



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2014
Sample Paper

Mathematics
(Project Maths – Phase 3)

Paper 1

Foundation Level

Time: 2 hours, 30 minutes

300 marks

Examination number

Centre stamp

Running total	
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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:

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

Question 1**(25 marks)**

Use your calculator to answer the following.

- (a) Find $\sqrt{45.36}$, correct to two decimal places.

Answer: _____

- (b) Find the exact value of $183.7 - 21.3 \times 4.2$.

Answer: _____

- (c) Write $\frac{5}{6} - \frac{6}{7} + \frac{7}{8}$ as a decimal, correct to four decimal places.

Answer: _____

- (d) Use two consecutive whole numbers to complete the following sentence:

The value of $\pi^2 + \sqrt{2}$ lies between _____ and _____.

Question 3

(25 marks)

- (a) Write 6^3 and $81^{\frac{1}{2}}$ without using indices.

$6^3 =$	$81^{\frac{1}{2}} =$

- (b) Simplify $\frac{a^3 a^5}{a^2}$.

- (c) Express 2^{24} in the form $a \times 10^n$, where $1 \leq a < 10$ and $n \in \mathbb{N}$, correct to three significant figures.

- (d) The mass of Jupiter is 1.90×10^{27} kg and the mass of the earth is 5.97×10^{24} kg. How many times greater is the mass of Jupiter than the mass of the earth?

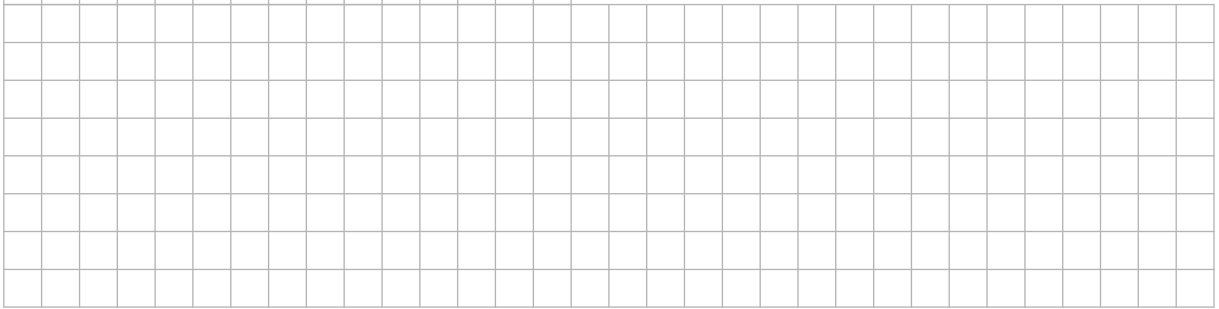
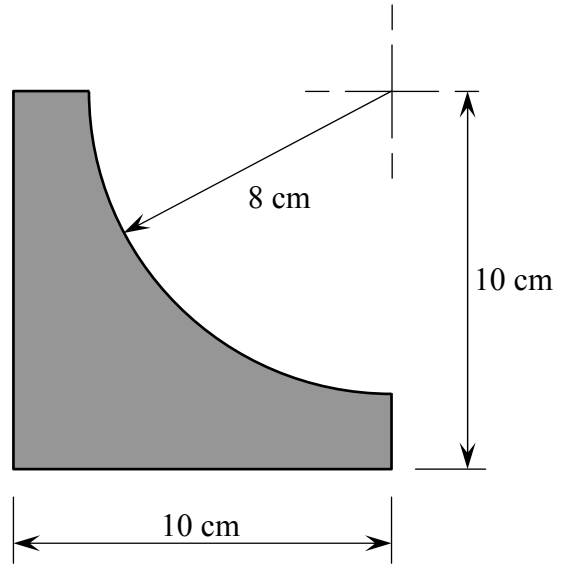
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Question 5

(25 marks)

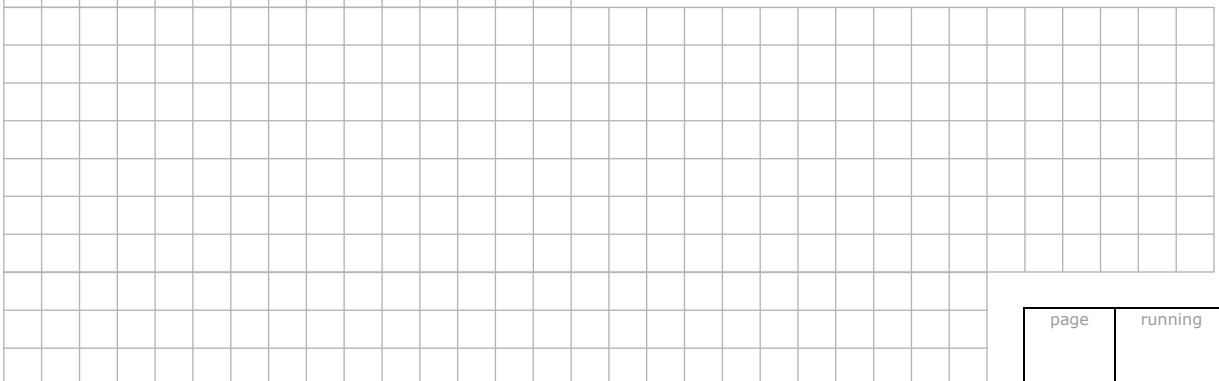
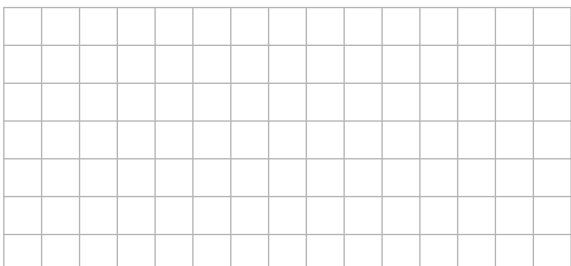
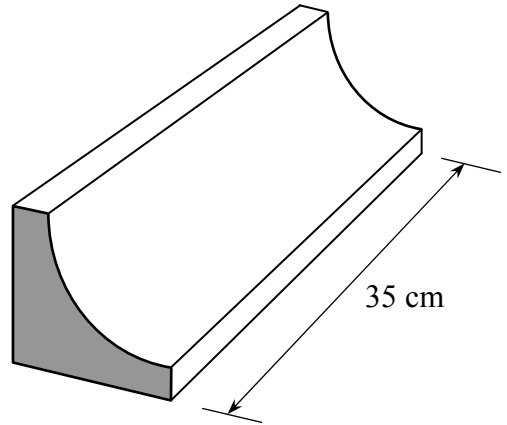
- (a) The shape shown in the diagram is a square from which a quarter of a disc has been removed.

Find the area of the shape, in cm^2 , correct to two decimal places.



- (b) The solid object shown is 35 cm long.
Its cross-section has the dimensions of the shape in part (a).

Find its volume, correct to the nearest cm^3 .



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Question 6

(25 marks)

- (a) Evaluate $\frac{4h-2k}{3h+k}$ when $h=3$ and $k=1$.

- (b) Solve the simultaneous equations:

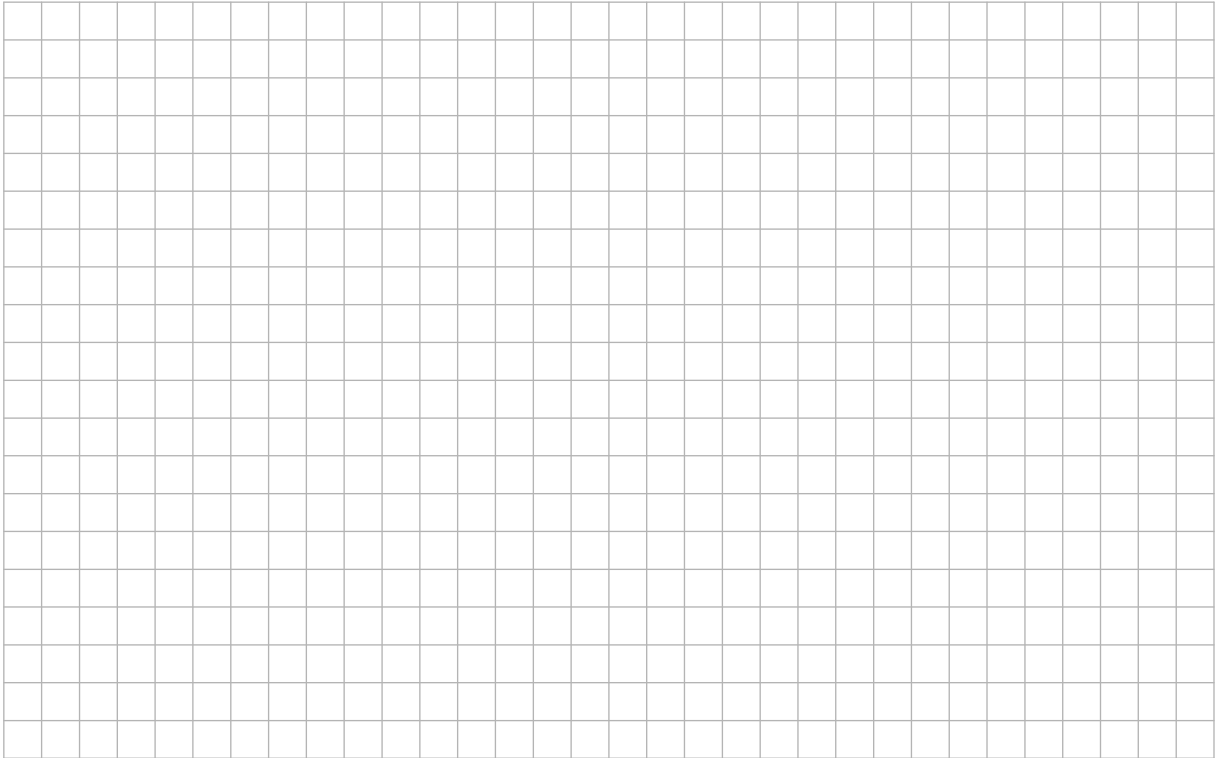
$$2x - 3y = 2$$

$$3x + 5y = 41.$$

Question 7

(25 marks)

(a) Solve the equation $x^2 - 7x + 6 = 0$.



(b) Solve the equation $t^2 - 6t - 23 = 0$, giving your answers correct to two decimal places.

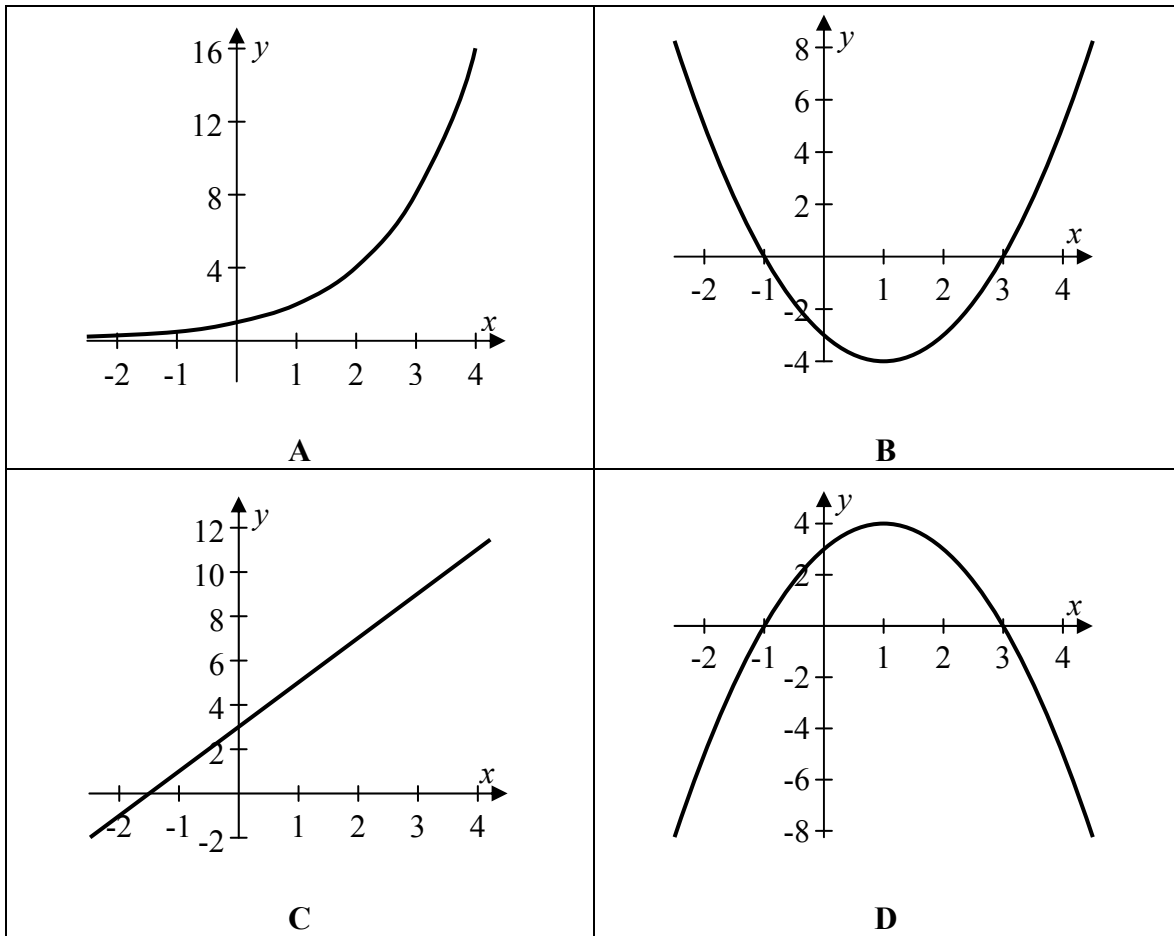


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Question 8

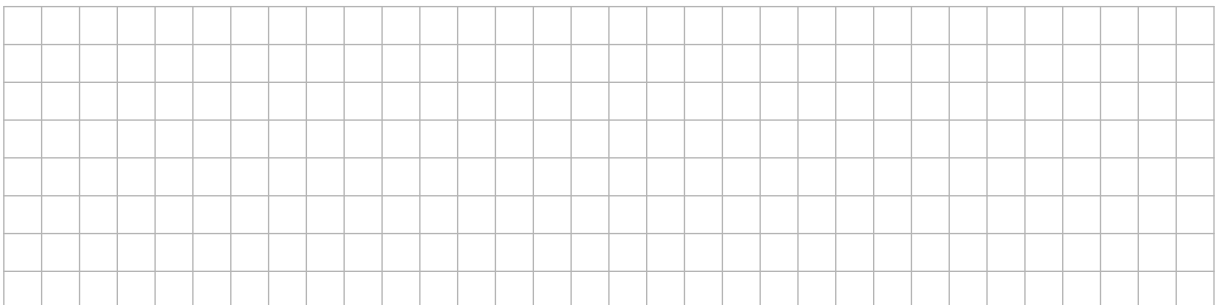
(25 marks)

- (a) The graphs of four functions are shown below. The graphs are labelled **A**, **B**, **C**, and **D**. The four functions are listed in the table beneath the graphs. Match the graphs to the functions, by putting the correct letter beside each one in the table.



Function	Graph
$f(x) = 2x + 3$	
$g(x) = (x - 3)(x + 1)$	
$h(x) = 2^x$	
$j(x) = 3 + 2x - x^2$	

- (b) For any **one** of the functions above, explain how you decided on your answer.



Answer **both** Question 9 **and** Question 10.

Question 9

(40 marks)

(a) Róisín was trying to calculate the volume of a tin of beans. She measured the diameter and used it to find the radius. She measured the height. Then she used the formula $V = \pi r^2 h$.

The answer Róisín got was $485\,000\text{ cm}^3$. She knows that she must have made a mistake.

(i) Explain why Róisín knows that she made a mistake.

(ii) Roughly, what answer do you think Róisín should have got?

(iii) Róisín's calculations are shown here.
Explain the mistake she made.

$$d = 76 \text{ mm, so } r = 38$$

$$h = 107$$

$$\pi r^2 h = (3.14)(38)^2(107)$$

$$= 485,155.12$$

$$\approx 485,000 \text{ cm}^3.$$

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(b) An extract from an electricity bill is shown.
Some of the numbers are missing, and are labelled (A), (B), (C), (D), (E), (F).

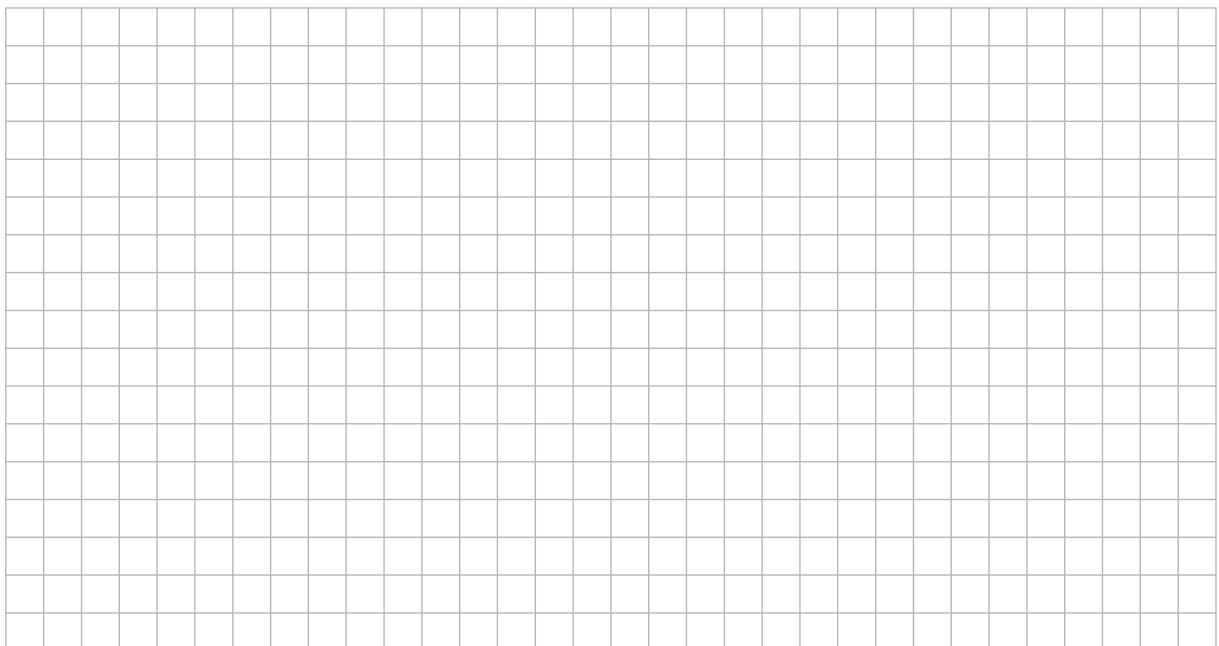
METER NO.	METER READINGS		ELECTRICITY USED	METER READING TYPES A: Actual reading C: Customer reading E: Estimated reading
	PRESENT	PREVIOUS	kWh	
Z0000001234	8020 A	7053 C	(A)	

			AMOUNT €
Discount Tariff – Urban Day			
Description	Units	Rate	
Standing charge	61 days	25.20 cent/day	(B)
24 hour units	(C)	14.10 cent/kWh	136.35
Direct debit discount		12%	15.99 CR
Total excluding V.A.T.			(D)
V.A.T. at 13.5%			(E)

PLEASE PAY BY	TOTAL €
Direct Debit 21 Sept 10	(F)

Calculate the missing numbers, and insert them in the table below.

A	B	C	D	E	F



(c) Mary has €10·00. Use the graph to work out how far will she be able to travel by taxi.

Answer: _____

(d) Write down a formula to represent the fare for any given distance in this range. State clearly the meaning of any letters used in your formula.



(e) Use your formula from part (d) to verify your answer to part (c).



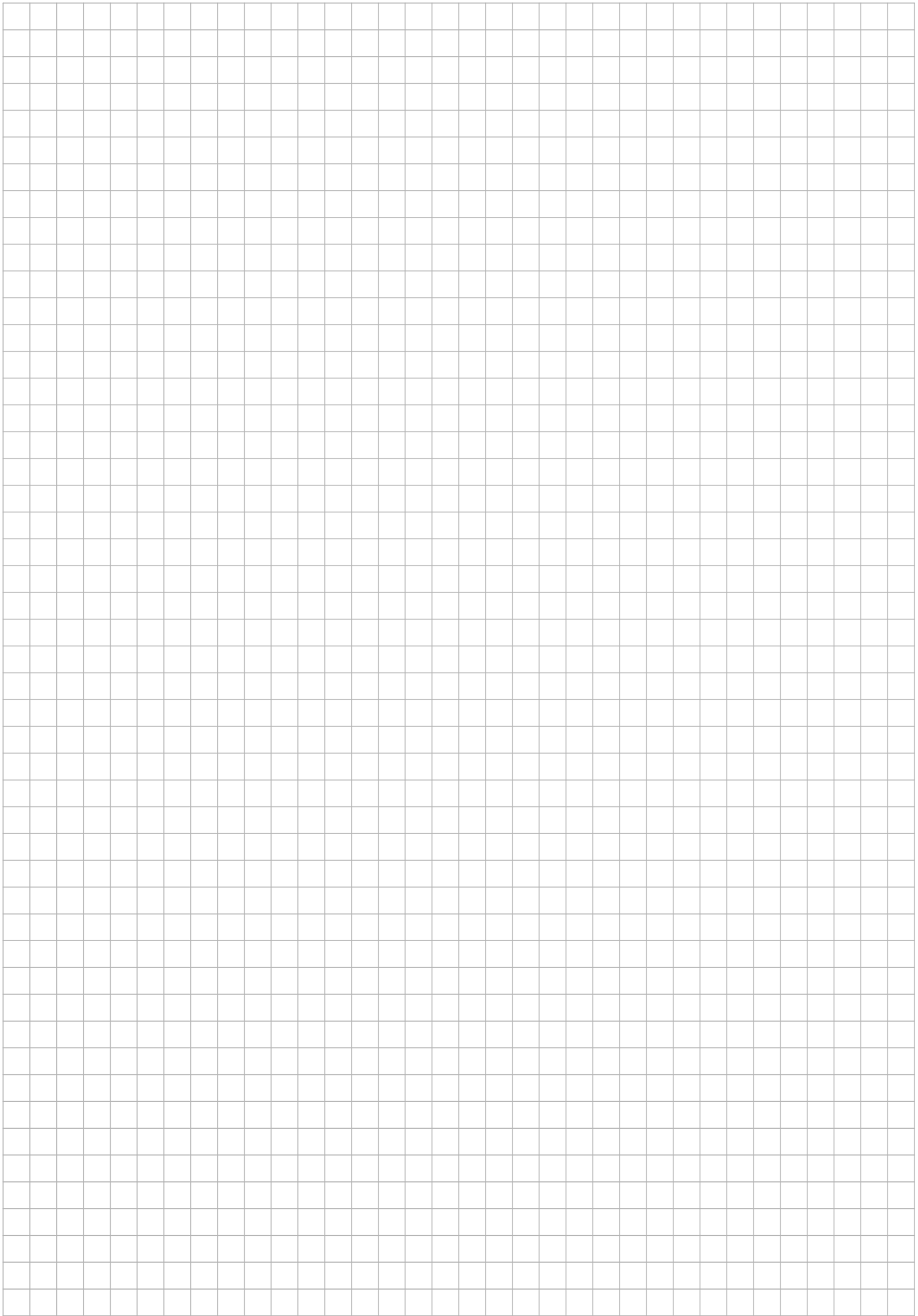
(f) Suppose that there is a suggestion to change the way that taxi fares are calculated. The suggestion is that the fare should be calculated using the formula:

$$f = 200 + 10d^2,$$

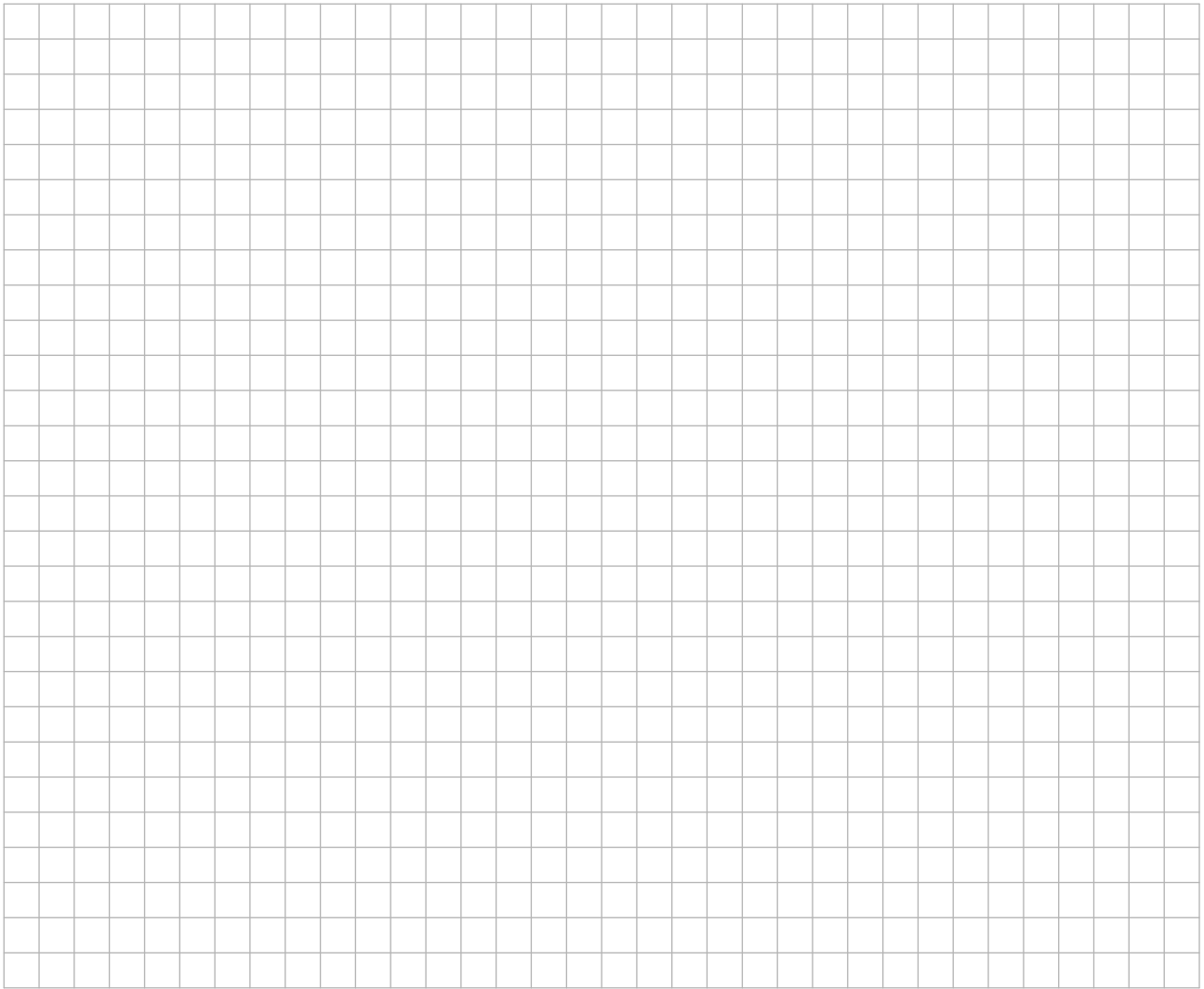
where f is the fare in cent and d is the distance travelled, in kilometres.

We want to see how fares worked out with this rule would compare to the old fares.

Using tables, graphs, or otherwise, work out which journeys, if any, would be cheaper with the new rule.



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Note to readers of this document:

This sample paper is intended to help teachers and candidates prepare for the June 2014 examination in *Mathematics* under Phase 3 of *Project Maths*. The content and structure do not necessarily reflect the 2015 or subsequent examinations.

Section A of the examination paper will consist of eight questions, each carrying 25 marks.

Section B will consist of two, three, or four questions. These questions will not necessarily carry equal marks. The number of marks for each will be stated on the examination paper. The total number of marks for Section B will be 100.

Leaving Certificate 2014 – Foundation Level

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Sample Paper

Time: 2 hours 30 minutes