High School Mathematics Test 2013

Year 10

Surface Area and Volume of Other Solids

Calculator Allowed

Skills and Knowledge Assessed:

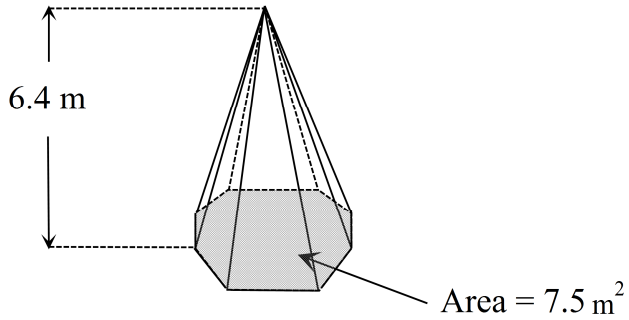
- Solve problems involving surface area and volume of right pyramids, right cones, spheres and related composite solids (ACMMG271)

Name_____

Section 1 Short Answer Section

Write all working and answers in the spaces provided on this test paper.
THE DIAGRAMS ARE NOT DRAWN TO SCALE.

1. The octagonal pyramid is 6.4 m high and its base has an area of 7.5 m^2. Find its volume.



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2. What is the volume of the square pyramid?

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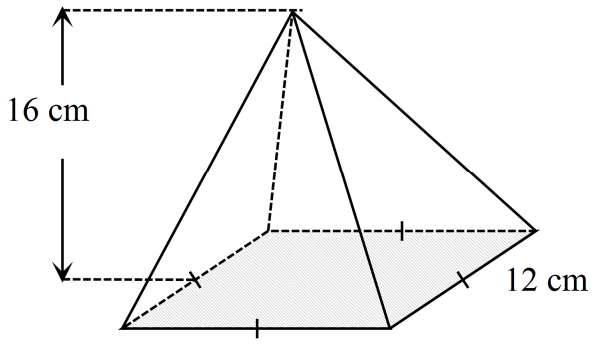
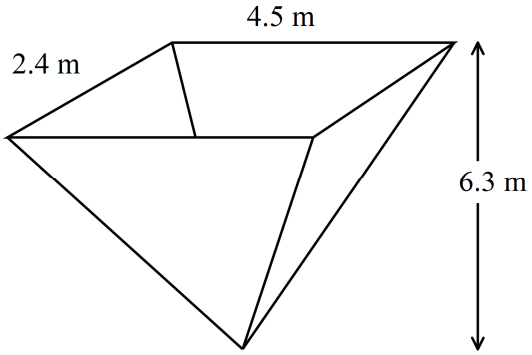


3. A water collector for a tank is in the shape of a rectangular pyramid. How many litres of water can it hold, if $1m^3$ holds 1 kilolitre of water?



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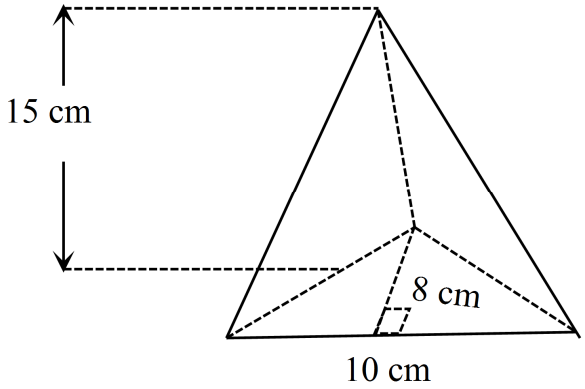
4. Calculate the volume of the triangular prism shown.



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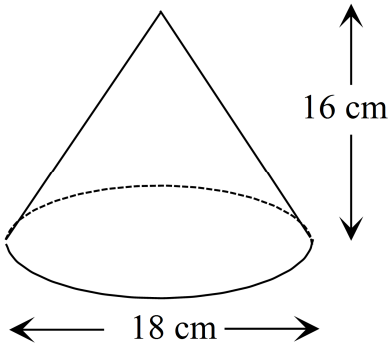
5. What is the volume of the right cone shown?



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6. An antique cannonball is a 28 cm diameter sphere and is made of iron. What is the volume of the cannonball?

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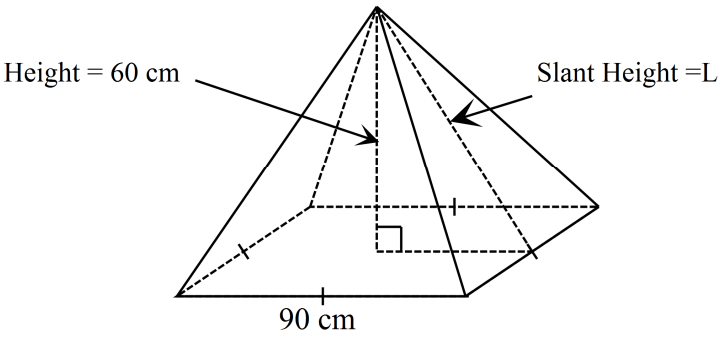
7. What is the value of L in the square pyramid shown?



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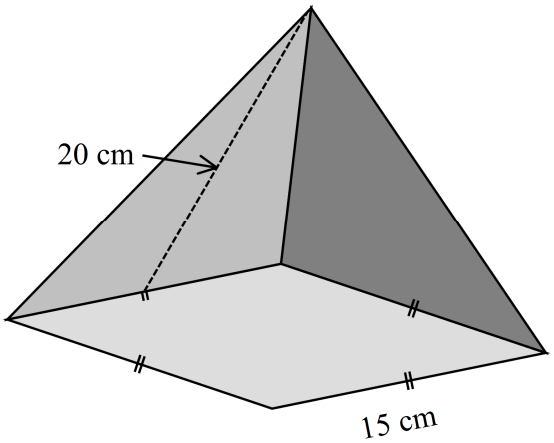
8. What is the surface area of the square pyramid shown?



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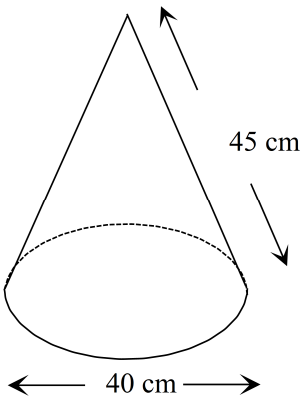
9. What is the surface area of this cone?



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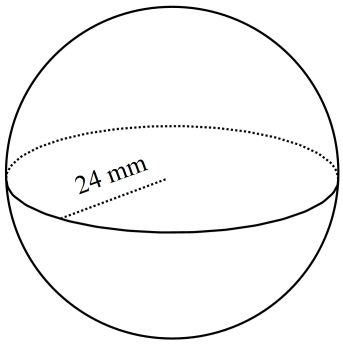
10. A sphere has a radius of 24 mm.
What is its surface area?



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High School Mathematics Test 2013

Surface Area and Volume of Other Solids

Year 10

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. A right pyramid has an irregular pentagonal base which has an area 134 cm^2. The perpendicular height of the pyramid is 18 cm.

   What is the volume of the pyramid?

   A. 224 cm^3 B. 268 cm^3 C. 804 cm^3 D. 2 412 cm^3

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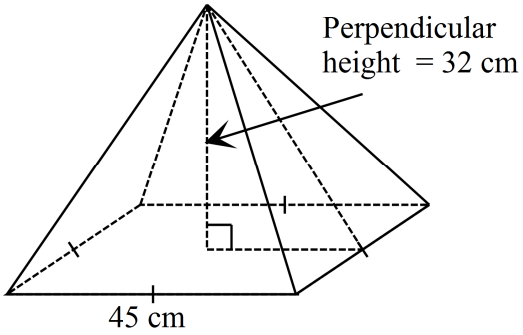
2. What is the volume of this square pyramid?

   A. 480 cm^3

   B. 21 600 cm^3

   C. 32 400 cm^3

   D. 64 800 cm^3



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3. A rectangular pyramid has base dimensions 12 m by 8 m, and has a volume of 224 m^3.

   What is its perpendicular height?

   A. 7 cm B. 7.5 cm C. 8 cm D. 9 cm

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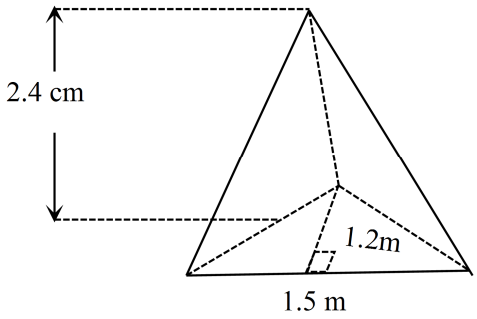
4. Calculate the volume of the triangular prism shown.

   A. 0.72 cm^3

   B. 2.16 cm^3

   C. 4.32 cm^3

   D. 8.10 cm^3



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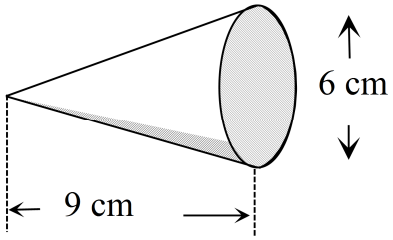
5. A tennis ball is a hollow sphere with an outer diameter of 12 cm and a thickness of 0.4 cm. What volume of air does the tennis ball hold?

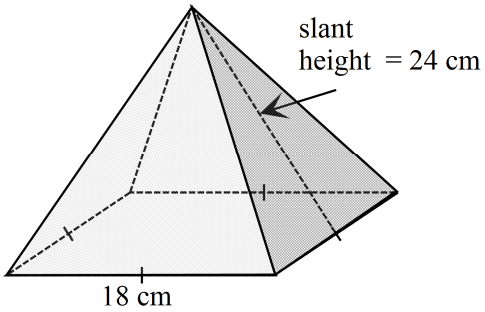
A. 70.4 cm^3 B. 735.6 cm^3 C. 817.3 cm^3 D. 6538.3 cm^3

6. What is the volume of this cone?



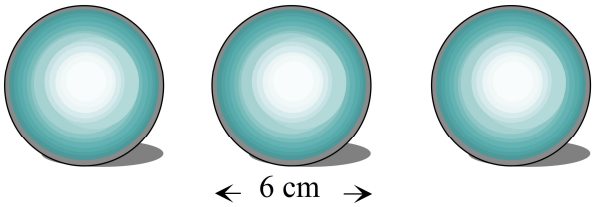
A. 28.3 cm^3
B. 37.7 cm^3
C. 56.5 cm^3
D. 84.8 cm^3

7. What is the surface area of the square pyramid shown?



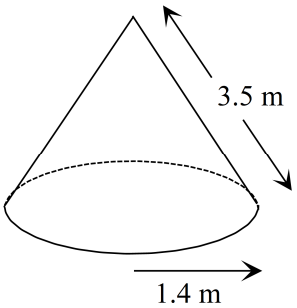
A. 420 cm^2
B. 540 cm^2
C. 864 cm^2
D. 1 188 cm^2

8. A snooker set has identical 15 red balls, three of which are shown below. If the entire set of red balls were to be repainted, what area would need to be covered?



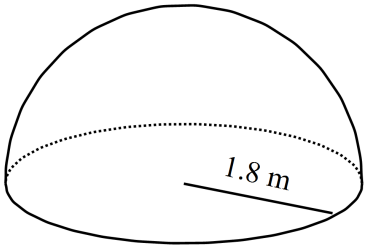
A. 848 cm^2
B. 1 131 cm^2
C. 1 696 cm^2
D. 5 089 cm^2

9. A cone has the dimensions shown.
What is the area of the curved surface of the cone?



A. 15.4 m^2
B. 21.6 m^2
C. 30.8 cm^2
D. 55.4 cm^2

10. What is the curved surface area of the hemisphere shown below?



A. 5.1 m^2
B. 11.3 m^2
C. 20.4 cm^2
D. 40.7 cm^2

High School Mathematics Test 2013

Year 10

Surface Area and Volume of Other Solids

Calculator Allowed

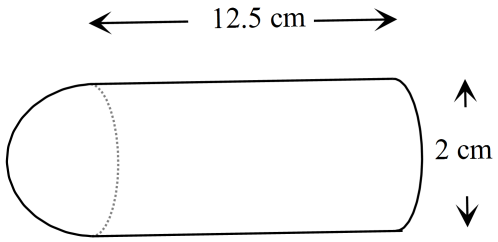
Name_____

Section 3 Longer Answer Section

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

Marks

1. A container for deodorant is in the shape shown, which is a cylinder topped by a hemisphere.



a) Given that 1 cm^3 holds 1 mL, find the amount of deodorant that the container will hold? Ignore the thickness of the container. **2**

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b) What is the surface area of the container? **2**

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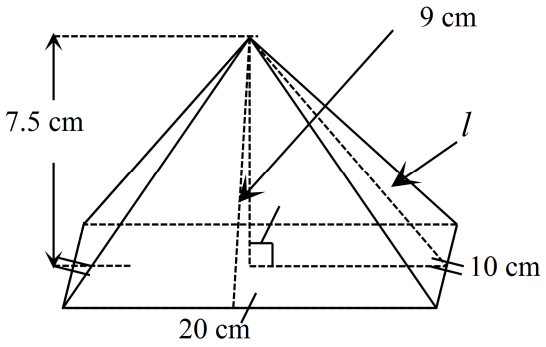
2. The rectangular pyramid has the dimensions shown. The slant height of the front triangular face is 9 cm.



a) Calculate the slant height (l) of the side triangular face. **1**

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b) Find the volume of the pyramid. **1**

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c) Find the surface area of the pyramid. **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 Other Solids

ANSWERS

Section 1	
1.	Volume $= \frac{1}{3}Ah$ $= \frac{1}{3} \times 7.5 \times 6.4$ $= 16 \text{ m}^3$
2.	Volume $= \frac{1}{3}Ah$ $= \frac{1}{3} \times 12^2 \times 16$ $= 768 \text{ cm}^3$
3.	Volume $= \frac{1}{3}Ah$ $= \frac{1}{3} \times (2.4 \times 4.5) \times 6.3$ $= 22.68 \text{ m}^3$ Capacity $= 22.68 \times 1000$ $= 22\,680$ litres.
4.	Volume $= \frac{1}{3}Ah$ $= \frac{1}{3} \times \left(\frac{1}{2} \times 8 \times 10\right) \times 15$ $= 200 \text{ cm}^3$
5.	Volume $= \frac{1}{3}Ah$ $= \frac{1}{3} \times \left(\pi \times 9^2\right) \times 16$ $= 1\,357.2 \text{ cm}^3$
6.	Radius = 14 cm Volume $= \frac{4}{3}\pi r^3$ $= \frac{4}{3} \times \pi \times 14^3$ $= 11\,494 \text{ cm}^3$

7.	$L^2 = 45^2 + 60^2$ $= 5625$ $L = \sqrt{5625}$ $= 75$ cm
8.	Surface Area $= 15^2 + 4 \times \frac{1}{2} \times 15 \times 20$ $= 225 + 600$ $= 825$ cm^2
9.	Surface Area $= \pi r^2 + \pi rl$ $= \pi \times 20^2 + \pi \times 20 \times 45$ $= 1257 + 2827$ $= 4084$ cm^2
10.	Surface Area $= 4\pi r^2$ $= 4 \times \pi \times 24^2$ $= 7238$ mm^2

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

Section 3	
1. a)	Volume $= \frac{4}{3}\pi r^3 \div 2 + \pi r^2 h$ $= \frac{4}{3} \times \pi \times 1^3 \div 2 + \pi \times 1^2 \times 12.5$ $= 41.4 \text{ cm}^3$ Capacity = 41.4 mL
	b) Surface area $= \frac{4\pi r^2}{2} + \pi r^2 + 2\pi r\, h$ $= 3\pi r^2 + 2\pi r\, h$ $= 3 \times \pi \times 1 + 2 \times \pi \times 1 \times 12.5$ $= 88.0 \text{ cm}^2$
2. (a)	$l^2 = 10^2 + 7.5^2$ $= 100 + 56.25$ $= 156.25$ $l = \sqrt{156.25}$ $= 12.5$ cm
(b)	Volume $= \frac{1}{3} A\, h$ $= \frac{1}{3} \times (20 \times 10) \times 7.5$ $= 500 \text{ cm}^3$
(c)	Surface Area $= 20 \times 10 + 2 \times \frac{1}{2} \times 20 \times 9 + 2 \times \frac{1}{2} \times 10 \times 12.5$ $= 200 + 180 + 125$ $= 505 \text{ cm}^2$

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 ○