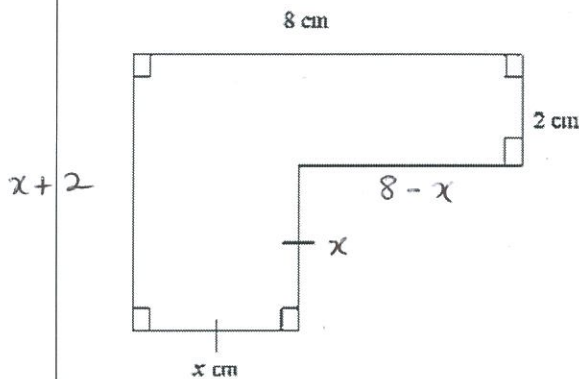


Surface Area and Volume: 23 marks

1. Find the value of x , given that the perimeter of the shape is 26 cm.

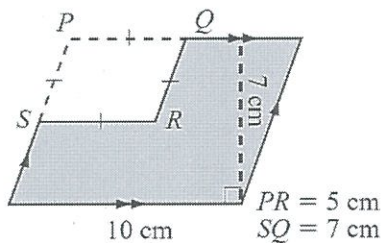


- A. 2 **B. 3**
C. 5 D. 7

$$8+2+8-x+x+x+x+2 = 26$$

$$20+2x = 26$$

2. Find the shaded area of the figure below. [3]



$$A \text{ of rhombus} = \frac{1}{2} \times 5 \times 7$$

$$= 17.5 \text{ cm}^2 \text{ (1)}$$

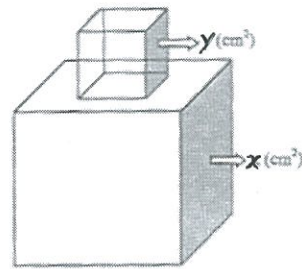
$$A \text{ of parallelogram} = 10 \times 7$$

$$= 70 \text{ cm}^2 \text{ (1)}$$

$$\therefore \text{shaded area} = 70 - 17.5$$

$$= 52.5 \text{ cm}^2 \text{ (1)}$$

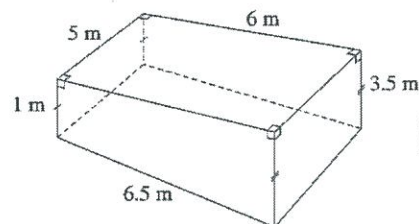
3. A smaller cube is placed on top of a larger cube as shown in the figure below.



Given that the areas of one face of the large cube and the small cube are equal to $x \text{ cm}^2$ and $y \text{ cm}^2$ respectively, find the surface area of the solid in square centimetres.

- A. $5x + 5y$ **B. $6x + 4y$**
C. $6x + 5y$ D. $5x + 6y$

4. A swimming pool has a length of 6 m and a width of 5 m. The depth of the pool is 1 m at one end and 3.5 m at the other end, as shown in the diagram.

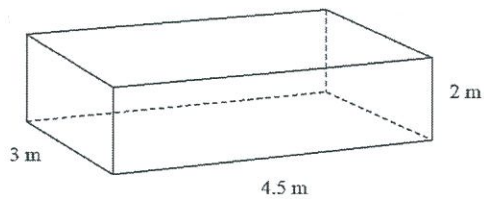


What is the volume of this pool? [2]

$$V = \left(\frac{1}{2} \times 6 \times (1 + 3.5) \right) \times 5$$

$$= 67.5 \text{ m}^3 \text{ (1)}$$

5. The four walls of a rectangular room, represented below, is to be painted.



- a) Find the total area to be painted. [1]

$$A = (4.5 \times 2) \times 2 + (3 \times 2 \times 2) \\ = 30 \text{ m}^2$$

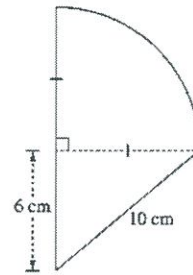
- b) If a can of paint covers 7 m^2 , find the number of cans of paint needed to paint the room with two coats. [2]

$$30 \times 2 = 60 \text{ m}^2$$

$$60 \div 7 = 8.57... \text{ ①}$$

$\therefore 9$ cans needed.

6. A shape consisting of a quadrant and a right-angled triangle is shown below.

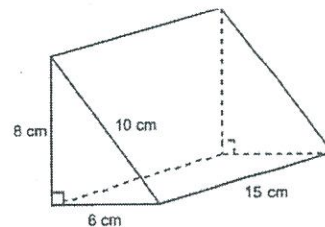


- What is the perimeter of this shape, correct to one decimal place? [2]

$$\begin{aligned} \text{radius} &= \sqrt{10^2 - 6^2} \\ &= 8 \\ \text{arc} &= \frac{2 \times \pi \times 8}{4} \\ &= 4\pi \end{aligned} \quad \left. \vphantom{\begin{aligned} \text{radius} &= \sqrt{10^2 - 6^2} \\ &= 8 \\ \text{arc} &= \frac{2 \times \pi \times 8}{4} \\ &= 4\pi \end{aligned}} \right\} \text{either ①}$$

$$\therefore P = 10 + 6 + 8 + 4\pi \\ = 36.6 \text{ cm} \text{ ①}$$

7. Find the length of the side of a cube which has the same volume as the triangular prism shown below. Answer correct to one decimal places [2]



$$V = \left(\frac{1}{2} \times 8 \times 6 \right) \times 15 \\ = 360 \text{ cm}^3 \text{ ①}$$

$$\therefore s^3 = 360$$

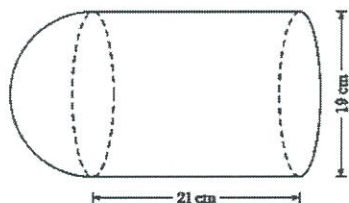
$$s = \sqrt[3]{360}$$

$$s = 7.11...$$

$$s = 7.1 \text{ cm}$$

① either

8. The solid shown below is made of a closed cylinder and a hemisphere (half of a sphere).



What is the total surface area of the solid, if the surface area of the hemisphere is 567cm^2 .
Answer correct to one decimal place. [3]

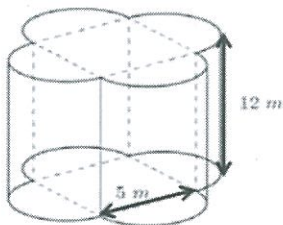
$$\begin{aligned}\text{cylinder} &= 2\pi rh + \pi r^2 \\ &= (2 \times \pi \times \frac{19}{2} \times 21) + (\pi \times \frac{19^2}{2})\end{aligned}$$

$$\begin{aligned}\text{total SA} &= 1537.024 + 567 \\ &= 2104.024\end{aligned}$$

$$\textcircled{1} = 2104.0\text{ cm}^2$$

rounding
Question

9. The base of a water tank is in the shape of a square with semi-circles on each side of the square. The side length of the square is 5 m and the height of the water tank is 12 m.



- a) Find the area of the base of the water tank.
Answer correct to one decimal places. [2]

$$\begin{aligned}A &= 5^2 + (2 \times \pi \times 2.5^2) \\ &= 64.269 \\ &= 64.3\text{ m}^2\end{aligned}$$

} either

- b) What is the capacity of the tank, to the nearest litre? [2]

$$\begin{aligned}V &= 64.3 \times 12 \\ &= 771.6\text{ m}^3 \textcircled{1} \\ &= 771600\text{ L} \textcircled{1}\end{aligned}$$

- c) During a thunderstorm 0.035m of rain falls onto a roof with an area of 630 m^2 and is then collected in the water tank.

By how much does the water level in the tank rise, correct to one decimal place? [2]

$$\begin{aligned}V &= 0.035 \times 630 \\ &= 22.05\text{ m}^3 \textcircled{1}\end{aligned}$$

$$\begin{aligned}h &= \frac{V}{A} \\ &= \frac{22.05}{64.3} \\ &= 0.3429\ldots \\ &= 0.3\text{ m}\end{aligned}$$

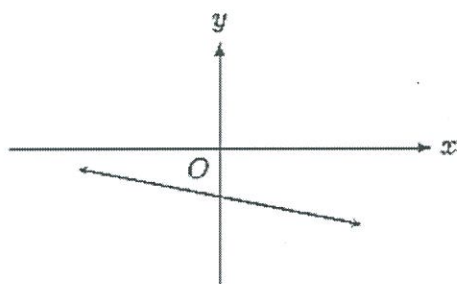
} either

Coordinate Geometry : 28 marks

1. A point on the number plane is 4 units to the left and 2 units up from the origin. What are the co-ordinates of this point?

- A. $(-2, 4)$
- B. $(2, -4)$
- C. $(4, -2)$
- ☒ D. $(-4, 2)$

2. The graph shows a line which has an equation of the form $y = mx + b$.



Which of the following statements is true?

- A. m is positive and b is negative
- B. m is negative and b is positive
- ☒ C. m and b are both negative
- D. m and b are both positive

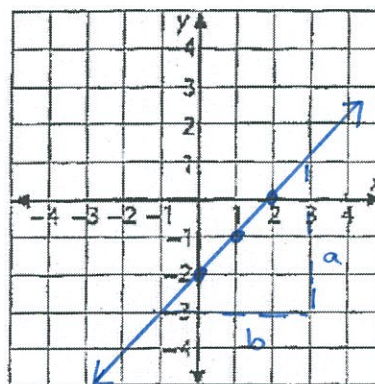
3. Which of the following statements about the line $y = 4$ is not true?

- A. The gradient is zero.
- B. The y-intercept is at $(0, 4)$.
- C. The graph is parallel to the x-axis.
- ☒ D. The point $(4, 2)$ lies on this graph.

4. a) Complete the table of values below for the equation $y = x - 2$. [2]

x	0	1	2
y	-2	-1	0

- b) Graph the equation on the number plane below. [2]



① line
① labels, use of ruler.

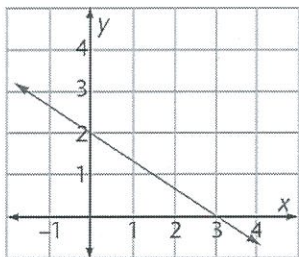
- c) The points $P(-1, -3)$ and $Q(3, 1)$ lie on the line $y = x - 2$.

Using **Pythagoras' theorem**, find the distance from P to Q. Leave your answer in exact form. [2]

$$\begin{aligned} PQ^2 &= 4^2 + 4^2 \\ PQ^2 &= 32 \\ PQ &= \sqrt{32} \rightarrow \textcircled{1} \end{aligned}$$

0 marks for using distance formula.

6. Consider the graph below:



a) What is the gradient of the line? [1]

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

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

(0, 2)
must be in point form

c) What is the equation of the line?
Answer in gradient- intercept form. [1]

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

0 mark if giving general form as well.

7. Find the gradient and y- intercept of the line with equation:

a) $y = 3x - 9$ [2]

$$m = 3$$

$$b = -9$$

b) $y = \frac{2x+3}{4}$ [2]

$$m = \frac{1}{2}$$

$$b = \frac{3}{4}$$

8. A line passes through the points $(-1, 3)$ and $(4, 5)$.

a) Calculate the distance between the two points, correct to one decimal place. [2]

$$\begin{aligned} d &= \sqrt{(4 - (-1))^2 + (5 - 3)^2} \quad \text{--- ①} \\ &= \sqrt{5^2 + 2^2} \\ &= \sqrt{29} \\ &= 5.4 \quad \text{--- ①} \end{aligned}$$

b) Find the slope of the line. [2]

$$\begin{aligned} m &= \frac{5 - 3}{4 - (-1)} \quad \text{①} \\ &= \frac{2}{5} \quad \text{①} \end{aligned}$$

9. $M(7, 2)$ is the midpoint of the line segment AB . If the coordinates of A are $(1, -4)$, find the coordinates of B . [2]

$$x = \frac{x_1 + x_2}{2}$$

$$y = \frac{y_1 + y_2}{2}$$

$$7 = \frac{1 + x_2}{2}$$

$$2 = \frac{-4 + y_2}{2}$$

$$14 = 1 + x_2$$

$$4 = -4 + y_2$$

$$13 = x_2$$

$$8 = y_2$$

$$\therefore (13, 8)$$

① ①

must be in pt form

10. Consider the line $y = 3 - 2x$.

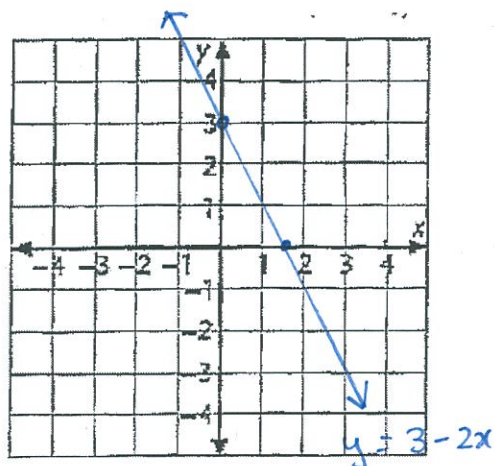
a) Find the x -intercept of the line. [1]

$$\begin{aligned} \text{When } y=0 : \quad 0 &= 3 - 2x \\ 2x &= 3 \\ x &= \frac{3}{2} \\ \text{or } \left(\frac{3}{2}, 0\right) \end{aligned}$$

b) Find the y -intercept of the line. [1]

$$\begin{aligned} \text{When } x=0 \quad y &= 3 - 2(0) \\ y &= 3 \\ \text{or } (0, 3) \end{aligned}$$

c) Graph the line $y = 3 - 2x$ on the number plane below. Mark clearly the intercepts on your graph. [2]



① line

① showing x/y intercepts.

11. Does the point $(0, 2)$ lie on the line $y = \frac{2x+3}{4}$? Justify your answer with appropriate working. [2]

$$2 \neq \frac{2(0)+3}{4}$$

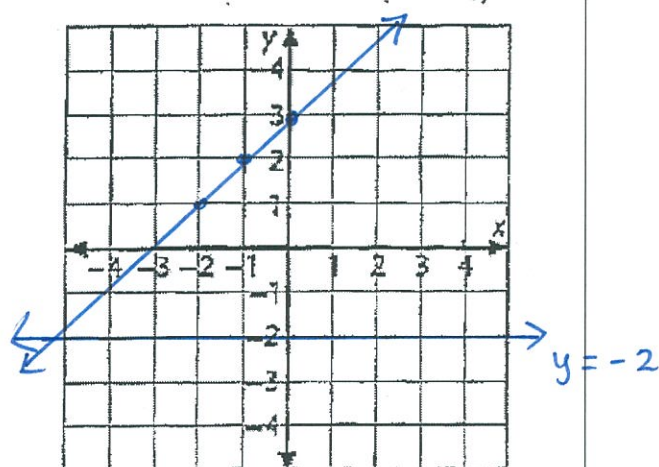
$$2 \neq \frac{3}{4} \quad (1)$$

LHS \neq RHS

$\therefore (0, 2)$ does not lie on $y = \frac{2x+3}{4}$.

① must have conclusion.

12. Solve the equation $x + 3 = -2$ graphically. Show full working. [2]



$$y = x + 3 \quad , \quad y = -2$$

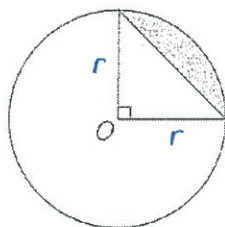
$$\therefore x = -5$$

must have graphing of both lines and showing intersection.

* 0 marks for $x = -5$ with NO graphing

Problem Solving: 2 marks

1. The shaded segment in the circle below, centre O, has an area of 1 cm^2 .



Find the radius of the circle.

$$A \text{ of quadrant} = \frac{\pi \times r^2}{4}$$

$$A \text{ of triangle} = \frac{1}{2} \times r \times r \\ = \frac{1}{2} r^2$$

$$1 = \frac{\pi r^2}{4} - \frac{r^2}{2}$$

$$1 = \frac{\pi r^2 - 2r^2}{4}$$

$$4 = (\pi - 2)r^2$$

$$\frac{4}{\pi - 2} = r^2$$

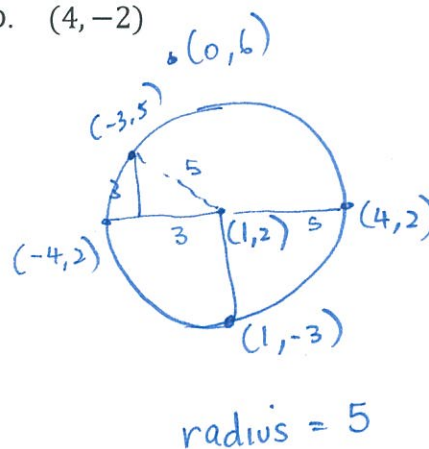
$$\sqrt{\frac{4}{\pi - 2}} = r$$

$$\frac{2}{\sqrt{\pi - 2}} = r$$

either

2. A circle has a centre of $(1, 2)$ and passes through $(1, -3)$. The circle passes through all of the following points **EXCEPT**:

- A. $(-4, 2)$
- B. $(-3, 5)$
- C. $(0, 6)$
- D. $(4, -2)$



Ans: $(0, 6)$.

THE END