

# Carlingford High School



## Mathematics

### Year 9 Term 2 Examination

#### 5.3 Course

2017

Name: \_\_\_\_\_ Class: 5.3 \_\_\_\_\_

Circle your teacher's name:     Mrs Lobejko   Mrs Lego   Mr Jiang

*Time allowed: 55 minutes*

- Board approved calculators may be used.
- Show all necessary working.
- 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	Algebraic Technique	Area, Surface Area and Volume	Linear Relationships	Total
Mark	/19	/14	/30	/63
Extension*	/5	/3	/3	/11
Total	/24	/17	/33	/74

## Part A – Algebraic Techniques (24 marks)

1. Which of the following mathematical statements is *true*? (1 mark)

**A**  $(a-b)^2 = a^2 + 2ab - b^2$

**B**  $(a-b)(a+b) = a^2 - 2ab + b^2$

**C**  $(a+b)(a-b) = a^2 + b^2$

**D**  $(a+b)^2 = a^2 + 2ab + b^2$

2. Simplify each of the following. ( $7 \times 1 = 7$  marks)

**a**  $8 - 3w + 7 - 2w$

**b**  $-6w \times 3w \times 2$

**c**  $27cf \div (-3fc)$

**d**  $9b - 12b^2 + 6b^2 - 16b$

**e**  $\frac{x}{3} + \frac{2x}{5}$

**f**  $\frac{8y}{5} \times \frac{3}{32y^2}$

**g**  $\frac{7}{10pt} \div \frac{28}{5pt}$

**3.** Expand and simplify each of the following. ( $5 \times 1 + 2 \times 3 = 11$  marks)

**a**  $3g(h - 2)$

**b**  $-(y - 7)$

**c**  $(x + 8)^2$

**d**  $(x + 6)(x - 6)$

**e**  $(2x - 9)(2x + 9)$

**f**  $7(n - 3) + n(n - 1)$

**g**  $(4x - 5)(2x + 1)$

**h**  $(n + 1)^2 + 2n - 3$

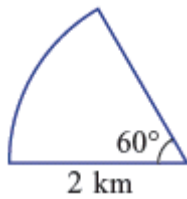
**4.** \*Expand and simplify each algebraic expression. ( $2 + 3 = 5$  marks)

**a**  $\frac{21cf}{q} \div \frac{5}{qf} \div \frac{7c}{a}$

**b**  $(x - 3)(x + 3) - (x + 3)^2 - (x - 3)^2$

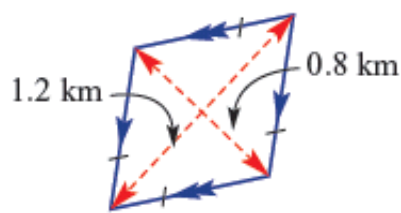
## Part B – Area Surface Area and Volume (17 marks)

1. Find the perimeter of this sector correct to two decimal places. (2 marks)

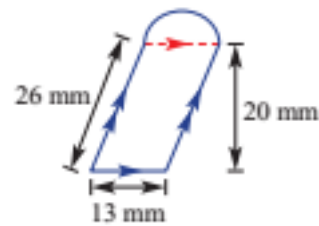


2. Find the area of the figures correct to two decimal places when necessary. (1 + 2 = 3 marks)

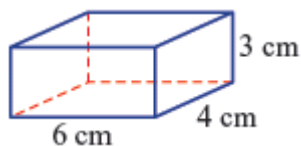
a



b

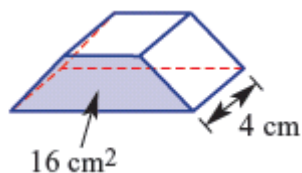


3. Find the surface area of the following solid objects, rounding your answer to two decimal places. (2 marks)

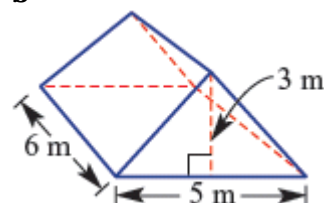


4. Find the volume of each of the following three-dimensional objects, rounding your answer to two decimal places when necessary. (1 + 2 = 3 marks)

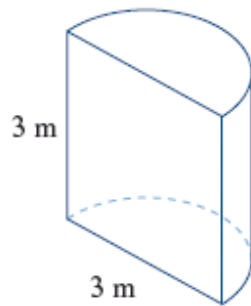
a



b



5. Joel is building a semi-cylindrical water tank that is to be positioned against a wall outside his house to catch rainwater. The water tank is 3 metres tall and 3 metres in diameter. It is to be fully enclosed; that is, have a base, a lid, one side that consists of a flat surface and the other side a curved surface, as shown in the given diagram. (2 + 1 + 3 + 1 = 7 marks)



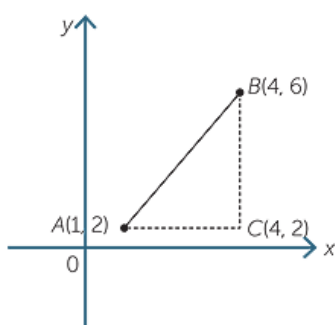
- a Find the volume of the water tank in cubic metres, correct to three decimal places.
- b Hence, find the capacity of the water tank to the nearest litre.  
(Remember 1 L = 1000 cm<sup>3</sup> and 1 m<sup>3</sup> = 1000 L.)
- c \* The water tank is to be made from flat sheets of steel. Find how much steel sheeting is required to build the water tank, correct to two decimal places.
- d Steel sheeting costs \$50 per square metre. How much will the tank cost to build to the nearest dollar?

## Part C – Linear Relationships: (33 Marks)

1. Which of the following lines contains the point  $(3, -1)$ ? (1 mark)

A.  $y = 3x - 8$       B.  $y = -3x - 3$   
C.  $y = 4x - 13$       D.  $y = -4x - 11$

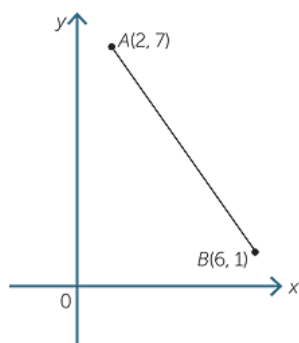
2. Find the slope of the line drawn below



(1 mark)

A.  $-\frac{4}{3}$       B.  $\frac{3}{4}$   
C.  $-\frac{3}{4}$       D.  $\frac{4}{3}$

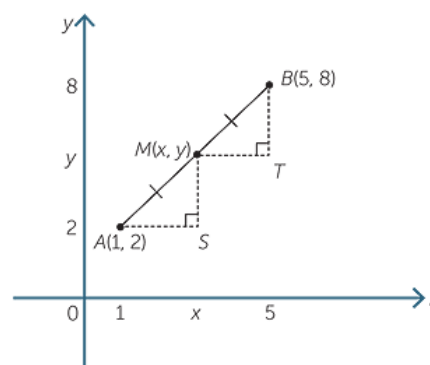
3. Use Pythagoras's theorem to find the length of the interval  $AB$ , correct to one decimal place. (2 marks)



4. Write the equation  $3x - 4y + 3 = 0$  in gradient-intercept form. (2 marks)

5. A circle with centre  $(3, 2)$  passes through the point  $(-5, 7)$ . Find the length of the radius, leaving your answer in exact form. (2 marks)

6. Find the co-ordinates of  $M$ , given that  $M$  is the midpoint of  $AB$ . (2 marks)



7. What are the gradient and y-intercept of the lines below? (4 marks)

a.  $y = 9x + 6$

$m = \underline{\hspace{2cm}}$        $b = \underline{\hspace{2cm}}$

b.  $y = 4 - \frac{1}{3}x$

$m = \underline{\hspace{2cm}}$        $b = \underline{\hspace{2cm}}$

8. The lines  $x = 3$  and  $y = -6$  intersect at  $R$  while the lines  $x = -2$  and  $y = 4$  intersect at  $S$ . Find the gradient of the line  $RS$ . (2 marks)

9. Find the equation of the line that is parallel to  $y = 5x + 6$  and passes through the origin. (1 marks)

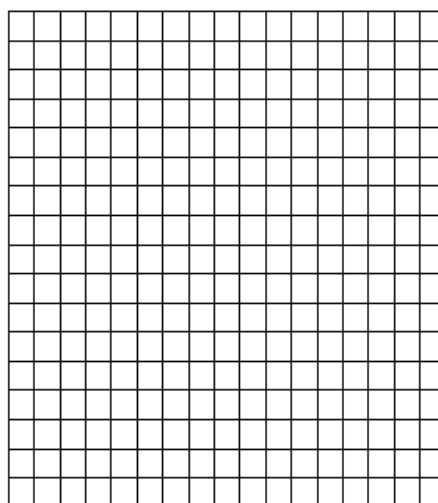
10. A straight line passes through the point  $(-2, 5)$  with a gradient of 2.

- a. Find the equation of the line in the form  $y = mx + b$ . (2 marks)

- b. Express this equation in general form. (1 mark)

- c. Find the  $x$  and  $y$  intercepts of the line. (2 marks)

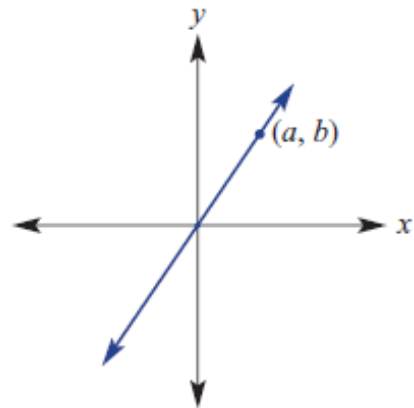
- d. Graph the line on the number plane below, clearly showing the intercepts. (2 marks)



- 11.** Find the equation of the line that passes through the points  $(2, 4)$  and  $(6, 8)$ . Express your answer in general form. (3 marks).

- 13.** \* Find the equation of the following linear relations.

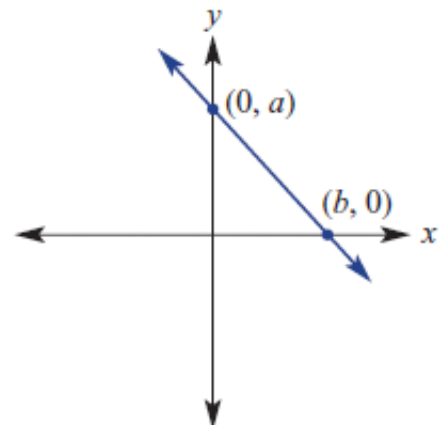
**a.**



(1 mark)

- 12.** \* Find the equation of the line that is perpendicular to  $y = \frac{1}{5}x + 7$  and passes through the point  $(4, -2)$ . (3 marks).

**b.**



(2 marks)

**End of Paper**