



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate Examination 2012
Sample Paper

Mathematics
(Project Maths – Phase 2)

Paper 1

Higher Level

Time: 2 hours, 30 minutes

300 marks

Examination number

Centre stamp

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

Grade

Instructions

There are 13 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.

Question 13 carries a total of 50 marks.

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 booklet of *Formulae and Tables*. 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:

- (b) How many divisors does each of the numbers in $(A \cup B \cup C)'$ have? _____
- (c) What name is given to numbers that have this many divisors? _____

Question 3

(Suggested maximum time: 10 minutes)

A group of 100 students were surveyed to find whether they drank tea (T), coffee (C) or a soft drink (D) at any time in the previous week.

24 had not drunk any of the three.

51 drank tea or coffee but not a soft drink.

41 drank tea.

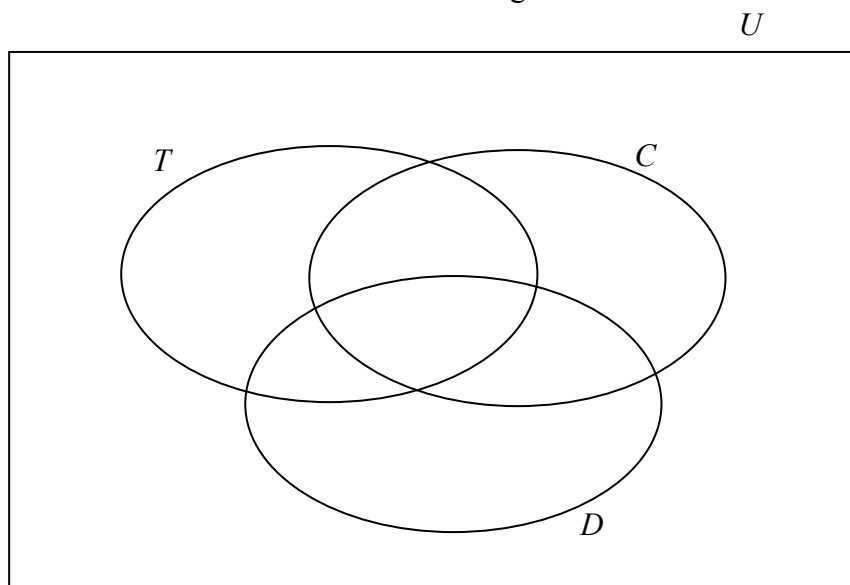
20 drank at least two of the three.

8 drank tea and a soft drink but not coffee.

9 drank a soft drink and coffee.

4 drank all three.

- (a) Represent the above information on the Venn diagram



- (b) Find the probability that a student chosen at random from the group had drunk tea or coffee.

- (c) Find the probability that a student chosen at random from the group had drunk tea and coffee but not a soft drink.

Question 5

(Suggested maximum time: 10 minutes)

A meal in a restaurant cost Jerry €136.20. The price included VAT at 13.5%. Jerry wished to know the price of the meal before the VAT was included. He calculated 13.5% of €136.20 and subtracted it from the cost of the meal.

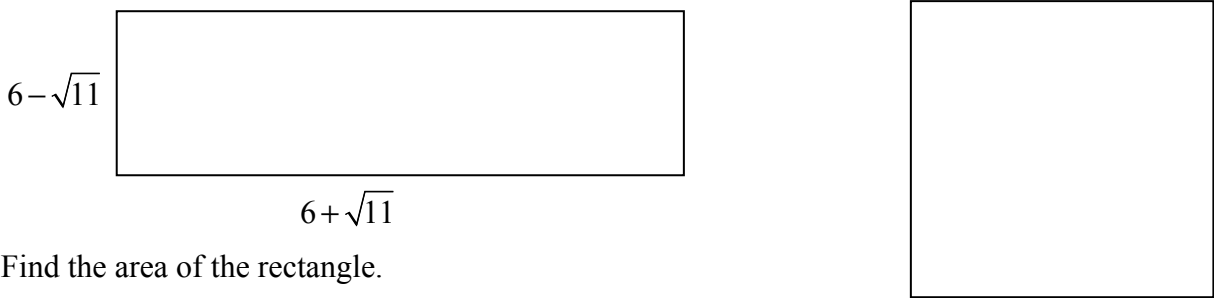
- (a) Explain why Jerry will not get the correct answer using this method.

- (b) From July 1, 2011, the VAT rate on food, in restaurants, was reduced to 9%. How much would Jerry have paid for the meal after this date if the VAT reduction was correctly applied?

Question 6

(Suggested maximum time: 5 minutes)

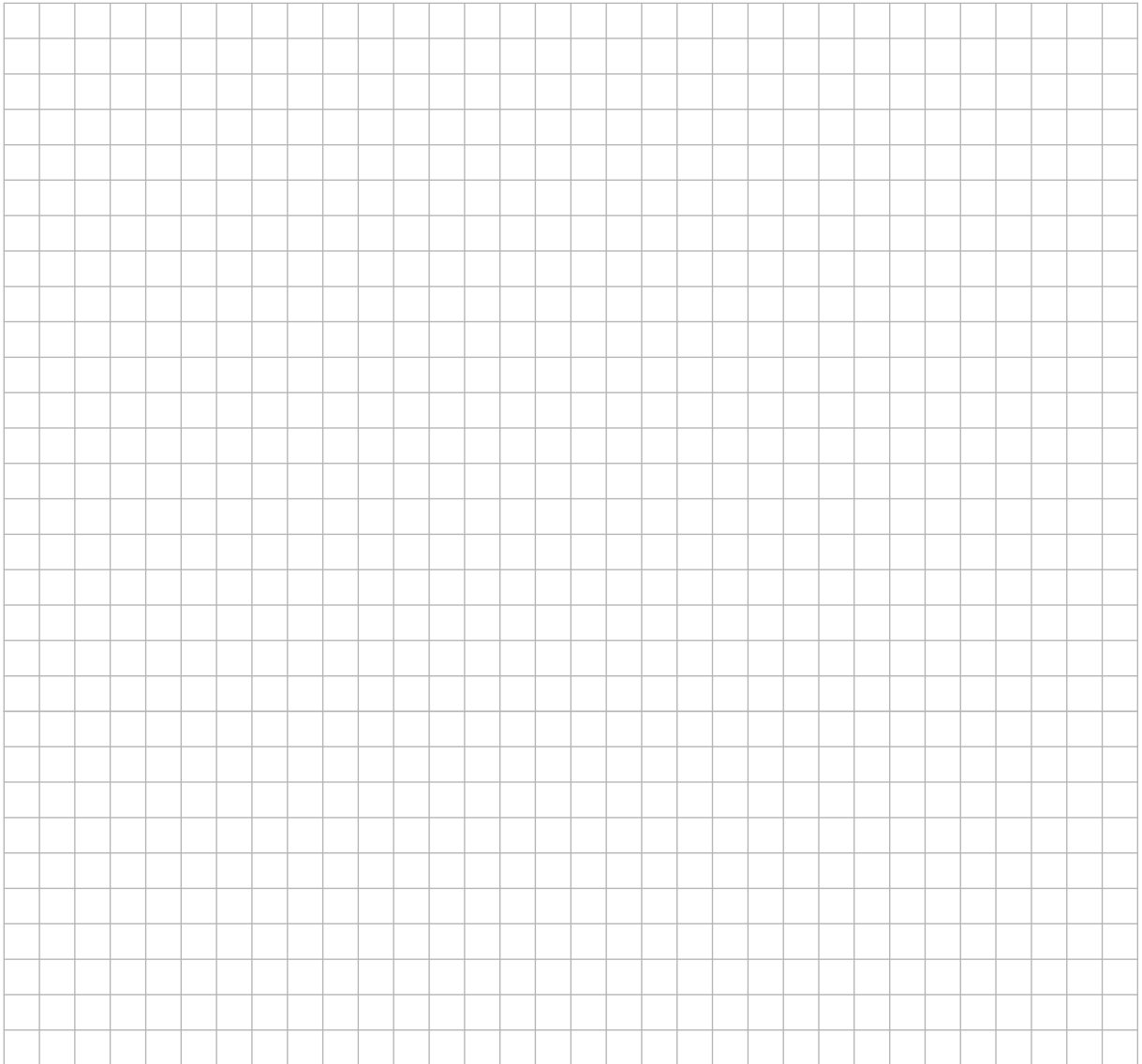
The rectangle and square below have the same area. The dimensions of both are in cm. The diagrams are not drawn to scale.



- (a) Find the area of the rectangle.

- (b) Find the length of one side of the square. _____

- (c) If $n^2 - m^2$, $2nm$ and $n^2 + m^2$ are the lengths of the sides of a triangle, show that the triangle is right angled.



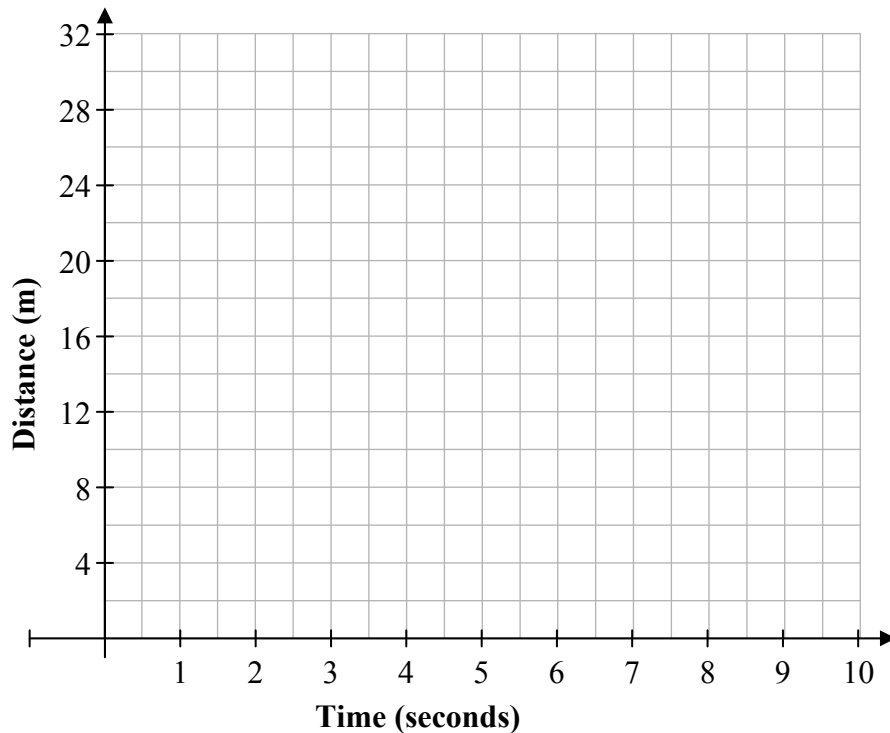
Question 9**(Suggested maximum time: 10 minutes)**

Bill and Jenny are two athletes running in the same direction at steady speeds on a race-track. Tina is standing beside the track. At a particular time, Bill has gone 7 m beyond Tina and his speed is 2 m/s. At the same instant Jenny has gone 2 m beyond Tina and her speed is 3 m/s.

- (a) Complete the table below to show the distance between two runners and Tina over the next 10 seconds.

Time	Bill Distance (m)	Jenny Distance (m)
0	7	2
1	9	
2		
3		
4		
5		
6		
7		
8		
9		
10		

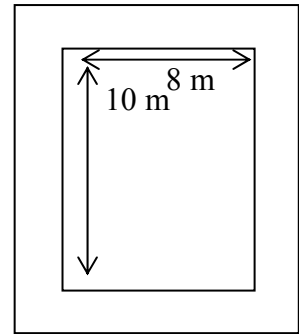
- (b) On the grid below draw graphs for the distance between Bill and Tina and the distance between Jenny and Tina over the 10 seconds.



Question 10

(Suggested maximum time: 20 minutes)

A plot consists of a garden measuring 8 m by 10 m surrounded by a path. The total area of the plot is 143 m². Three students, Kevin, Elaine and Tony, have been given the problem of trying to find the width of the path. Each of them is using a different method, but all of them are using x to represent the width of the path.

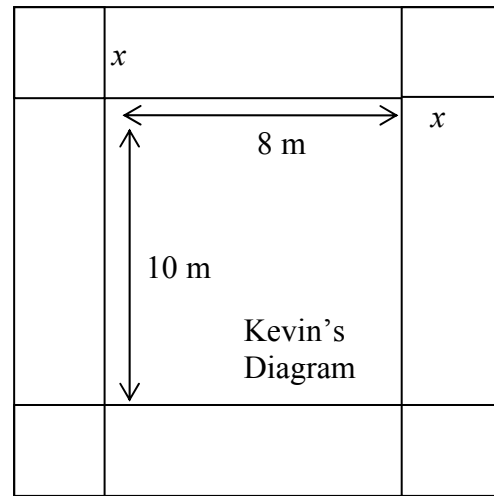


Kevin divides the path into eight pieces. He writes down the area of each piece in terms of x . He then forms an equation by setting the area of the path plus the area of the garden equal to the total area of the plot.

(a) Write, in terms of x , the area of each section into Kevin's diagram below.

(b) Write down and simplify the equation which you think Kevin got. Give your answer in the form $ax^2 + bx + c = 0$.

Equation:

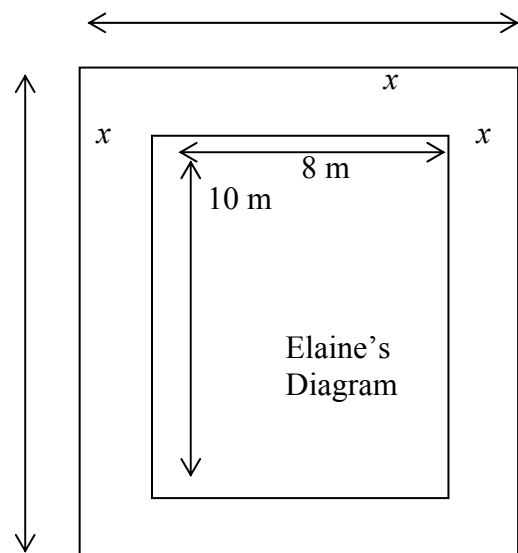


Elaine writes down the length and width of the plot in terms of x . She multiplies these and sets the answer equal to the total area of the plot.

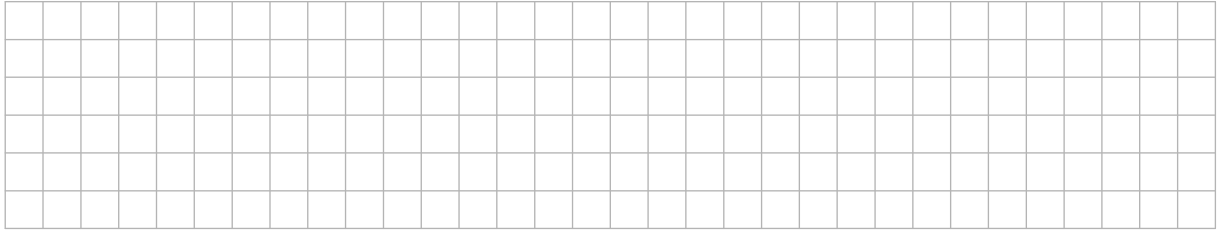
(c) Write, in terms of x , the length and width of the plot on Elaine's diagram.

(d) Write down and simplify the equation which you think Elaine got. Give your answer in the form $ax^2 + bx + c = 0$.

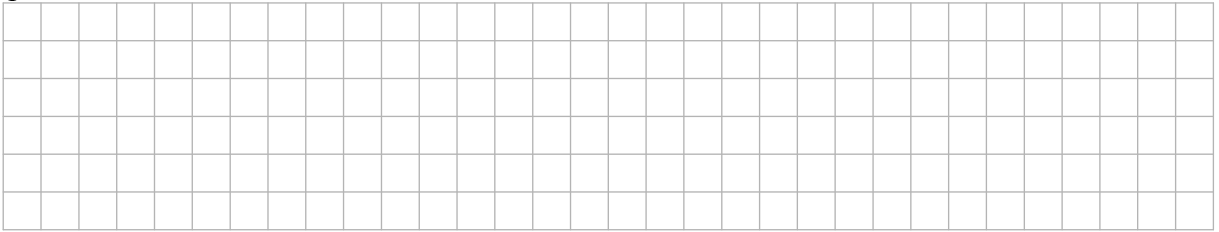
Equation:



(e) Solve an equation to find the width of the path.

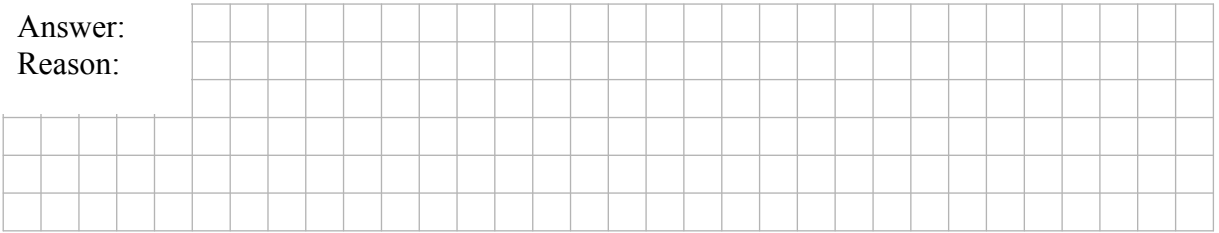


(f) Tony does not answer the problem by solving an equation. Instead, he does it by trying out different values for x . Show some calculations that Tony might have used to solve the problem.



(g) Which of the three methods do you think is best? Give a reason for your answer.

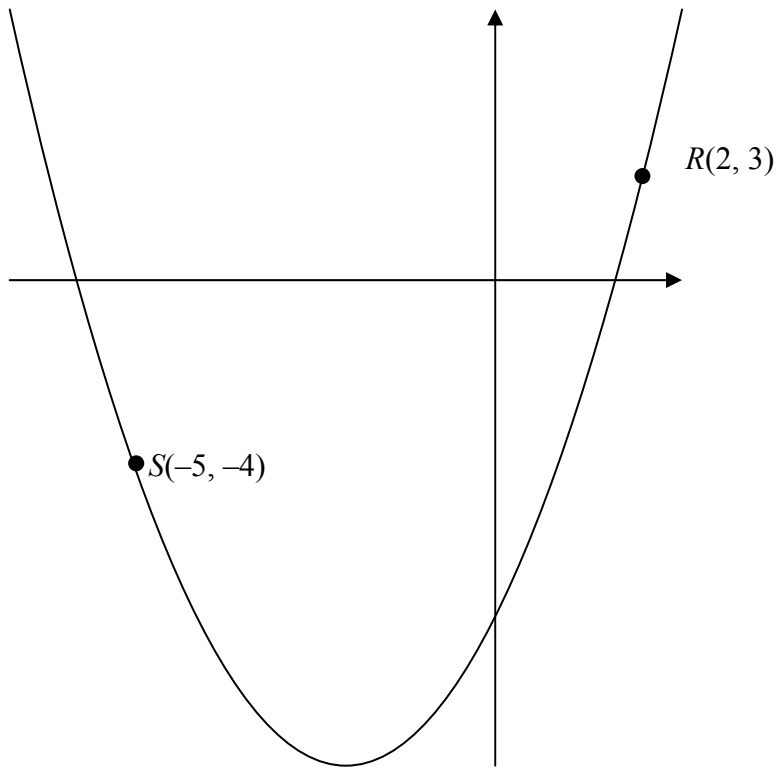
Answer:
Reason:



Question 11

(Suggested maximum time: 20 minutes)

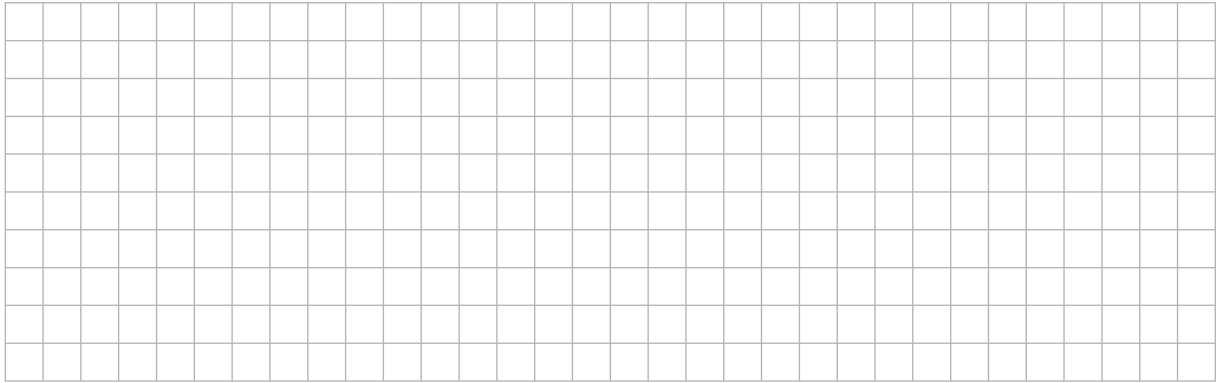
Part of the quadratic function $y = x^2 + ax + b$ where $a, b \in \mathbb{Z}$ is shown below.



The points $R(2, 3)$ and $S(-5, -4)$ are on the curve.

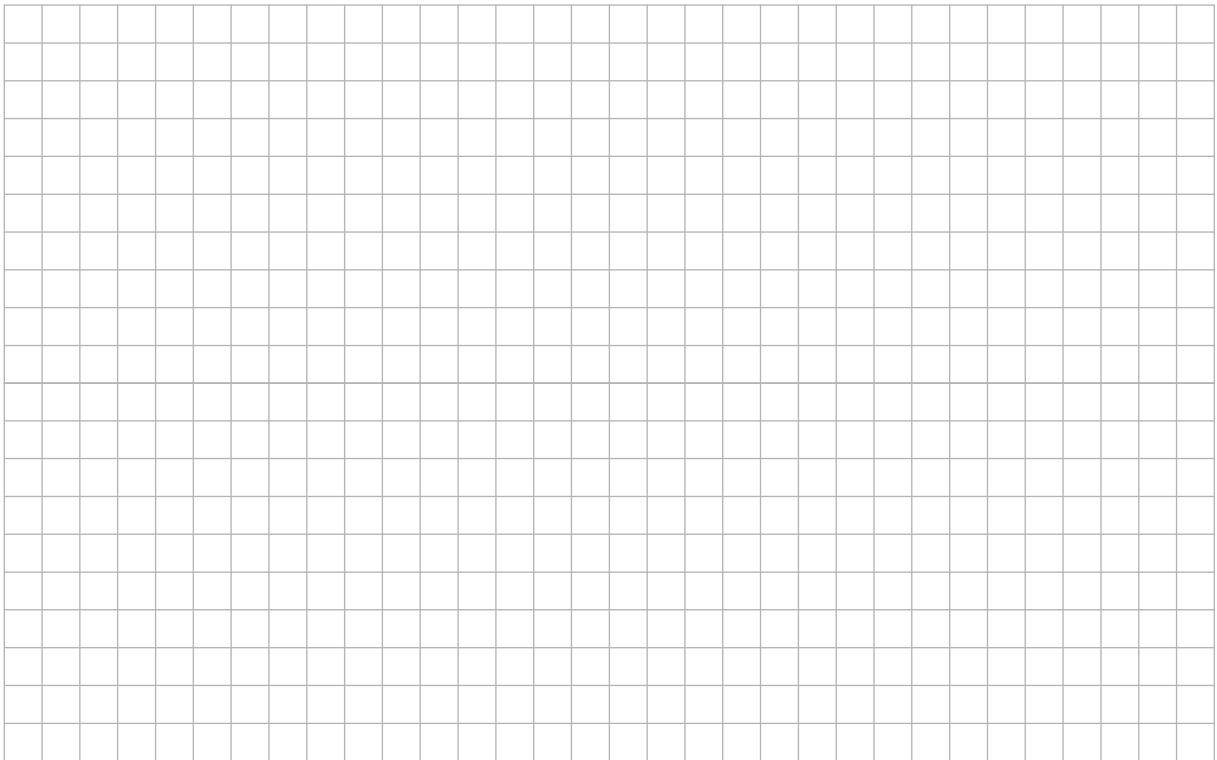
- (a) Use the given points to form two equations in a and b .

(b) Solve your equations to find the value of a and the value of b .



(c) Write down the co-ordinates of the point where the curve crosses the y -axis. (,)

(d) Find the points where the curve crosses the x -axis. Give your answers correct to one place of decimals.

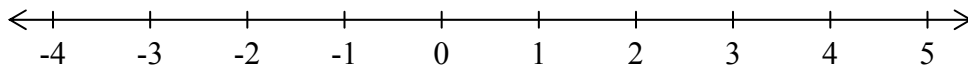


Question 12

(Suggested maximum time: 5 minutes)

(a) Solve the inequality $-2 < 5x + 3 \leq 18$, $x \in \mathbb{R}$.

(b) Graph your solution on the number line below.



(c) Niamh is in a clothes shop and has a voucher which she **must** use. The voucher gives a €10 reduction when more than €35 is spent. She also has €50 cash. Write down an inequality in x to show the range of money she could spend in the shop.

$$\square \leq x \leq \square$$

Write down an inequality in y to show the price range of articles she could buy.

$$\square \leq y \leq \square$$

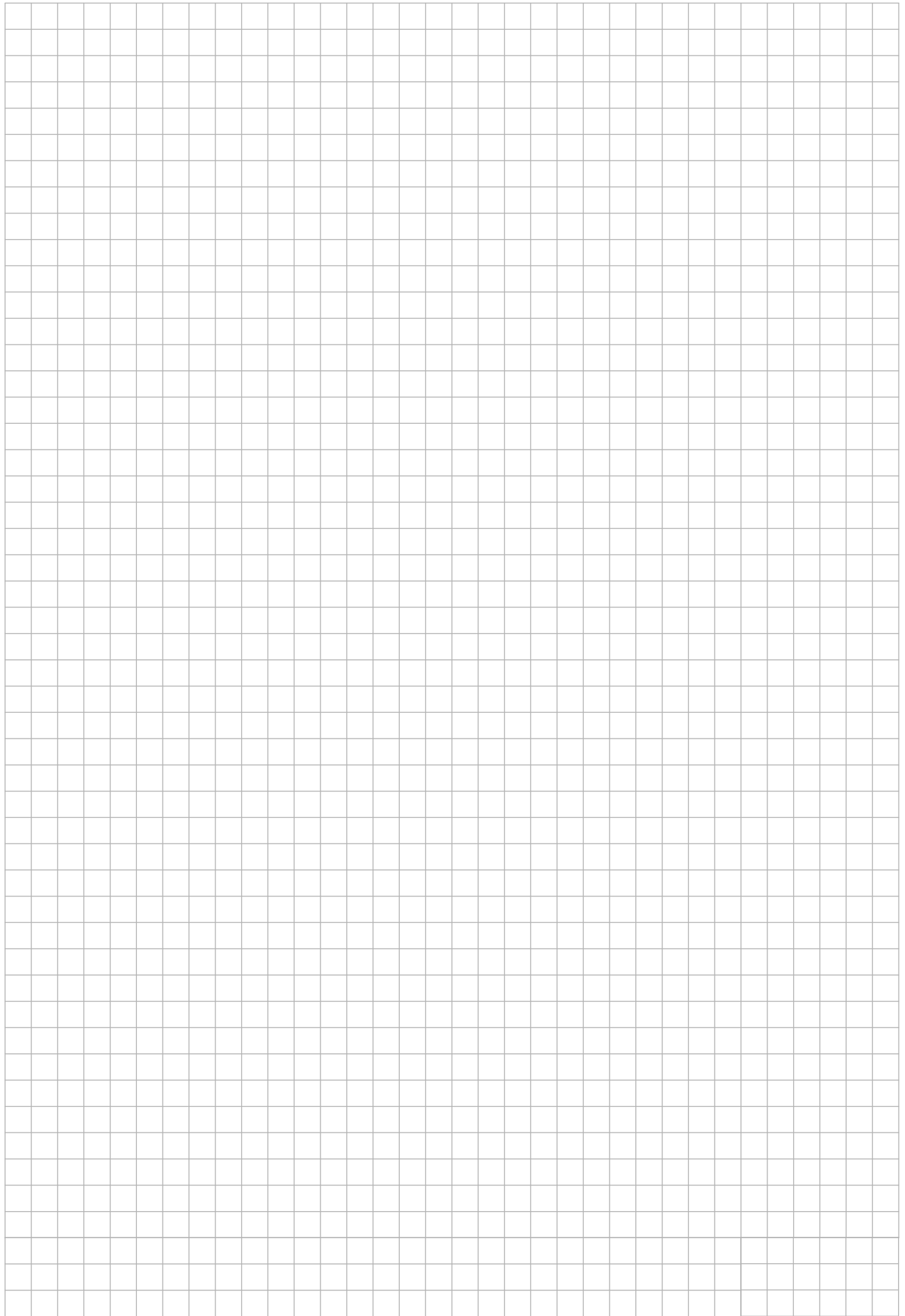
Question 13

(Suggested maximum time: 20 minutes)

(a) A function is defined by $f(x) = 3x - 4$. Given that $f(k) = 11$, find the value of k .

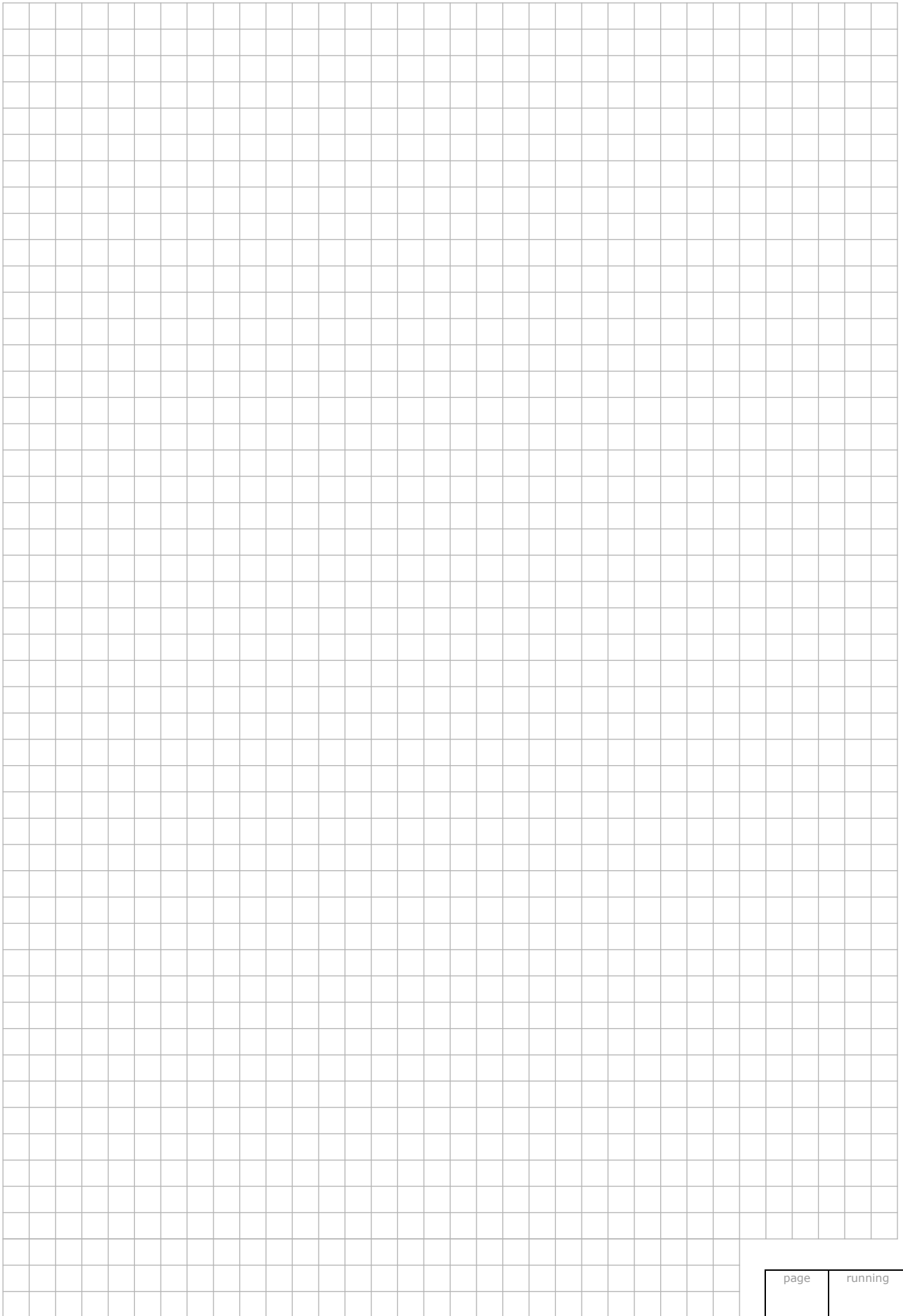
(b) Let f be the function $f: x \mapsto 7x - x^2$.

Draw the graph of f for $0 \leq x \leq 7$, $x \in \mathbb{R}$.

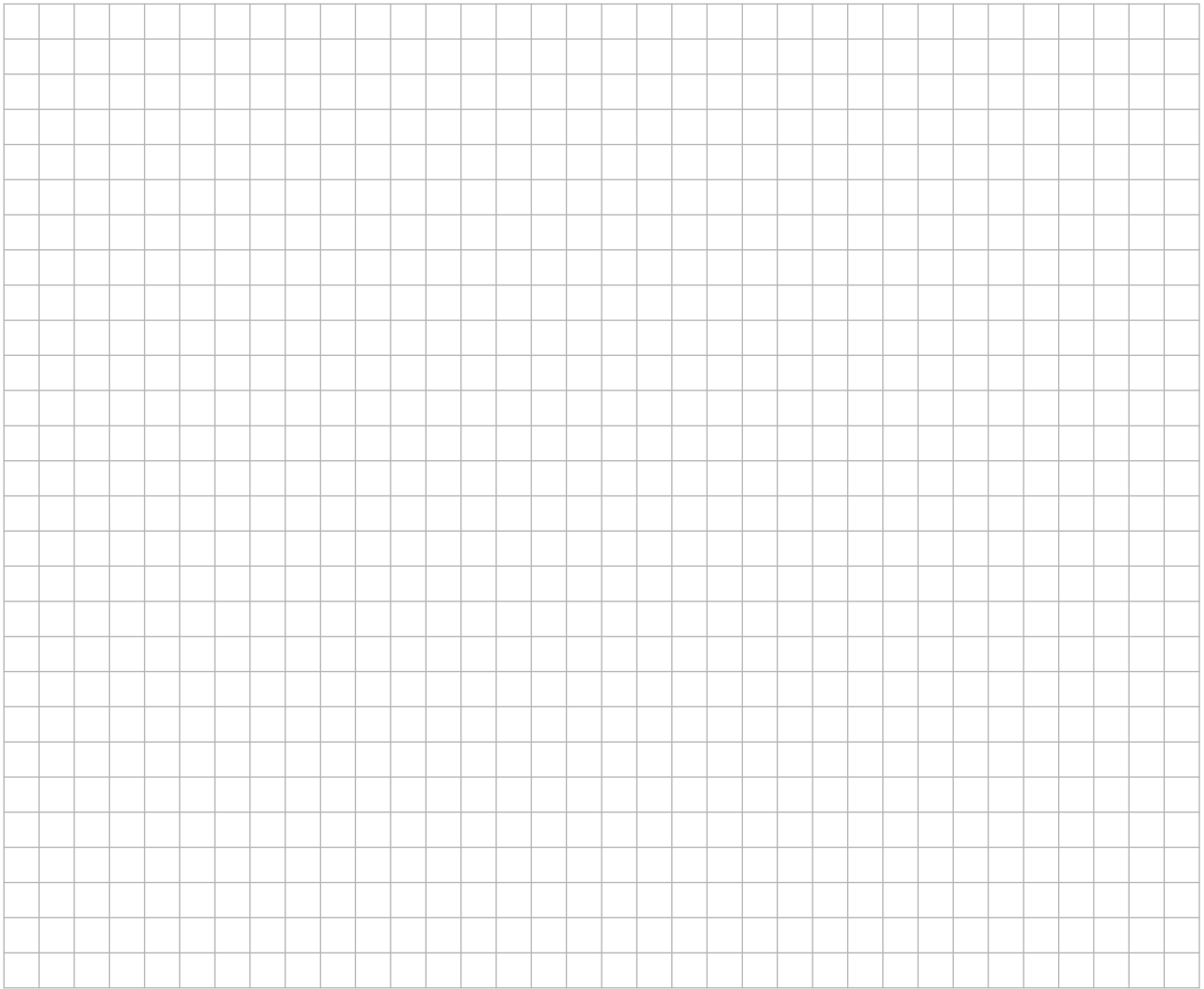


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Note to readers of this document:

This sample paper is intended to help teachers and candidates prepare for the June 2012 examination in the *Project Maths* initial schools. The content and structure do not necessarily reflect the 2013 or subsequent examinations in the initial schools or in all other schools.

In the 2012 examination, one question will be the same as a question on the examination for candidates who are not in the initial schools. On this sample paper, the corresponding question from the 2011 examination has been inserted as question 13, to illustrate.

Junior Certificate 2012 – Higher Level

Mathematics (Project Maths, Phase 2) – Paper 1

Sample Paper

Time: 2 hours 30 minutes