High School Mathematics Test 2013

Year 9

Surface Area and Volume of Prisms

Calculator Allowed

Skills and Knowledge Assessed:

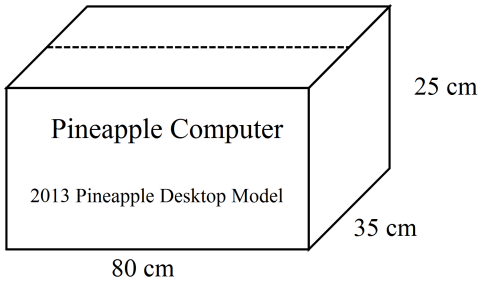
- Solve problems involving the surface area and volume of right prisms (ACMMG218)
- Calculate the surface area and volume of cylinders and solve related problems (ACMMG217)
- Solve problems involving surface area and volume for a range of prisms, cylinders and composite solids (ACMMG242)

Name_____

Section 1 Short Answer Section

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

1. What is the surface area of this carton which is used to deliver new Pineapple Computers?



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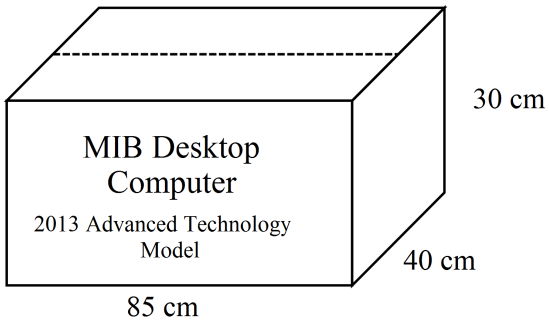
2. An MIB computer is shipped in the carton shown. The computer itself takes up 60% of the volume of the carton, with the rest being packing material. What volume of packing material is used in the carton?



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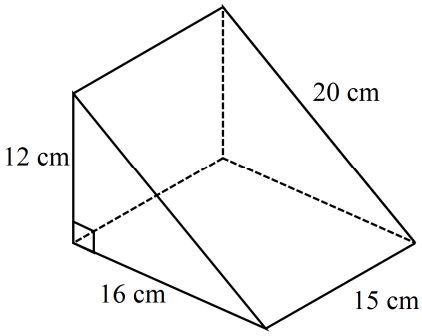
3. What is the volume of the triangular prism shown?



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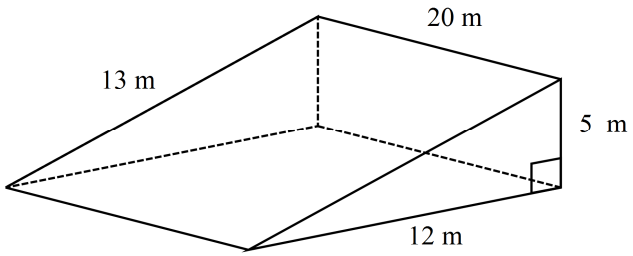
4. What is the surface area of the prism shown?



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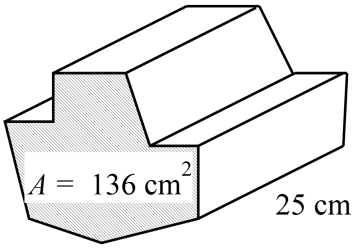
5. A prism has, as its base, an irregular polygon with area 136 cm^2. What is the volume of the prism?



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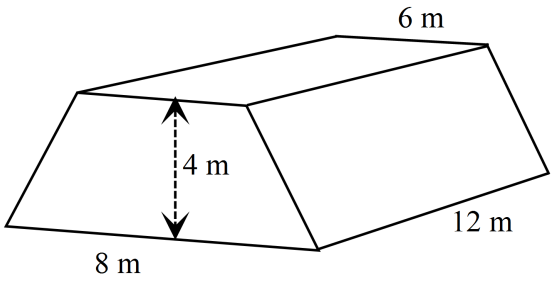
6. A haystack is in the shape of a trapezoidal prism as shown.
What volume of hay is held in the haystack?



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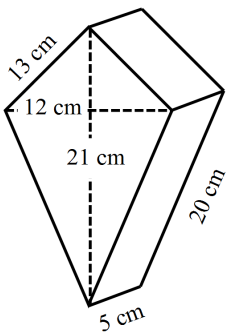
7. The packet for Peppa mints is a plastic prism with its cross section in the shape of a kite as shown.
What area of plastic is needed for the packet?



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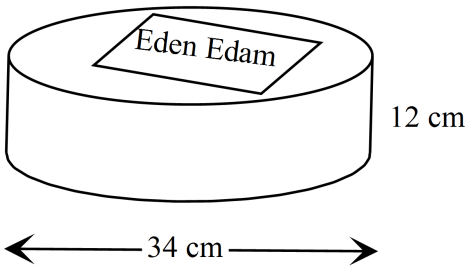
8. The cylinder of cheese shown is coated in wax on all of its faces. What is the area of wax that was used?



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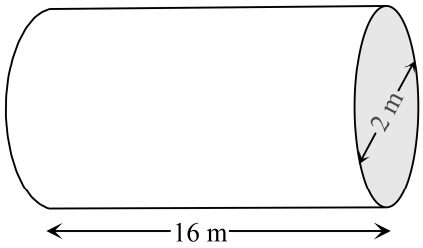
9. What is the volume of the cylinder shown?



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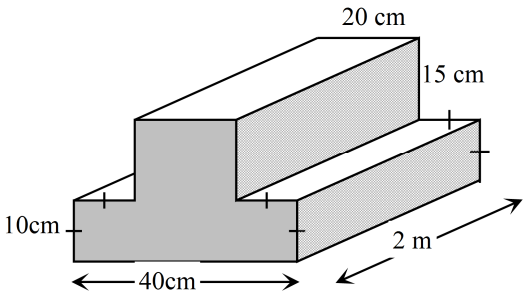
10. Find the volume of the prism shown.



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High School Mathematics Test 2013

Surface Area and Volume of Prisms

Year 9

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. Terracotta bricks are in the shape of rectangular prisms measuring 12 cm by 15 cm by 20 cm. A wall is built using 2 000 of these bricks. What is the volume of the bricks that make up the wall?

   A. 0.72 m^3 B. 7.2 m^3 C. 72 m^3 D. 720 m^3

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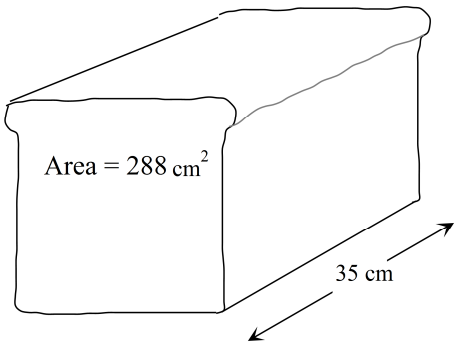
2. A loaf of bread has cross sectional area 288 cm^2 and length 35 cm. It is sliced into 40 even slices.
   What is the volume of one of the slices?



   A. 252 cm^3 B. 283 cm^3
   C. 288 cm^3 D. 300 cm^3

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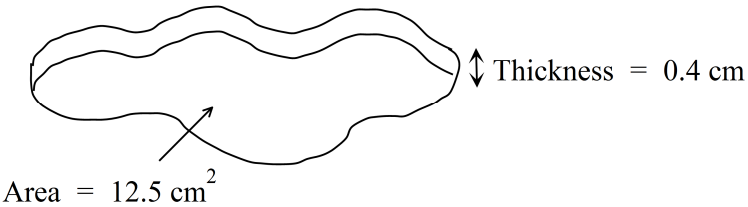
3. A fridge magnet for Turtle Island is in the shape of the island and is 0.4 cm thick.
   The magnet is made of plastic and the area of the face is 12.5 cm^2.
   What volume of plastic is needed to make 500 of these magnets?

   A. 100 cm^3
   B. 500 cm^3
   C. 2 500 cm^3
   D. 5 000 cm^3



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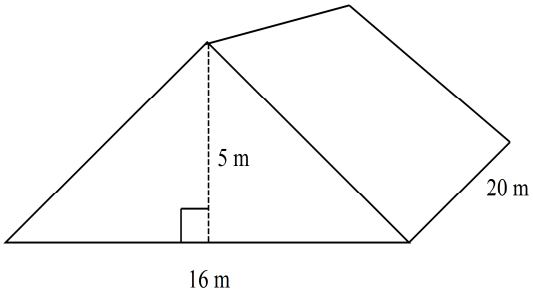
4. What is the volume of this triangular prism?

   A. 640 cm^3
   B. 800 cm^3
   C. 1 600 m^3
   D. 2 400 cm^3



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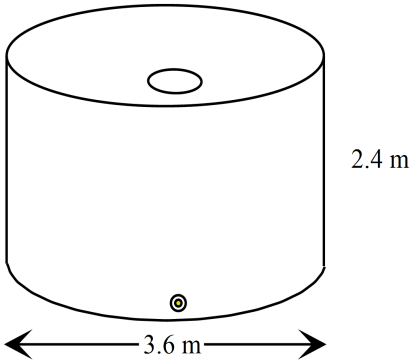
5. What is the volume of the cylindrical water tank shown?



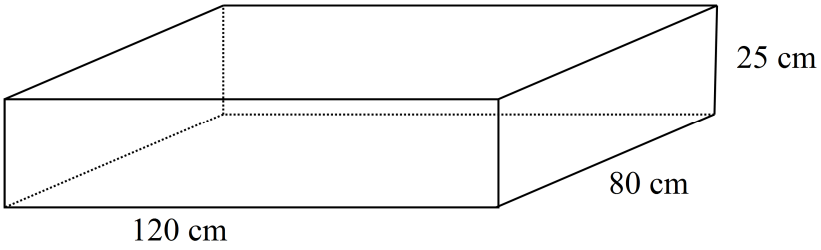
A. 8.6 m^3

B. 24.4 m^3

C. 97.7 m^3

D. 390.9 m^3

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



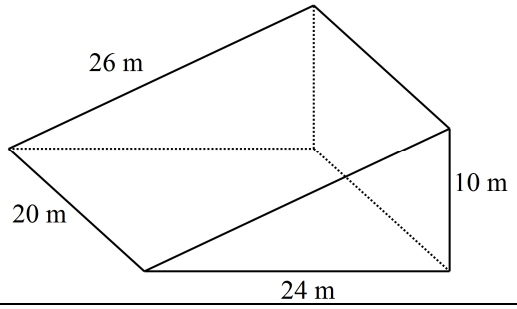
A. 14 600 cm^2

B. 29 200 cm^2

C. 120 000 cm^2

D. 240 000 cm^2

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



A. 480 m^3

B. 1 180 m^3

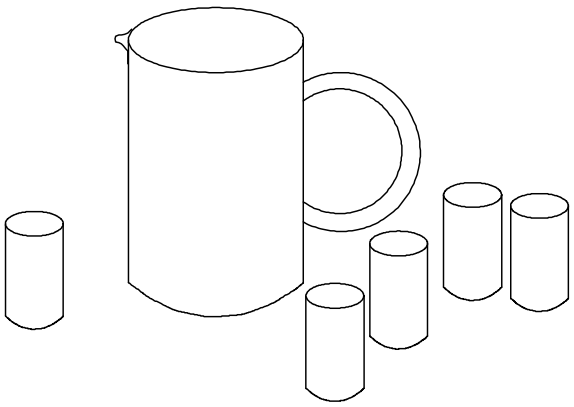
C. 1 200 m^3

D. 1 440 m^3

8. A jug for fruit juice is a cylinder with radius 8cm and height 15 cm.

The matching glasses are cylinders with radius 3 cm and height 12 cm.

How many glasses could be filled from the jug?



A. Two and a bit glasses.

B. Four and a half glasses.

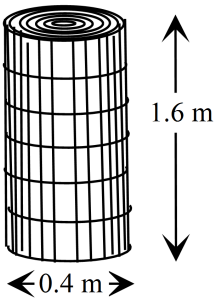
C. Exactly eight glasses.

D. Almost nine glasses.

9. A roll of fencing wire is cylindrical, with the dimensions shown.

It is to be surrounded completely in a plastic protective wrapping.

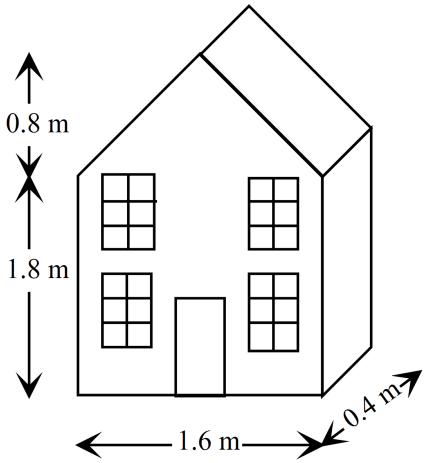
What area of plastic is needed to do this?



A. 0.20 m^2 B. 2.00 m^2

C. 2.13 m^2 D. 2.26 m^2

10. A solid polystyrene foam model of a house is to be constructed for a stage play.
What volume of foam is needed for the model?



A. 1.408 m^3 B. 1.664 m^3

C. 35.20 m^3 D. 70.40 m^3

High School Mathematics Test 2013

Year 9

Surface Area and Volume of Prisms

Calculator Allowed

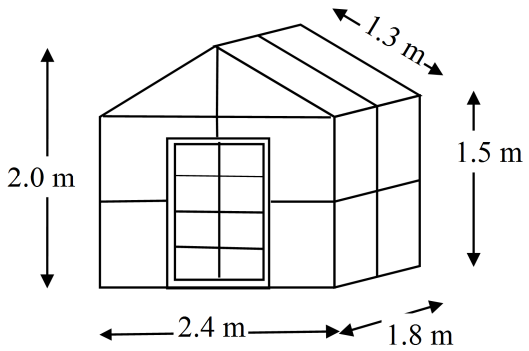
Name_____

Section 3 Longer Answer Section

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

Marks

1. A glasshouse for raising seedlings has a concrete floor and all other faces are made of glass, including the door.



a) The concrete floor is 0.3 m thick. What volume of concrete is needed for the floor? **1**

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b) What area of glass is needed for the glasshouse (including the door)? **2**

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c) The air in the glass house is circulated by a fan which moves 3 cubic metres per minute. How long would it take (theoretically) to circulate all the air in the glasshouse? **2**

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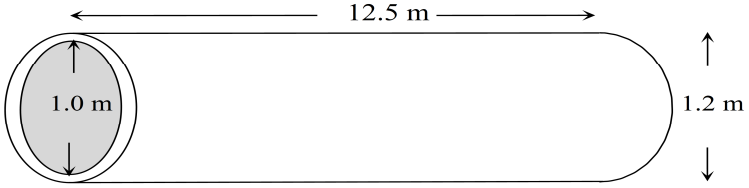
Marks

2. A gas pipeline is to be constructed from sections of the size shown.



a) If the pipeline between two towns is to be 100 km long, how many sections of pipe will be needed? **1**

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b) What volume of gas will be held in the pipe between the two towns? **2**

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c) The outside of the pipeline between the two towns is to be painted with a rust protective paint. What area will need to be painted? **2**

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High School
Mathematics Test 2013

Multiple Choice Answer Sheet

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 ⬭

High School
Mathematics Test 2013
Surface Area and Volume of Prisms

ANSWERS

Section 1	
1.	SA $= 2 \times 80 \times 35 + 2 \times 80 \times 25 + 2 \times 25 \times 35$ $= 11\,350 \text{ cm}^2$
2.	$V = 85 \times 40 \times 30$ $= 102\,000 \text{ cm}^3$ Packing = 40% of $102\,000 \text{ cm}^3$ $= 40\,800 \text{ cm}^3$
3.	Volume $= Ah$ $= \left(\frac{1}{2} \times 16 \times 12\right) \times 15$ $= 1\,440 \text{ cm}^3$
4.	SA $= 2 \times \frac{1}{2} \times 5 \times 12 + 5 \times 20 + 12 \times 20 + 13 \times 20$ $= 60 + 100 + 240 + 260$ $= 660\ m^2$
5.	Volume $= 136 \times 25$ $= 3\,400 \text{ cm}^2$
6.	Area Trapezium $= \frac{4}{2}(6 + 8) = 28\ m^2$ Volume $= 28 \times 12 = 336\ m^3$
7.	Area of Kite $= \frac{1}{2} \times 21 \times 12 = 126 \text{ cm}^2$ Surface area $= 2 \times 126 + 2 \times 5 \times 20 + 2 \times 5 \times 13$ $= 252 + 200 + 130$ $= 582 \text{ cm}^2$
8.	Surface Area $= 2\pi r(r + h)$ $= 2\pi \times 17(17 + 12)$ $= 3\,098 \text{ cm}^2$
9.	Volume $= \pi r^2 h$ $= \pi \times 1^2 \times 16$ $= 50.3 \text{ m}^3$

10.	Area of cross section $= 40 \times 10 + 20 \times 15 = 400 + 300 = 700\ cm^2$ Volume = Area × Length $= 700 \times 200$ $= 140\ 000\ cm^3$

Section 2	
1.	B
2.	A
3.	C
4.	B
5.	B
6.	B
7.	D
8.	D
9.	D
10.	A

Section 3	
1.	a) Volume $= 2.4 \times 1.8 \times 0.3$ $= 1.296\ m^3$
	b) Area end $= 2.4 \times 1.5 + 2.4 \times 0.5 \div 2$ $= 4.2\ m^2$ Surface area $= 4.2 \times 2 + 1.8 \times 1.5 \times 2 + 1.3 \times 1.8 \times 2$ $= 8.4 + 5.4 + 4.68$ $= 18.48\ m^2$ of glass
	c) Volume of air $= 4.2 \times 1.8$ $= 7.56\ m^3$ Time to circulate $= \frac{7.56}{3}$ $= 2.52$ minutes (2 minutes and 31 seconds)
2.	a) Number of sections $= 100\ 000 \div 12.5$ $= 8000$ sections
	b) Volume of inside of 1 section $= 9.8\ m^3$ Volume of inside of 8000 section $= 78\ 540\ m^3$
	c) Area of outside of 1 section $= 2\pi \times 0.6 \times 12.5 = 47.1\ m^2$ Area of outside of 8000 section $= 47.1 \times 8000 = 376\ 991\ m^2$

High School
Mathematics Test 2013

Multiple Choice Answer Sheet

Name Marking Sheet

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 ○