Carlingford High School

Mathematics
Year 9 5.2 Term 2 Examination
2017

Name: _____

Circle your teacher's name:

Mrs Pennington, Mrs Tomar, Mr Cheng

Time allowed: 55 minutes

- Show all necessary working.
- Answer all questions in the spaces provided.
- Marks may be deducted for careless or untidy work.
- Questions marked with an asterisk * are extension level questions.
- **Complete the examination in blue or black pen.**

Topic	Surface Area & Volume	Algebra	Total
Mark	/27	/30	/57
Extension*	/4	/6	/10
Total	/31	/36	/67

*Question 5

Find the volume of this composite solid, correct to 1 decimal place.

6 cm

5 cm

4 cm   4 cm
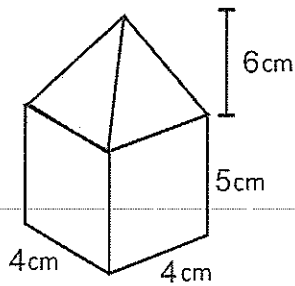
[3 marks]

Question 6

A closed cylindrical oil storage tank has a height of 14 metres and a diameter of 14m and a height of 16m. Calculate the:

14 m

16 m
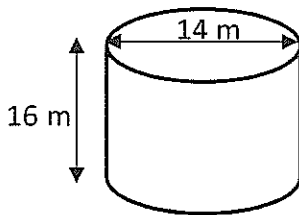
(a) Volume of the tank, correct to 1 decimal place.

[2 marks]

(b) Surface area, correct to 1 decimal place.

[2 marks]

*(c) Capacity, correct to the nearest kilolitre.

[1 mark]

Question 7

Use the following words to fill complete:

[Capacity, Prism, Surface Area, Sector]

(a) _____ is the amount of fluid in a container.

(b) _____ is the region of a circle cut off by two radii.

(c) _____ is a solid with uniform cross-section and ends with straight lines.

(d) _____ is the total area of the outside of a solid shape.

(c) $(4x)^2$

[2 marks]

(d) $21a^2b \div 7a$

[2 marks]

Question 4

Fully simplify:

(a) $\dfrac{15}{x} - \dfrac{12}{x}$

[1 mark]

(b) $\dfrac{x}{3} + \dfrac{x}{2}$

[2 marks]

(c) $\dfrac{3}{2m} \div \dfrac{9m}{8m^2}$

[2 marks]
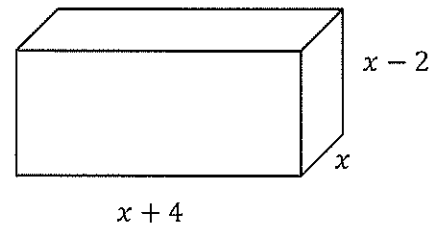
(d) $\dfrac{12m}{5} \times \dfrac{10}{18m^2}$

[2 marks]

*(e) $\dfrac{x+2}{2} + \dfrac{x-1}{4}$

[3 marks]

(f) $\dfrac{4}{5} + \dfrac{7a}{10}$

[2 marks]

*Question 5

Write an algebraic expression for the surface area of this rectangular prism. Expand and fully simplify.

[3 marks]

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Mathematics
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Extension*	/4	/6	/10
Total	/31	/36	/67

Surface Area and Volume

Question 1

Convert:

(a) $300cm = \underline{0.003}$ km

$\curvearrowleft$ $3m$

(b) $1.46km = \underline{1460000}$ mm

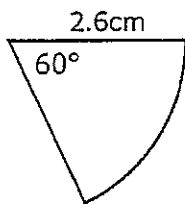(c) $1m^2 = \underline{10000}$ cm^2

$1m = 100$
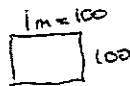
[3 marks]

Question 2

Find the perimeter of the following sector.
[2 marks]

2.6cm 60°

$\frac{60}{360°} = \frac{1}{6}$

$\frac{1}{6} \times (2\pi r) + 2r.$

$= \frac{1}{6} \times 2\pi \times 2.6$

$+ 2 \times 2.6$
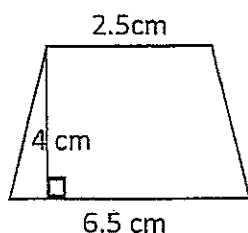
$= 7.9cm$

$P = \frac{2\pi \times 2.6}{6} + r + r$

$= \frac{\pi \times 2.6}{3} + 2.6 \times 2$

$= 7.9cm$

Question 3

Find the area of the following shapes, ~~correct to 2 decimal places~~.

(a)

2.5cm, 4 cm, 6.5 cm

$\frac{1}{2} \times h(a+b)$
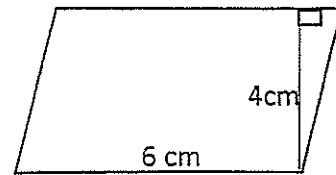
$\frac{1}{2} \times 4(2.5 + 6.5)$

$2 \times (9)$

$= 18cm^2.$

[2 marks]

(b)

4cm, 6 cm

$A = b \times h$

$A = 4 \times 6$
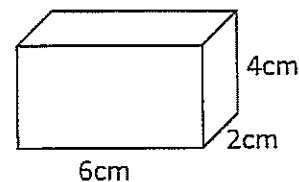
$A = 24cm^2$

[2 marks]

Question 4

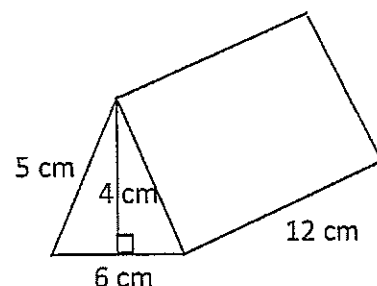Find the surface area of the following solids, correct to 1 decimal place.

(a)

4cm, 2cm, 6cm

$SA = (2 \times 6 \times 4) + (2 \times 6 \times 2)$

$+ (2 \times 4 \times 2)$

$SA = 48 + 24 + 16$

$SA = 88\ cm^2$

[2 marks]

(b)

5 cm, 4cm, 12 cm, 6 cm

Area $\triangle = \frac{1}{2} \times 4 \times 6$

$= 2 \times 6$

$= 12cm^2$

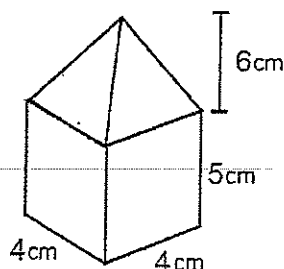$SA = 12 \times 2 + (2 \times 5 \times 12) + (6 \times 12)$

$= 24 + 120 + 72$

$= 216.cm^2$

[3 marks]

*Question 5

Find the volume of this composite solid, correct to 1 decimal place.

6cm

5cm

4cm   4cm

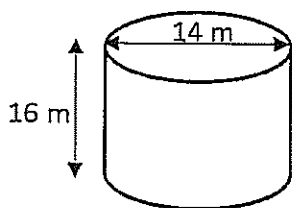$V = 4 \times 4 \times 5 + \frac{1}{3} \times 6 \times 4 \times 4$

$V = 80 + 32$

$V = 112 \ cm^3$

[3 marks]

Question 6

A closed cylindrical oil storage tank has a height diameter of 14 metres and a diameter of 14m and a height of 16m. Calculate the:

14 m

16 m

(a) Volume of the tank, correct to 1 decimal place.

$V = \pi r^2 h$

$V = 3.14 \times 7^2 \times 16$

$V = 2463.0 \ cm^3$

[2 marks]

(b) Surface area, correct to 1 decimal place.

$SA = 2\pi r^2 + 2\pi r h$

$SA = 2 \times \pi \times 7^2 + 2 \times \pi \times 7 \times l$

$\approx 1011.6 \ cm^2$

[2 marks]

*(c) Capacity, correct to the nearest kilolitre.

$1mL = 1cm^2$

$1KL = 1000000$

$1011.6 \div 1000000$

$= 0.0011016 \ KL$ [1 mark]

$= 0.001 \ KL$

Question 7

Use the following words to fill complete:

[Capacity, Prism, Surface Area, Sector]

(a) __Capacity__ is the amount of fluid in a container.
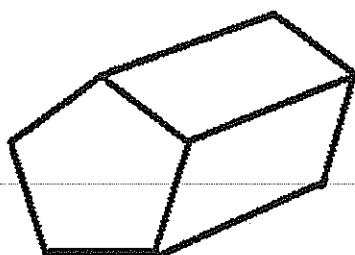
(b) __Sector__ is the region of a circle cut off by two radii.

(c) __Prism__ is a solid with uniform cross-section and ends with straight lines.

(d) __Surface Area__ is the total area of the outside of a solid shape.

Question 8

The volume of the pentagonal prism is $512cm^3$.

Write possible values for the area of the pentagon and the height of the prism.
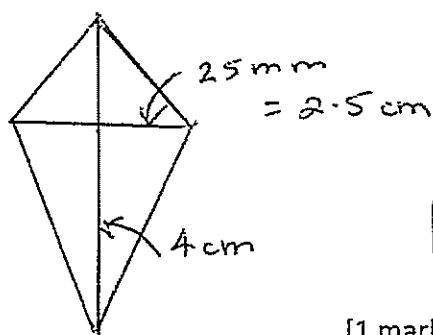
(a) Area of pentagon = ___32___ cm^2

(b) Height of prism = ___16___ cm

[2 marks]

Any combination that works.

Question 9

A child wants to construct a kite which is 4cm long and 25mm wide.

(a) Use a ruler to draw the kite.

25 mm = 2·5 cm

4 cm

[1 mark]

(b) Find the area of the kite.

$Area = \frac{1}{2} d_1 d_2$

$= \frac{1}{2} \times 2·5 \times 4$

$= 5 \; cm^2$

[2 marks]

Algebra

Question 1

Write an algebraic sentence for each statement:

(a) The sum of p and q.

___$p+q$___

(b) X is increased by 6 then doubled.

$(x+6) \times 2$

[2 marks]

Question 2

(a) If $a = -2, b = 3, c = -5$, find the value of $\frac{a \times b}{c}$

$\frac{-2 \times 3}{-5} = \frac{-6}{-5}$

$= \frac{6}{5} = 1\frac{1}{5}$

[2 marks]

(b) If $a = 4$, $b = 3$, $c = 5$, find the value of $\frac{ab}{c-1}$

$\frac{4 \times 3}{5 - 1}$

$= \frac{12}{4}$

$= 3$

[2 marks]

Question 3

Simplify:

(a) $10y - 3x - 6y + 4x$

$10y - 6y - 3x + 4x$

$= 4y + x$

[1 mark]

(b) $-3a \times (-2b)$

$6ab$

[1 mark]

(c) $(4x)^2$ $= 4x \times 4x$

$16x^2$

OR Just (2) for the answer.

[2 marks]

(d) $21a^2b \div 7a$

$3ab$

[2 marks]

Question 4

Fully simplify:

(a) $\dfrac{15}{x} - \dfrac{12}{x}$ $= \dfrac{3}{x}$

[1 mark]

(b) $\dfrac{x}{3} + \dfrac{x}{2}$ $= \dfrac{2x}{6} + \dfrac{3x}{6}$

$= \dfrac{5x}{6}$

[2 marks]

(c) $\dfrac{3}{2m} \div \dfrac{9m}{8m^2}$ $= \dfrac{\cancel{3}^{1}}{\cancel{2m}_{1}} \times \dfrac{\cancel{8m^2}^{4}}{\cancel{9m}_{3}}$

$= \dfrac{4}{3}$

[2 marks]

(d) $\dfrac{\cancel{12m}^{2}}{\cancel{5}} \times \dfrac{\cancel{10}^{2}}{\cancel{18m^2}_{3}} = \dfrac{4\cancel{m}}{\cancel{m^2}}$

$= \dfrac{4}{m}$

[2 marks]

*(e) $\dfrac{x+2}{2} + \dfrac{x-1}{4}$

$\dfrac{2(x+2)}{4} + \dfrac{x-1}{4}$

$\dfrac{2x+4 + x-1}{4} = \dfrac{3x+3}{4}$
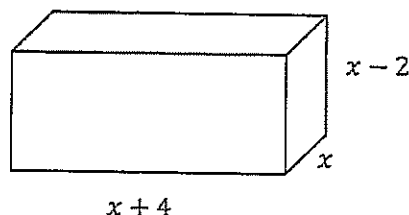
[3 marks]

$= \dfrac{3(x+1)}{4}$

(f) $\dfrac{4}{5} + \dfrac{7a}{10}$

$\dfrac{8}{10} + \dfrac{7a}{10}$

$= \dfrac{8+7a}{10}$

[2 marks]

*Question 5

$x-2$

x

$x+4$

Write an algebraic expression for the surface area of this rectangular prism. Expand and fully simplify.

$SA = 2 \times (x+4) \times x + 2 \times x(x-2)$
$\qquad + 2(x+4)(x-2)$

$= 2x^2 + 8x + 2x^2 - 4x +$
$\qquad + 2(x^2 + 4x - 2x - 8)$

$= 4x^2 + 4x + 2(x^2 + 2x - 8)$

$= 4x^2 + 4x + 2x^2 + 4x - 16$

$= 6x^2 + 8x - 16.$

[3 marks]

Question 6

Expand and fully simplify:

(a) $3(x-4)$

$= 3x - 12$

[1 mark]

(b) $-3(2x-4) =$

$-6x +12$

[2 marks]

(c) $6x - 4(x-2)$

$6x - 4x + 8 = 2x + 8$

[2 marks]

*(d) $5(2a+5) - 6(4-a)$

$10a + 25 - 24 + 6a$

$16a + 1$

[3 marks]

Question 7

Two numbers have a sum of 1 and a product of -12. What are the numbers?

-3 and 4

[1 mark]