



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate Examination 2017

Mathematics

Paper 1
Ordinary Level

Friday 9 June
Afternoon 2:00 – 4:00

300 marks

Examination Number

Centre Stamp

Running Total	
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For Examiner					
Q.	Ex.	Adv. Ex.	Q.	Ex.	Adv. Ex.
1			11		
2			12		
3					
4					
5					
6					
7					
8					
9					
10			Total		

Grade

Instructions

There are 12 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. You may lose marks if you do not do so. You may 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 you do not show all necessary work.

You may lose marks if you do not include the appropriate units of measurement, where relevant.

You may lose marks if you do not give your answers in simplest form, where relevant.

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

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Question 1 (Suggested maximum time: 10 minutes)

Question 1 (Suggested maximum time: 10 minutes)

The table below shows all the factors of each of the given numbers.

- (a)** Complete the table to show **all** the factors of 10, 11, and 12.

Number	Factors
9	1, 3, 9
10	
11	
12	

[illegible]

- (b)** Which one of the numbers 9, 10, 11, or 12 is **prime**? Give a reason for your answer.

Number that is prime:

9

10

11

12

(Tick (✓) **one** box only)

☐

5

Reason:

[illegible]

- (c) Write down three **other prime** numbers between 0 and 20.

Answer =

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,

--

2

and

- (d) Find the **smallest** number that is a **multiple** of each of the three numbers you chose in part (c) above (i.e. their Lowest Common Multiple).

[illegible]

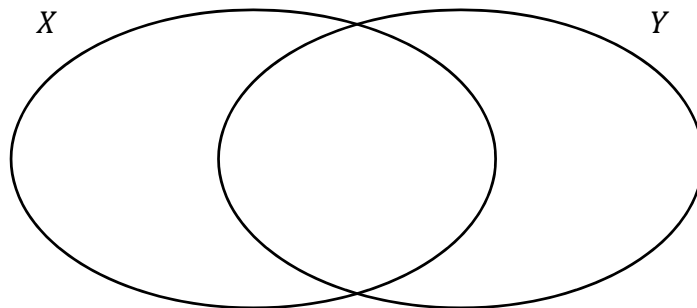
Question 2

(Suggested maximum time: 10 minutes)

- (a)** Fill in the Venn diagram below, given that:

$$X = \{N, I, C, O, L, A\}$$

$$Y = \{S, O, P, H, I, A\}.$$



- (b)** Write down a **subset** of X that has 2 elements, and that is also a subset of Y .

Answer = $\{ \quad , \quad \}$

- (c) Write down a **subset** of X that has 2 elements, and that is **not** a subset of Y .

Answer = $\{ \quad , \quad \}$

The table below shows three statements. Each statement is written in English and in set notation.

- (d)** Complete the table.

	English	Set Notation
Statement 1	Letters in both X and Y .	$X \cap Y$
Statement 2		$X \setminus Y$
Statement 3	Letters in X or Y or both.	

(Suggested maximum time: 10 minutes)

He works every Friday and Saturday, from 6 p.m. to 11 p.m.

- [illegible]

(Suggested maximum time: 10 minutes)

The winner of the raffle chooses **one** prize.

- (a) Prize A: The winner gets some money each day for six days.
She gets €10 on Day 1, €15 on Day 2, and so on until Day 6.
Each day after Day 1, she gets €5 **more** than she got the day before.
- (i) Complete the table below to show how much money she gets each day for Prize A.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Prize A	€10	€15				

[illegible]

- ## Exponential

[illegible]

- [illegible]

- (b) Prize B:** The winner gets €2 on Day 1, €4 on Day 2, and so on until Day 6. Each day after Day 1, she gets **twice as much** as she got the day before.

- (i) Complete the table below to show how much money she gets each day for Prize B.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Prize B	€2			€16		

- (ii)** What kind of sequence is made by the daily amounts that the winner gets for Prize B? Give a reason for your answer.

Kind of sequence:

Linear

Quadratic

Exponential

(Tick (✓) **one** box only)

☐☐[illegible]

For Prize **C**, the winner gets a single prize of €100 on Day 1.

Alexa wins the raffle.

- (c)** Which prize do you think Alexa should choose, Prize **A**, Prize **B**, or Prize **C**?

Give a reason for your answer.

Alexa should choose:

Prize **A**Prize **B**

Prize C

(Tick (✓) **one** box only)

☐[illegible]

Question 5

(Suggested maximum time: 10 minutes)

Tom and Mary travelled to Rio with their two children to watch the Olympic Games. They flew from London to Rio.

The time in Rio was 4 hours behind the time in London,
so when it was 6:00 p.m. in London, it was 2:00 p.m. in Rio.

Their flight left London at 9:00 a.m.



- (a) (i)** What was the time in Rio when their flight left London?

[illegible]

Their flight took 11 hours and 40 minutes.

- (ii)** What was the time in Rio when their flight landed?

The currency in Rio is the Real (R\$).

The exchange rate was €1 = R\$3.60.

- (b)** The total cost of their tickets for the Athletics was R\$756. Work out the cost of these tickets in euro (€).

Tom and Mary got 2 adult tickets and 2 children's tickets for their R\$756.

The cost of an adult ticket was **twice** the cost of a child's ticket.

- (c)** Work out the cost of a child's ticket. Give your answer in Real (R\$).

Cost of a child's ticket = R\$

Question 6 (Suggested maximum time: 10 minutes)

Question 6 (Suggested maximum time: 10 minutes)

Emma was 4 years old when her dog Spot was born.

The table below shows Emma's age and Spot's age at different times.

Emma's age, in years	4	5	6	7	10	16
(a)(i) Spot's age, in years	0	1				
(a)(ii) Spot's age, in dog years		7			42	

- (a) (i)** Fill in the row in the table showing Spot's age in years, given Emma's age.

[illegible]

Emma says that 1 year is the same as **7 dog years**.

- (ii) Fill in the row in the table showing Spot's age in dog years, given Emma's age.

- (b)** At the moment, Spot's age is **105 dog years**.

Work out Emma's age, in years.

[illegible]

Question 7 (Suggested maximum time: 5 minutes)

Question 7 (Suggested maximum time: 5 minutes)

The function h takes a **shape** as an input. The output is the **number of sides** of that shape.

(a) Complete the table below, showing the number of sides of four different shapes.

Shape: x	Number of sides: $h(x)$
Pentagon	5
Square	
Hexagon	
	3

(b) Write down the **range** of the function h , as shown in the table above.

Range = { , , }

Question 8 (Suggested maximum time: 5 minutes)

Question 8 (Suggested maximum time: 5 minutes)

(a) Find the value of $\frac{2n+1}{3n-2}$, when $n = 4$.

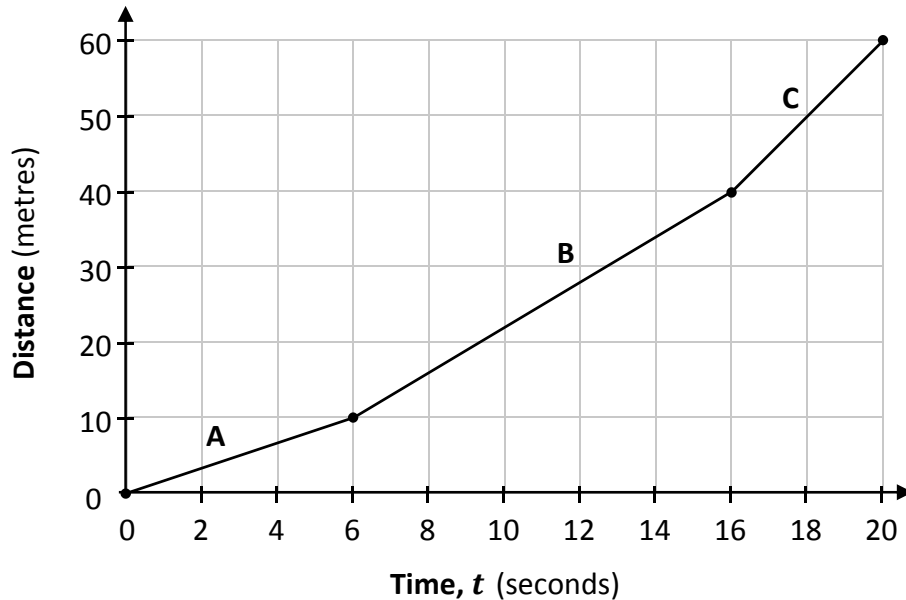
[illegible]

(b) Multiply out and simplify $(w + 4)(3w - 2)$.

[illegible]

(Suggested maximum time: 15 minutes)

The graph below shows the distance in metres travelled by Martin after t seconds during the race. The graph is in three sections, labelled **A**, **B**, and **C**.



-

-

- C**

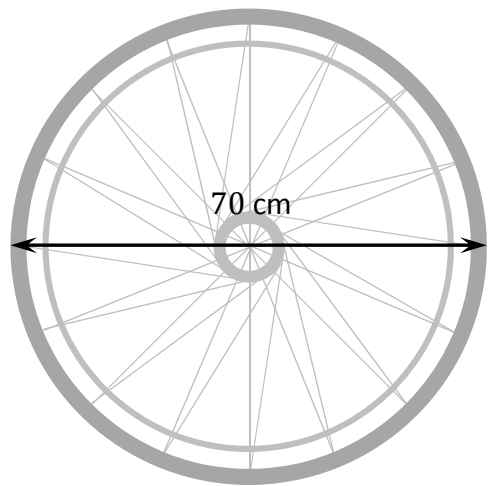
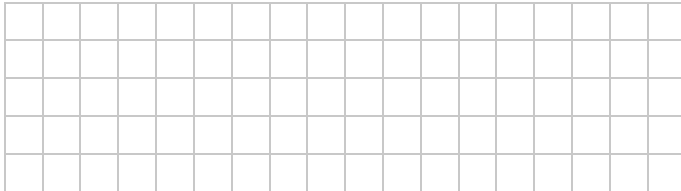
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Martin was racing in a wheelchair.

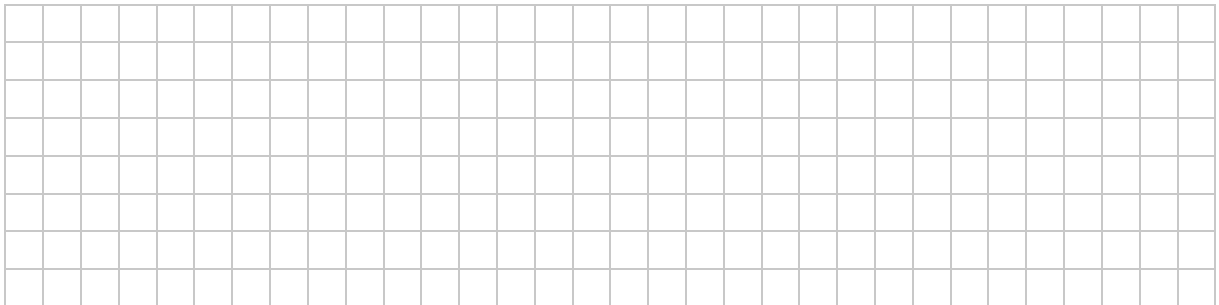
The **diameter** of the large circular wheel on Martin's wheelchair was 70 cm.

- (c) (i) Write down the **radius** of this wheel.

Radius = cm

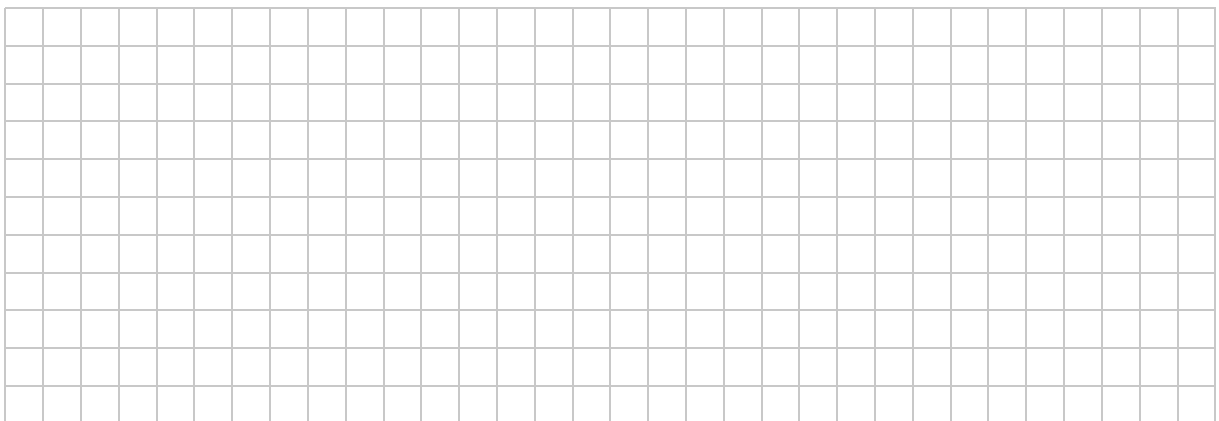


- (ii) Show that the length of the **perimeter** of this wheel was 220 cm, correct to the nearest centimetre.



Every time this wheel turned fully, the wheelchair travelled a distance equal to the length of the wheel's perimeter.

- (d) Find how many times this wheel turned **fully** during the 60 metre race.
Remember that there are 100 cm in one metre.



(Suggested maximum time: 5 minutes)

Note: x is an element of a different set ($\mathbb{N}$, $\mathbb{Z}$, or $\mathbb{R}$) in each case.

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- A horizontal number line with arrows at both ends. It has tick marks at every integer from -4 to 4, labeled with their respective numbers: -4, -3, -2, -1, 0, 1, 2, 3, 4.

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(Suggested maximum time: 5 minutes)

- $$x^2 + 4x - 5 = (x + 5)(\quad)$$

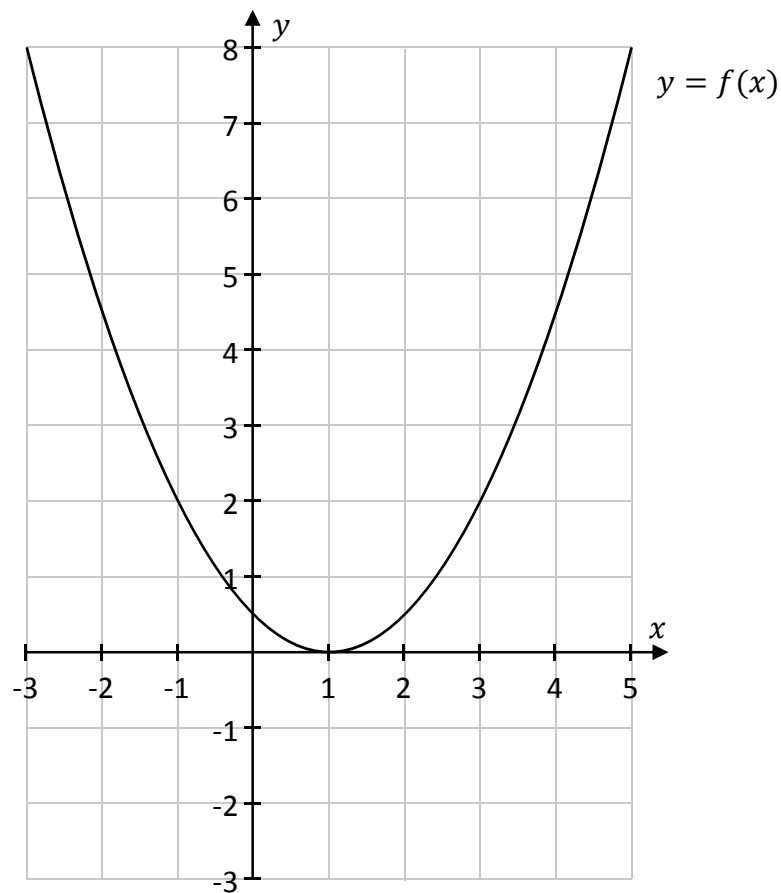
- [illegible]

Ordinary Level
Paper 1

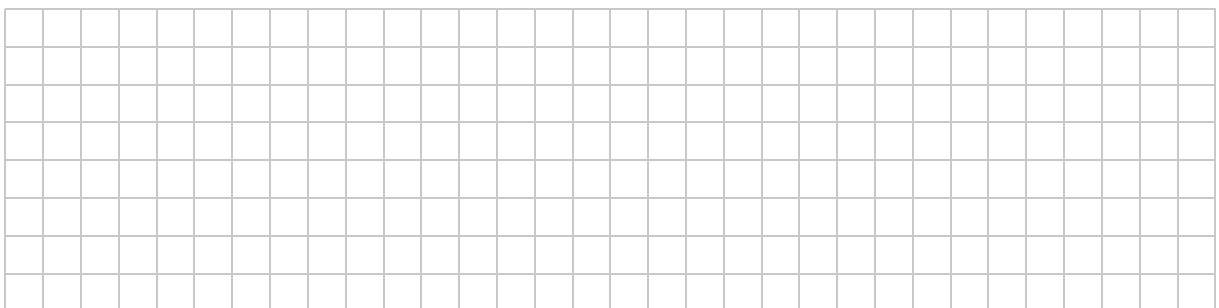
Question 12

(Suggested maximum time: 15 minutes)

- (a) The co-ordinate diagram below shows the graph of the function $y = f(x)$.

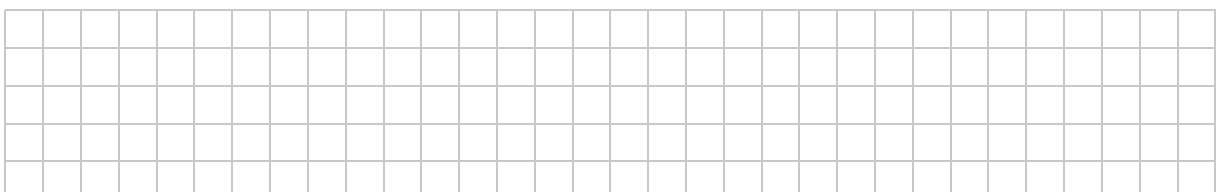


- (i) On the same axes, draw the graph of the line $g(x) = x + 3$, for $-3 \leq x \leq 5$, $x \in \mathbb{R}$.



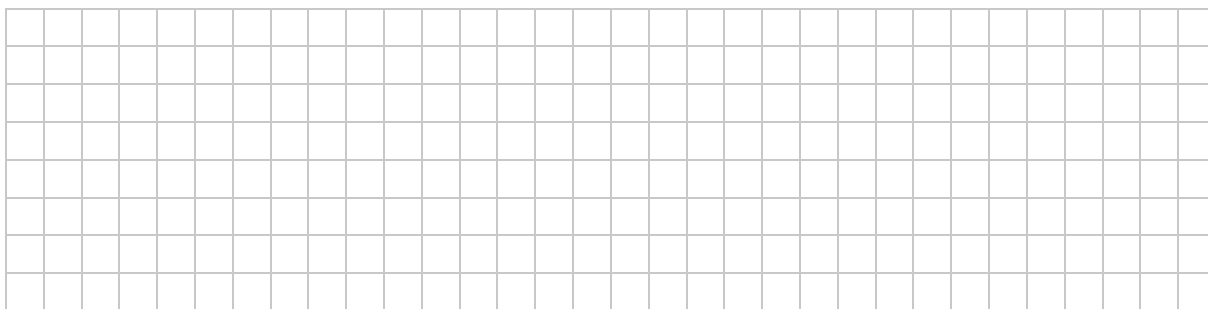
- (ii) Use the graphs to write down the points of intersection of $f(x)$ and $g(x)$.

Answer = (,) and (,)

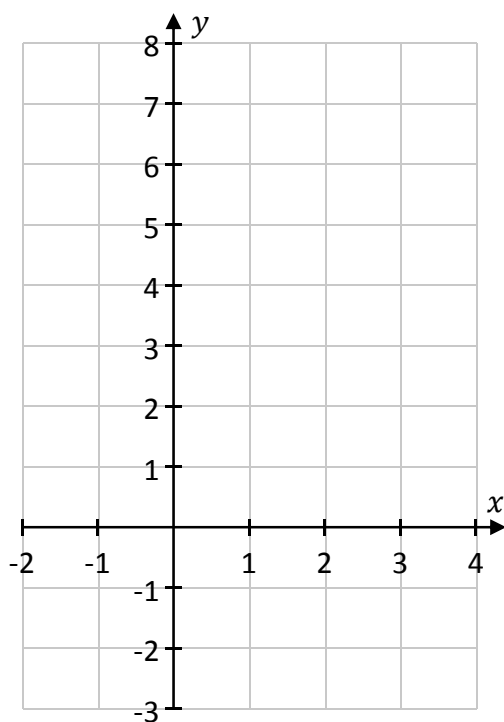


(b) Another function is $k(x) = x^2 - 2x - 1$.

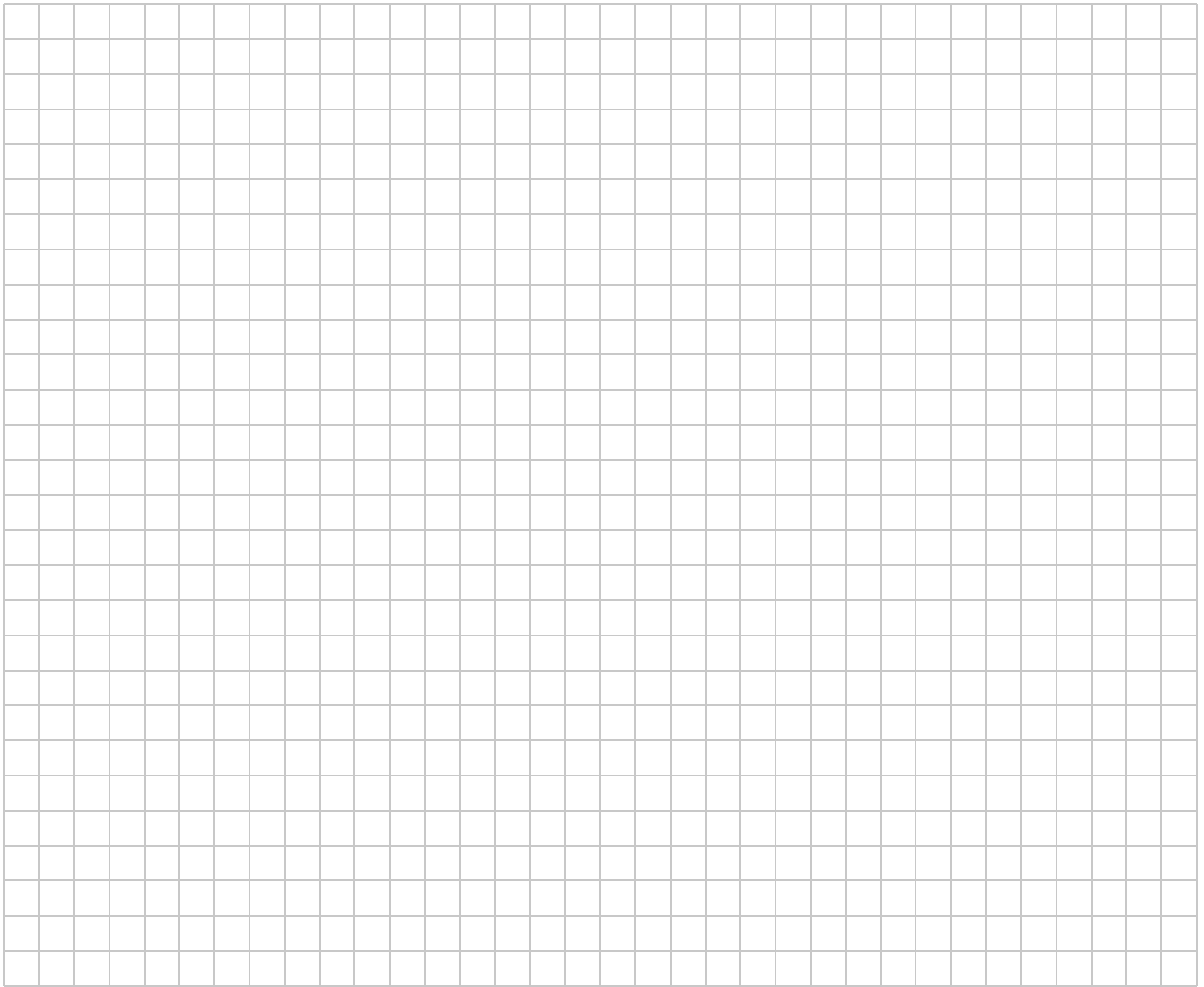
(i) Work out the value of $k(3)$.



(ii) Draw the graph of the function $k(x) = x^2 - 2x - 1$ on the axes below, for $-2 \leq x \leq 4$, $x \in \mathbb{R}$.



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