



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2014
Mathematics
(Project Maths – Phase 3)

Paper 1

Foundation Level

Friday 6 June Afternoon 2:00 – 4:30

300 marks

Examination number

Centre stamp

Running total

For examiner	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total	

Grade

Instructions

There are **two** sections in this examination paper.

Section A	Concepts and Skills	200 marks	8 questions
Section B	Contexts and Applications	100 marks	2 questions

Answer all ten questions.

Write your answers in the spaces provided in this booklet. You may lose marks if you do not do so. 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.

You will lose marks 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:

Section A**Concepts and Skills****200 marks**

Answer **all eight** questions from this section.

Question 1**(25 marks)**

- (a) Use your calculator to answer the following.

- (i) Find $\sqrt{3 \times 10^5}$, correct to the nearest whole number.

- (ii) Find $\frac{\pi}{12}$, correct to one decimal place.

- (iii) Find 8% of 910, correct to the nearest whole number.

- (b) The population of China is 1.351×10^9 people.

Write this as a whole number of people.

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Question 2

(25 marks)

- (a) (i)** Write 125 as 5^n , where $n \in \mathbb{N}$.

- (ii) Find $49^{\frac{1}{2}}$.

- (b)** Simplify $\frac{(a^4)^2}{a^5}$.

- (c) For each of the following sequences of numbers, use the pattern to continue the sequence for two more terms:

- (i) 2, 6, 18, 54, _____, _____.

- (ii) 1, 3, 6, 10, _____, _____.

Question 3**(25 marks)**

- (a) (i) Write each of the numbers below correct to the nearest whole number.

$$1 \cdot 8 = \boxed{}$$

$$15 \cdot 2 = \boxed{}$$

$$4 \cdot 9 = \boxed{}$$

- (ii) Use your values from above to estimate the value of $\frac{1 \cdot 8 \times 15 \cdot 2}{4 \cdot 9}$.

A grid for estimation. It features two empty boxes for writing numbers, an 'X' symbol indicating multiplication, a horizontal line for the multiplication process, another empty box for the result, and an equals sign.

- (iii) Use your calculator to find the actual value of $\frac{1 \cdot 8 \times 15 \cdot 2}{4 \cdot 9}$. Give your answer correct to one decimal place.

A large grid for performing the calculation $\frac{1 \cdot 8 \times 15 \cdot 2}{4 \cdot 9}$ using a calculator.

- (b) (i) Find the difference between the actual value and your estimated value in part (a) (ii).

A grid for calculating the difference between the actual value and the estimated value.

- (ii) Find the percentage error in your estimate. Give your answer correct to one decimal place.

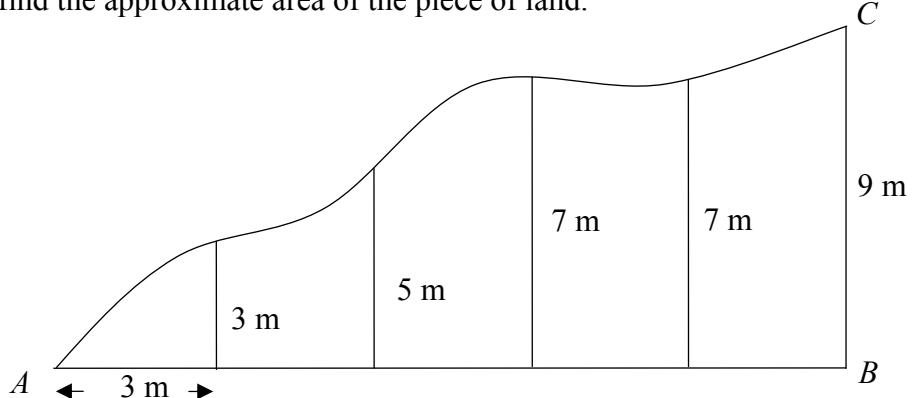
A large grid for calculating the percentage error.

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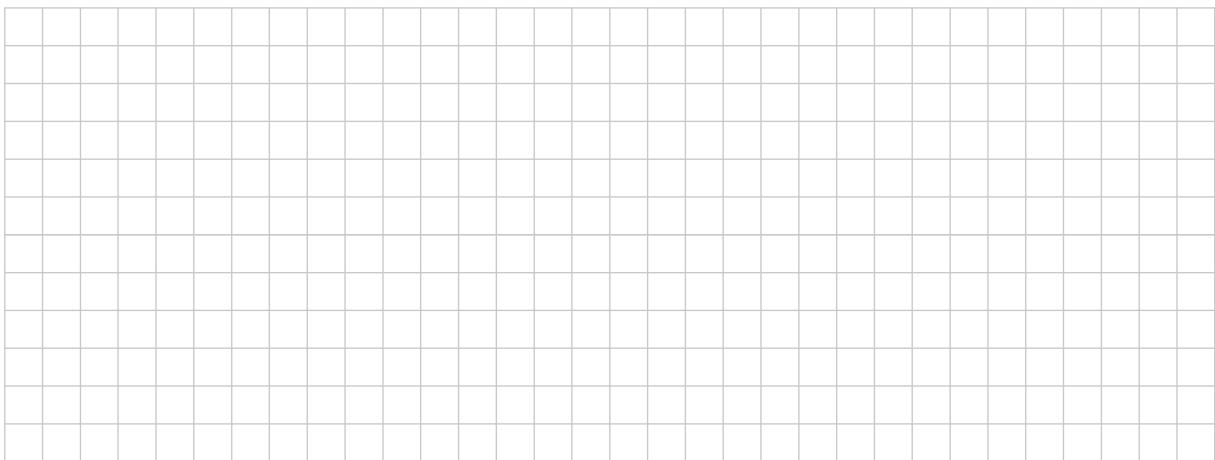
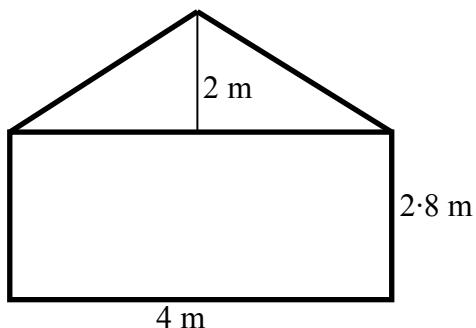
Question 4

(25 marks)

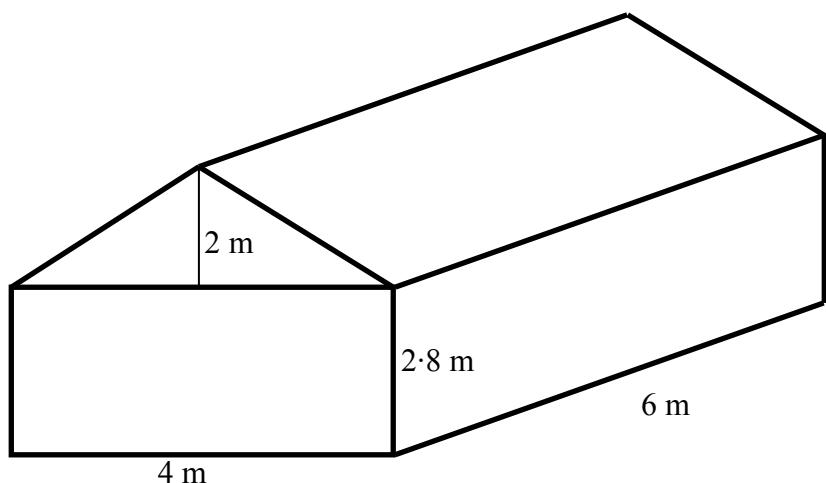
- (a)** A surveyor needed to find the area of a small piece of land, bounded in part by two straight walls $[AB]$ and $[BC]$. He divided $[AB]$ into five equal parts. Each part is 3 m long. The distance to the boundary from each part is shown in the diagram below. Use the Trapezoidal Rule to find the approximate area of the piece of land.



- (b) (i)** The diagram below shows the end wall of a shed. Find the area of the end wall.



- (ii)** The diagram below shows the shed. Find the volume of the shed.



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Question 5

(25 marks)

- (a)** In the spaces provided, write down:

(i) 2 natural numbers

ANSWER

and

Page 1

(ii) 2 negative integers

ANSWER

and

ANSWER

(iii) 2 prime numbers

Page 1

and

Page 1

- (b) A tractor depreciates in value at a rate of 15% per year.

(i) Write 15% as a decimal.

(ii) The tractor was bought for €100 000. Find its value at the end of three years.

Question 6

(25 marks)

- (a) Find the value of $x^2 - 2x + 5$ when $x = -3$.

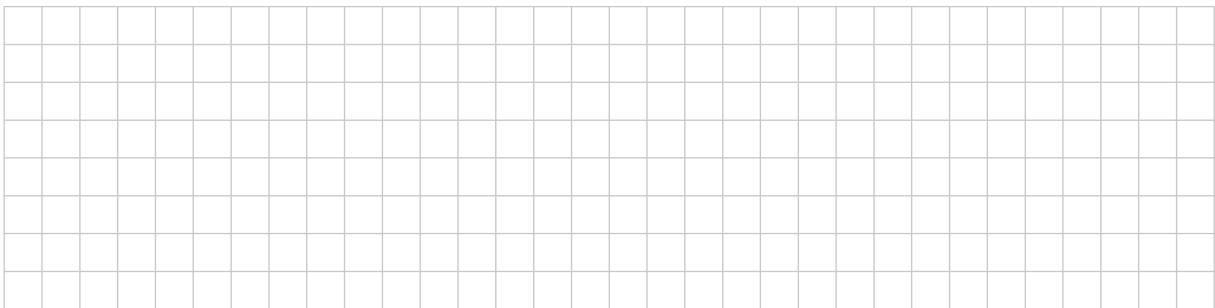
- (b) Simplify $3(5a - 1) - 4(a - 2)$.

- (c) Solve the equation $m^2 + 2m - 5 = 0$. Give your answers correct to one decimal place.

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Question 7**(25 marks)**

- (a) Solve the equation $3x - 1 = 2x + 5$.



- (b) Write down the natural numbers, x , which satisfy the inequality $9 - 2x > 1$.



- (c) Ruairí is x years of age.

- (i) Alex is 7 years older than Ruairí. Write down an expression in x for Alex's age.

Answer: _____

- (ii) Aideen is three times as old as Ruairí. Write down an expression in x for Aideen's age.

Answer: _____

- (iii) Aideen's age added to Alex's age is 47. How old is Ruairí?



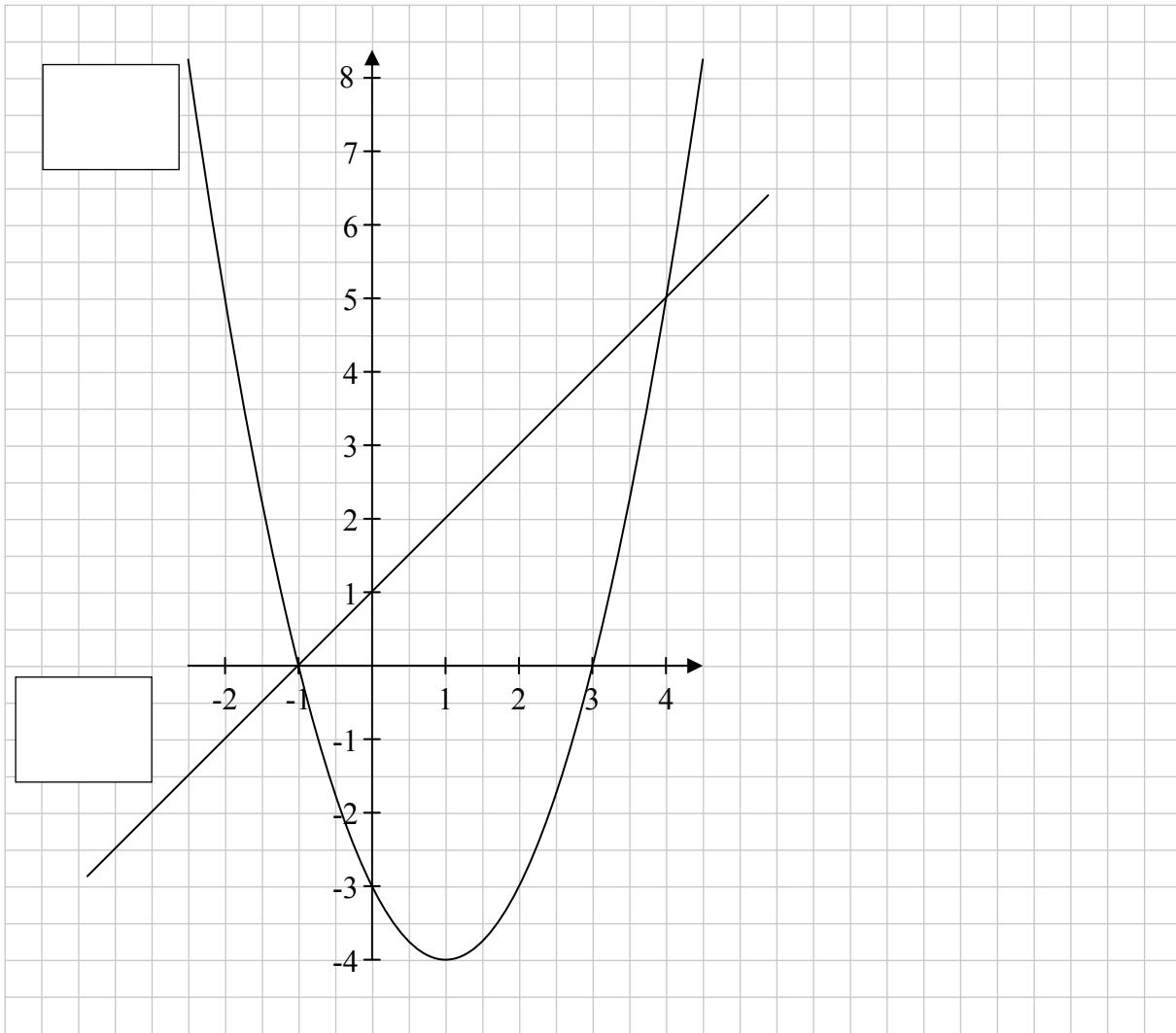
Question 8

(25 marks)

- (a)** The function $f : x \mapsto 3 - 2x$ is defined for all values of $x \in \mathbb{R}$. Find the value of $f(-3)$.

- (b) The graphs of two functions are shown on the axes below. The functions are:

$$g(x) = x + 1, \quad x \in \mathbb{R} \quad \text{and} \quad h(x) = x^2 - 2x - 3, \quad x \in \mathbb{R}.$$



- (i) Identify the functions by writing $g(x)$ or $h(x)$ in the blank boxes on the diagram above.

Use the diagram to answer the questions below. Show your work on the diagram.

- (ii) Find the value of $h(1.5)$. Answer: _____

(iii) Find the value of x for which $g(x) = 3$. Answer: _____

(iv) Find the values of x for which $h(x) = g(x)$. Answers: _____ and _____

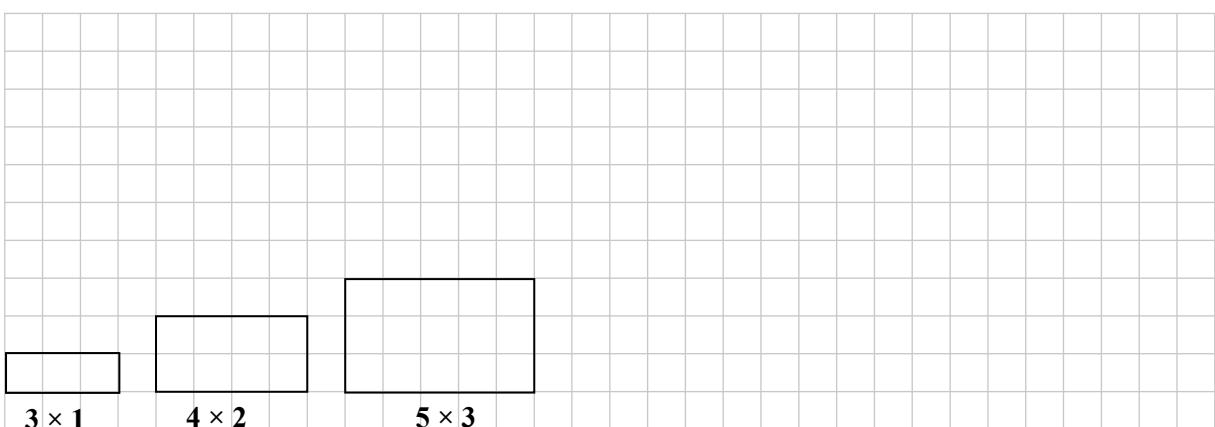
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Answer **both** Question 9 and Question 10 from this section.

Question 9

(50 marks)

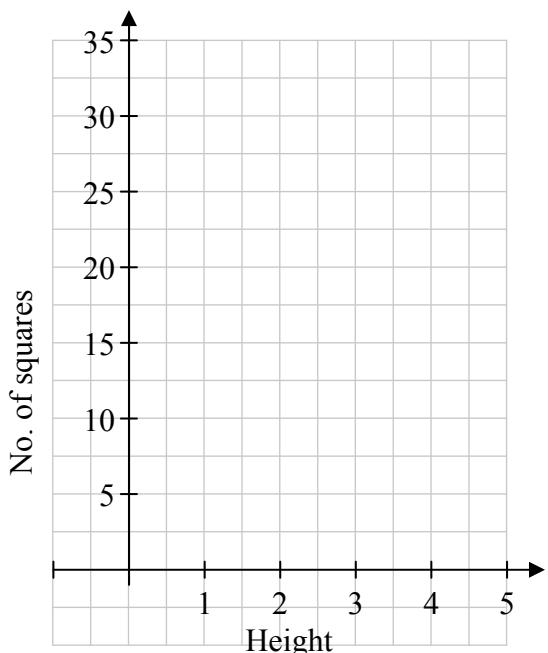
- (a) A pattern of rectangles is shown in the diagram below.



- (ii) Complete the table below.

Height of rectangle	No. of small squares in the rectangle.
1	3
2	8
3	
4	
5	

- (iii) Plot the 5 points from your table ((1, 3), (2, 8), etc.) on the given axes.



- (b) (i)** The number of small squares in **each** rectangle in part **(a)** can be calculated by using one of the following three expressions, where h is the height of the rectangle.

$$h^2 + h$$

$$h^2 + 2$$

$$h^2 + 2h$$

Which expression always gives the correct number of small squares?

Give a reason for your answer.

Expression:

(ii) For each of the 5 rectangles above, shade in the biggest possible square that fits into that rectangle.

(iii) For each of the 5 rectangles, write down the numbers of small squares that are **not** shaded.

(iv) Is there a pattern to be seen in the numbers in your answer to (iii) above? Give a reason for your answer.

Answer:

Reason:

Question 10

(50 marks)

The chart below shows the distances (in kilometres) between some of Ireland's main towns. For example, the distance between Portlaoise and Galway is 150 km and the distance between Sligo and Belfast is 206 km (highlighted in the chart).

Distance Chart (km)

	Athlone								
	Belfast		224						
			Cork					423	219
			Derry					428	117
			Dublin					237	167
			Galway					257	126
			Kilkenny					219	93
			Limerick					172	126
			Mullingar					113	121
			Portlaoise					145	50
			Sligo					109	74
			Waterford					191	117
								137	
								232	
								245	
								138	
								217	
								135	
								336	
								206	
								126	
								383	
								174	
								220	
								158	
								48	
								164	
								129	
								100	
								293	

Use the chart to answer the following questions.

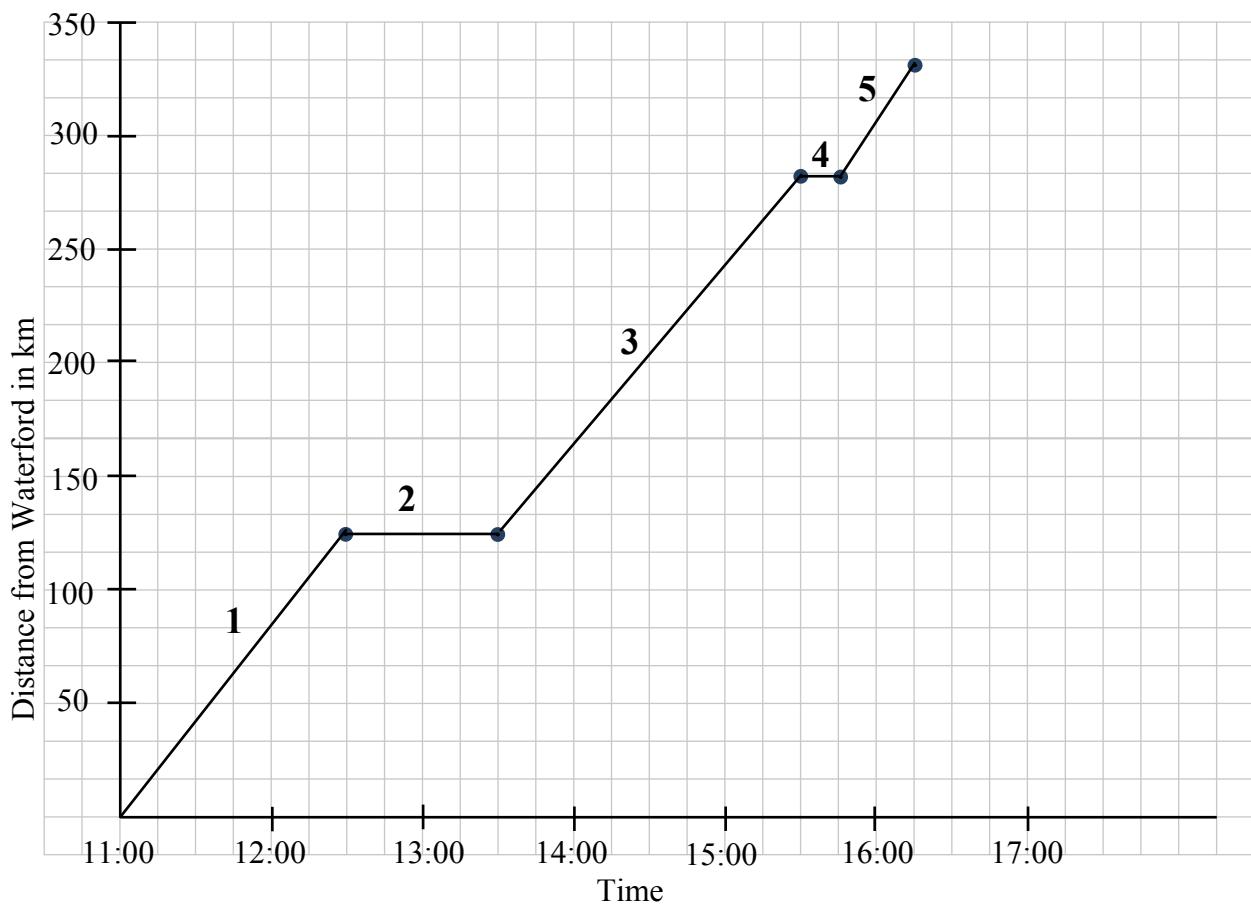
- (a) (i) What is the distance between Sligo and Dublin? Answer: _____

(ii) Carla has to go from Sligo to Dublin. She travels from Sligo to Portlaoise first and then on to Dublin. How many kilometres does this add to her journey?

- (b) Which two towns, shown in the chart, are furthest apart?

Answer: and

- (c) Amanda travelled from Waterford to Belfast. The graph below shows the 5 stages of her journey.



The stages of the journey are labelled 1, 2, 3, 4, and 5 on the graph.

There are five statements below, labelled with letters A, B, C, D, and E.

- A. She takes about 15 minutes to change the wheel.
- B. She drives steadily and arrives in Belfast around 16:15.
- C. She stops for lunch for about an hour.
- D. She sets out from Waterford at 11:00 and drives at a steady speed until lunchtime.
- E. She drives steadily for about 2 hours.

In the table below, insert the letters A, B, C, D, and E to match each one of the statements above with a stage of her journey.

Stages of her journey	Statement
1	
2	
3	
4	
5	

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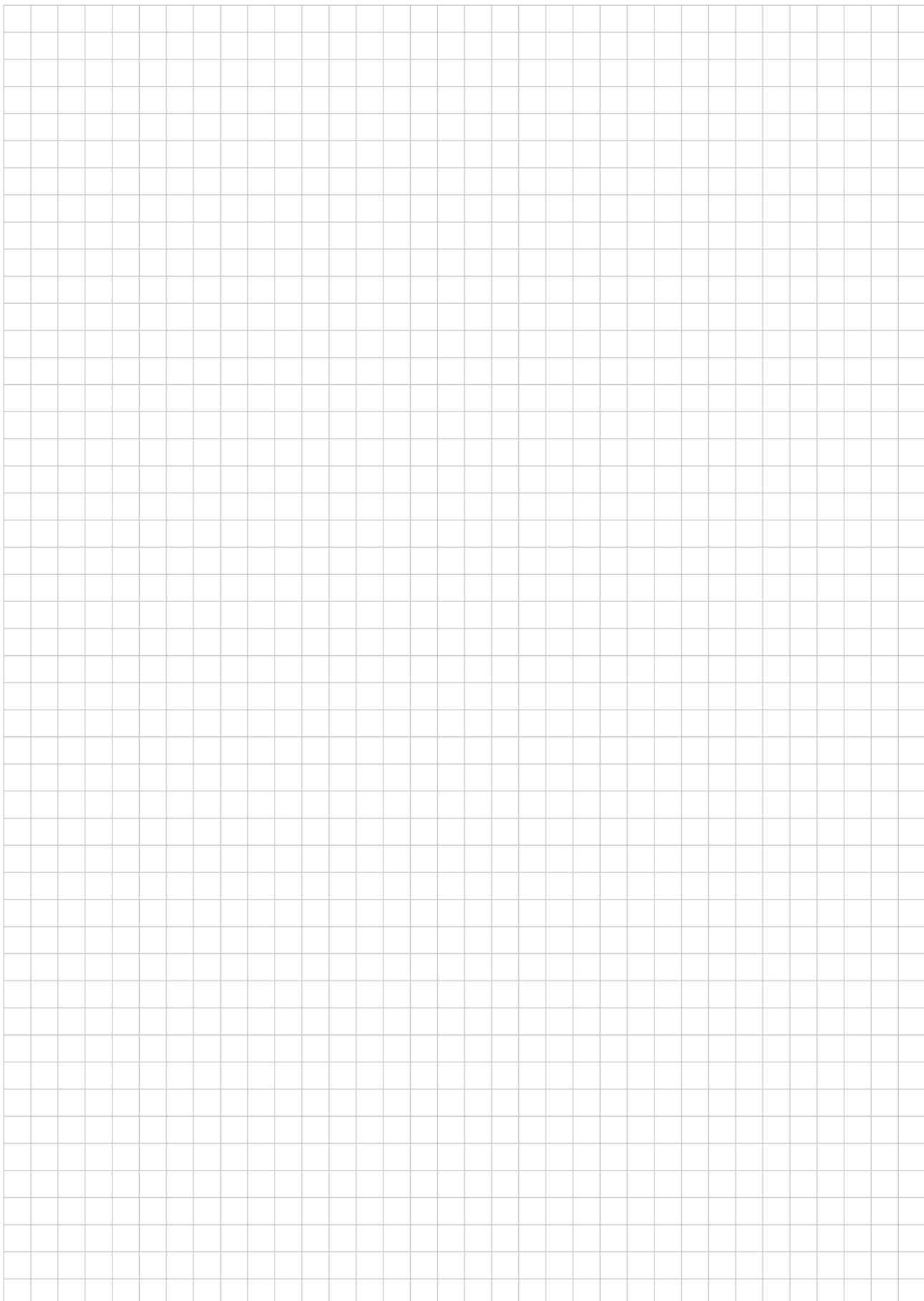
- (d) (i) How long, in total, did it take Amanda to travel from Waterford to Belfast?

- (ii) Find Amanda's average speed during her trip, in kilometres per hour. Give your answer correct to the nearest whole number.

- (e) The car was stopped for a total of one hour and fifteen minutes. Find the amount of time the car was being driven during the journey.

- (f) Amanda changed some euro into sterling. She got £215.
The exchange rate was €1 = £0.86. How much did she have to pay, in euro?

You may use this page for extra work.

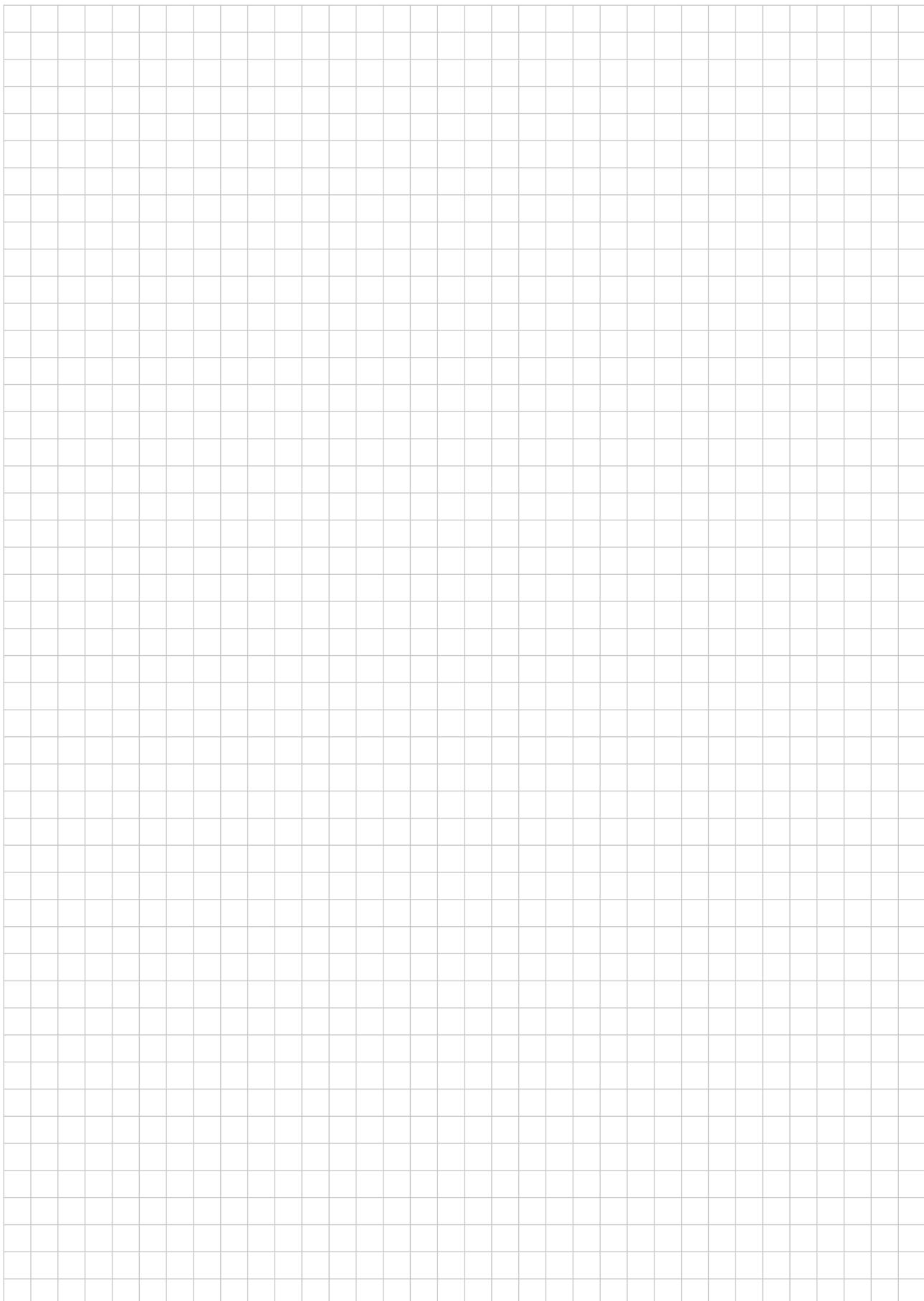


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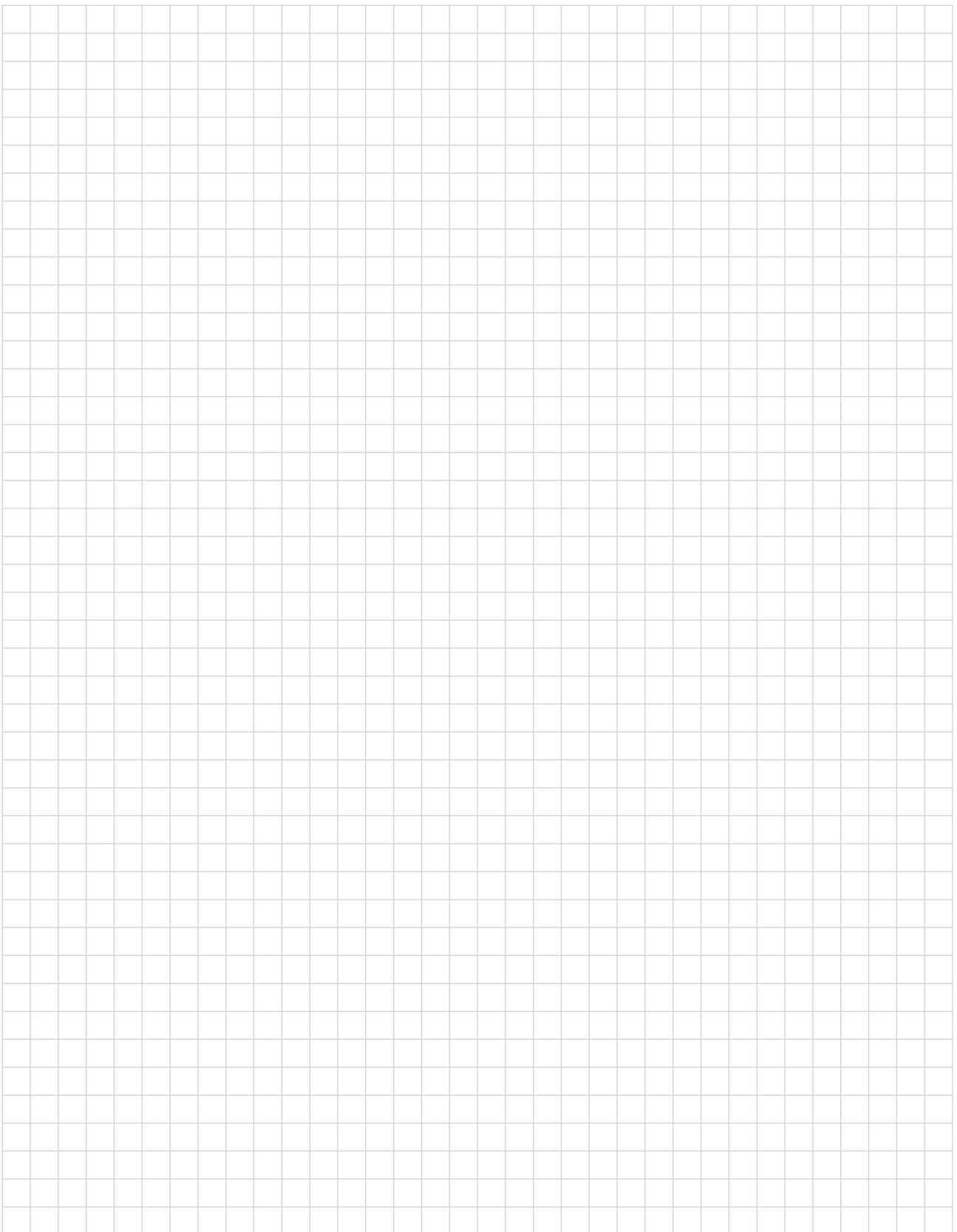
You may use this page for extra work.

A large grid of squares, approximately 20 columns by 30 rows, intended for students to use for extra work or calculations.

You may use this page for extra work.



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