

# High School Mathematics Test 2014

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.

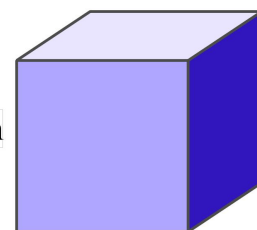
1. What is the volume of the cube shown?

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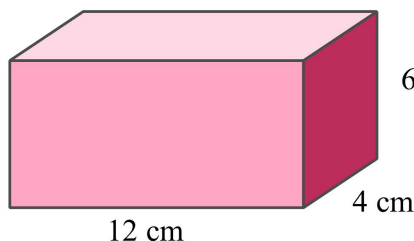
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15 cm



2. What is the volume of the rectangular prism?



6 cm

4 cm

12 cm

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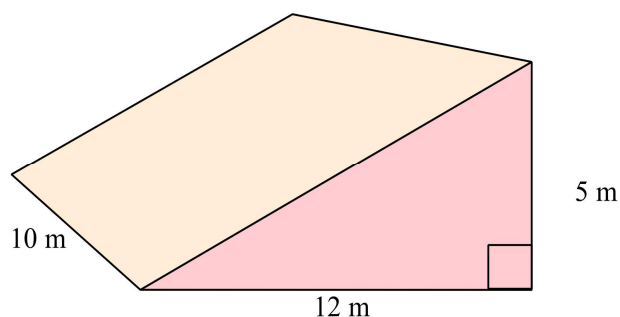
3. Find the volume of the triangular prism shown.

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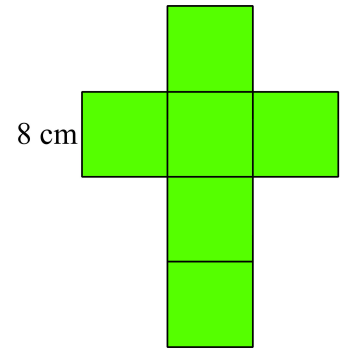


10 m

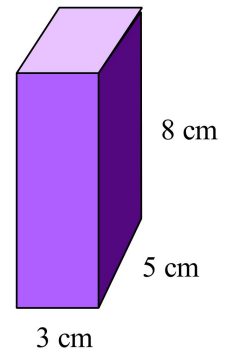
12 m

5 m

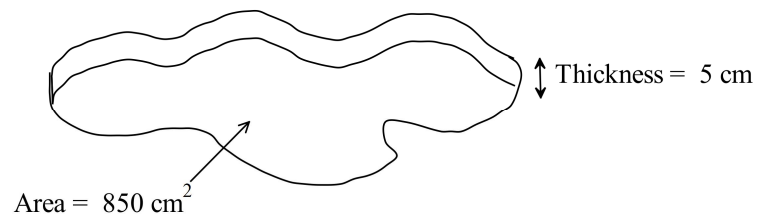
4. What is the surface area of the cube formed from the net shown?



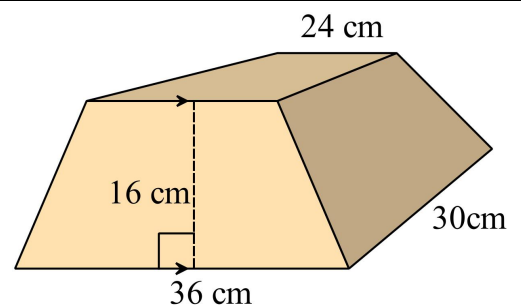
5. What is the surface area of the rectangular prism shown?



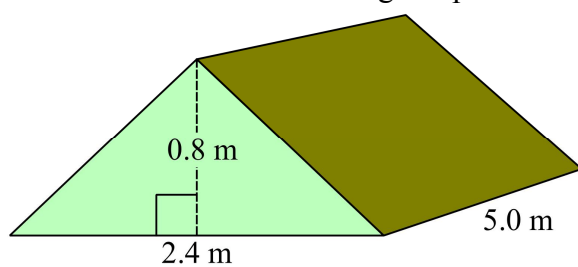
6. An advertising sign for Hayman Island is in the shape of the island and is 5 cm thick. The sign is made of wood and has an area of  $850 \text{ cm}^2$ . What volume of wood is in the sign?



7. What is the volume of the trapezoidal prism shown?



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



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9. The prism shown has a cross section which is an equilateral triangle with sides 4 cm and area approximately  $6.9 \text{ cm}^2$ . Its height is 12 cm.

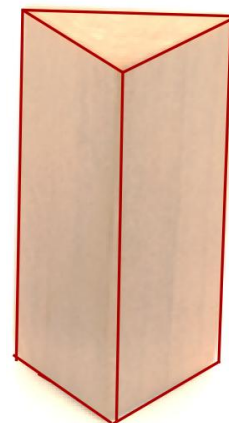
What is its surface area??

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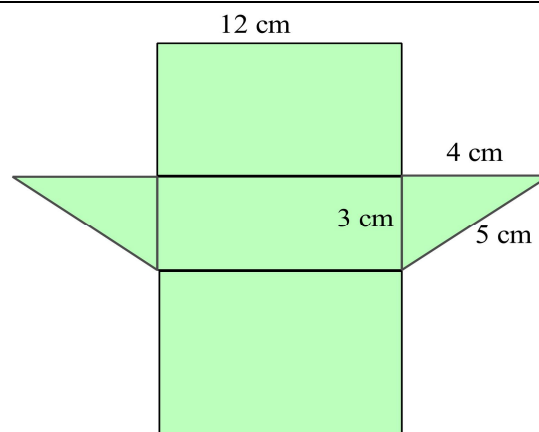
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10. Find the surface area of the prism whose net is shown.



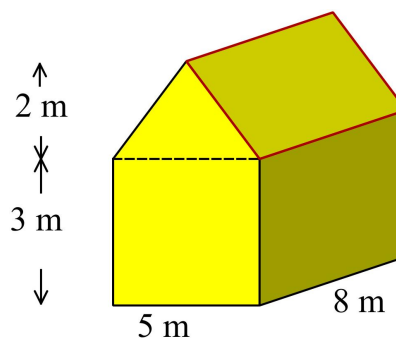
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11. What is the volume of the prism shown?



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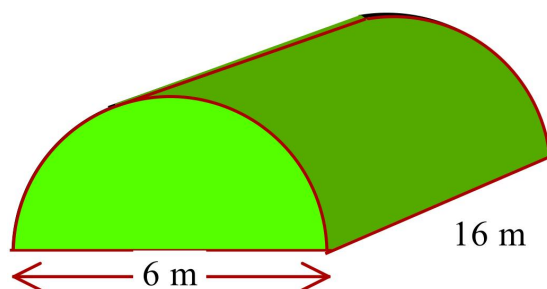
12. Find the volume of this half cylinder.  
Answer in terms of  $\pi$ .

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13. Each of these hexagonal boxes has a depth of 20 cm and the hexagonal top of each has an area which can be broken into two trapezia as shown.

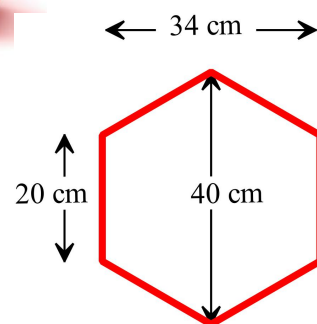
Find the total volume of the three boxes.

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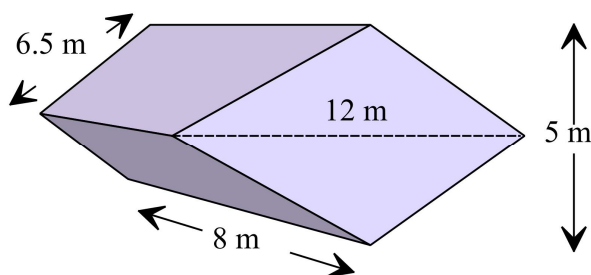
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14. The prism shown has a rhombus as its cross section.  
Find the surface area of the prism.



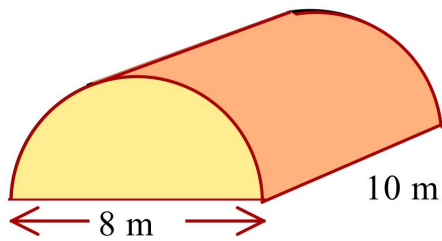
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15. A solid wooden cylinder has been cut in half to give this solid.  
Find its surface area (in terms of  $\pi$ ).



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# High School Mathematics Test 2014

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## Volume and SA of Prisms and Cylinders

Calculator Allowed

Name \_\_\_\_\_

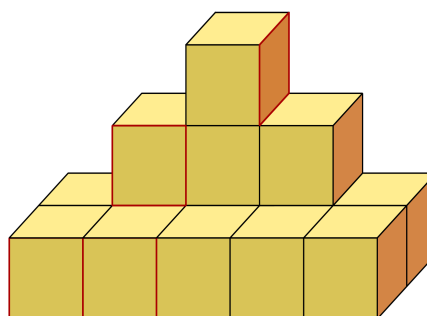
### Section 2 Multiple Choice Section

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. The solid shown is made using 1 cm cubes.

What is the total volume of the solid?

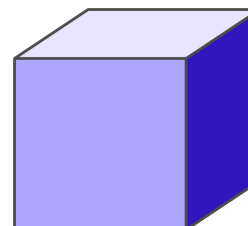
- A. 11 cm<sup>3</sup>
- B. 13 cm<sup>3</sup>
- C. 14 cm<sup>3</sup>
- D. 15 cm<sup>3</sup>



2. The cube shown has a volume of 13.824 cm<sup>3</sup>.

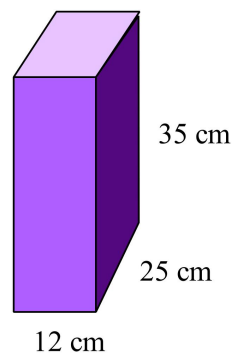
What is its side length?

- A. 1.4 cm
- B. 2.4 cm
- C. 2.8 cm
- D. 3.4 cm



3. What is the volume of the prism shown in cm<sup>3</sup>?

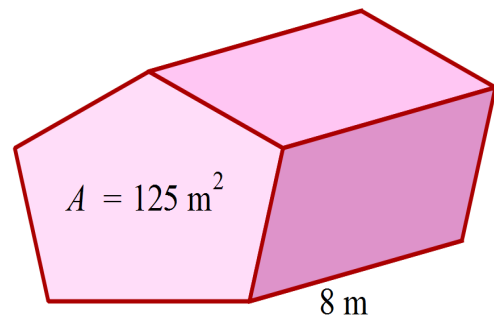
- A. 814 cm<sup>3</sup>
- B. 105 cm<sup>3</sup>
- C. 1 050 cm<sup>3</sup>
- D. 10 500 cm<sup>3</sup>



4. The area of the pentagonal base of this prism is  $125 \text{ m}^2$ .

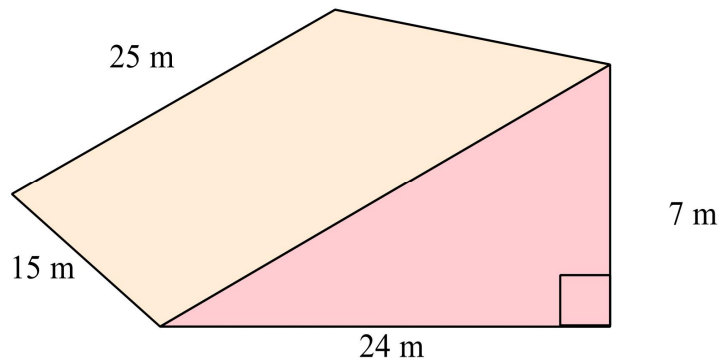
What is the volume of the prism?

- A.  $250 \text{ m}^3$   
B.  $500 \text{ m}^3$   
C.  $875 \text{ m}^3$   
D.  $1\,000 \text{ m}^3$



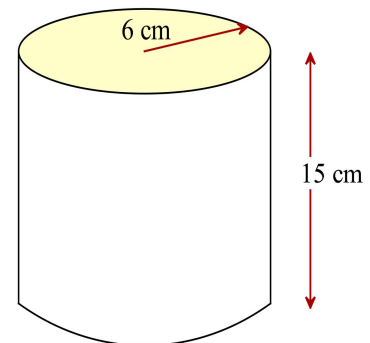
5. Which calculation could be used to find the volume of the triangular prism shown?

- A.  $\frac{1}{2} \times 7 \times 24 \times 15$   
B.  $\frac{1}{2} \times 7 \times 25 \times 15$   
C.  $\frac{1}{2} \times 24 \times 25 \times 15$   
D.  $7 \times 24 \times 25$



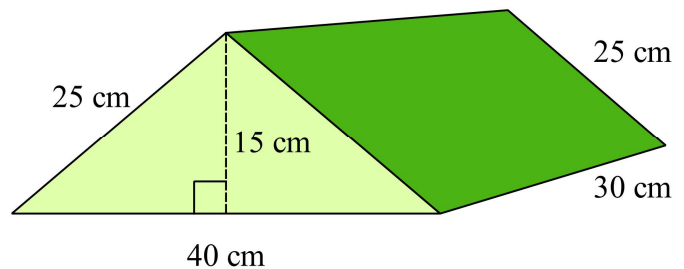
6. What is the volume of the cylinder to the nearest  $\text{cm}^3$ ?

- A.  $1\,696 \text{ m}^3$   
B.  $3\,393 \text{ m}^3$   
C.  $5\,089 \text{ m}^3$   
D.  $6\,786 \text{ m}^3$



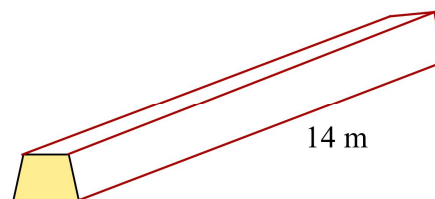
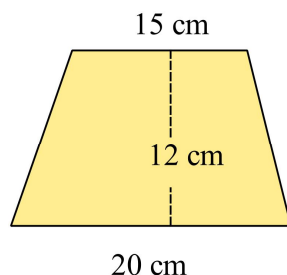
7. Find the volume of the triangular prism shown.

- A.  $4\,500 \text{ m}^3$   
B.  $9\,000 \text{ m}^3$   
C.  $15\,000 \text{ m}^3$   
D.  $18\,000 \text{ m}^3$



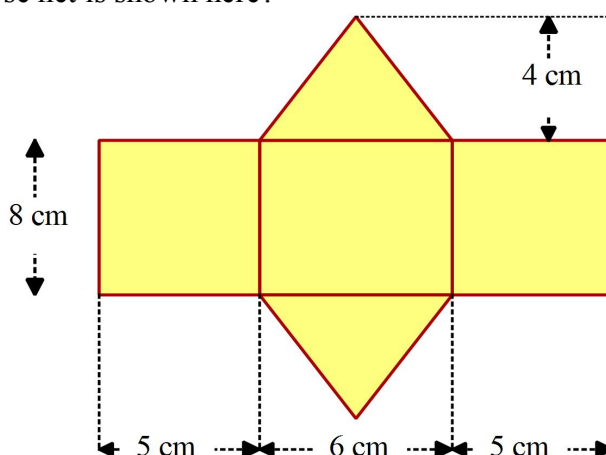
8. An air conditioning duct is in the shape of the trapezoidal prism, with cross section as shown below and a length of 14 metres. What is the volume of air held in the duct?

- A.  $210 \text{ cm}^3$   
 B.  $2\,940 \text{ cm}^3$   
 C.  $5\,880 \text{ cm}^3$   
 D.  $294\,000 \text{ cm}^3$



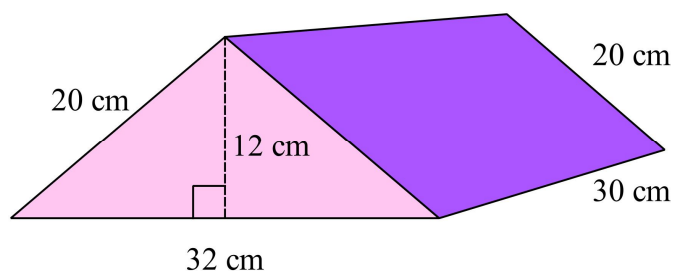
9. What is the surface area of the prism whose net is shown here?

- A.  $112 \text{ cm}^2$   
 B.  $140 \text{ cm}^2$   
 C.  $152 \text{ cm}^2$   
 D.  $200 \text{ cm}^2$



10. Find the surface area of the triangular prism shown.

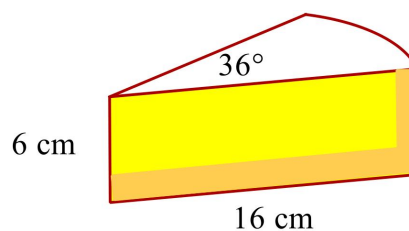
- A.  $984 \text{ m}^2$   
 B.  $1\,584 \text{ m}^2$   
 C.  $1\,944 \text{ m}^2$   
 D.  $2\,544 \text{ m}^2$



11. A slice of pie, when viewed from above, is a sector of a circle with radius 16 cm and an angle of  $36^\circ$ . The depth of the slice is 6 cm.

What is the approximate the volume of the slice?

- A.  $192 \text{ cm}^3$   
 B.  $480 \text{ cm}^3$   
 C.  $804 \text{ cm}^3$   
 D.  $1\,930 \text{ cm}^3$

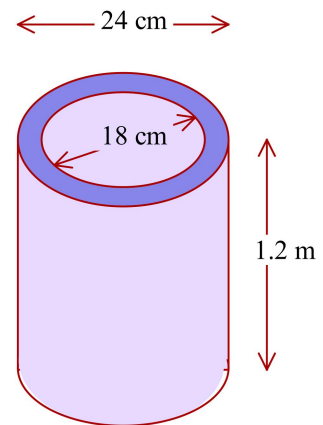




12. A section of concrete pipe is cylindrical with an outside diameter of 24 cm and an inner diameter of 18 cm. The section is 1.2 m long.

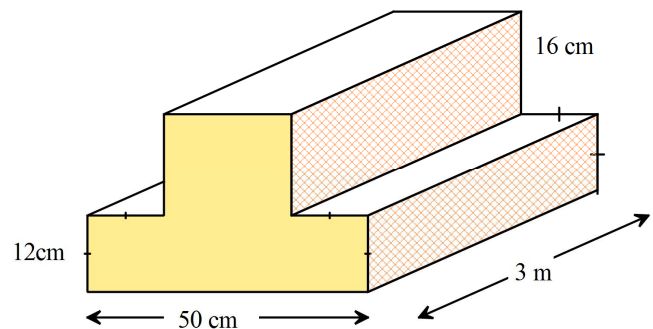
What volume of concrete is used to make the pipe?

- A.  $238 \text{ cm}^3$   
 B.  $950 \text{ cm}^3$   
 C.  $23\,750 \text{ cm}^3$   
 D.  $95\,002 \text{ cm}^3$



13. Find the volume of the prism shown (in cubic metres).

- A.  $0.3048 \text{ m}^3$   
 B.  $3.048 \text{ m}^3$   
 C.  $30.48 \text{ m}^3$   
 D.  $3\,048 \text{ m}^3$



14. A cylindrical metal beaker has a diameter of 10 cm and a depth of 20 cm and is open at one end.

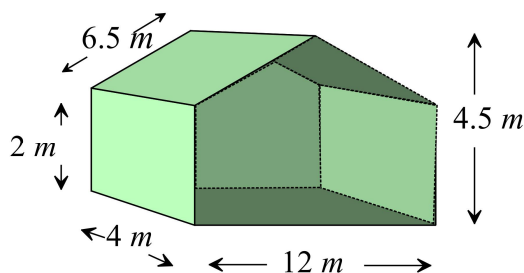
Find the area of metal used to make the beaker.

- A.  $157 \text{ cm}^2$   
 B.  $628 \text{ cm}^2$   
 C.  $707 \text{ cm}^2$   
 D.  $785 \text{ cm}^2$



15. A tractor shed is in the shape shown and is clad with sheet metal. It is open at one end and has an earth floor.

What area of sheet metal is needed to clad the shed?



- A.  $55 \text{ m}^2$   
 B.  $68 \text{ m}^2$   
 C.  $91 \text{ m}^2$   
 D.  $107 \text{ m}^2$

# *High School Mathematics Test 2014*

## Volume and SA of Prisms and Cylinders

### Multiple Choice Answer Sheet

Name \_\_\_\_\_

Completely fill the response oval representing the most correct answer.

- |     |   |                       |   |                       |   |                       |   |                       |
|-----|---|-----------------------|---|-----------------------|---|-----------------------|---|-----------------------|
| 1.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 2.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 3.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 4.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 5.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 6.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 7.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 8.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 9.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 10. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 11. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 12. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 13. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 14. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 15. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |

# High School Mathematics Test 2014

## Volume and SA of Prisms and Cylinders

### ANSWERS

Section 1 ( 1 mark each)	
	Working and Answers
1.	$V = 15 \times 15 \times 15 = 225 \times 15$ $= 3375 \text{ cm}^2$
2.	$V = 12 \times 4 \times 6 = 288 \text{ cm}^3$
3.	$V = \frac{1}{2} \times 12 \times 5 \times 10 = 300 \text{ cm}^3$
4.	$SA = 6 \times 8^2 = 6 \times 64 = 384 \text{ cm}^2$
5.	$SA = 2 \times 3 \times 5 + 2 \times 3 \times 8 + 2 \times 5 \times 8$ $SA = 30 + 48 + 80$ $SA = 158 \text{ cm}^2$
6.	$V = Al = 850 \times 5 = 4\,250 \text{ cm}^2$
7.	$V = \frac{16}{2}(24 + 36) \times 30$ $= 8 \times 60 \times 30$ $= 14\,400 \text{ cm}^3$
8.	$A = \frac{1}{2} \times 2.4 \times 0.8 = 1.2 \times 0.8 = 0.96 \text{ m}^2$ $V = 0.96 \times 5 = 4.80 \text{ m}^3$
9.	$SA = 6.9 \times 2 + 3 \times 4 \times 12$ $= 13.8 + 144$ $= 157.8 \text{ cm}^2$
10.	$SA = 2 \times \frac{1}{2} \times 3 \times 4 + 3 \times 12 + 4 \times 12 + 5 \times 12$ $= 12 + 36 + 48 + 60$ $= 156 \text{ cm}^2$

11.	$\text{Area} = 3 \times 5 + \frac{1}{2} \times 2 \times 5$ $= 20 \text{ m}^2$ $\text{Volume} = 20 \times 8 = 160 \text{ m}^3$
12.	$V = \frac{1}{2} \times \pi \times 3^2 \times 16$ $= 8 \times 9 \times \pi$ $= 72\pi \text{ m}^3$
13.	$\text{Area Trapezium} = \frac{17}{2}(20 + 40) = \frac{17}{2} \times 60$ $= 17 \times 30 = 510 \text{ cm}^2$ $\text{Area Hexagon} = 510 \times 2 = 1020 \text{ cm}^2$ $\text{Volume of three boxes} = 1020 \times 20 \times 3$ $= 61\,200 \text{ cm}^3$
14.	$SA = 2 \times \frac{1}{2} \times 5 \times 12 + 4 \times 6.5 \times 8$ $= 60 + 26 \times 8$ $= 60 + 208$ $= 268 \text{ m}^2$
15.	$SA = 2 \times \frac{1}{2} \times \pi \times 4^2 + \frac{1}{2} \times \pi \times 8 \times 10 + 8 \times 10$ $= 16\pi + 40\pi + 80$ $= 56\pi + 80 \text{ m}^2$

Section 2 (1 mark each)		
	Working	Answers
1.	There are 14 cubes, including the hidden ones. $V = 14 \text{ cm}^3$	C
2.	$s^3 = 13.824$ $s = \sqrt[3]{13.824} = 2.4 \text{ cm}$	B
3.	$V = 12 \times 25 \times 35$ $= 10\,500 \text{ cm}^3$	D
4.	$V = Al$ $= 125 \times 8$ $= 1\,000 \text{ m}^2$	D
5.	$V = A \times l$ $= \frac{1}{2} \times b \times h \times l$ $= \frac{1}{2} \times 7 \times 24 \times 15$	A
6.	$V = \pi \times 6^2 \times 15$ $= 113.1 \times 15$ $= 1696.460$ $= 1696 \text{ m}^3$	A
7.	$V = Al$ $= \left( \frac{1}{2} \times 40 \times 15 \right) \times 30$ $= 9\,000 \text{ cm}^3$	B
8.	$A = \frac{12}{2}(20 + 15)$ $14 \text{ m} = 1\,400 \text{ cm}$ $= 6(35)$ $V = Al$ $= 210 \text{ cm}^3$ $= 210 \times 1400$ $= 294\,000$	D
9.	$SA = 2 \times \frac{1}{2} \times 6 \times 4 + 2 \times 8 \times 5 + 8 \times 6$ $= 24 + 80 + 48$ $= 152 \text{ cm}^2$	C
10.	$SA = 2 \times \left( \frac{1}{2} \times 32 \times 12 \right) + 32 \times 30 + 2 \times 20 \times 30$ $= 384 + 960 + 1200$ $= 2544 \text{ cm}^2$	D
11.	$V = \frac{36}{360} \times \pi \times 16^2 \times 6$ $= \frac{1}{10} \times \pi$ $= 480 \text{ cm}^3$	B
12.	$A = \pi \times 12^2 - \pi \times 9^2$ $= 197.92$ $V = 197.92 \times 120$ $= 23\,750 \text{ cm}^3$	C
13.	Area = $0.50 \times 0.12 + 0.16 \times 0.26 = 0.1016 \text{ m}^2$ Volume = $0.1016 \times 3 = 0.3048 \text{ m}^2$	A

14.	$A = \pi r^2 + 2\pi r l$ $= \pi \times 5^2 + 2 \times \pi \times 5 \times 20$ $= 78.54 + 628.31$ $= 706.9 \text{ cm}^2$	C
15.	$\text{Area end} = 12 \times 2 + \frac{1}{2} \times 12 \times 2.5 = 24 + 15 = 39 \text{ m}^2$ $\text{Area sides} = 2 \times 2 \times 4 = 16 \text{ m}^2$ $\text{Area roof} = 2 \times 6.5 \times 4 = 52 \text{ m}^2$ $\text{Total area} = 39 + 16 + 52 = 107 \text{ m}^2$	D

# High School Mathematics Test 2014

## Volume and SA of Prisms and Cylinders

### Multiple Choice Answer Sheet

Name Marking Sheet

Completely fill the response oval representing the most correct answer.

- |     |   |                                  |   |                                  |   |                                  |   |                                  |
|-----|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|
| 1.  | A | <input type="radio"/>            | B | <input type="radio"/>            | C | <input checked="" type="radio"/> | D | <input type="radio"/>            |
| 2.  | A | <input type="radio"/>            | B | <input checked="" type="radio"/> | C | <input type="radio"/>            | D | <input type="radio"/>            |
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| 4.  | A | <input type="radio"/>            | B | <input type="radio"/>            | C | <input type="radio"/>            | D | <input checked="" type="radio"/> |
| 5.  | A | <input checked="" type="radio"/> | B | <input type="radio"/>            | C | <input type="radio"/>            | D | <input type="radio"/>            |
| 6.  | A | <input checked="" type="radio"/> | B | <input type="radio"/>            | C | <input type="radio"/>            | D | <input type="radio"/>            |
| 7.  | A | <input type="radio"/>            | B | <input checked="" type="radio"/> | C | <input type="radio"/>            | D | <input type="radio"/>            |
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