

Question 1**(20 marks)**

- (a) Change 5000 g to kilograms.

$$5000 / 1000 = 5 \text{ (kg)}$$

- (b) Change 2.7 m to centimetres.

$$(2.7)100 = 270 \text{ (cm)}$$

- (c) Change 8000 cm³ to litres.

$$8000 / 1000 = 8 \text{ (litres)}$$

- (d) Change 4 m² to cm².

$$(4)(100)(100) = 40\,000 \text{ (cm}^2\text{)}$$

Question 2**(20 marks)**

Three students completed a test but got their results in different ways. The teacher told Karen that she got 0.7 of the questions correct. John was told he got 80% of the questions correct. David was told he got $\frac{3}{4}$ of the questions correct.

- (a) Which student got the best result? Give a reason for your answer.

John

$$0.7 = 70\% \quad \frac{3}{4} = 75\%$$

$$\text{Both} < 80\%$$

- (b) There were twenty questions on the test. How many questions each did Karen, John and David answer correctly?

$$0.7 \times 20 = 14$$

$$80\% \times 20 = 16$$

$$\frac{3}{4} \times 20 = 15$$

- (c) Find the mean number of correct answers.

$$\frac{14 + 16 + 15}{3} = \frac{45}{3} = 15$$

Question 3

(20 marks)

Barra is comparing the cost of electricity supplied by two companies.
He used 510 units last month.

(a) Fill in the following tables:



<i>GRIDPOWER</i>	€
Standing charge	9.47
18.5 cent per unit	94.35
Sub-total	103.82
13.5% VAT	14.02
Total	117.84

<i>ELECTROLINE</i>	€
No standing charge	
First 50 units free Then 25 cent per unit	115
Sub-total	115
13.5% VAT	15.53
Total	130.53

$$510 \times 18.5 = 94.35$$

$$510 - 50 = 460 \times 0.25 = 115$$

(b) What is the difference between the bills of the two companies?

$$130.53 - 117.84 = \text{€}12.69$$

(c) Barra contacted the more expensive company. The company offered him a 10% discount off his total bill.

In your opinion, from which company should Barra get his electricity?
Give a reason for your answer.

Electroline

because its cheaper

$$130.53 - 10\% = 117.48$$

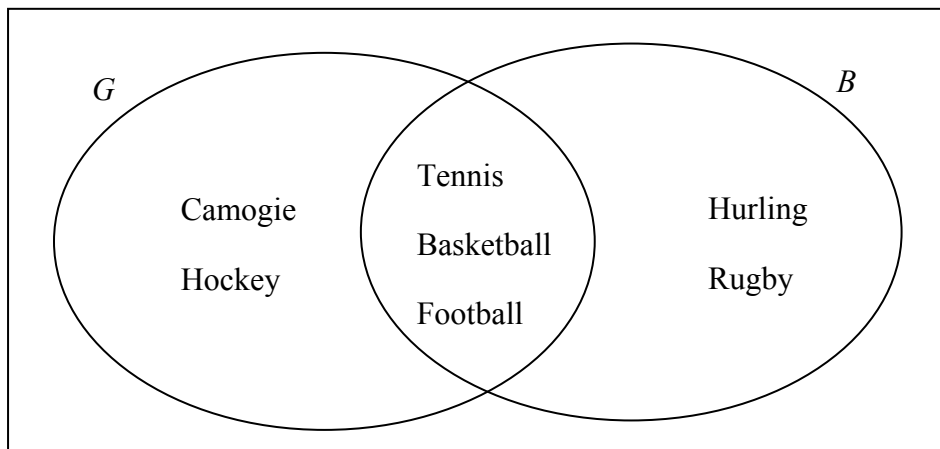
$$117.84 - 117.48 = 36 \text{ cent difference}$$

Note: Accept either company if a reasonable reason given

Question 4

(25 marks)

The sports played by a set of girls G and a set of boys B in a Limerick school are shown in the Venn diagram.



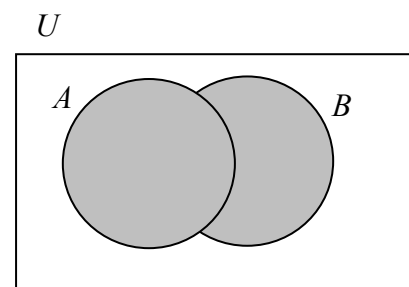
- (a) Describe the region of the diagram where camogie and hockey are located.

Girls only or $G \setminus B$ or $U \setminus B$

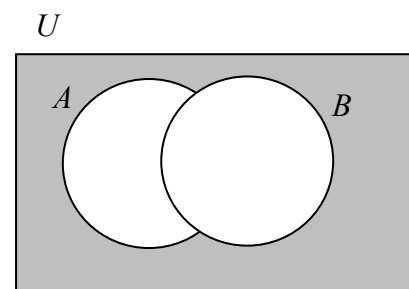
- (b) Describe the region of the diagram where tennis, basketball and football are located.

Girls and Boys both play or $G \cap B$

- (c) (i) In the Venn diagram, shade the set $A \cup B$.



- (ii) In the Venn diagram, shade the set $(A \cup B)'$, where $(A \cup B)'$ is the complement of $A \cup B$.

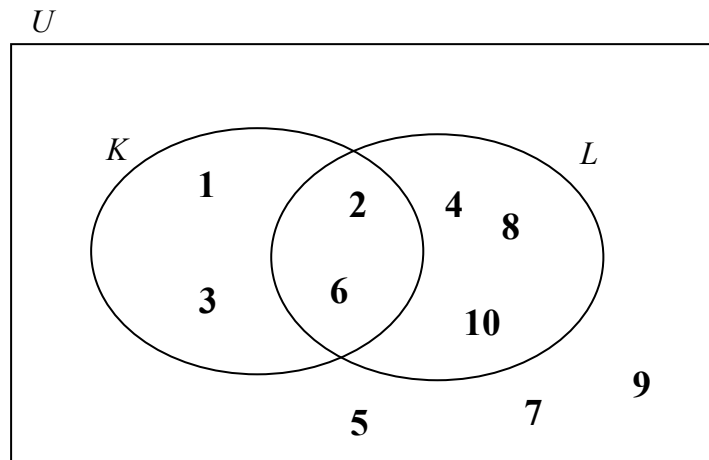


Question 5

(20 marks)

$U = \{ \text{Natural numbers from 1 to 10 inclusive} \}$ $K = \{ \text{Factors of 6} \}$ $L = \{ \text{Even numbers} \}$

(a) Fill in the Venn diagram below:



(b) Use ✓ to indicate whether each of the following statements is true or false. Give a reason for each answer.

(i) $K \cap L = \{ \}$

True ☐

False ☒

$$K \cap L = \{2, 6\}$$

(ii) $K \neq L$

True ☒

False ☐

$K = \{1, 2, 3, 6\}$, $L = \{2, 4, 6, 8, 10\}$. These are not equal.

(iii) $K \cup L = U$

True ☐

False ☒

$K \cup L$ does not include 5, 7, 9.

Question 6**(15 marks)**

Kathy and Jack Byrne have four children. A family ticket for the cinema costs €19·50. A family ticket is for two adults and two children. A single adult ticket costs €7·25 and a single child ticket costs €4·50.

- (a) What is the total cost of a family ticket and two child tickets?

$$19\cdot50 + 2(4\cdot50) = \text{€}28\cdot50$$

- (b) If an individual ticket was bought for each member of the family, what would be the extra cost?

$$2(7\cdot25) + 4(4\cdot50) = \text{€}32\cdot50$$

$$32\cdot50 - 28\cdot50 = \text{€}4 \text{ extra}$$

Question 7**(15 marks)**

Pat is a waiter at a restaurant. He is paid €8·65 per hour. He can also get tips. Last week he worked for 22 hours. Pat's wages plus tips were €235·50 in total for the week.

How much did Pat make on tips last week?

$$22 \times 8\cdot65 = \text{€}190\cdot30$$

$$\text{Tips: } 235\cdot50 - 190\cdot30 = \text{€}45\cdot20$$

Question 8**(20 marks)**

- (a) Croke Park in Dublin holds 82 300 people when full.



During a football match a reporter estimated that the stadium was 40% full.

How many people were estimated to be at the game?

Give your answer correct to the nearest 100 people.

$$82\,300 \times 40\% = 32\,920$$

$$= 32\,900 \text{ to nearest } 100$$

- (b) Eight people ate at a restaurant. Each meal was approximately the same cost. The bill was €128. A service charge of 10% was then added.

Michelle said “€15 each is enough to pay the bill and service charge”.

- (i) Do you agree with her estimate? Give a reason for your answer.

Yes

☐

No

☒

$$\text{Bill: } 128 + 10\% = €140.80$$

$$\text{Cost each: } 140.80 \div 8 = €17.60$$

So €15 each is not enough

$$\text{Bill: } 128 + 10\% = €140.80$$

$$15 \times 8 = €120$$

So €15 each is not enough

- (ii) Can you suggest a better estimate? Give a reason for your answer.

$$€18 \text{ (or an amount } \geq €17.60)$$

$$\text{Cost each: } €17.60$$

$$20.80 \div 8 = €2.60 \text{ so need at least this much extra each.}$$

Question 9**(15 marks)**

(a) Find the next three terms in each sequence.

(i) 2, 5, 8, 11, 14, 17

(ii) 16, 12, 8, 4, 0, -4

(iii) 1, 4, 9, 16, 25, 36, 49

(b) The first eight Fibonacci numbers are 0, 1, 1, 2, 3, 5, 8, 13.

Fibonacci numbers are found by adding the previous two numbers to get the next one.

5 was found by adding the two numbers before it (2 + 3).

8 was found by adding the two numbers before it (3 + 5).

13 was found by adding the two numbers before it (5 + 8).

Find the next three Fibonacci numbers:

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55.

(c) In a number pyramid you add the two numbers in the lower blocks to find the number in the block above (for example $2 + 3 = 5$).

Complete the number pyramid by filling in the empty spaces.

73				
36		37		
15		21	16	
5	10	11	5	
2	3	7	4	1

Question 10**(30 marks)**

(a) Find the values of the following expressions if $x = 3$ and $y = 5$.

(i) $5x + 4y$

$$5(3) + 4(5) = 15 + 20 = 35$$

(ii) $x^2 + y^2$

$$(3)^2 + (5)^2 = 9 + 25 = 34$$

(b) (i) Multiply $5(3a - 4b)$.

$$15a - 20b$$

(ii) Multiply $x(x - y) + y(x + y)$. Write the answer in its simplest form.

$$\begin{aligned} x^2 - xy + xy + y^2 \\ = x^2 + y^2 \end{aligned}$$

(c) Factorise fully each of the following:

(i) $4xy - 6x^2y^2$

$$= 2xy(2 - 3xy)$$

(ii) $2ax - ay + 2bx - by$

$$a(2x - y) + b(2x - y) = (a + b)(2x - y)$$

Question 11**(5 marks)**

- (a)** Factorise the quadratic expression $x^2 - x - 12$.

$$(x + 3)(x - 4)$$

- (b)** Use the factors from part **(a)** to solve the equation $x^2 - x - 12 = 0$.

$$(x + 3)(x - 4) = 0$$

$$x + 3 = 0 \quad x - 4 = 0$$

$$x = -3 \quad x = 4$$

Question 12**(15 marks)**

Clodagh tests the knowledge of her two younger sisters, Anna and Lauren.

- (a) Clodagh says that the sum of two **consecutive** numbers is 35.
Anna answers that the numbers are 20 and 15. Lauren says the numbers are 17 and 18.

Which sister is right? Give a reason for your answer.

Lauren

17 and 18 are consecutive numbers

- (b) Clodagh then says “When 8 is added to three times a number the result is 47”.
Anna works out the correct answer, which is 13.

Show one method Anna could have used to get the correct answer.

$$8 + 3x = 47$$

$$3x = 39$$

$$x = 13$$

$$47 - 8 = 39$$

$$39 \div 3 = 13$$

- (c) Solve the simultaneous equations

$$5x + 2y = 30$$

$$3x - 2y = 2$$

$$5x + 2y = 30$$

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

$$8x = 32$$

$$x = 4$$

$$5(4) + 2y = 30$$

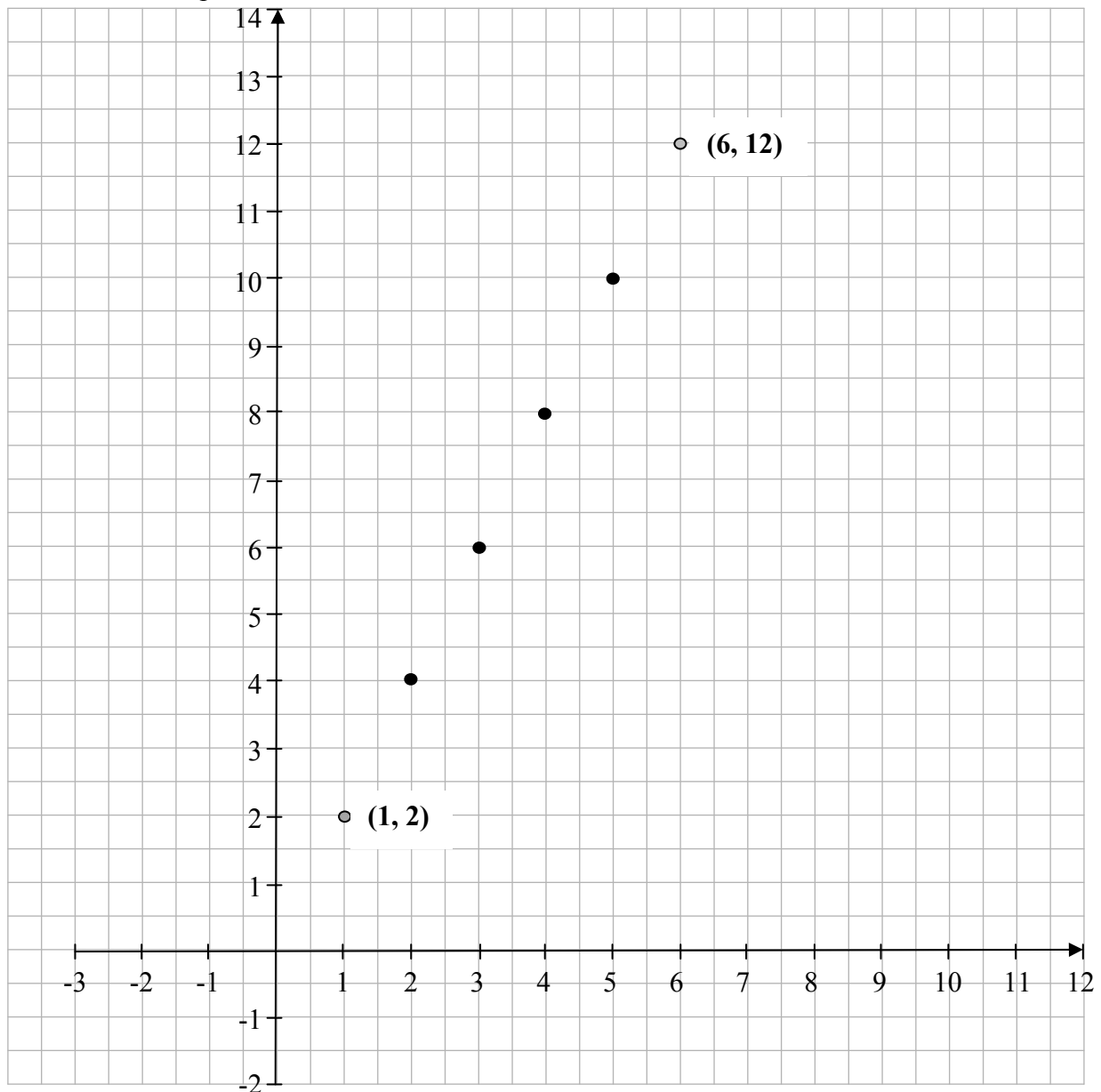
$$2y = 30 - 20 = 10$$

$$y = 5$$

Question 13**(25 marks)**

$\{ (2, 4), (3, 6), (4, 8), (5, 10) \}$ are four couples of a function f .

(a) Plot the four couples.



(b) The function f is derived from a rule. Suggest a rule for f .

$$x \rightarrow 2x$$

1st component is $\frac{1}{2}$ (2nd component) etc.

(c) On your diagram in (a), plot and label two other couples which could be got from the same rule.

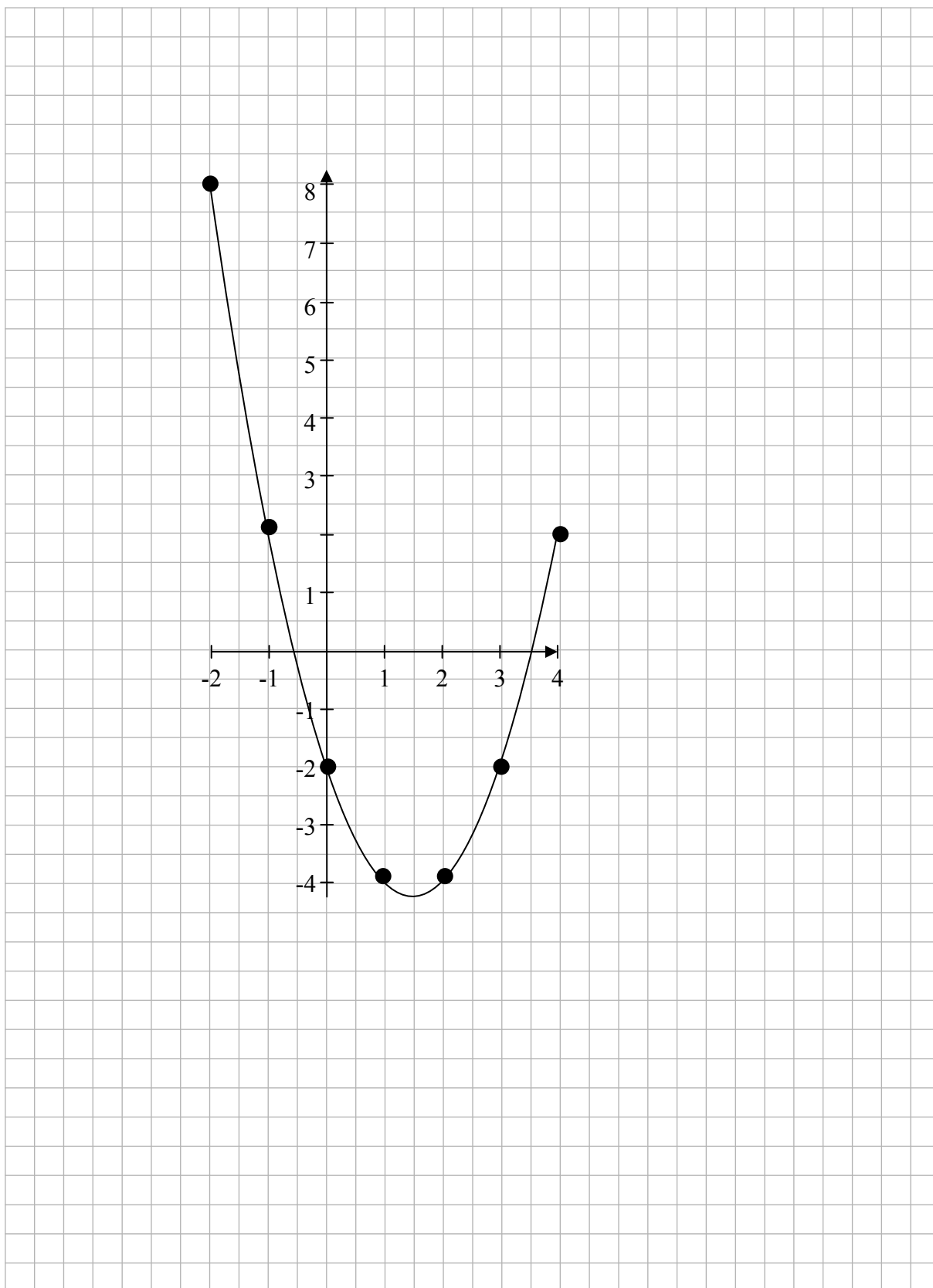
For example : (1, 2) (6, 12)

Question 14**(30 marks)**

- (a) Complete the following table for the function $f : x \mapsto x^2 - 3x - 2$ in the domain $-2 \leq x \leq 4$.

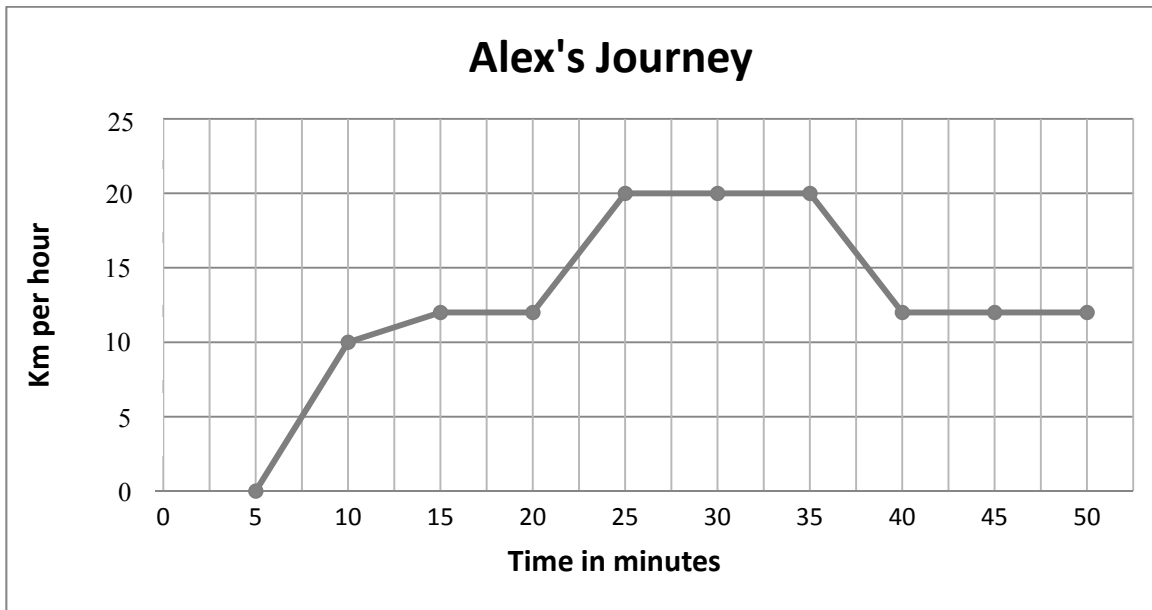
x	$f(x)$	$(x, f(x))$
-2	8	$(-2, 8)$
-1	2	$(-1, 2)$
0	-2	$(0, -2)$
1	-4	$(1, -4)$
2	-4	$(2, -4)$
3	-2	$(3, -2)$
4	2	$(4, 2)$

- (b) Using the values obtained in (a), draw the graph of the function $f : x \mapsto x^2 - 3x - 2$ in the domain $-2 \leq x \leq 4$, $x \in \mathbb{R}$.



Question 15**(25 marks)**

The graph below shows some details about a journey Alex made by bicycle.



Alex waited for his friend before he set off on his journey.

- (a) How long did he wait before setting out?

5 minutes

- (b) What was Alex's highest speed during the journey?

20 km/h

- (c) For what length of time was Alex travelling at the highest speed?

10 minutes

- (d) How far did Alex travel at the highest speed?

10 mins = $\frac{1}{6}$ hour

$20 \times \frac{1}{6} = 3\frac{1}{3}$ km.