

NAME:	CLASS:	INDEX NO:
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QUEENSWAY SECONDARY SCHOOL  
END-OF-YEAR EXAMINATION 2024  
SECONDARY 2

**E**

## MATHEMATICS

Paper 1

**4052/01**

**26 September 2024**

Candidates answer on Question Paper.

**1 hour**

### READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction tape.

Answer **all** the questions.

The number of marks is given in brackets [ ] at the end of each question or part question.

If working is needed for any question it must be shown with the answer.

Omission of essential working will result in loss of marks.

The total of the marks for this paper is 40.

The use of an approved scientific calculator is expected, where appropriate.

If the degree of accuracy is not specified in the question and if the answer is not exact, give the answers correct to three significant figures. Give answers in degrees to one decimal place.

For  $\pi$ , use either your calculator value or 3.142.

[Turn over

Answer **all** the questions.

- 1 (a) Calculate  $\sqrt{\frac{5.6^3}{0.9}} + 10.01$ .

Write down the first 5 digits on your calculator display.

Answer ..... [1]

- (b) Write your answer to **part (a)** correct to 4 significant figures.

Answer ..... [1]

- 2 (a) Solve the inequality  $-\frac{3}{8}y - 1 \leq \frac{1}{6}$ .

Answer ..... [2]

- (b) Hence, state the smallest integer that satisfies the inequality.

Answer ..... [1]

- 3 (a) Expand and simplify  $(10p+3)(2p-1)$ .

Answer ..... [2]

- (b) Hence, factorise  $20(k-1)^2 - 4(k-1) - 3$  completely.

Answer ..... [2]

4

4 Solve the following pair of simultaneous equations.

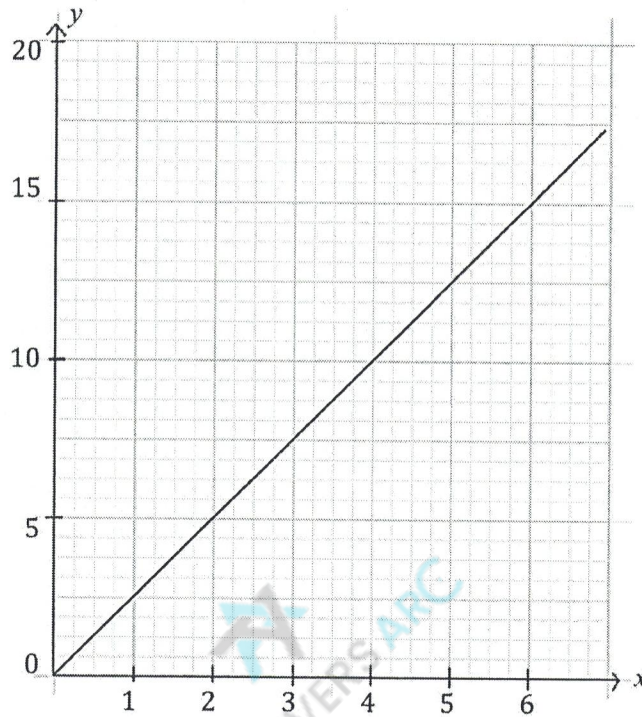
$$5x - 3y = 2$$

$$3x + 4y = 7$$

Answer  $x = \dots\dots\dots$

$y = \dots\dots\dots$  [3]

- 5 The graph of a straight line is drawn on the grid below. Point  $(k, 12.5)$  lies on the line.



- (a) State the value of  $k$ .

Answer  $k = \dots\dots\dots$  [1]

- (b) Find the equation of the line.

Answer  $\dots\dots\dots$  [2]

- (c) Explain why  $x$  and  $y$  are in direct proportion.

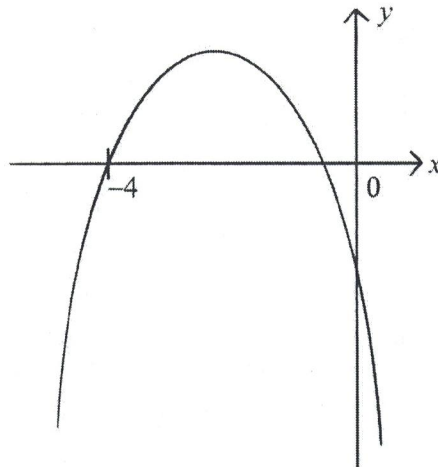
Answer

.....

.....

..... [1]

- 6 The diagram shows the curve  $y = -x^2 - 5x - 4$ .



- (a) Find the y-intercept.

Answer y - intercept = ..... [1]

- (b) The equation of the line of symmetry is  $x = -2.5$ . Find the other x - intercept.

Answer x - intercept = ..... [1]

7 (a) Simplify the following.

(i)  $\frac{16q^3r^4}{18q^2r^6}$

Answer ..... [1]

(ii)  $\frac{p-2q}{8} \div \frac{4p-8q}{24}$

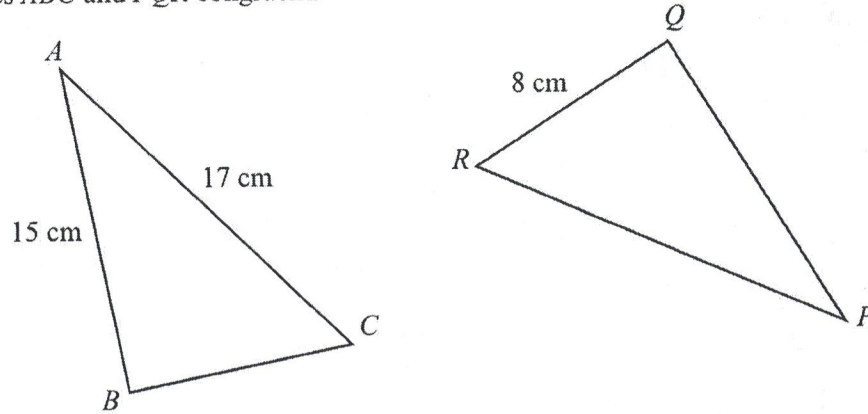
Answer ..... [2]

(b) Make  $z$  the subject of the formula  $xz - x = z + 1$ .

Answer ..... [2]



- 8 Triangles  $ABC$  and  $PQR$  congruent.



- (a) Find the length of  $RP$ .

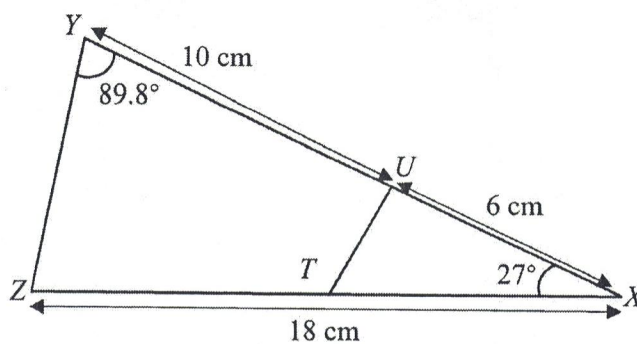
Answer ..... cm [1]

- (b) Show that triangle  $ABC$  is a right-angled triangle.

Answer



- (c) Triangle  $XYZ$  is similar to triangle  $XTU$ .  
 $YU = 10$  cm,  $UX = 6$  cm and  $ZX = 18$  cm.  
 Angle  $XYZ = 89.8^\circ$  and angle  $ZXU = 27^\circ$ .



Find

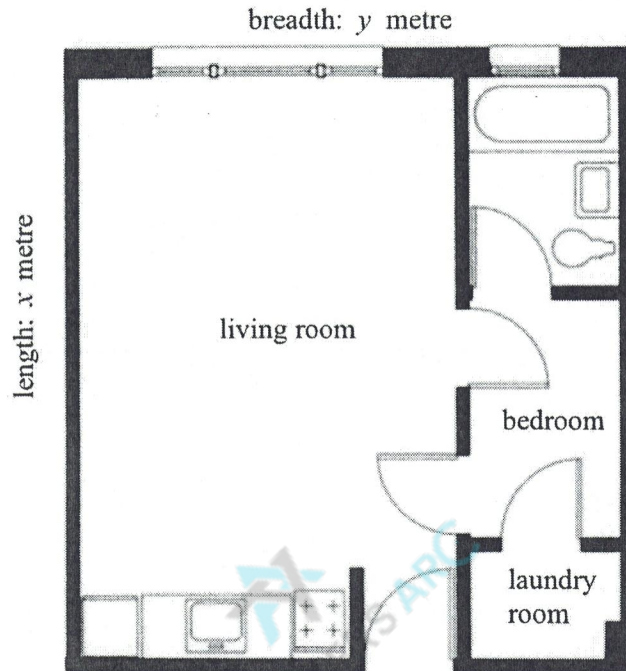
- (i) angle  $UTX$ ,

Answer .....  $^\circ$  [1]

- (ii) length  $XT$ .

Answer ..... cm [2]

- 9 The figure shows the floorplan of an apartment drawn to a scale of 1 : 150. The apartment has an actual length of  $x$  metre and an actual breadth of  $y$  metre.



- (a) Find the values of  
(i)  $x$ ,

Answer  $x = \dots\dots\dots$  [1]

- (ii)  $y$ .

Answer  $y = \dots\dots\dots$  [1]

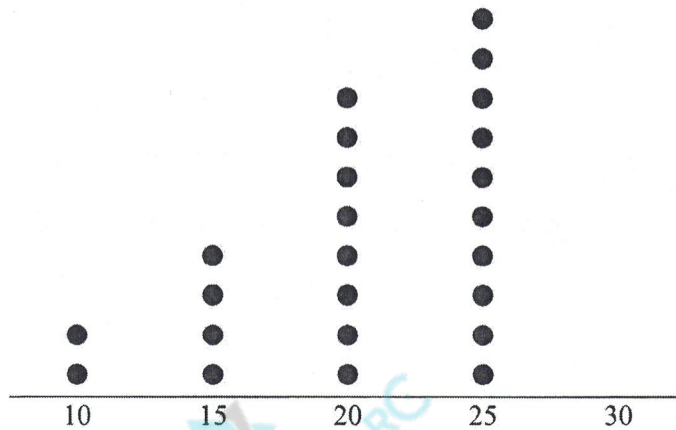
- (b) A square floor rug has an area of  $1.44 \text{ m}^2$ . Determine if the floor rug can be placed in the living room. Show your working.

Answer

[3]

- 10 Jane constructed a dot diagram on a piece of paper to represent the time taken, in minutes, for a group of students to complete their lunch. However, she accidentally left out the dots representing the students who took 30 minutes to complete their lunch.

A student is selected at random. The probability that the selected student took 30 minutes to finish the lunch is 0.2, complete the dot diagram below. Show your working clearly.





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QUEENSWAY SECONDARY SCHOOL  
END-OF-YEAR EXAMINATION 2024  
SECONDARY 2

E

## MATHEMATICS

Paper 2

4052/02

1 October 2024

1 hour 30 minutes

Candidates answer on the Question Paper.

### READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

Answer **all** the questions.

The number of marks is given in brackets [ ] at the end of each question or part question.

If working is needed for any question, it must be shown with the answer.

Omission of essential working will result in loss of marks.

The total of the marks for this paper is 60.

The use of an approved scientific calculator is expected, where appropriate.

If the degree of accuracy is not specified in the question and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For  $\pi$ , use either your calculator value or 3.142.

[Turn over



**Section A (28 marks)**

- 1 At an electronics store, customers who pay a \$20 membership fee can enjoy a 20% discount on all items. Jane wants to buy a laptop priced at \$1000. The salesperson recommends that she become a member.

How much less does she have to pay in total if she joins as a member and buys the laptop?

Answer \$ ..... [2]

- 2 Factorise each of the following expressions completely

(a)  $2y^2 - 18$ ,

Answer ..... [2]

(b)  $4px + 8qx - py - 2qy$ .

Answer ..... [2]

- 3 (a) An outdoor camp is planned for a group of 30 students and food is bought to last for 8 days.

Given that all students consume the same amount of food every day, find the number of days the food can last if 6 students are absent from the camp.

Answer ..... days [2]

- (b)  $P$  is inversely proportional to the square root of  $Q$ . If  $Q$  is increased by 300%, find the percentage decrease in  $P$ .

Answer ..... % [2]

- 4 (a) Solve  $x(x-5) = 6$ .

Answer  $x =$  ..... or ..... [2]

- (b) Explain why  $y^2 + 81 = 0$  has no real solutions. Show your working clearly.

Answer .....

..... [2]



5 Express the following as a single fraction in its simplest form

(a)  $\frac{4}{x-2} - \frac{3-x}{2-x},$

Answer ..... [2]

(b)  $\frac{1}{3x^2-2x-5} + \frac{1}{x+1}.$

Answer ..... [3]

6  $p$  is a positive integer.

- (a) Explain why  $2p+4$  is an even number.

Answer .....  
.....  
.....[1]

- (b) Expand and simplify  $(2p+4)^2$ .

Answer ..... [1]

- (c) Write down an expression for the next even number which is greater than  $2p+4$ .

Answer ..... [1]

- (d) Find, in its simplest form, an expression for the sum of squares of these two even numbers.

Answer ..... [2]

- 7 The number of books read by a group of students in one month is recorded.

No. of books read	0	1	2	3	4	5
No. of students	3	7	$x$	6	5	3

- (a) If the mean number of books read is  $2\frac{3}{7}$ , find the value of  $x$ .

Answer  $x = \dots\dots\dots$  [2]

- (b) If the median number of books read is 3, find the greatest possible value of  $x$ .

Answer  $x = \dots\dots\dots$  [1]

- (c) If the modal number of books read is 1, find the greatest possible value of  $x$ .

Answer  $x = \dots\dots\dots$  [1]

## Section B (32 mark)

- 8 (a) A card is drawn at random from a box containing 30 cards numbered 1 to 30.

Find the probability of drawing

- (i) a '4',

Answer ..... [1]

- (ii) a prime number,

Answer ..... [1]

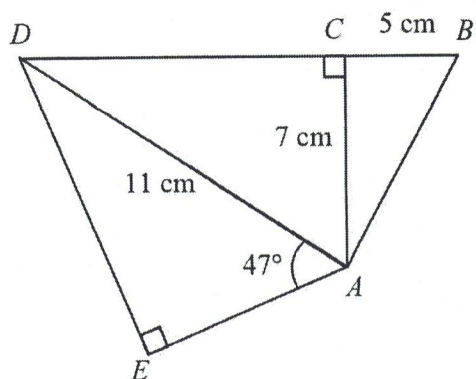
- (iii) an even number.

Answer ..... [1]

- (b) There are 18 identical balls in a bag. 8 of the balls are red and the rest are yellow. After  $x$  yellow balls are removed from the bag, the probability of getting a yellow ball is  $\frac{3}{7}$ . Find the value of  $x$ .

Answer  $x =$  ..... [2]

- 9 In the diagram,  $BCD$  is a straight line.  
 $BC = 5$  cm,  $AD = 11$  cm and  $AC = 7$  cm.  
 Angle  $DCA = \text{angle } DEA = 90^\circ$  and angle  $EAD = 47^\circ$ .



Calculate

- (a)  $CD$ ,

Answer ..... cm [2]

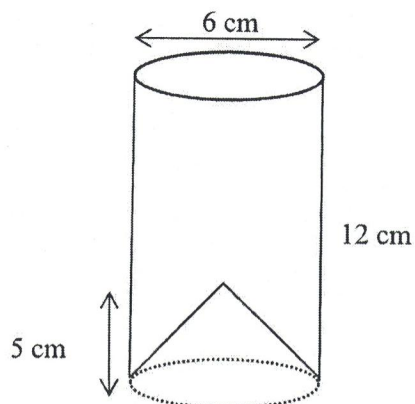
- (b) angle  $CBA$ ,

Answer .....  $^\circ$  [2]

- (c)  $DE$ .

Answer ..... cm [2]

- 10 The diagram shows a solid ornament formed by removing a cone from a solid cylinder. The cylinder has a diameter of 6 cm and a height of 12 cm. The cone has a height of 5 cm.



- (a) Find the volume of the ornament.

Answer .....  $\text{cm}^3$  [2]

- (b) Show that the slant height of the cone is 5.83 cm when it is rounded to 3 significant figures.

Answer

[1]

- (c) Jane painted the exterior of the ornament. It is given that it will cost \$8 to paint an area of  $10 \text{ cm}^2$ . Find the total cost of the paint needed for the ornament.

Answer \$ ..... [4]

- 11 A bird takes off from the top of a tree. Its position during its flight is represented by the equation  $y = 7 + 6x - x^2$ , where  $y$  is the height of the bird above ground level, in metres, and  $x$  is its horizontal distance from the tree, in metres.

The table below gives some values of  $x$  and the corresponding values of  $y$ .

$x$ (m)	0	1	2	4	5	6
$y$ (m)	7	12	15	15	12	$p$

- (a) Find the value of  $p$ .

Answer  $p = \dots\dots\dots$  [1]

- (b) Using a scale of 2 cm to represent 1 unit on the  $x$ -axis and 2 cm to represent 2 units on the  $y$ -axis, draw the graph of  $y = 7 + 6x - x^2$  for  $0 \leq x \leq 6$  on the grid in the next page. [3]

- (c) Find the horizontal distance(s) from the tree if the bird is at a height of 13 m.

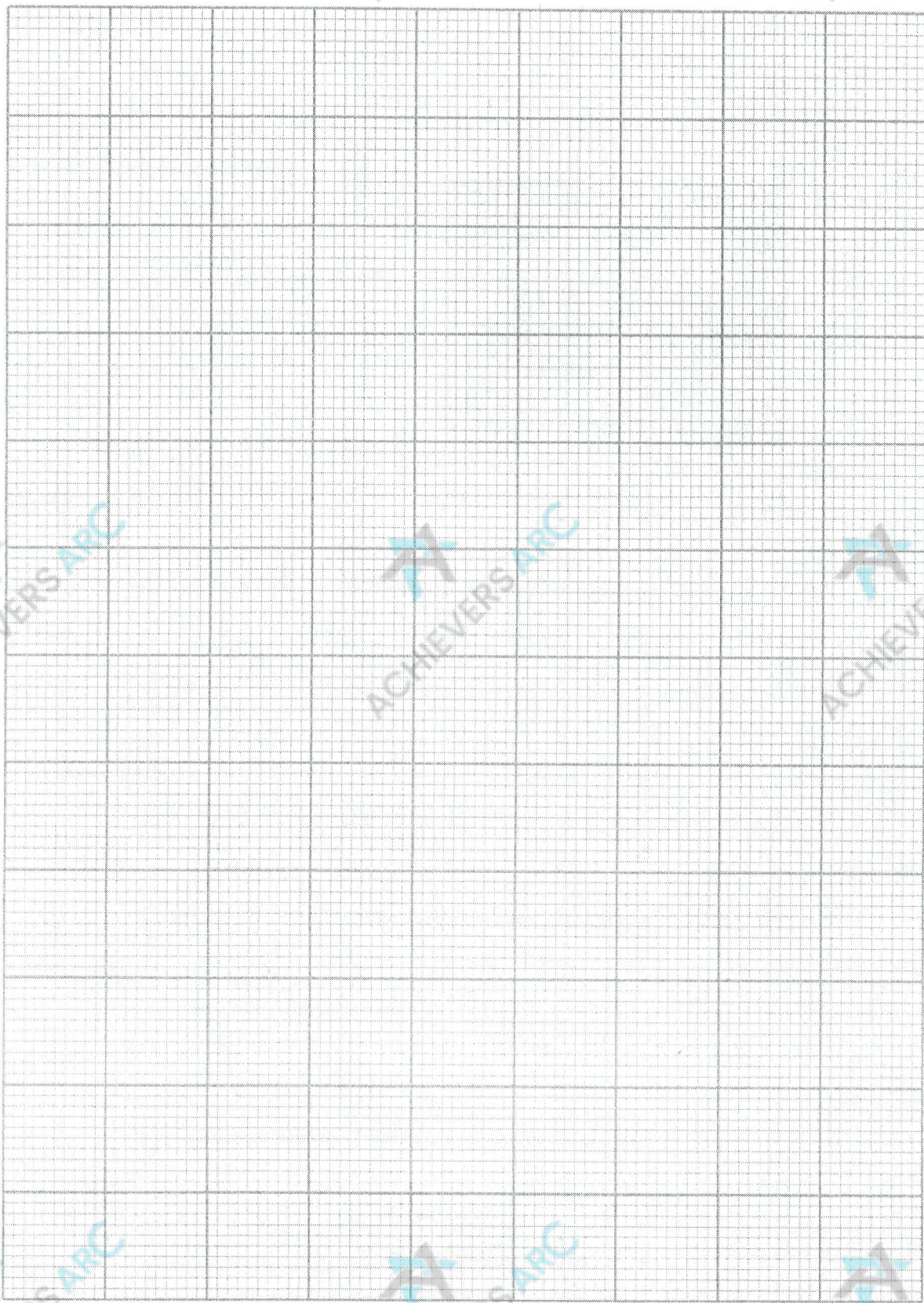
Answer  $\dots\dots\dots$  m [1]

- (d) Alison claims that the bird managed to fly 20 metres above ground level during its path. Using the graph drawn, determine and explain if her claim is correct.

Answer  $\dots\dots\dots$

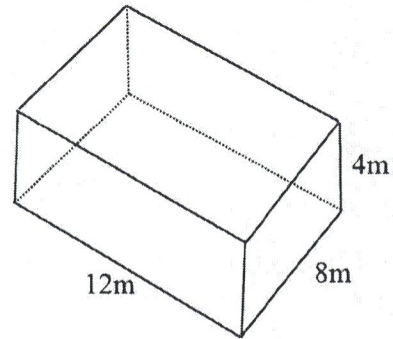
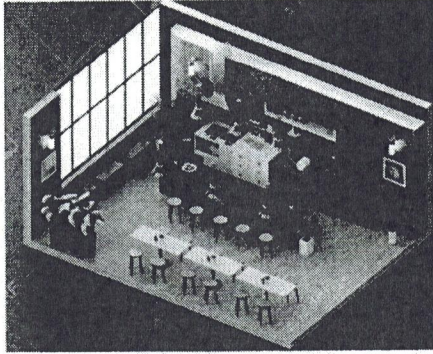
$\dots\dots\dots$  [1]







- 12 James bought a shop to open a cafe.  
The cafe can be modelled as a cuboid with length 12 m, breadth 8 m and height 4 m.



- (a) A tile store sells ceramic floor tiles at \$15 per square metre. James wants to buy tiles for his cafe.

Find the total cost of purchasing the tiles for the entire floor area. Assume that there is no wastage in cutting tiles.

Answer \$. . . . . [2]

- (b) James has a budget of \$2000 for purchasing tables. Each table cost \$25.

By forming an inequality, find the maximum number of tables he can purchase.

Answer ..... tables [2]

- (c) James decided to buy an air purifier to improve the air quality of his cafe.

Air Changes per Hour (ACH) is used to measure air quality. It measures the number of times the air in a room gets replaced within one hour. ACH is dependent on the volume of air that the air purifier delivers and is measured in cubic feet per minute (CFM).

ACH is calculated based on the formula as shown below

$$\text{ACH} = \frac{\text{CFM} \times 60}{\text{Volume of room (m}^3\text{)} \times 35.314}$$

James is deciding between two brands of air purifiers.

He would like to purchase an air purifier that has the lowest cost and meets the recommended ACH rating.

The recommended ACH rating for his cafe is between 5 ACH to 6 ACH.

The table below shows the CFM and prices of the air purifiers.

Brand	CFM	Price
Purifier A	1300	\$1200
Purifier B	1350	\$1246

Determine which air purifier James should buy. Show your working clearly.

*Answer*

