School Name
Mathematics Test 2017

Year 9

Volume and SA of Prisms and Cylinders

Non Calculator

Skills and Knowledge Assessed:

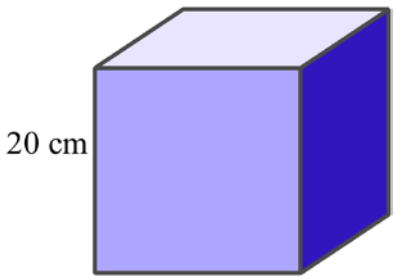
- Solve problems involving the surface area and volume of right prisms (ACMMG218)
- Calculate the surface area and volume of cylinders and solve related problems (ACMMG217)
- Solve problems involving surface area and volume for a range of prisms, cylinders and composite solids (ACMMG242)

Name_____

Section 1 Short Answer Section

Write all working and answers in the spaces provided on this test paper.

1. What is the volume of the cube shown?



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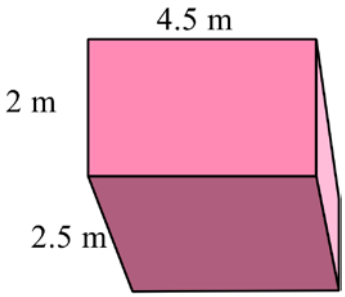
2. What is the volume of this rectangular prism?



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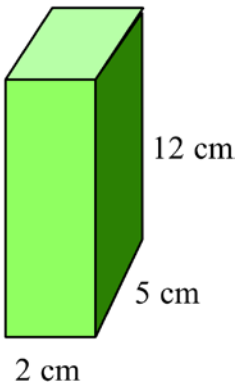
3. Find the surface area of this rectangular prism.



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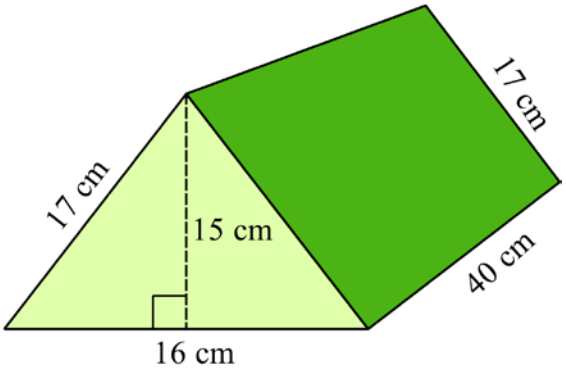
4. What is the volume of this triangular prism?



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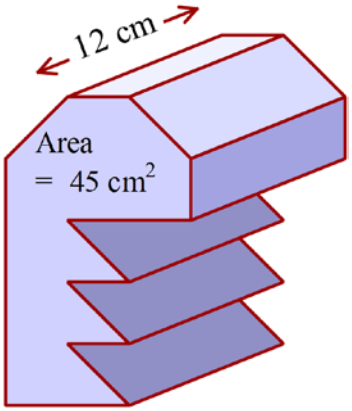
5. The area of the cross section of this prism is 45 cm^2.
What is the volume of the prism?



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6. A prism has a volume of 2.5 m^3.
What is its volume in cubic centimetres?

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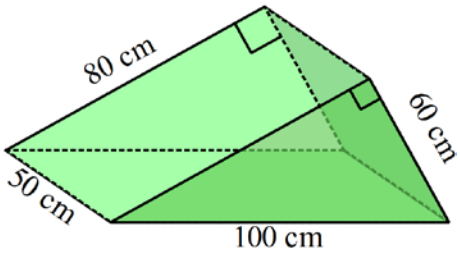
7. Find the surface area of the triangular prism.



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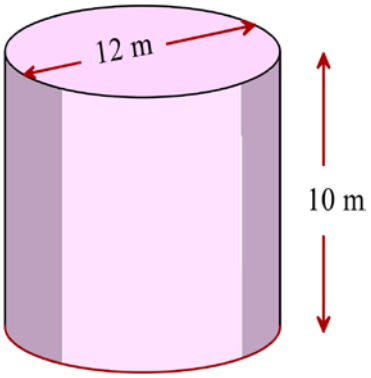
8. What is the volume of the cylinder in terms of π ?



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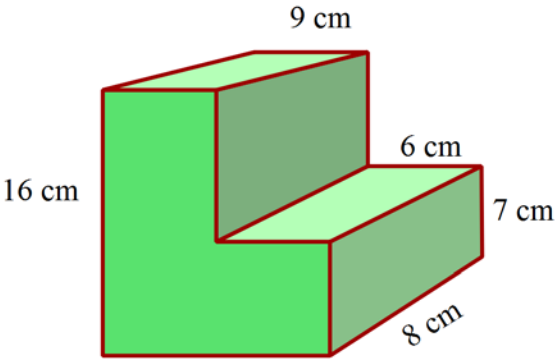
9. What is the volume of the solid shown?



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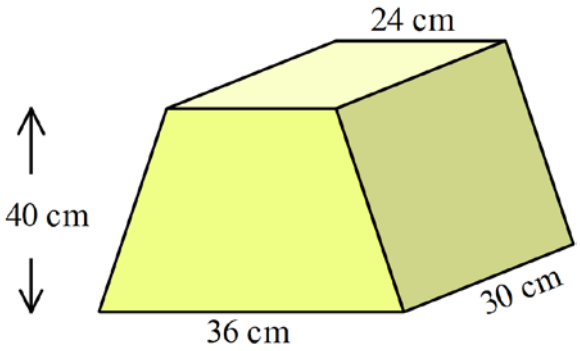
10. The prism shown has a trapezium as its cross section.
What is its volume?



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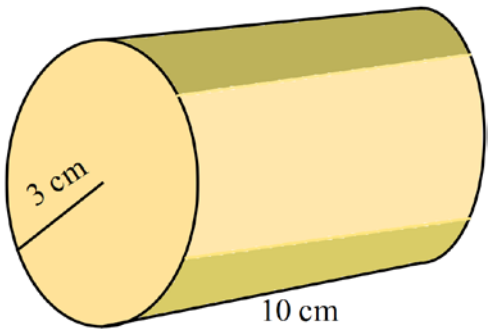
11. Calculate the surface area of the closed cylinder, using $\pi = 3.14$.



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12. The four timber beams shown all have a cross section measuring 45 mm by 150 mm.
The beams are all 3.6 metres long.
A cubic metre of the timber weighs 480 kg.
What is the weight of the 4 beams?

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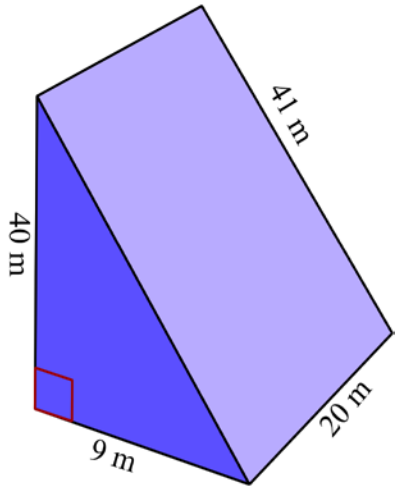
13. The triangular prism shown is to be painted on all its faces, with a paint which covers 40 m^2 per litre.
How much paint is needed?



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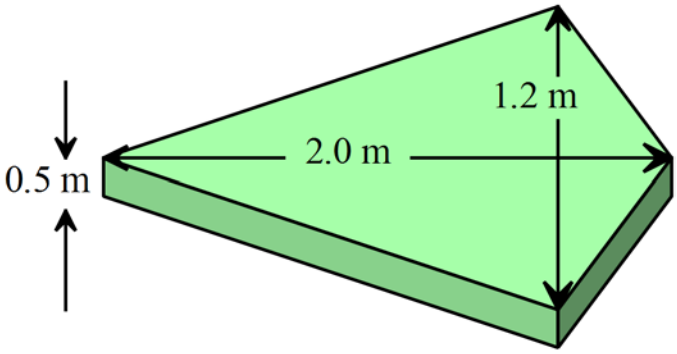
14. The prism shown is a simplified version of a component for an aeroplane.
Its cross section is a kite with diagonals 1.2 m and 2.0 m and it is 0.5 m thick.
A cubic metre of the alloy from which it will be made has a mass of 1200 kg.
What is the mass of the component?



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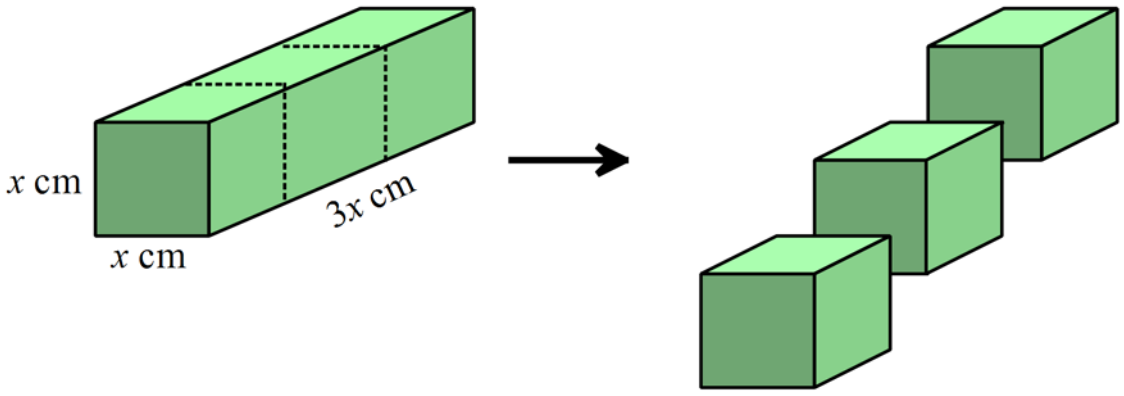
15. A square prism has dimensions x cm, x cm and $3x$ cm.

With two slices, it is cut into three identical cubes as shown.



The surface area of the three cubes is greater than that of the original prism.

What is the percentage increase in surface area? (Answer correct to 1 decimal place.)

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Mathematics Test 2017

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Volume and SA of Prisms and Cylinders

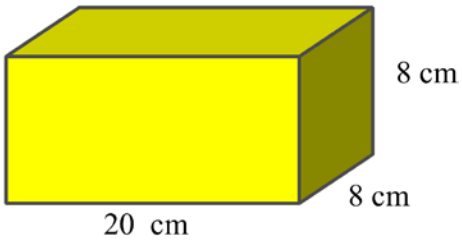
Calculator Allowed

Name_____

Section 2 Multiple Choice Section

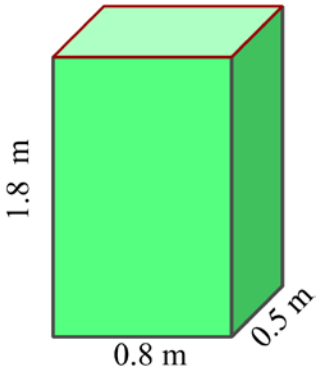
Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

1. What is the volume of this square prism?



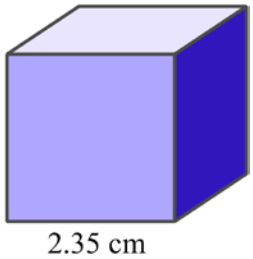
A. 320 cm^2
B. 480 cm^2
C. 640 cm^2
D. 1280 cm^2

2. What is the surface area of this rectangular prism?



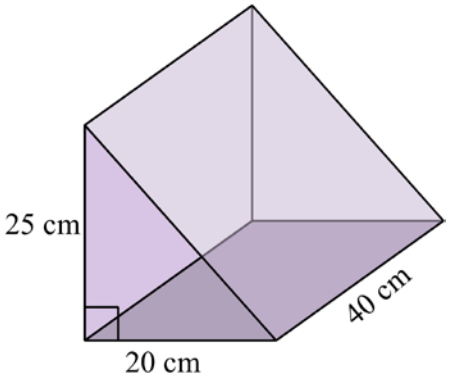
A. 0.72 m^2
B. 2.74 m^2
C. 5.48 m^2
D. 8.64 m^2

3. Calculate the surface area of this cube, correct to the nearest square centimetre.



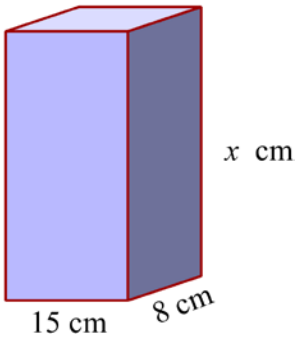
A. 33 cm^2
B. 34 cm^2
C. 35 cm^2
D. 38 cm^2

4. What is the volume of this triangular prism?



A. 5 000 cm^3
B. 7 500 cm^3
C. 10 000 cm^3
D. 20 000 cm^3

5. This rectangular prism has a volume of 3000 m^2.
What is its height (x cm)?



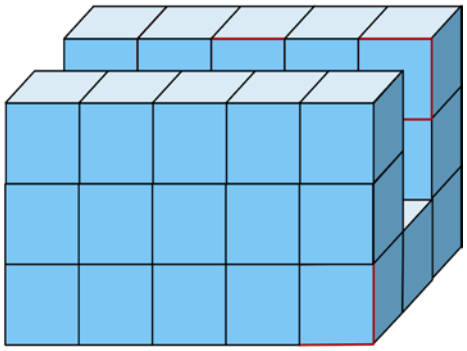
A. 20 cm
B. 25 cm
C. 30 cm
D. 50 cm

6. A cube has a surface area of 13.5 cm^2.

What is its side length?

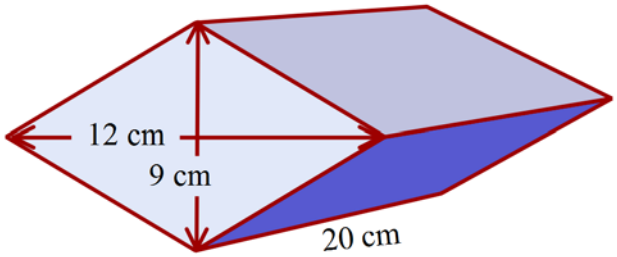
A. 1.25 cm B. 1.5 cm C. 2.25 cm D. 2.5 cm

7. This prism is made by joining 1 centimetre cubes together.
What is the volume of the prism?



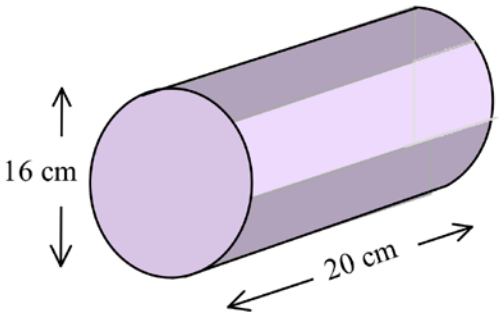
A. 22 cm^3
B. 35 cm^3
C. 40 cm^3
D. 45 cm^3

8. The cross section of this prism is a rhombus.
What is its volume?



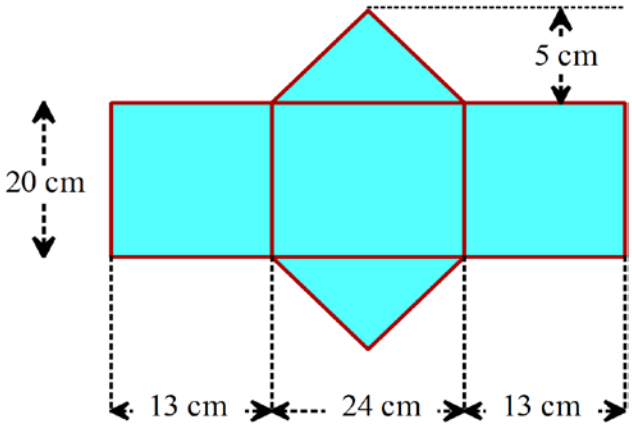
A. 1080 cm^3
B. 1416 cm^3
C. 1620 cm^3
D. 2160 cm^3

9. Find the volume of the cylinder shown.



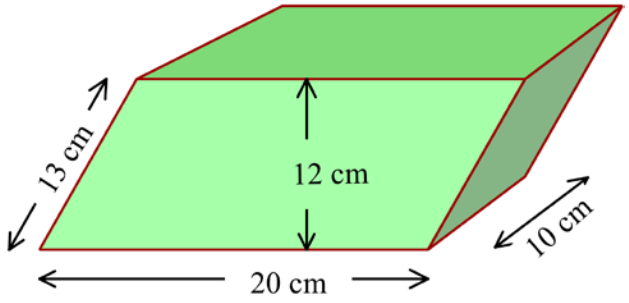
A. 1005 cm^3
B. 1508 cm^3
C. 2011 cm^3
D. 4021 cm^3

10. Find the surface area of the triangular prism whose net is shown.



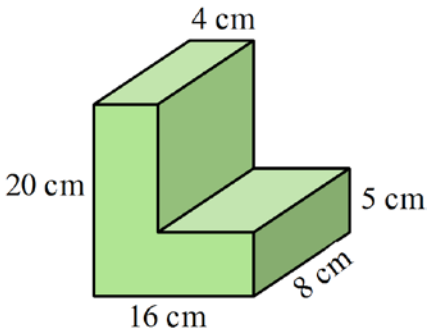
A. 940 cm^2
B. 1060 cm^2
C. 1120 cm^2
D. 1200 cm^2

11. This prism has a parallelogram as its cross section.
What is its surface area?



A. 880 cm^2
B. 940 cm^2
C. 1010 cm^2
D. 1140 cm^2

12. Calculate the volume of the prism shown.



A. 1120 cm^3

B. 1200 cm^3

C. 1440 cm^3

D. 2400 cm^3

13. A water trough for sheep is in the shape of half a cylinder with diameter 40 cm and length 4.2 metres.

What volume of water will the trough hold?

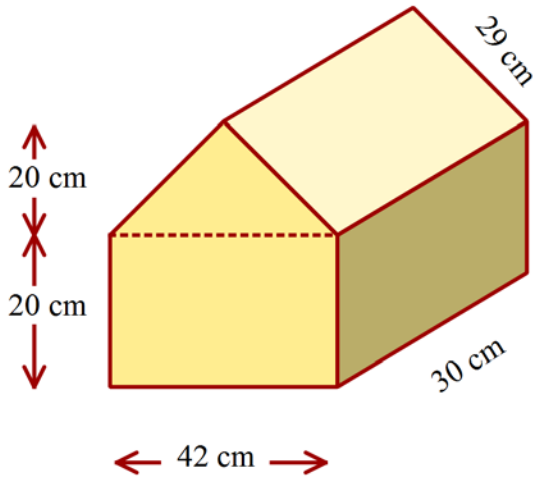
A. 0.13 m^3

B. 0.26 m^3

C. 0.52 m^3

D. 1.06 m^3

14. Calculate the surface area of the prism shown.



A. 6720 cm^2

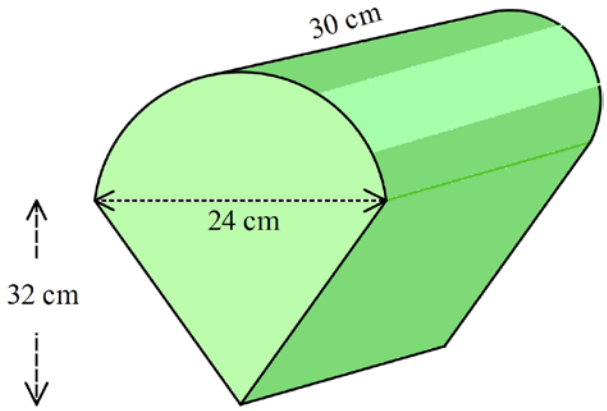
B. 7200 cm^2

C. 8040 cm^2

D. 8880 cm^2

15. Find the cross section of this prism is made up of a semicircle and a triangle.

Find the volume of the prism.



A. 9048 cm^3

B. 16 405 cm^3

C. 18 306 cm^3

D. 19 526 cm^3

School Name

Mathematics 2017

Multiple Choice Answer Sheet

Volume and SA of Prisms and Cylinders

Name _____

Completely fill the response oval representing the most correct answer.

1.	A ⬭	B ⬭	C ⬭	D ⬭
2.	A ⬭	B ⬭	C ⬭	D ⬭
3.	A ⬭	B ⬭	C ⬭	D ⬭
4.	A ⬭	B ⬭	C ⬭	D ⬭
5.	A ⬭	B ⬭	C ⬭	D ⬭
6.	A ⬭	B ⬭	C ⬭	D ⬭
7.	A ⬭	B ⬭	C ⬭	D ⬭
8.	A ⬭	B ⬭	C ⬭	D ⬭
9.	A ⬭	B ⬭	C ⬭	D ⬭
10.	A ⬭	B ⬭	C ⬭	D ⬭
11.	A ⬭	B ⬭	C ⬭	D ⬭
12.	A ⬭	B ⬭	C ⬭	D ⬭
13.	A ⬭	B ⬭	C ⬭	D ⬭
14.	A ⬭	B ⬭	C ⬭	D ⬭
15.	A ⬭	B ⬭	C ⬭	D ⬭

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Mathematics Test 2017

Year 9

Volume and SA of Prisms and Cylinders

Non Calculator Section

ANSWERS

Question	Working and Answer
1.	$V = A\,l$ $= 20 \times 20 \times 20$ $= \mathbf{8000\ cm^3}$
2.	$A = 2.0 \times 4.5 = 9.0\ m^2$ $V = A\,l$ $= 9.0 \times 2.5$ $= \mathbf{22.5}\ m^3$
3.	$SA = 12 \times 2 \times 2 + 2 \times 5 \times 2 + 12 \times 5 \times 2$ $= 48 + 20 + 120$ $= \mathbf{188\ cm^2}$
4.	$A = \frac{1}{2} \times 16 \times 15$ $= 8 \times 15$ $= 120\ cm^2$ $V = A\,l$ $= 120 \times 40$ $= \mathbf{4800\ cm^3}$
5.	Volume $= A\,l$ $= 45 \times 12$ $= \mathbf{540\ cm^3}$
6.	Using relationship that $1\ m^3 = 1\,000\,000\ cm^3$ $\mathbf{2.5\ m^3 = 2\,500\,000\ cm^3}$ or by modelling a rectangular prism with volume $2.5\ m^3$ L = 2.5 m, . W = 1 m and H = 1 m: L = 250 cm, . W = 100 cm *and* H = 100 cm $V = 250 \times 100 \times 100$ $= 2\,500\,000\ cm^3$

Question	Working and Answer
7.	$SA = 2 \times \frac{1}{2} \times 60 \times 80 + 60 \times 50 + 100 \times 50 + 80 \times 50$ $= 4800 + 3000 + 5000 + 4000$ $= \mathbf{16\,800\ cm^2}$
8.	$A = \pi r^2$ $= \pi \times 6^2$ $= 36\pi\ m^2$ $V = A\,l$ $= 36\,\pi \times 10$ $= \mathbf{360\,\pi\ m^3}$
9.	$A = 16 \times 9 + 6 \times 7$ $= 144 + 42$ $= 186\ cm^2$ $V = 186 \times 8$ $= \mathbf{1488\ cm^3}$
10.	$\text{Area} = \frac{h}{2}(a + b)$ $= \frac{40}{2}(36 + 24)$ $= 20 \times 60$ $= 1200\ cm^2$ $V = A\,l$ $= 1200 \times 30$ $= \mathbf{36\,000\ cm^3}$
11.	$\text{Circular area} = \pi r^2$ $= \pi \times 3^2$ $= 9 \times 3.14$ $= 28.26\ cm^2$ $\text{Curved area} = 2\,\pi\,r\,l$ $= 2 \times \pi \times 3 \times 10$ $= 60 \times 3.14$ $= 188.40$ $SA = 2 \times 28.26 + 188.4$ $= 56.52 + 188.4$ $= \mathbf{244.92\ cm^2}$

Question	Working and Answer
12.	Each beam has volume $= 0.045 \times 0.15 \times 3.6$ $= 0.0243\ m^3$ Volume of 4 beams $= 0.0243 \times 4$ $= 0.0972$ Mass of 4 beams $= 0.0972 \times 480$ **$= 46.656$ kg (any reasonable rounding)**
13.	$SA = 2 \times \frac{1}{2} \times 9 \times 40 + 9 \times 20 + 40 \times 20 + 41 \times 20$ $= 360 + 180 + 800 + 820$ $= 2160\ \text{m}^2$ Paint needed $= 2160 \div 40$ **$= 54$ litres**
14.	Area of kite $= \frac{1}{2} \times 2.0 \times 1.2$ $= 1.2\ \text{m}^2$ $V = A\,l$ $= 1.2 \times 0.5$ $= 0.6\ \text{m}^3$ Mass $= 0.6 \times 1200$ **$= 720$ kg**
15.	SA of original prism $= 2 \times x \times x + 4 \times x \times 3x$ $= 2x^2 + 12x^2$ $= 14x^2$ SA of 3 cubes $= 3 \times 6 \times x \times x$ $= 18x^2$ Increase $= 18x^2 - 14x^2 = 4x^2$ Percentage increase $= \frac{4x^2}{14x^2} \times 100$ $= \frac{2}{7} \times 100$ $= 28.571428571428571428571428571429$ **$= 28.6\%$ increase**

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Volume and SA of Prisms and Cylinders

Calculator Allowed
Multiple Choice
Section

ANSWERS

Question	Working	M C Answer
1.	$V = Al$ $= 20 \times 8 \times 8$ $= 20 \times 64$ $= 1280 \text{ cm}^3$	**D**
2.	$SA = 2 \times (1.8 \times 0.8 + 0.8 \times 0.5 + 1.8 \times 0.5)$ $= 2 \times (1.44 + 0.4 + 0.9)$ $= 2 \times 2.74$ $= 5.48 \text{ cm}^2$	**C**
3.	$S \text{ Area} = 2.35^2 \times 6$ $= 5.5225 \times 6$ $= 33.135 \text{ cm}^2$ $= 33 \text{ cm}^2 \text{ (nearest cm}^2 \text{)}$	**A**
4.	$\text{Volume} = Al$ $= \left(\frac{1}{2}bh\right) \times l$ $= \frac{1}{2} \times 20 \times 25 \times 40$ $= 10\,000 \text{ cm}^3$	**C**
5.	$V = Al$ $= 15 \times 8 \times x$ $3000 = 120 \times x$ $x = \frac{3000}{120} = 25$	**B**

6.	$SA = 13.5 \text{ cm}^2$ Cube has σx identical faces so Area one face $= 13.5 \div 6 = 2.25 \text{ cm}^2$ $Si\delta$ length $= \sqrt{2.25}$ $= 1.5$ cm	**B**
7.	Area cross section $= 7 \text{ cm}^2$ Length $= 5$ cm $V = A\,l$ $= 7 \times 5$ $= 35 \text{ cm}^3$	**B**
8.	$A = \frac{1}{2}xy$ $= \frac{1}{2} \times 9 \times 12$ $= 54 \text{ cm}^3$ $V = A\,l$ $= 54 \times 20$ $= 1080 \text{ cm}^3$	**A**
9.	$A = \pi r^2$ $= \pi \times 8^2$ $= 201.0619$ $V = A\,l$ $= 201.0619 \times 20$ $= 4021.2386$ $= 4021 \text{ cm}^3$ (nearest cm^3)	**D**
10.	$SA = 2 \times \frac{1}{2} \times 24 \times 5 + 2 \times 20 \times 13 + 20 \times 24$ $= 120 + 520 + 480$ $= 1120 \text{ cm}^2$	**C**
11.	$SA = 20 \times 10 \times 2 + 20 \times 12 \times 2 + 13 \times 10 \times 2$ $= 400 + 480 + 260$ $= 1140 \text{ cm}^2$	**D**
12.	Area Cross Section $= 20 \times 4 + (16 - 4) \times 5$ $= 80 + 60$ $= 140 \text{ cm}^2$ $V = A\,l$ $= 140 \times 8$ $= 1120 \text{ cm}^3$	**A**

13.	$\text{Area} = \frac{1}{2} \times \pi r^2$ $= \frac{1}{2} \times \pi \times 0.2^2$ $= 0.06283185307$ $\text{Volume} = A\,l$ $= 0.06283185307 \times 4.2$ $= 0.2638937$ $= 0.26\ m^3$ (2 dec places)	**B**
14.	$SA = 2 \times \frac{1}{2} \times 42 \times 20 + 2 \times 20 \times 42 + 2 \times 30 \times 20$ $+ 2 \times 29 \times 30 + 30 \times 42$ $= 840 + 1680 + 1200 + 1740 + 1260$ $= 6720\ \text{cm}^2$	**A**
15.	$\text{Area} = \frac{1}{2} \times \pi \times 12^2 + \frac{1}{2} \times 24 \times 32$ $= 226.194 + 384$ $= 610.19467$ $\text{Volume} = A\,l$ $= 610.19467 \times 30$ $= 18305.8401$ $= 18\,306\ \text{cm}^3$	**C**

School Name

Mathematics 2017

Multiple Choice Answer Sheet

Volume and SA of Prisms and Cylinders

Name _____

Completely fill the response oval representing the most correct answer.

1.	A	○	B	○	C	○	D ●
2.	A	○	B	○	C	●	D ○
3.	A	●	B	○	C	○	D ○
4.	A	○	B	○	C	●	D ○
5.	A	○	B	●	C	○	D ○
6.	A	○	B	●	C	○	D ○
7.	A	○	B	●	C	○	D ○
8.	A	●	B	○	C	○	D ○
9.	A	○	B	○	C	○	D ●
10.	A	○	B	○	C	●	D ○
11.	A	○	B	○	C	○	D ●
12.	A	●	B	○	C	○	D ○
13.	A	○	B	●	C	○	D ○
14.	A	●	B	○	C	○	D ○
15.	A	○	B	○	C	○	D ●