$

pyramid

34 (3 marks) If this rectangular ~~prism~~ has a volume of 120 cm^3, then write a possible value for its base length, base width and perpendicular height.

$\frac{1}{3} \times l \times w \times h = 120$
$l \times w \times h = 360$



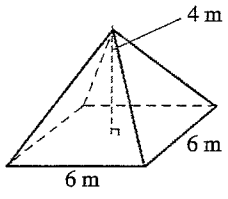
Base length = 3 cm

Base width = 6 cm

Perp. height = 12 cm

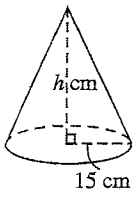
or other combos. eg. $4 \times 9 \times 10$

35 (5 marks) Find the surface area of this square pyramid.



slant height = 5
$SA = 4(\frac{1}{2} \times 6 \times 5) + 6^2$
$= 60 + 36$
$= 96 \text{ m}^2$

36 (2 marks) A cone has a volume of 4500 cm^3. If its circular base has a radius of 15 cm, find the height of the cone correct to two decimal places.



$V = \frac{1}{3}\pi r^2 h$
$4500 \times 3 = \pi(15)^2 h$
$h = \frac{13500}{225\pi}$
$= 19.10 \text{ cm}$

END OF TEST.

Use the back of this page for extra working space.