High School
Mathematics Test 2015

| 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)
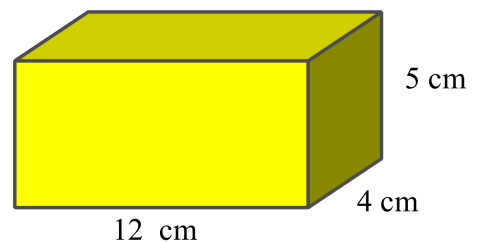
Name_____

Section 1   Short Answer Section

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

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1.   What is the volume of the rectangular prism?

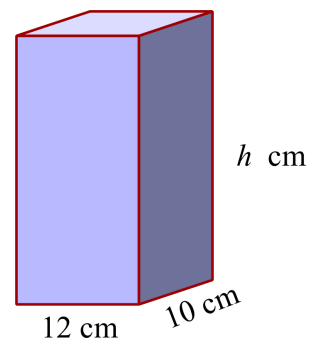………………………………………………
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5 cm
4 cm
12 cm

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2.   This rectangular prism has a volume of 1 200 m^2.
What is its height (*h* cm)?

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……………………………………………....
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h cm
12 cm
10 cm

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3.   What is the volume of a cube with sides 6 cm?

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4.	What is the surface area of a cube with sides 5 cm?

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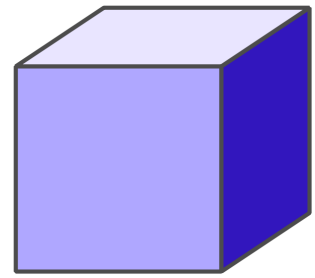
5.	What is the surface area of the rectangular prism?

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10 cm

6 cm

5 cm
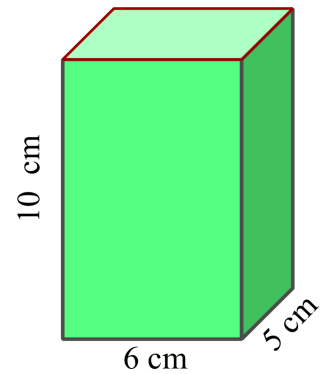
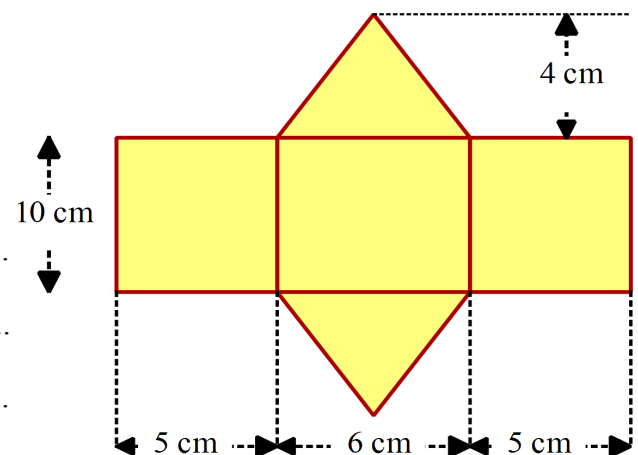| 6.	The solid is made by joining cubes together. Each cube measures 2 cm on each edge. What is the volume of the solid?

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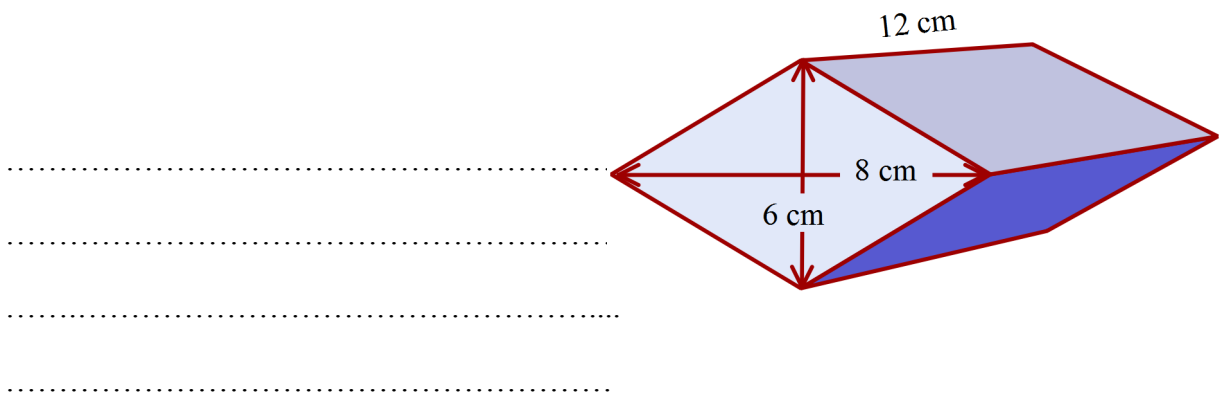
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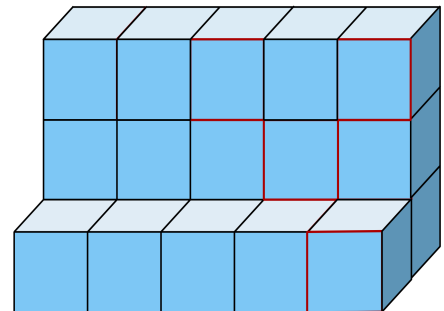
7.	Find the surface area of the solid whose net is shown.

4 cm

10 cm

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5 cm   6 cm   5 cm

8.	The prism has a rhombus as its base. What is its volume?

12 cm

8 cm

6 cm

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....

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....

9.	A paperweight is a prism with a face in the shape of a kite, as shown. It is 3 cm thick and made of glass. What volume of glass is used to make the paperweight?

18 cm

12 cm

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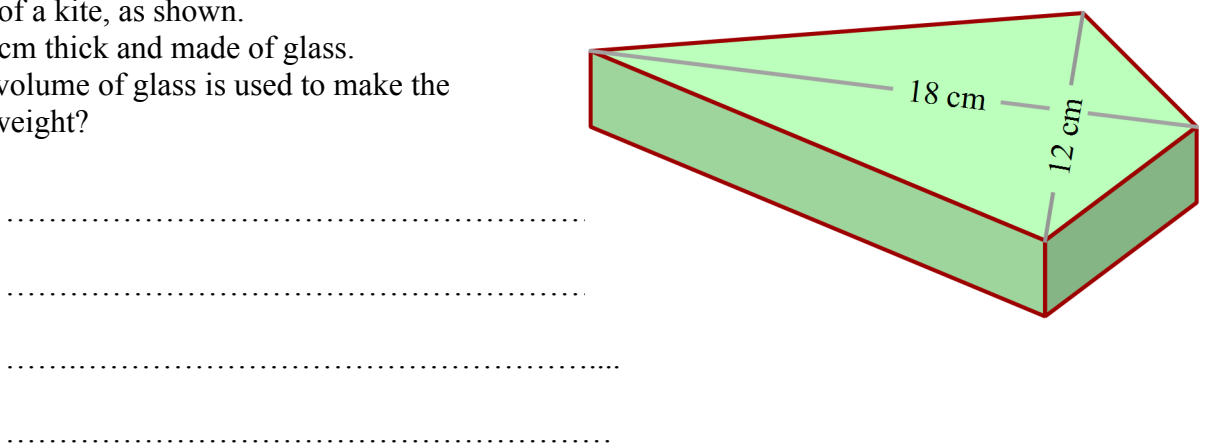
10.	Calculate the surface area of the prism shown.

13 cm

12 cm

15 cm

20 cm

10 cm

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....
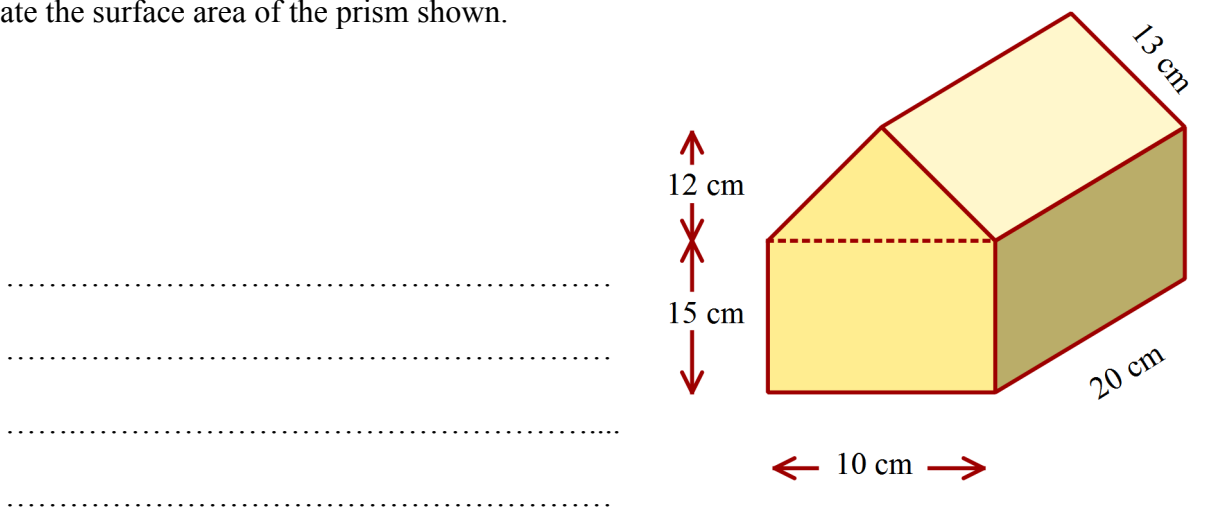
11.	The diagram shows a picnic hamper.

Find the volume of the hamper?

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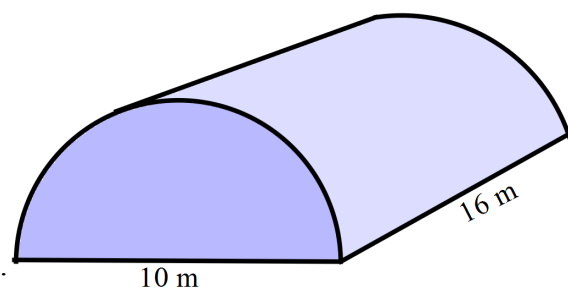……………………………………………………

8 cm

45 cm

10 cm

25 cm

40 cm
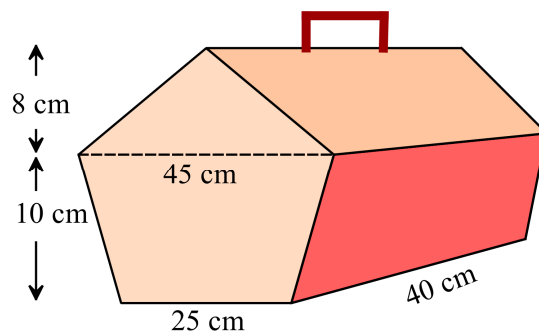
12.	A storage hut is in the shape of a half cylinder.

The diameter of the semicircle is 10 metres and the
length of the hut is 16 metres.
What is its volume, answer in terms of π.

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16 m

10 m

13.	Part of an artwork is a prism, in the shape shown.

Calculate the volume of the prism.

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15 cm

60 cm

20 cm
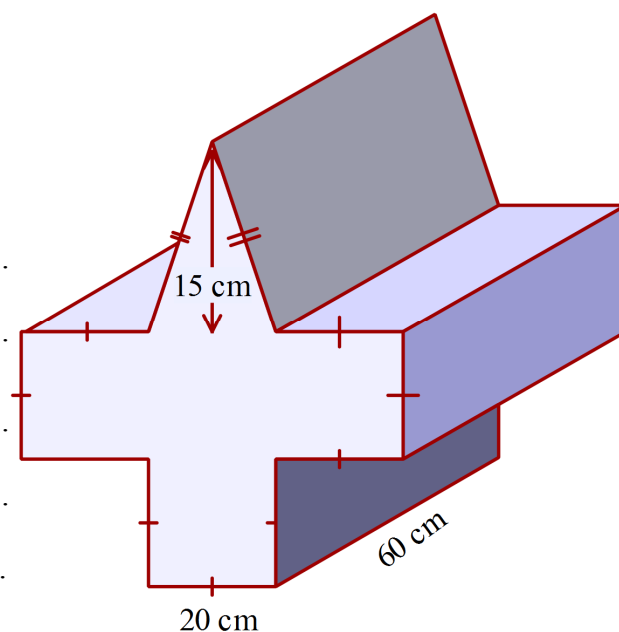
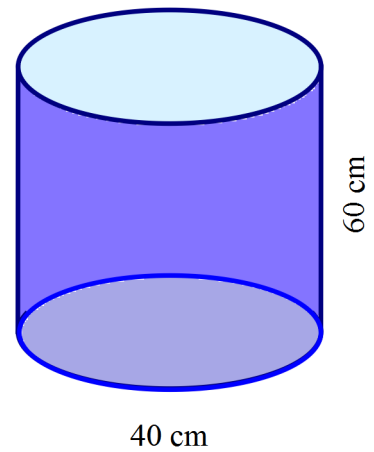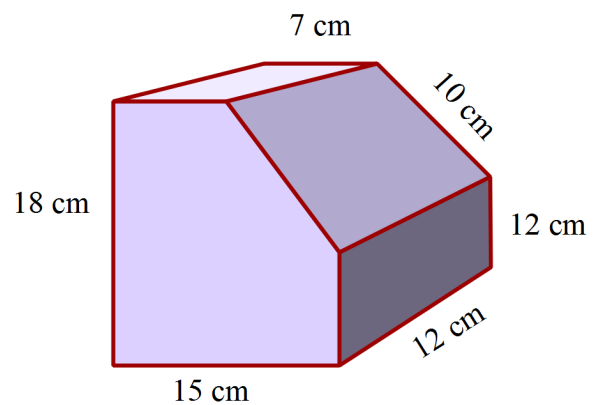| 14.	A cylindrical water cooler is 60 cm high and has a diameter of 40 cm. The cylindrical cups that are provided with the cooler have a radius of 2 cm and a height of 10 cm. How many cups could be filled from the cooler? …………………………………………………………… …………………………………………………………… …………………………………………………………….... ……………………………………………………………	60 cm 40 cm
15.	Calculate the surface area of the prism shown. …………………………………………………………… …………………………………………………………… …………………………………………………………….... ……………………………………………………………	7 cm 10 cm 18 cm 12 cm 12 cm 15 cm

| Year 9 | *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.

Questions 1 – 3 refer to the net shown.

15 cm

3 cm

10 cm
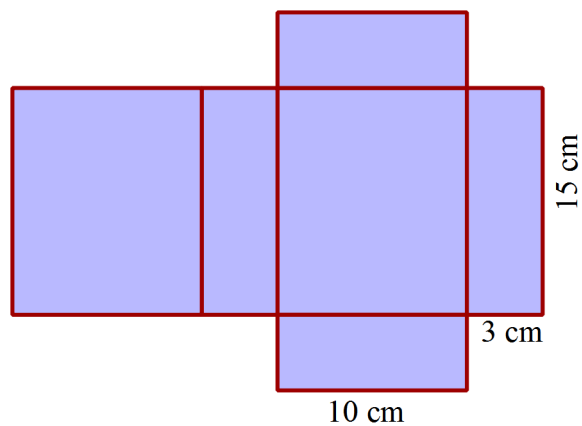
1.   What solid would be formed from the net?

   A.   Rectangular prism
   B.   Rectangular pyramid.
   C.   Square prism.
   D.   Square pyramid.

2.   What is the total area of the net?

   A.   225 cm^2 B.   300 cm^2 C.   405 cm^2 D.   450 cm^2

3.   What is the volume of the solid formed from the net?

   A.   225 cm^3 B.   300 cm^3 C.   405 cm^3 D.   450 cm^3

| 4. | The area of the cross section of this prism is 250 cm².
 What is the volume of the prism?

     A.   2 000 cm³
     B.   3 200 cm³
     C.   4 000 cm³
     D.   8 000 cm³ | ← 16 cm → |

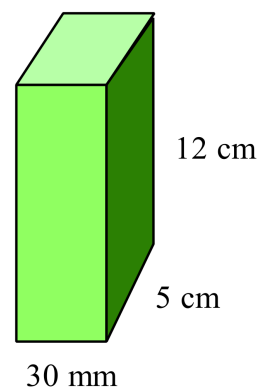| 5. | Which calculation could be used to find the volume of the triangular prism shown?
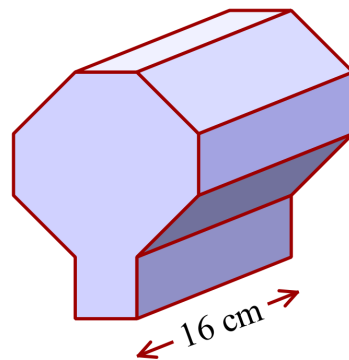
   A. $\frac{1}{2} \times 9 \times 40 \times 16$

   B. $\frac{1}{2} \times 9 \times 41 \times 16$

   C. $\frac{1}{2} \times 9 \times 40 \times 41$
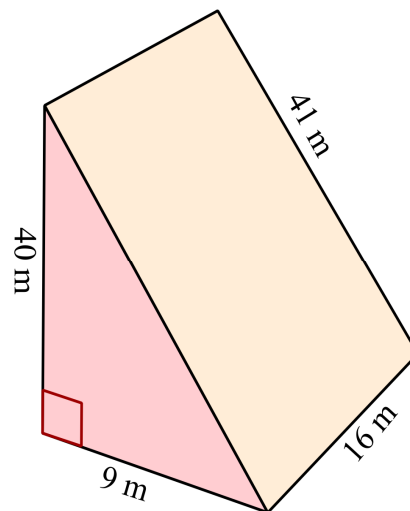
   D. $\frac{1}{2} \times 16 \times 40 \times 41$ | 41 m
 40 m
 9 m
 16 m |

| 6. | How many cubic centimetres are there in a cubic metre?
     A.   100
     B.   10 000
     C.   1 000 000
     D.   100 000 000 |

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

     A.   18 cm³
     B.   180 cm³
     C.   1 800 cm³
     D.   18 000 cm³ | 12 cm
 5 cm
 30 mm |

8.	What is the surface area of the triangular prism shown?

A. 900 cm^2

B. 1 000 cm^2

C. 1 240 cm^2

D. 1 560 cm^2

17 cm

17 cm

15 cm

20 cm

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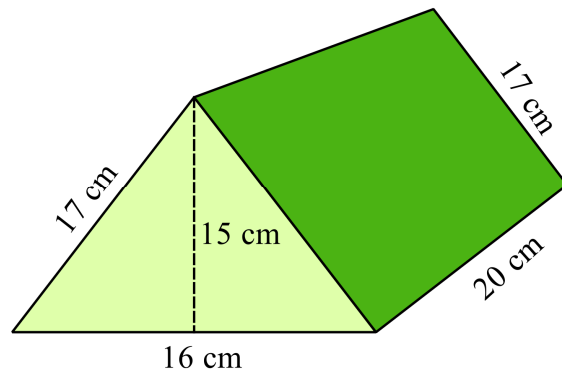
9.	What is the volume of the cylinder to the nearest cm^3?

A. 151 cm^3

B. 483 cm^3

C. 603 cm^3

D. 1 930 cm^3

6.4 cm

15 cm
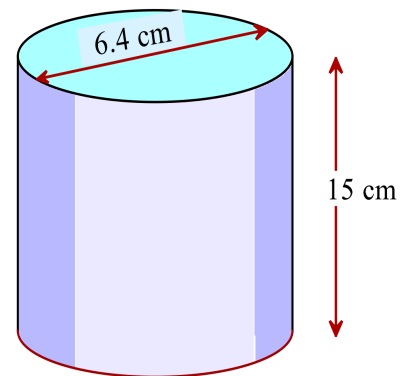
10.	What is the volume of the solid shown?

A. 161 cm^3

B. 966 cm^3

C. 1 932 cm^3

D. 2 112 cm^3

7 cm

15 cm

7 cm

12 cm

15 cm
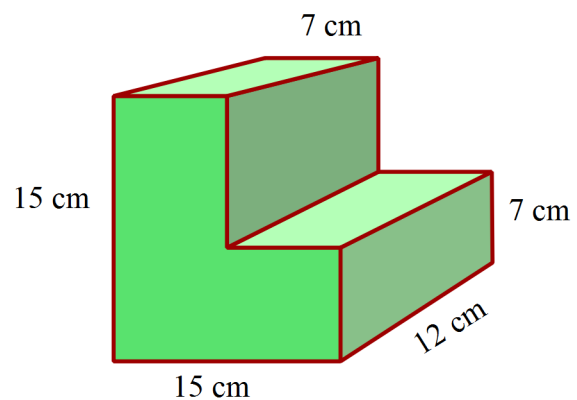
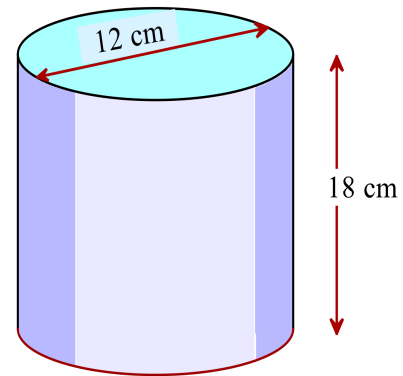| 11.	Jack is building a prism from 1 cm^2 cubes. What is the least number of cubes he must add to produce a prism?

A. 6

B. 8

C. 12

D. 14
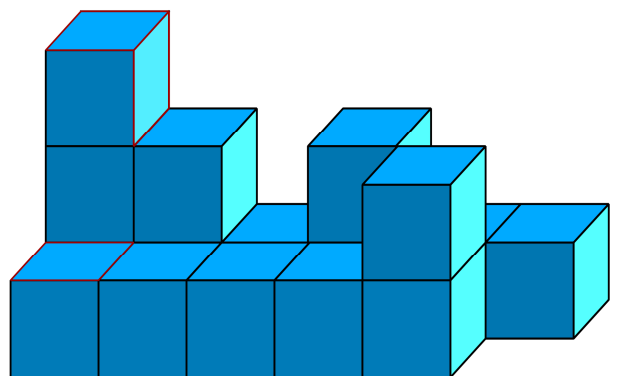
12.	What is the surface area of the cylinder?

Answer to the nearest cm^2.

     A.   905 cm^2

     B.   1 131 cm^2

     C.   1 507 cm^2
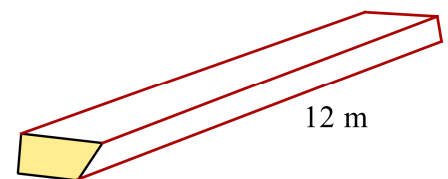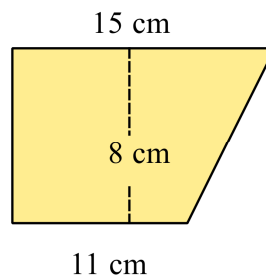
     D.   1 583 cm^2

12 cm

18 cm

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13. A section of guttering is in the shape of the trapezoidal prism, with cross section as shown.

Its length is 12 metres.

How many litres of water could the section hold when it was completely full?

(1 000 cm^3 holds 1 litre)

15 cm

8 cm

11 cm

12 m

   A.   12.5 litres   B.   25.6 litres   C.   62.4 litres   D.   124.8 litres

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14. A cylindrical grain silo has an internal diameter of 12 metres and a height of 45 metres.

If each cubic metre of grain weighs 0.75 tonnes, how many rail wagons which carry 120 tonnes each would be needed to empty the silo when it is full?

     A.   16   B.   32   C.   35   D.   43

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15. A barn has the dimensions shown.

Calculate the volume of the barn in cubic metres.

     A.   108 m^3

     B.   216 m^3

     C.   256 m^3

     D.   336 m^3
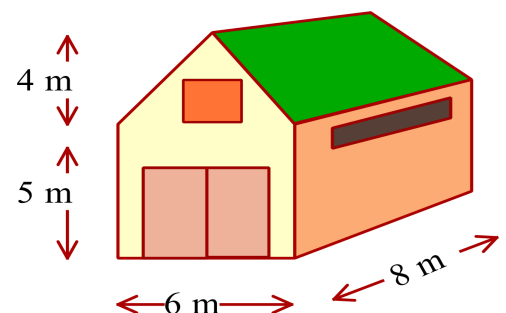
4 m

5 m

6 m

8 m

High School
Mathematics Test 2015

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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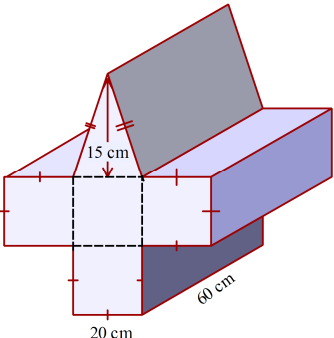
Year 9	*Volume and SA of Prisms and Cylinders*	Non Calculator

Section 1 Short Answer Section

ANSWERS

No.	WORKING	ANSWER
1.	$V = Al$ $= 12 \times 4 \times 5$ $= 240 \text{ cm}^3$	240 cm³
2.	$V = Al$ $= 12 \times 10 \times h$ $1200 = 120 \times h$ $h = \dfrac{1200}{120} = 10$ $h = 10$	$h = 10$
3.	$V = Al$ $= 6 \times 6 \times 6$ $= 36 \times 6$ $= 216 \text{ cm}^3$	216 cm³
4.	$SA = 6A$ $= 6 \times 5 \times 5$ $= 6 \times 25$ $= 150 \text{ cm}^2$	150 cm²
5.	$SA = 2 \times (10 \times 6 + 10 \times 5 + 6 \times 5)$ $= 2 \times (60 + 50 + 30)$ $= 2 \times 140$ $= 280 \text{ cm}^2$	280 cm²
6.	Number of cubes $= \quad 4 \times 5 = 20$ Each cube $= 2 \times 2 \times 2 = 8 \text{ cm}^3$ $V = 20 \times 8$ $= 160 \text{ cm}^3$	160 cm³

7.	$SA = 2 \times$ triangles $+ 3$ rectangles $= 2 \times \left(\dfrac{1}{2} \times 6 \times 4 \right) + (10 \times 5) \times 2 + 10 \times 6$ $= 24 + 100 + 60$ $= 184 cm^2$	184 cm²
8.	$V = Al$ $= \left(\dfrac{1}{2} \times 6 \times 8 \right) \times 12$ $= 24 \times 12$ $= 2 \times 12 \times 12 = 2 \times 144$ $= 288\ cm^3$	288 cm³
9.	$V = Al$ $= \left(\dfrac{1}{2} \times 18 \times 12 \right) \times 3$ $= 108 \times 3$ $= 324 cm^3$	324 cm³
10.	$SA = 2 \times$ end $+ 5 \times$ rectangles End $= 15 \times 10 + \dfrac{1}{2} \times 10 \times 12$ $= 150 + 60 = 210$ $SA = 2 \times 210 + 10 \times 20 + 2 \times 15 \times 20 + 2 \times 13 \times 20$ $= 420 + 200 + 600 + 520$ $= 1740\ cm^2$	1740 cm²
11.	$V = Al$ $A = \dfrac{10}{2}(45 + 25) + \dfrac{1}{2} \times 8 \times 45$ $= 5 \times 70 + 4 \times 45$ $= 350 + 180$ $= 530$ $V = 530 \times 40$ $= 21\ 200 cm^3$	21 200 cm³

12.	$A = \dfrac{1}{2} \pi \, r^2 = \dfrac{1}{2} \times \pi \times 5^2$ $\qquad = \dfrac{25\pi}{2}$ $V = Al = \dfrac{25\pi}{2} \times 16$ $\qquad = 25\pi \times 8$ $V = 200 \, \pi \, \mathrm{m}^3$	$200 \, \pi \, \mathrm{m}^3$
13.	$A = 4 \text{ squares} + \text{ a triangle}$ $= 4 \times 20^2 + \dfrac{1}{2} \times 20 \times 15$ $\qquad = 4 \times 400 + 10 \times 15$ $\qquad = 1600 + 150 = 1750$ $V = Al$ $\qquad = 1750 \times 60$ $\qquad = 105\,000 \mathrm{cm}^3$ *(figure: 15 cm, 60 cm, 20 cm)*	$105\,000 \text{ cm}^3$
14.	Water cooler $\quad V = Al$ $\qquad = \pi \times 20^2 \times 60$ $\qquad = \pi \times 400 \times 60$ $\qquad = 24000\pi \, \mathrm{cm}^3$ Cups $\quad V = Al$ $\qquad = \pi \times 2^2 \times 10$ $\qquad = \pi \times 4 \times 10$ $\qquad = 40 \, \pi \, \mathrm{cm}^3$ Number of cups $= \dfrac{24000\pi}{40\pi}$ $\qquad = 600 \text{ cups}$	600 cups
15.	$SA \ 2 \times \text{ end} + 5 \text{ rectangles}$ $\text{End} = 18 \times 15 - \left(\dfrac{1}{2} \times 6 \times 8 \right)$ $\qquad = 9 \times 30 - 3 \times 8$ $\qquad = 270 - 24$ $\qquad = 246$ $SA = 246 \times 2 + 12 \times 12 + 12 \times 10$ $\qquad + 12 \times 7 + 12 \times 18 + 12 \times 15$ $\qquad = 492 + 144 + 120 + 84 + 216 + 180$ $\qquad = 1236 \, \mathrm{cm}^2$	$1\,236 \text{ cm}^3$
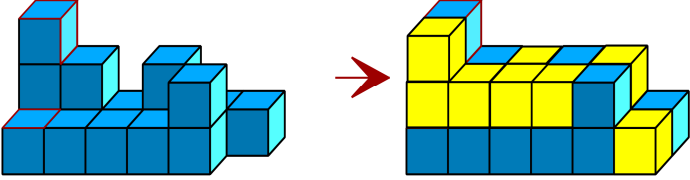
Year 9	*Volume and SA of Prisms and Cylinders*	Calculator Allowed

Section 2   Multiple Choice Section

ANSWERS

No.	WORKING	ANSWER
1.	It is a rectangular prism	A
2.	$SA = 2 \times (10 \times 3 + 10 \times 15 + 3 \times 15)$ $= 2 \times (30 + 150 + 45)$ $= 2 \times 225$ $= 450 \text{ cm}^2$	D
3.	$V = Al$ $= 10 \times 3 \times 15$ $= 450 \text{ cm}^3$	D
4.	$V = Al$ $= 250 \times 16$ $= 4000 \text{ cm}^3$	C
5.	$V = Al$ $= \left(\dfrac{1}{2} \times 9 \times 40 \right) \times 16$ $= \dfrac{1}{2} \times 9 \times 40 \times 16$	A
6.	$V_{CUBIC\ METRE} = Al$ $= 100 \text{ cm} \times 100 \text{ cm} \times 100 \text{ cm}$ $= 1\ 000\ 000 \text{ cm}^3$	C
7.	$V = Al$ $= 3 \times 5 \times 12$ $= 3 \times 60$ $= 180 \text{ cm}^3$	B
8.	$V = Al$ $= 2 \times \left(\dfrac{1}{2} \times 16 \times 15 \right) + 16 \times 20 + 2 \times 17 \times 20$ $= 240 + 320 + 680$ $= 1\ 240 \text{ cm}^2$	C

9.	$V = Al$ $\quad = (\pi \times 3.2^2) \times 15$ $\quad = 482.54863$ $\quad = 483 \text{ cm}^3$	B
10.	$A = 15 \times 15 - 8 \times 8$ $\quad = 161$ $V = Al$ $\quad = 161 \times 12$ $\quad = 1\,932 \text{ cm}^3$	C
11.	 There are 8 added.	B
12.	$SA = 2 \times \pi \times 6^2 + \pi \times 12 \times 18$ $\quad = 72\,\pi + 216\,\pi$ $\quad = 288\pi$ $\quad = 904.778$ $\quad = 905 \text{cm}^2$	A
13.	$A = \dfrac{8}{2}(15 + 11) = 4 \times 26 = 104$ $V = Al$ $\quad = 104 \times 1200 \text{ cm}$ $\quad = 124\,800 \text{ cm}^3$ Capacity $= \dfrac{124800}{1000} = 124.8$ litres	D
14.	$A = \pi \times 6^2$ $\quad = 36\,\pi$ $V = 36\,\pi \times 45$ $= 1620\,\pi$ $\quad = 5089.380 \text{ m}^3$ $\quad = 5089.380 \times 0.75$ tonnes $= 3817.035$ tonnes Number of wagons $= 3817.035 \div 120$ $\quad = 31.809$ So a train with 32 wagons would be needed to empty the silo.	B

15.	$A = 5 \times 6 + \dfrac{1}{2} \times 6 \times 4$	D
	$= 30 + 12 = 42\ m^2$	
	$V = Al$	
	$= 42 \times 8$	
	$= 336\text{cm}^3$	

High School
Mathematics Test 2015

Multiple Choice Answer Sheet

Volume and SA of Prisms and Cylinders

Name _____ANSWERS_____

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 ●