Carlingford High School

Mathematics

Year 10 Term 1 Examination

5.2 Course

2019

Name: _____ Class: _____

Circle your teacher's name: Mr Cheng Ms Aung Mr Wilson Mrs Lego

Time allowed: 50 minutes

- Board approved calculators may be used.
- Show all necessary working.
- Marks may be deducted for careless or untidy work.
- Complete the examination in blue or black pen.

Linear Relationships	Surface Area and Volume	Literacy	Total
/21	/21	/9	/51

Linear Relationships (19 marks)

1. A formula for determining the gradient of a line is given below.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

What is the slope of the line that passes through the points $(2, 3)$ and $(5, 2)$?

A. -11 B. -3

C. $-\frac{1}{3}$ D. $-\frac{1}{11}$

2. Show that the point $(1,1)$ lies on the line $y = 3x - 2$. [2]

$y = 3x - 2$

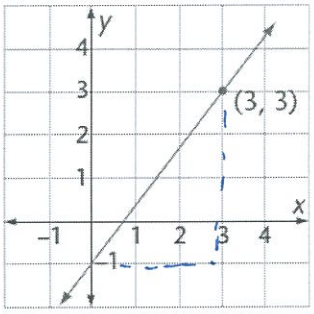
$1 = 3(1) - 2$ ①

$1 = 3 - 2$

$1 = 1$

$\therefore$ $(1,1)$ lies on $y = 3x - 2$ ①

3. Find the equation of the line drawn below. [2]



$m = \frac{4}{3}$ ①

$y - 3 = \frac{4}{3}(x - 3)$

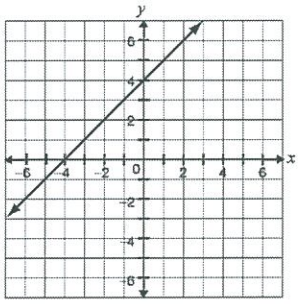
$y - 3 = \frac{4x}{3} - 4$

$y = \frac{4x}{3} - 1$ ①

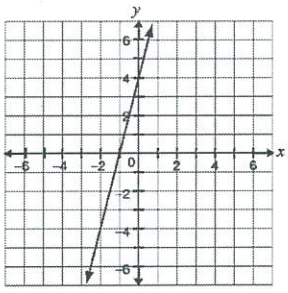
4. Consider the line represented by the equation $y = 3x + 2$. A new line is formed by decreasing the slope and increasing the y-intercept.

Which of the following could be the graph of the new line?

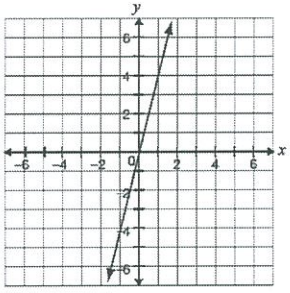
A.



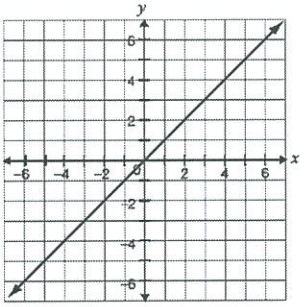
B.



C.



D.



5. Line *RS* has a gradient of $-\frac{3}{5}$. Find the equation of the line parallel to *RS*, that passes through the point $(4, 1)$.
Write your answer in:

a) gradient-intercept form [2]

$m = -\frac{3}{5}$ (1)

$y - 1 = -\frac{3}{5}(x - 4)$

$y - 1 = -\frac{3x}{5} + \frac{12}{5}$

$y = -\frac{3x}{5} + \frac{17}{5}$ (1)

b) general form [2]

$\frac{3x}{5} + y - \frac{17}{5} = 0$ (1)

$3x + 5y - 17 = 0$ (1)

6. Consider the line $y = 3 - \frac{2}{3}x$.

a) What is the gradient? [1]

$m = -\frac{2}{3}$

b) What is the y-intercept? [1]

$(0, 3)$

c) What is the x- intercept? [2]

when $y = 0$] $0 = 3 - \frac{2}{3}x$

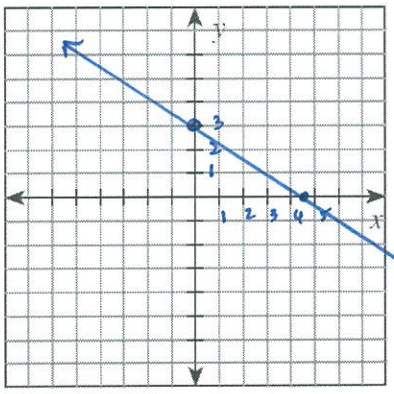
$\frac{2}{3}x = 3$

$x = 4\frac{1}{2}$ (1)

(1)

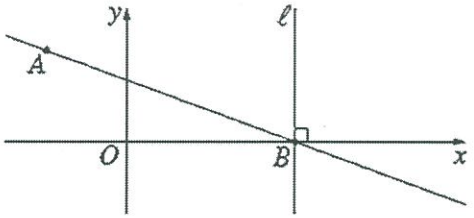
$\therefore (4\frac{1}{2}, 0)$

d) Graph the linear equation $y = 3 - \frac{2}{3}x$, showing clearly the x and y intercepts? [2]



$y = 3 - \frac{2}{3}x$

7. The diagram below shows the points $A(-1, 3)$ and $B(4, 0)$.



a) Find the length of the interval *AB*. [2]
Leave your answer in surd form.

$d = \sqrt{(4 - -1)^2 + (0 - 3)^2}$ (1)

$= \sqrt{5^2 + (-3)^2}$

$= \sqrt{34}$ units (1)

b) Find the midpoint of the line *AB*. [2]

$x = \frac{4 - 1}{2}$ $y = \frac{0 + 3}{2}$

$= \frac{3}{2}$ $= 3/2$

$\therefore (1\frac{1}{2}, 1\frac{1}{2})$ must be in point form

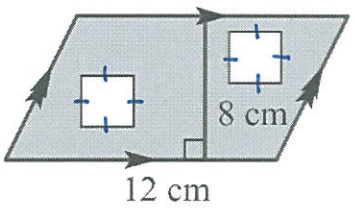
c) The line ℓ is perpendicular to the x-axis and passes through the point B.

Write the equation of the line ℓ [1]

$x = 4$

Surface Area : 21 marks

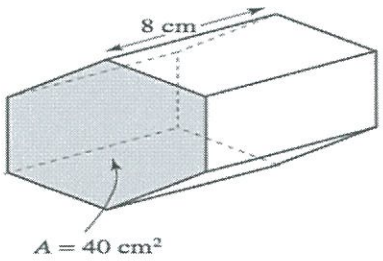
1. Find the shaded area of the following shape. The two identical squares have a side length of 2 cm.



A. 92 cm^2 (B.) 88 cm^2

C. 56 cm^2 D. 40 cm^2

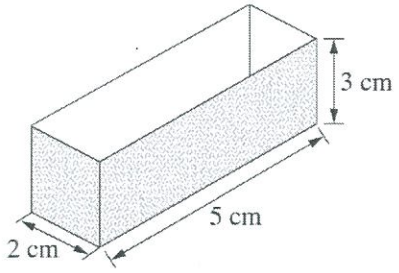
2. Calculate the volume of the following solid.



A. 88 cm^3 B. 93.33 cm^3

C. 1920 cm^3 (D.) 320 cm^3

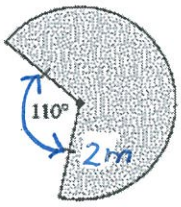
3. What is the surface area of the open box below?



A. 10 cm^2 B. 30 cm^2

(C.) 52 cm^2 D. 62 cm^2

4. Find, correct to one decimal place, the area of the sector below. [2]

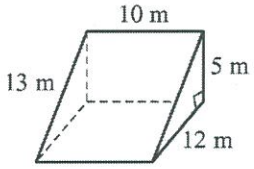


$A = \frac{250}{360} \times \pi \times 2^2$ (1)

either $= 8.726...$ (1)

$= 8.7\ m^2$

5. Find the surface area of the triangular prism below. [3]



A of base $= 12 \times 10$

$= 120$

A of sides $= (\frac{1}{2} \times 5 \times 12) \times 2$

$= 60$

A of back $= 10 \times 5$

$= 50$

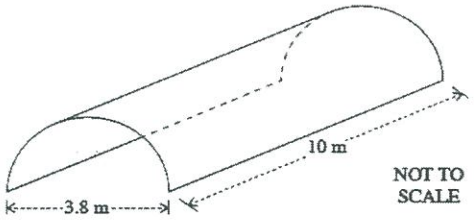
A of front $= 10 \times 13$

$= 130$

(2)

$\therefore$ total $= 360\ m^2$ (1)

6. A shade shelter is to be constructed in the shape of half a cylinder with open ends. The diameter is 3.8 m and the length is 10 m.



The curved roof is to be made of plastic sheeting. What area of plastic sheeting is required, to the nearest m^2? [2]

Curved surface $= \frac{2\pi rh}{2}$

$= \frac{2 \times \pi \times 1.9 \times 10}{2}$

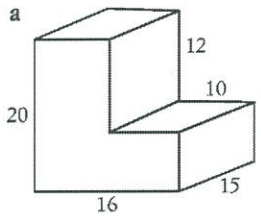
$= \frac{119.380...}{2}$

① 119.380..

either $\begin{cases} = 59.69 \\ = 60\ m^2 \end{cases}$

accept any correct rounding

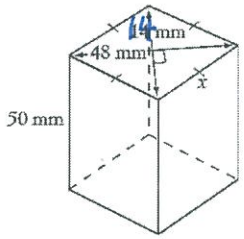
7. Find the surface area of the solid below.



(A.) 1480 $units^2$ B. 1280 $units^2$

C. 1240 $units^2$ D. 1180 $units^2$

8. a) Calculate the area of the cross-section for the solid drawn below [1]



$A = \frac{1}{2} \times 48 \times 14$

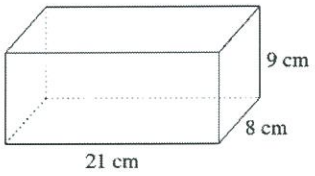
$= 336\ mm^2$

b) Hence, or otherwise, calculate the volume of the solid. [1]

$V = 336 \times 50$

$= 16800\ mm^3$

9. A clay brick is made in the shape of a rectangular prism with dimensions as shown below.

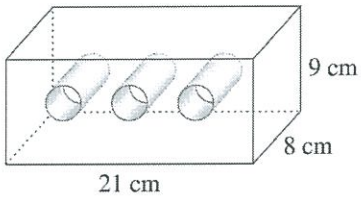


a) Calculate the volume of the clay brick. [1]

$V = 21 \times 8 \times 9$

$= 1512 \text{ cm}^3$

Three identical cylindrical holes are made through the brick as shown. Each hole has a radius of 1.4 cm



b) Calculate the volume of one of the cylindrical hole, to one decimal place. [2]

$V = \pi \times 1.4^2 \times 8$ (1)

$= 49.260\ldots$ } either

$= 49.3 \text{ cm}^3$ } (1)

c) What is the volume of clay remaining in the brick after the holes have been made, to one decimal place? [2]

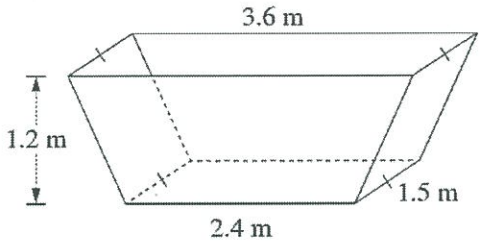
V of 3 holes $= 49.3 \times 3$

$= 147.8 \text{ cm}^3$ (1)

V left $= 1512 - 147.8$

$= 1364.2 \text{ cm}^3$ (1)

10. A skip bin is in the shape of a trapezoidal prism, with dimensions as shown.



a) What is the volume of the skip bin? [2]

$V = \left[\frac{1}{2} \times 1.2 \times (3.6 + 2.4)\right] \times 1.5$ (1)

$= 5.4 \text{ m}^3$

b) Calculate its capacity in kL, correct to one decimal place. [1]

5.4 kL.

Literacy : 9 marks

Use words from the list below to complete the following sentences.

upwards edges parallel downwards
intercept faces positive surface
volume gradient capacity vertices
negative cross-section perpendicular

a) A line sloping upwards has a positive rise and a positive gradient.

b) Parallel lines have the same gradient.

c) The intercept of a line is where the line cuts the axis.

d) The gradient of a line is the slope of the line.

e) The surface area of a solid is the total area of all the faces of the solid

f) A cross-section of a solid is a 'slice' of the solid cut across it, parallel to its end faces.

g) The volume of a solid is the amount of space it occupies

h) The capacity of a container is the amount of fluid (liquid or gas) it holds