Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate Examination, 2013

Mathematics
(Project Maths – Phase 3)

Paper 1

Ordinary Level

Friday 7 June Afternoon 2.00 to 4.00

300 marks

Examination number

Centre stamp

Running total	

For examiner			
Question	Mark	Question	Mark
1		11	
2		12	
3		13	
4		14	
5		15	
6			
7			
8			
9			
10		Total	

Grade

Instructions

There are 15 questions on this examination paper. Answer **all** questions.

Questions do not necessarily carry equal marks. To help you manage your time during this examination, a maximum time for each question is suggested. If you remain within these times you should have about 10 minutes left to review your work.

Write your answers in the spaces provided in this booklet. There is space for extra work at the back of the booklet. You may also ask the superintendent for more paper. Label any extra work clearly with the question number and part.

The superintendent will give you a copy of the *Formulae and Tables* booklet. You must return it at the end of the examination. You are not allowed to bring your own copy into the examination.

Marks will be lost if all necessary work is not clearly shown.

Answers should include the appropriate units of measurement, where relevant.

Answers should be given in simplest form, where relevant.

Write the make and model of your calculator(s) here:

Question 1 **(Suggested maximum time: 5 minutes)**

(a) Change 5000 g to kilograms.

(b) Change 2·7 m to centimetres.

(c) Change 8000 cm^3 to litres.

(d) Change 4 m^2 to cm^2.

Question 2 **(Suggested maximum time: 5 minutes)**

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.

Answer

Reason

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

Karen

John

David

(c) Find the mean number of correct answers.

Question 3 **(Suggested maximum time: 10 minutes)**

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

(a) Fill in the following tables:

GRIDPOWER	€
Standing charge	9·47
18·5 cent per unit	
Sub-total	
13·5% VAT	
Total	

ELECTROLINE	€
No standing charge	
First 50 units free Then 25 cent per unit	
Sub-total	
13·5% VAT	
Total	

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

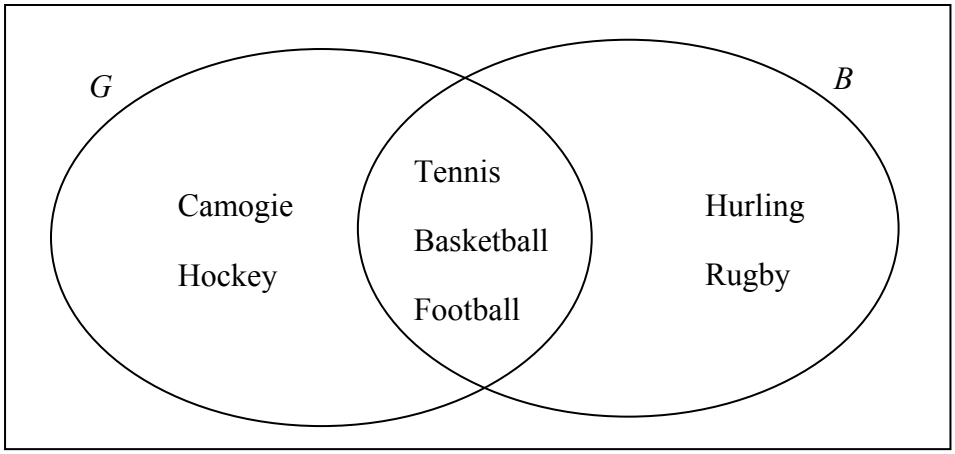
(c) Barra contacted the more expensive company. The company offered him a 10% discount off his total bill.
In your opinion, from which company should Barra get his electricity?
Give a reason for your answer.

Answer

Reason

Question 4 **(Suggested maximum time: 5 minutes)**

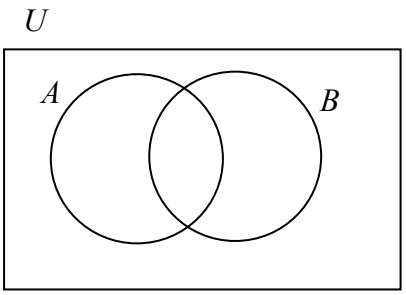
The sports played by a set of girls G and a set of boys B in a Limerick school are shown in the Venn diagram.



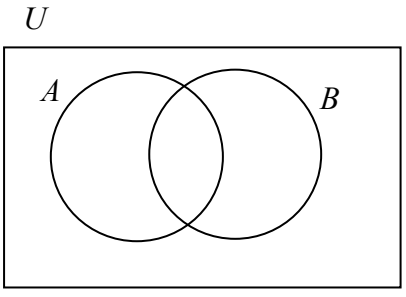
(a) Describe the region of the diagram where camogie and hockey are located.

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

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



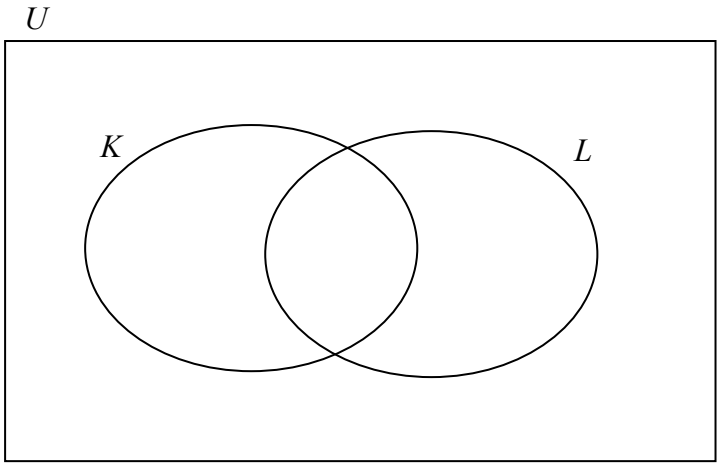
(ii) In the Venn diagram, shade the set $(A \cup B)'$, where $(A \cup B)'$ is the complement of $A \cup B$.



Question 5 **(Suggested maximum time: 5 minutes)**

U= { Natural numbers from 1 to 10 inclusive } K = { Factors of 6 } L= { 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 ☐

Reason

(ii) $K \neq L$

True ☐ False ☐

Reason

(iii) $K \cup L = U$

True ☐ False ☐

Reason

Question 6 **(Suggested maximum time: 5 minutes)**

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?

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

Question 7 **(Suggested maximum time: 5 minutes)**

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?

Question 8 **(Suggested maximum time: 10 minutes)**

(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.

(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? Yes ☐ No ☐
Give a reason for your answer.

Reason

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

Answer

Reason

Question 9 **(Suggested maximum time: 10 minutes)**

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

(i) 2, 5, 8, ____ , ____ , ____

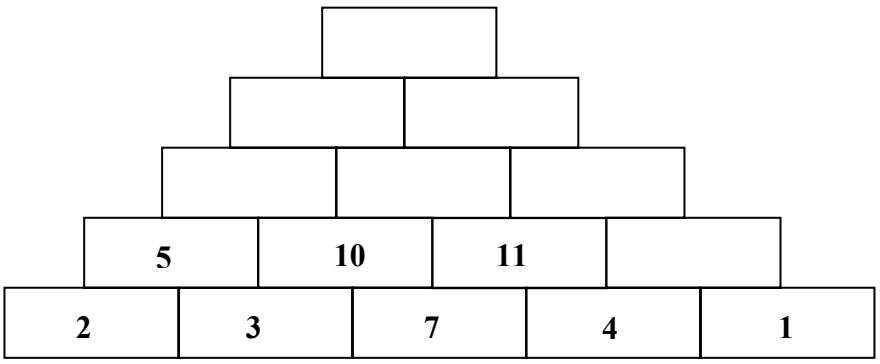
(ii) 16, 12, 8, ____ , ____ , ____

(iii) 1, 4, 9, 16, ____ , ____ , ____

(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, ____ , ____ , ____ .

(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.



Question 10 **(Suggested maximum time: 10 minutes)**

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

(i) $5x + 4y$

$5(\quad) + 4(\quad)$

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

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

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

(c) Factorise fully each of the following:

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

$= 2xy(\qquad\qquad)$

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

Question 11 **(Suggested maximum time: 5 minutes)**

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

( )( )

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

Question 12 **(Suggested maximum time: 10 minutes)**

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.

Answer

Reason

(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.

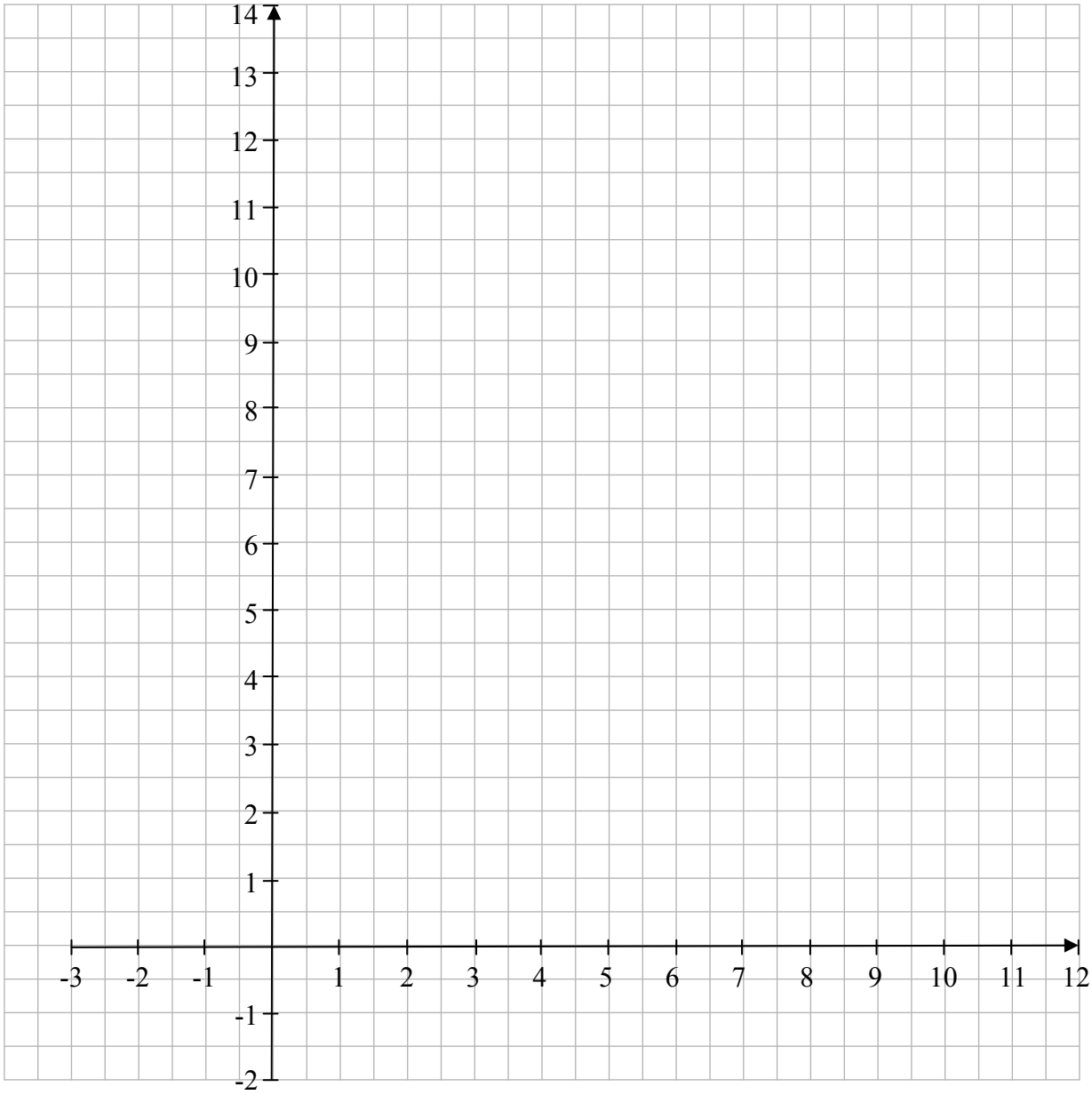
(c) Solve the simultaneous equations

$$5x + 2y = 30$$
$$3x - 2y = 2$$

Question 13 **(Suggested maximum time: 5 minutes)**

{ (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*.

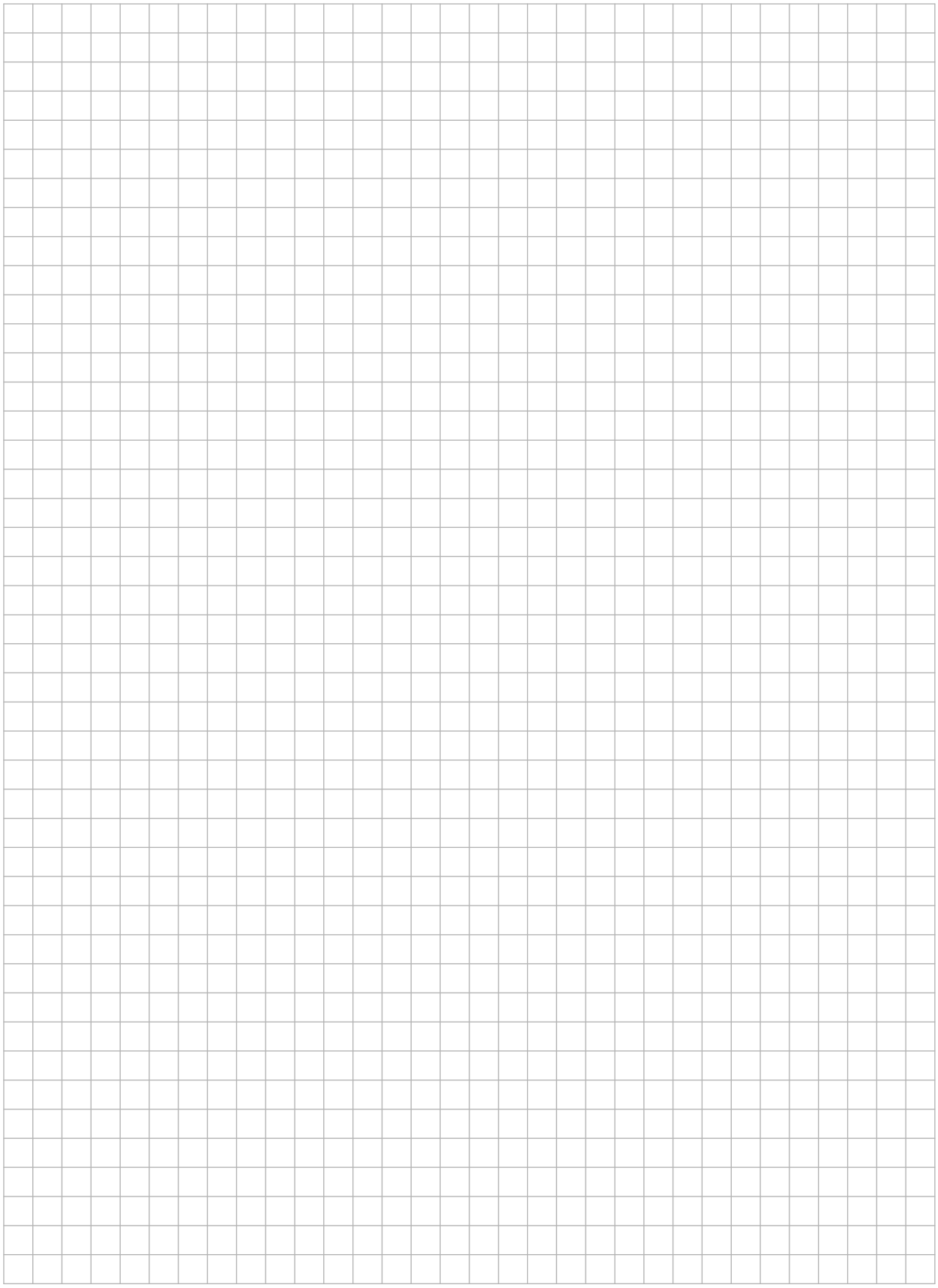
(c) On your diagram in **(a)**, plot and label two other couples which could be got from the same rule.

Question 14 **(Suggested maximum time: 15 minutes)**

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

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

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



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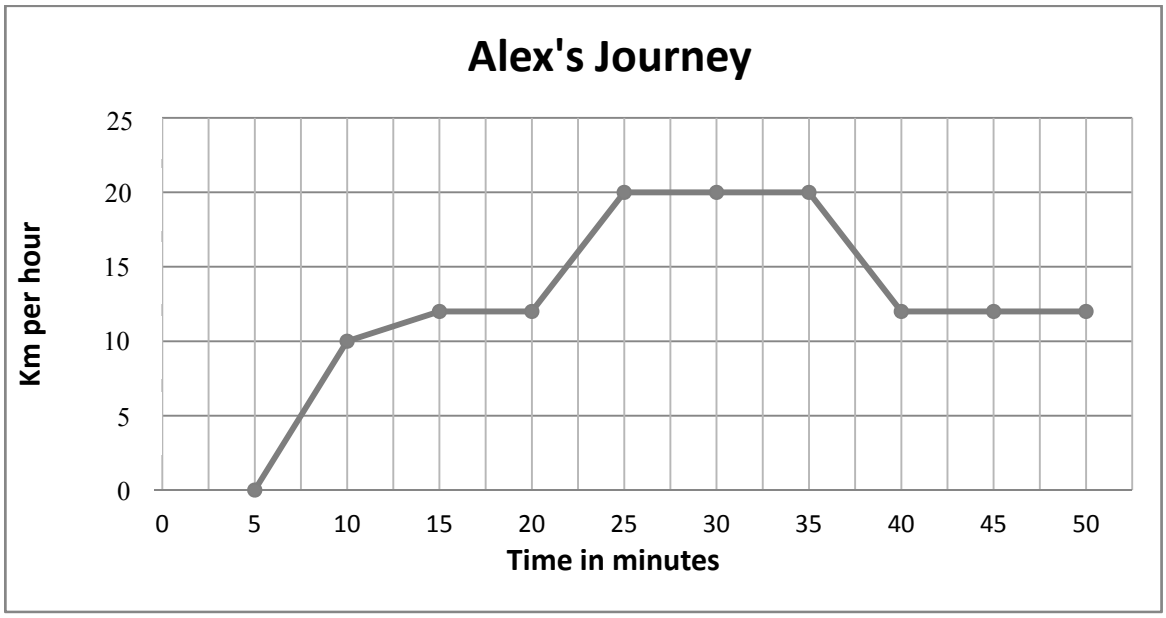
Question 15 **(Suggested maximum time: 5 minutes)**

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?

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

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

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

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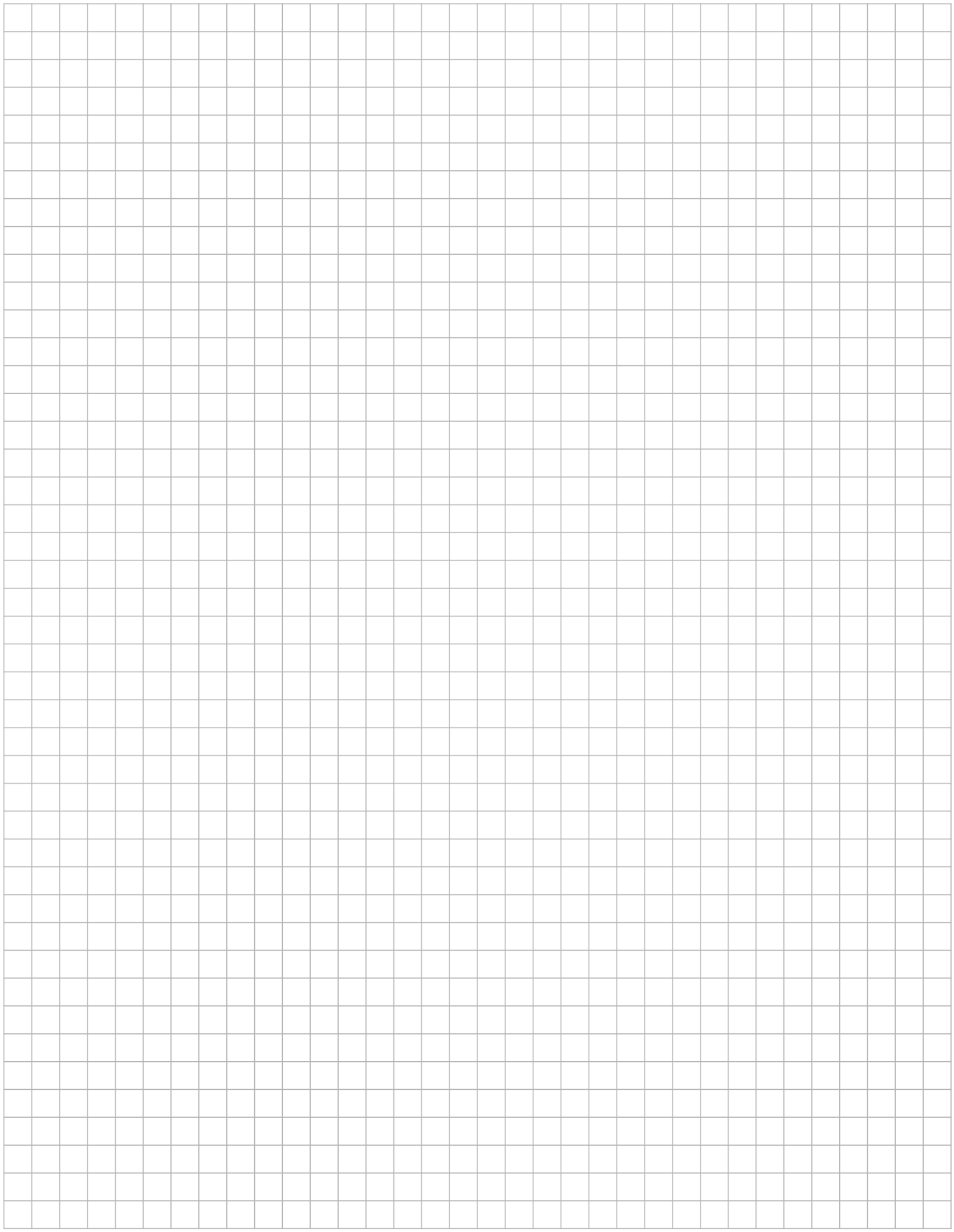

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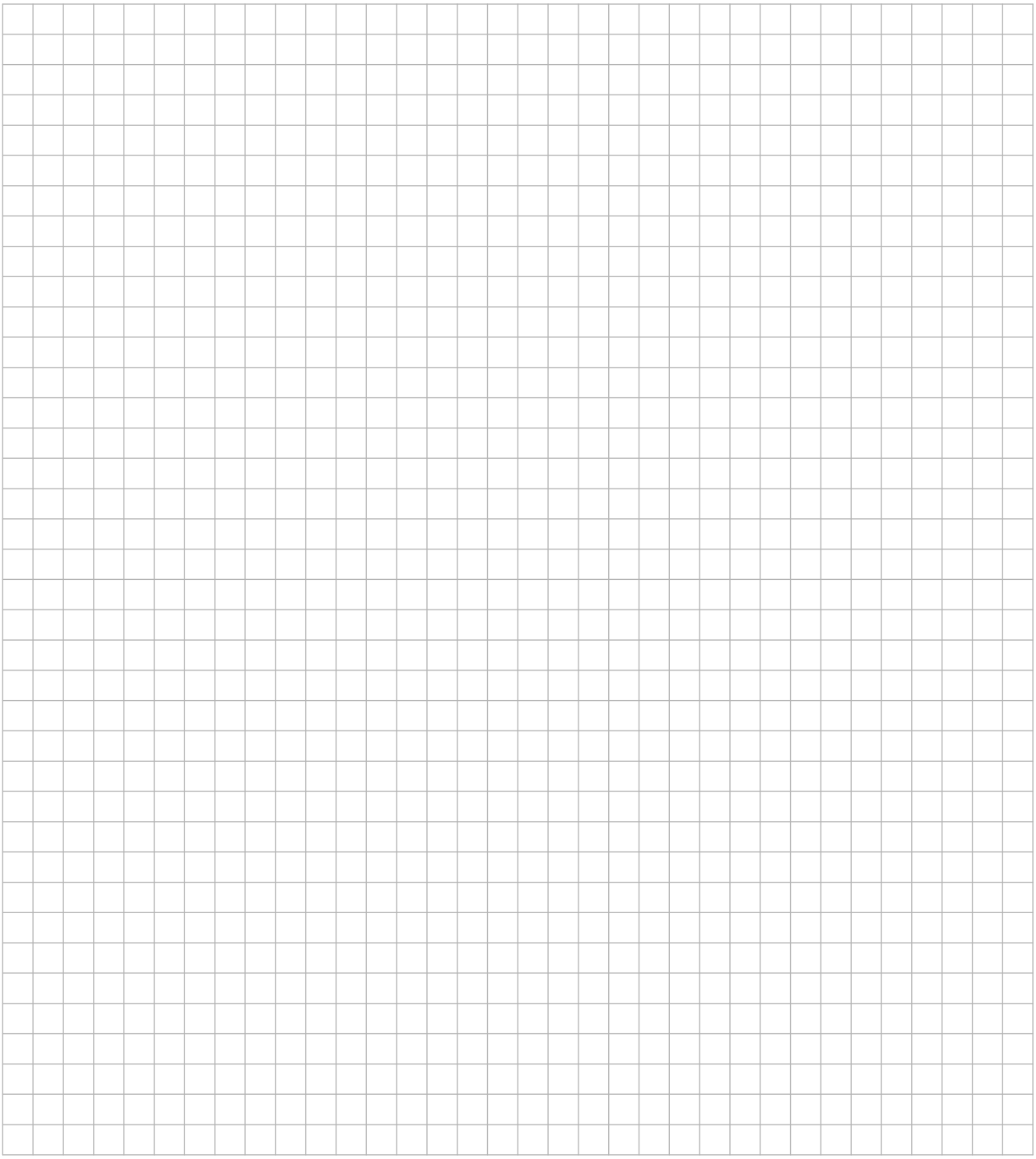

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