



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate Examination, 2012

Mathematics
(Project Maths – Phase 2)

Paper 2

Higher Level

Monday 11 June Morning 9:30 to 12:00
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 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.

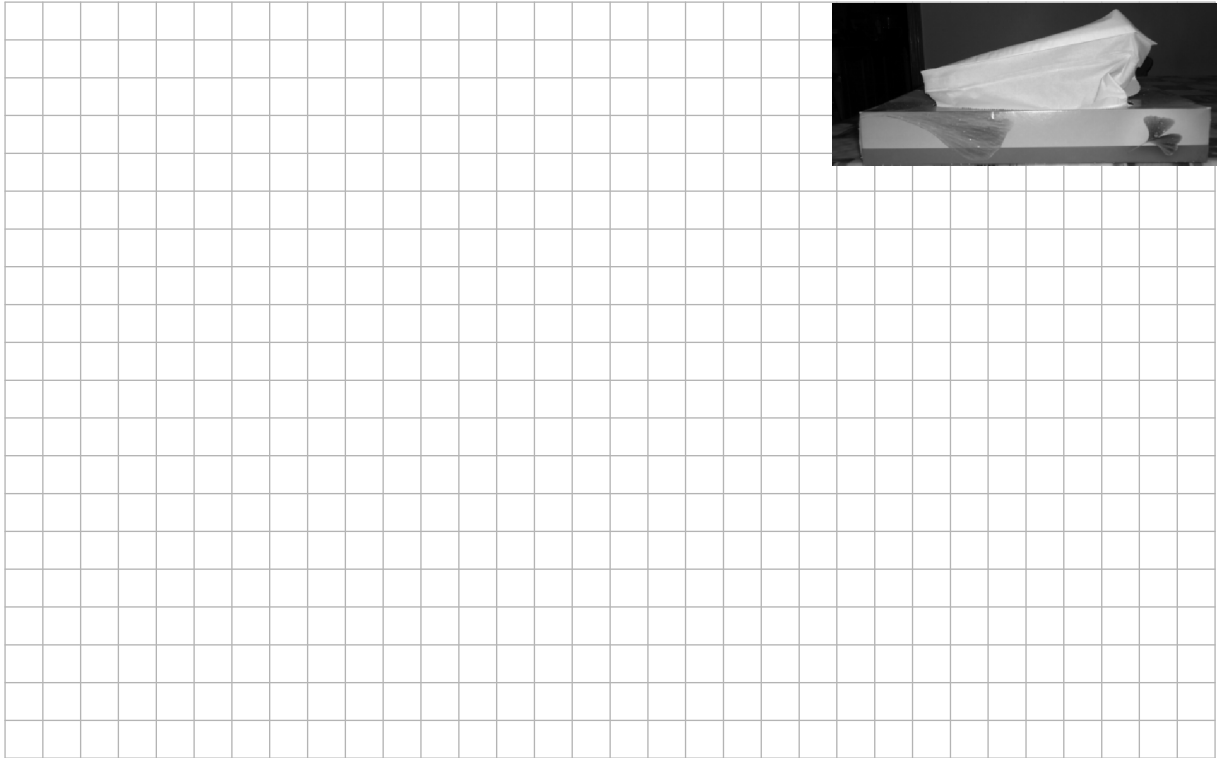
Answers should be given in simplest form, where relevant.

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

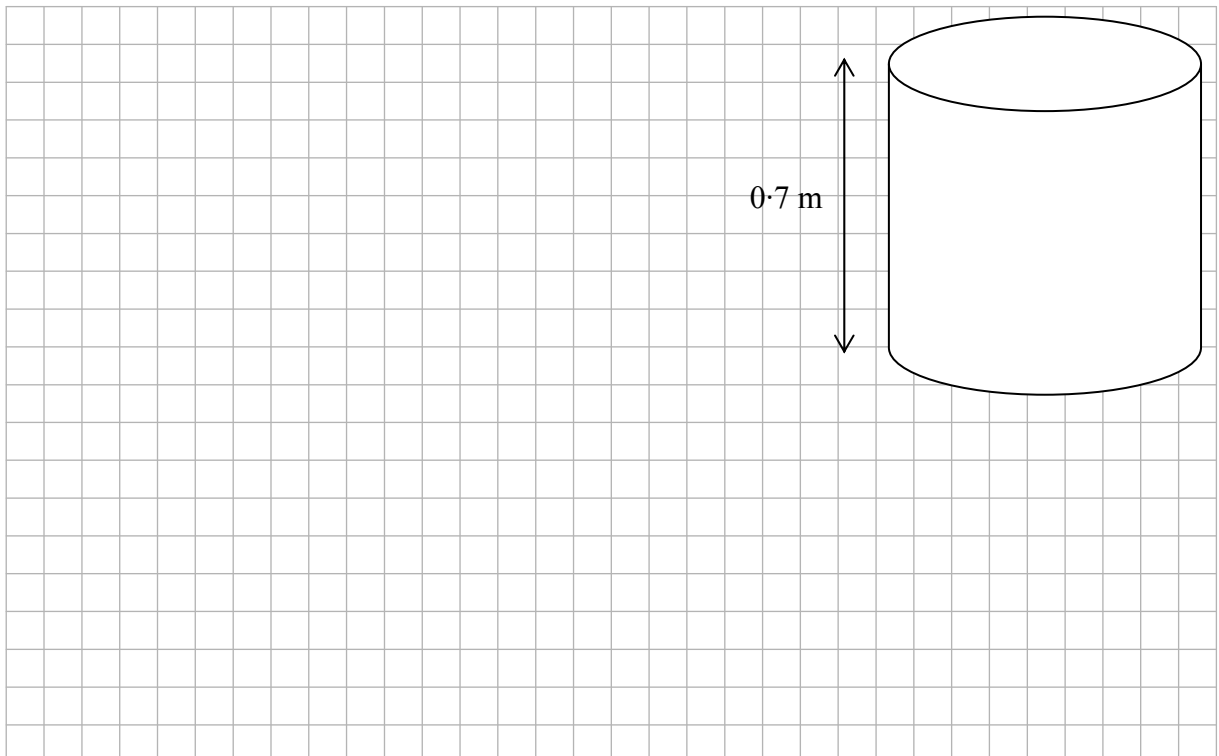
--

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

A tissue measures $300\text{ mm} \times 260\text{ mm}$. There are 100 tissues in a box.
Find the total area of tissue in the box in m^2 .

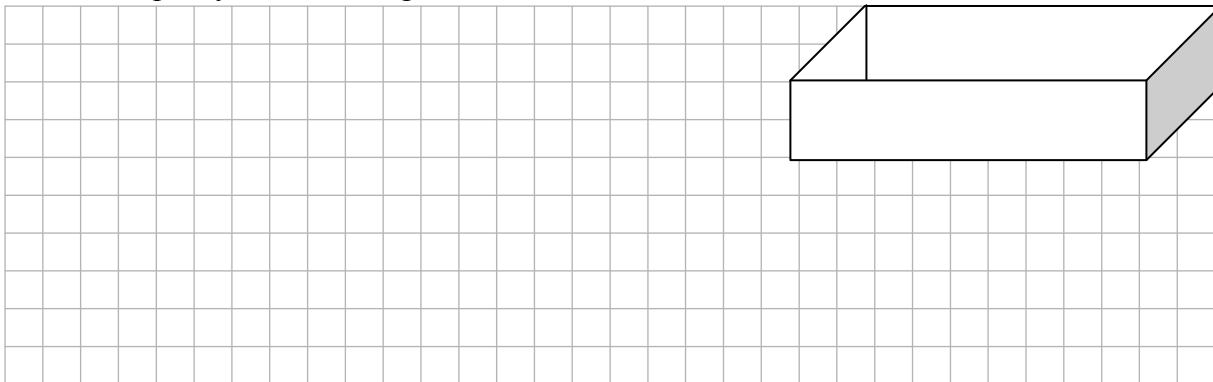
**Question 2****(Suggested maximum time: 10 minutes)**

- (a) A container in the shape of a cylinder has a capacity of 50 litres. The height of the cylinder is 0.7 m . Find the length of the diameter of the cylinder.
Give your answer correct to the nearest whole number.

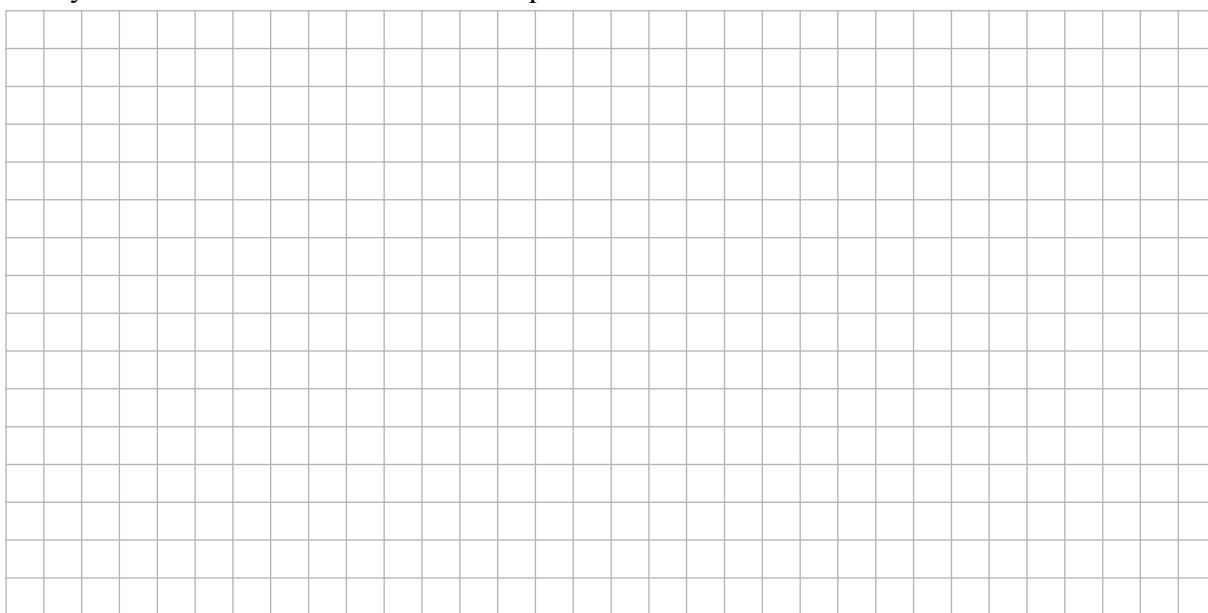


page	running
------	---------

- (b) A rectangular tank has a length of 0.6 m, a width of 0.35 m and its height measures 15 cm. Find the capacity of the rectangular tank.



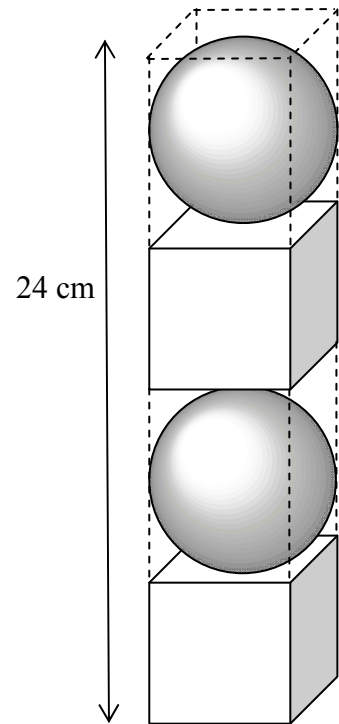
- (c) The rectangular tank is full of water. This water is then poured into the cylindrical container in (a) above. Find the depth of water in the cylinder. Give your answer correct to one decimal place.



Question 3

(Suggested maximum time: 10 minutes)

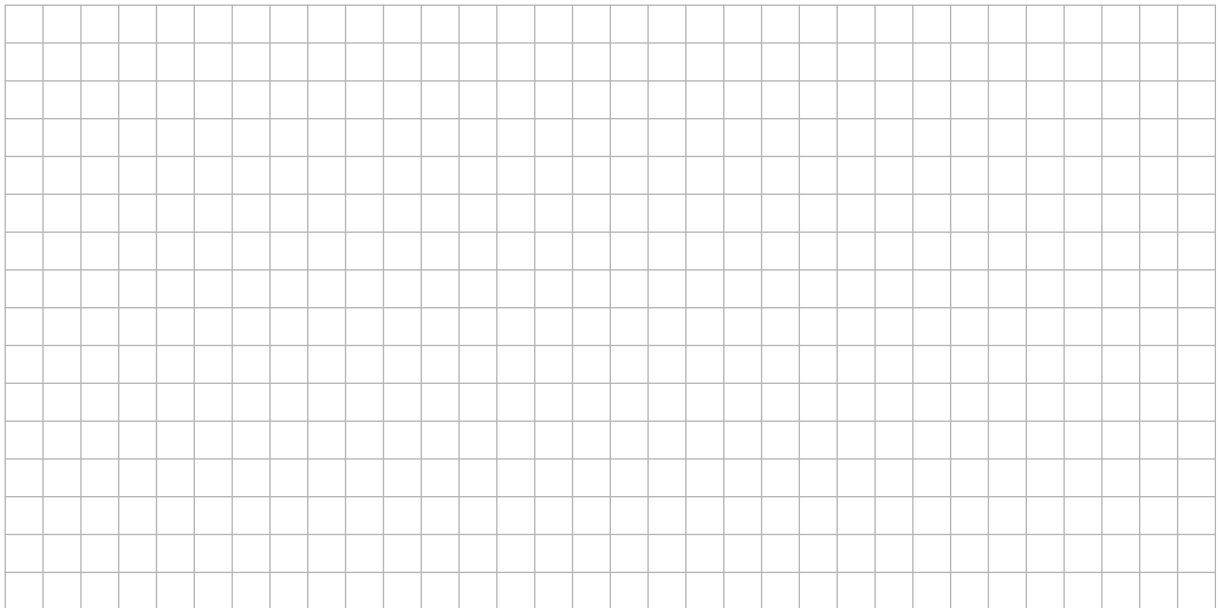
An ornament is carved from a rectangular block of wood which has a square base and a height of 24 cm. The ornament consists of two identical spheres and two identical cubes as illustrated in the diagram. The diameter of each sphere is equal to the length of the side of each cube. The ornament has the same width as the original block.



- (a) Find the length of a side of one of the cubes.



- (b) Find the volume of the ornament.



- (c) In making the ornament, what percentage of the original block of wood is carved away?



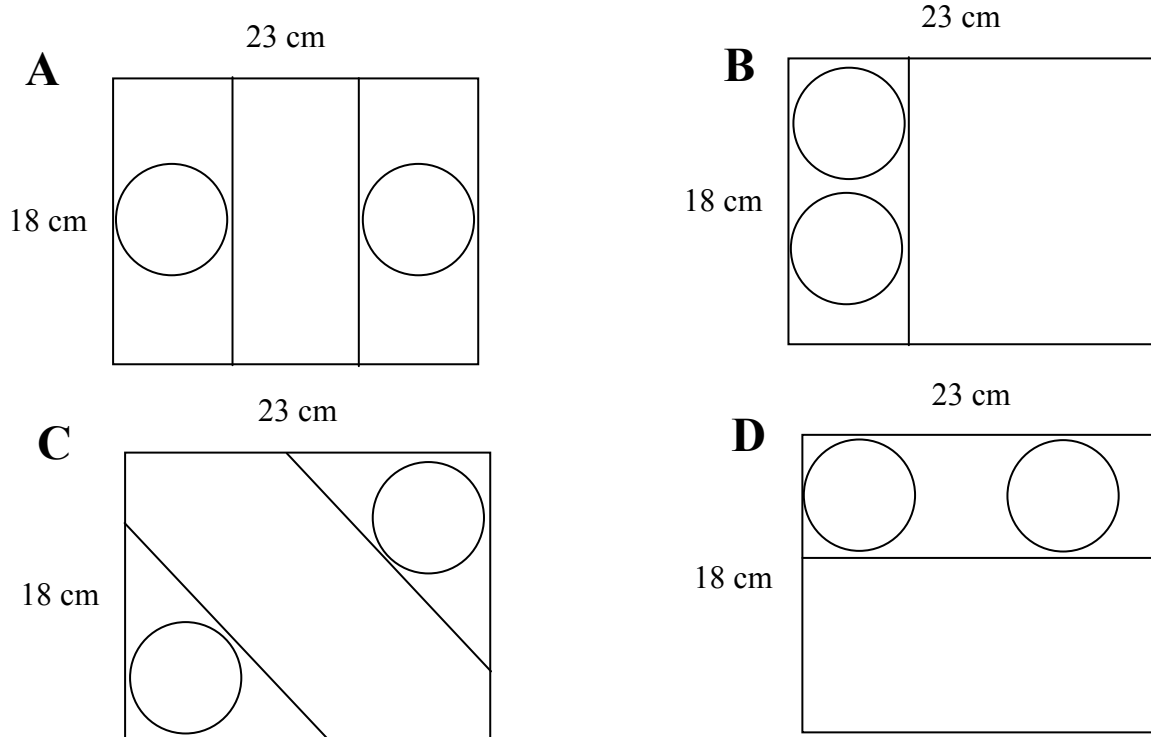
page	running
------	---------

Question 4 (Suggested maximum time: 10 minutes)

Question 4 (Suggested maximum time: 10 minutes)

A soup tin in the form of a cylinder has a diameter of 7 cm and a height of 10 cm. The cylinder is constructed from pieces of metal cut from a thin sheet measuring 23 cm by 18 cm.

- (a) Which one of the four diagrams A, B, C or D could represent the sheet of metal from which the cylinder has been cut?



Answer = Diagram _____. Give a reason for your choice.

- (b)** Find the area of metal which remains after the pieces have been cut out.

Question 6 (Suggested maximum time: 15 minutes)

Question 6 (Suggested maximum time: 15 minutes)

The ages of the Academy Award winners for best male actor and best female actor (at the time they won the award) from 1992 to 2011 are as follows:

Male actor 54 52 37 38 32 45 60 46 40 36 47 29 43 37 38 45 50 48 60 50

Female actor 42 29 33 36 45 49 39 26 25 33 35 35 28 30 29 61 32 33 45 29

- (a)** Represent the data on a back-to-back stem-and-leaf diagram.

Male actors										Female actors									
								2											
								3											
								4											
								5											
								6											
Key:																			

- (b)** State one similarity and one difference that can be observed between the ages of the male and female winners.

- (c)** Mary says “The female winners were younger than the male winners.” Investigate this statement in relation to:

- (i) The mean age of the male winners and mean age of the female winners.

- (ii) The median age of the male winners and the median age of the female winners.

[illegible]

- (d)** Find the interquartile ranges of the ages of the male winners and of the female winners.

[illegible]

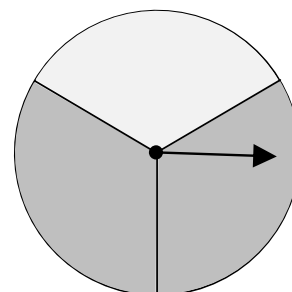
Question 7

(Suggested maximum time: 5 minutes)

A fair circular spinner consists of three equal sectors. Two are coloured blue and one is coloured red.

The spinner is spun and a fair coin is tossed.

- (a)** What is the probability of the spinner landing on a blue sector?

[illegible]

- (b)** Find the probability of getting a head and a red.

- (c) Find the probability of getting a tail and a blue.

[illegible]

Question 8 (Suggested maximum time: 10 minutes)

Question 8 (Suggested maximum time: 10 minutes)

- (a)** What is the probability of getting a 1 when a fair die is tossed?

A fair die is tossed 500 times.

The results are partially recorded in the table below.

Number on die	1	2	3	4	5	6
Frequency	70	82		90	91	81
Relative Frequency						



- (b)** Calculate the number of times a 3 appeared. Write your answer in the table above.

- (c) Calculate the relative frequency of each outcome and write it into the table above. Give your answers correct to 2 decimal places.

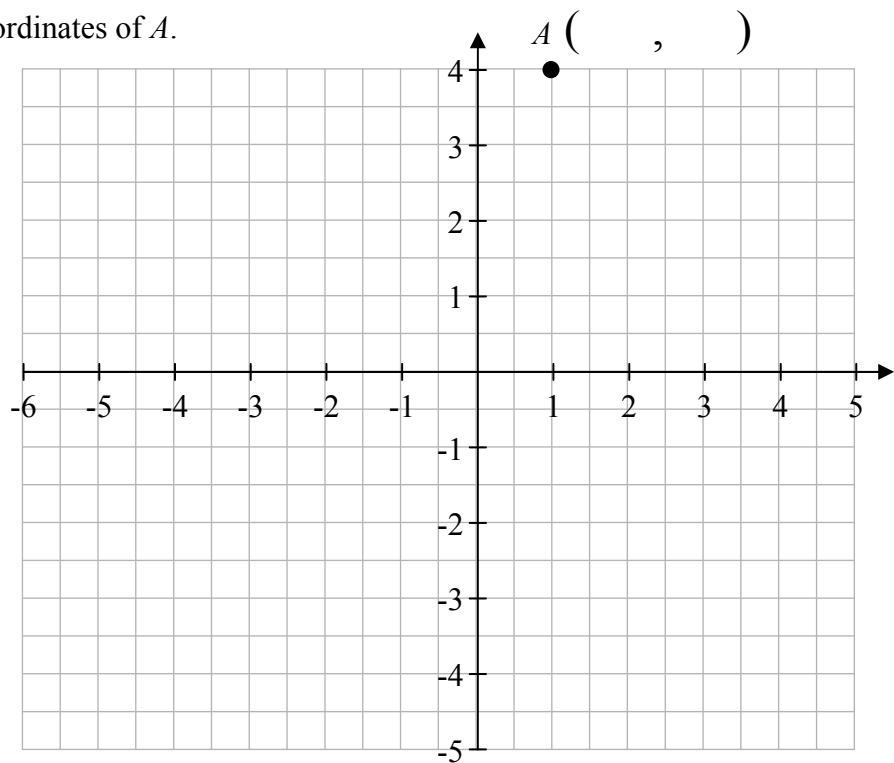
- (d) Give a possible reason for the difference in value between the relative frequency for 1 in the table and your answer to part (a).

Question 9

(Suggested maximum time: 15 minutes)

The point A is shown on the diagram.

- (a)** Write down the co-ordinates of A .



- (b)** Plot the following points on the diagram above.

B	C	D	E	F
$(2, 0)$	$(-4, -4)$	$(0, 4)$	$(-6, 0)$	$(4, -4)$

- (c) Calculate the midpoint of $[DF]$.

[illegible]

- (d) Find the slope of BF .

[illegible]

- (e) Write down the equation of the line BF in the form $y = mx + c$.

Question 10

(Suggested maximum time: 20 minutes)

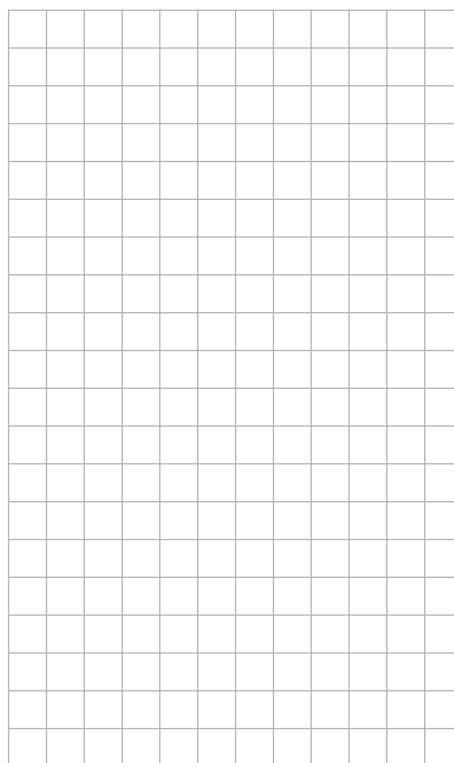
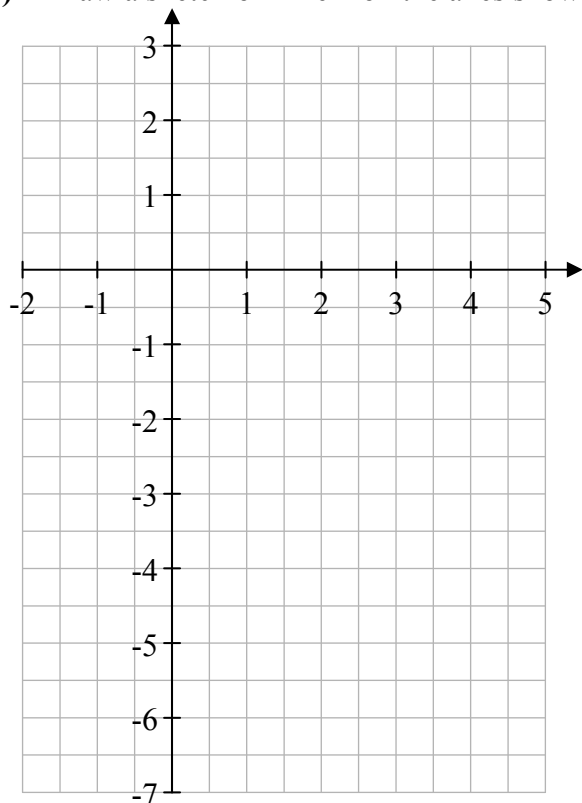
The table below gives the equations of six lines.

Line 1	$y = 3x - 6$
Line 2	$y = 3x + 12$
Line 3	$y = 5x + 20$
Line 4	$y = x - 7$
Line 5	$y = -2x + 4$
Line 6	$y = 4x - 16$

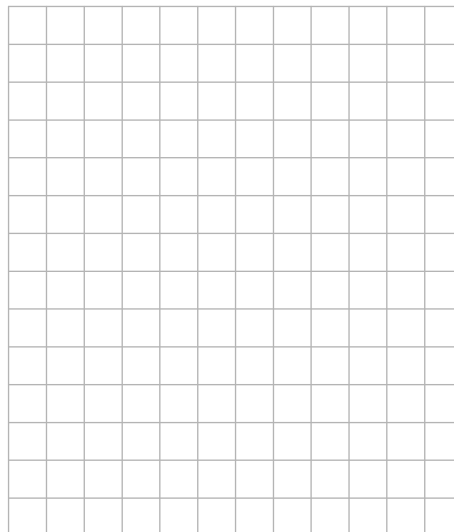
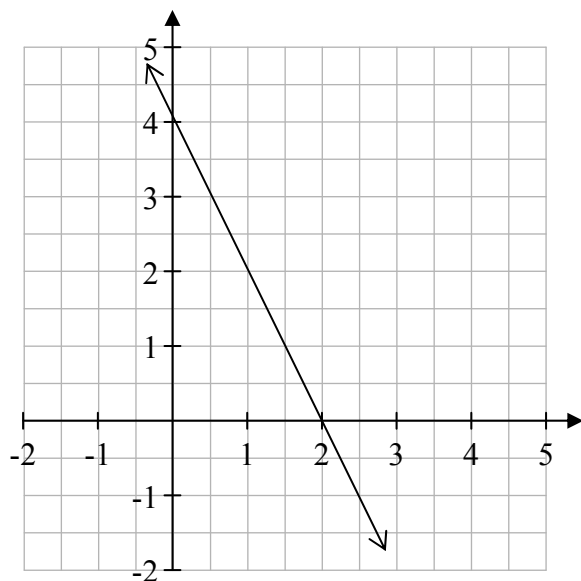
- (a)** Which line has the greatest slope? Give a reason for your answer.

- (b)** Which lines are parallel? Give a reason for your answer.

(c) Draw a sketch of Line 1 on the axes shown.



(d) The diagram below represents one of the given lines. Which line does it represent?



Answer = Line _____

- (e) The table shows some values of x and y for the equation of one of the lines. Which equation do they satisfy?

x	y
7	12
9	20
10	24

Answer = Line _____

- (f) There is one value of x which will give the same value of y for Line 4 as it will for Line 6. Find, using algebra, this value of x and the corresponding value of y .

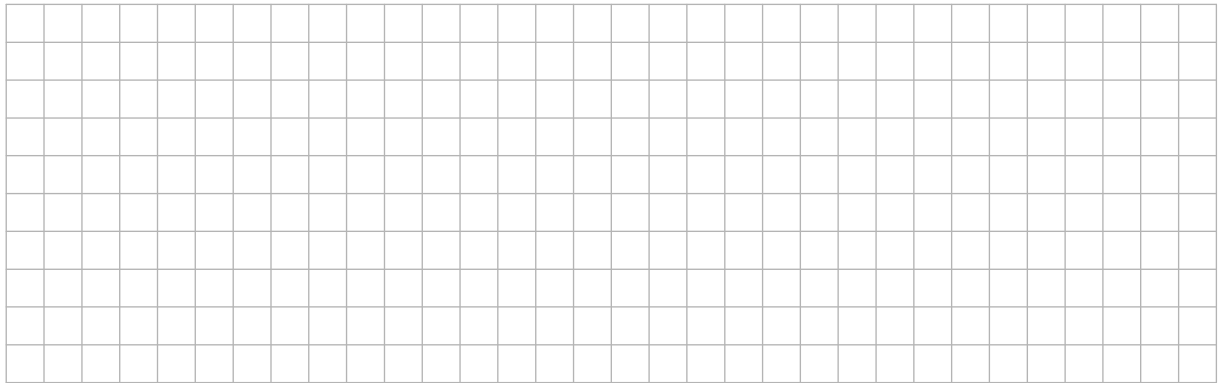
A blank sheet of graph paper featuring a uniform grid of small squares. The grid consists of 20 columns and 10 rows, providing a structured space for drawing or writing.

- (g) Verify your answer to (f) above.

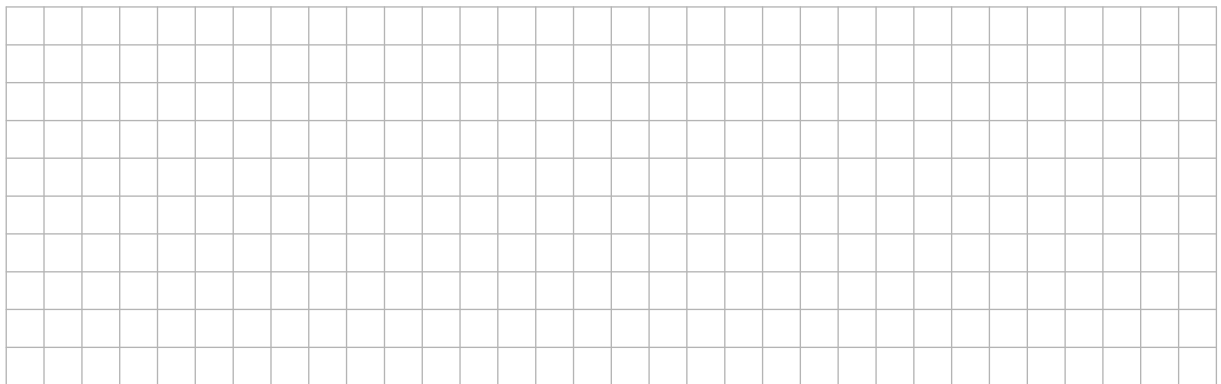
[illegible]

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

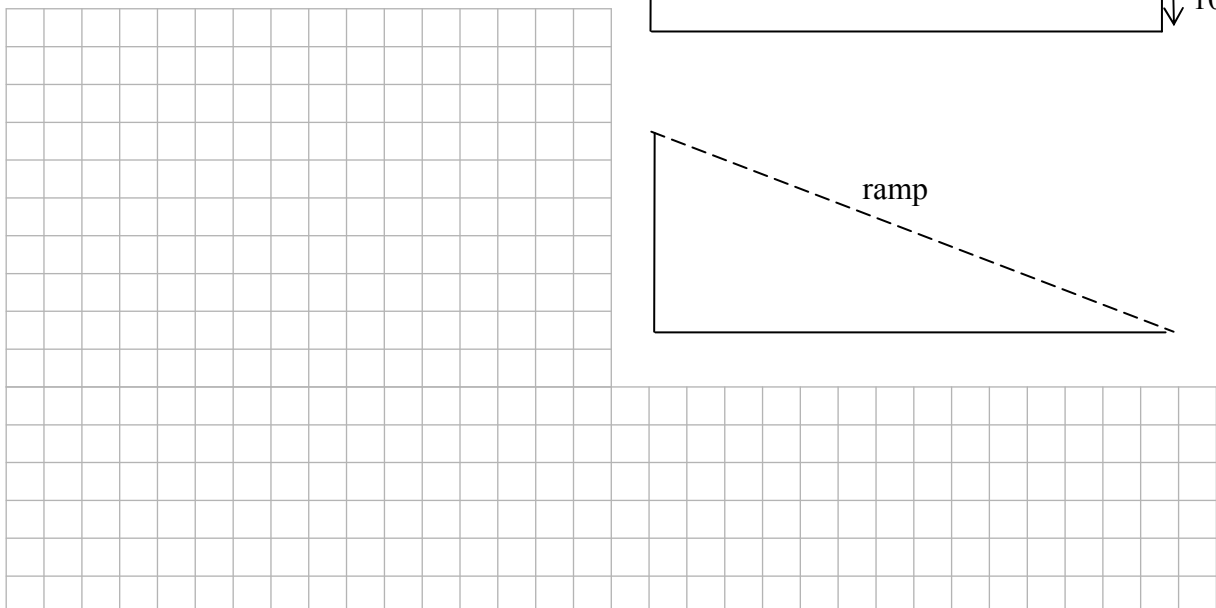
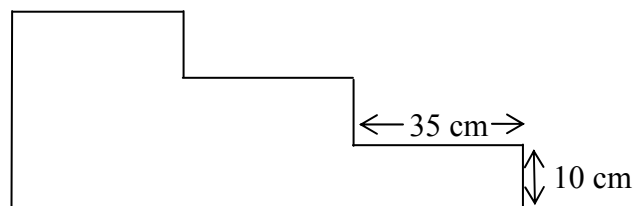
- (a) Construct a right-angled triangle containing an angle A such that $\sin A = 0.4$.



- (b) Find, from your triangle, $\cos A$ in surd form.

**Question 12****(Suggested maximum time: 5 minutes)**

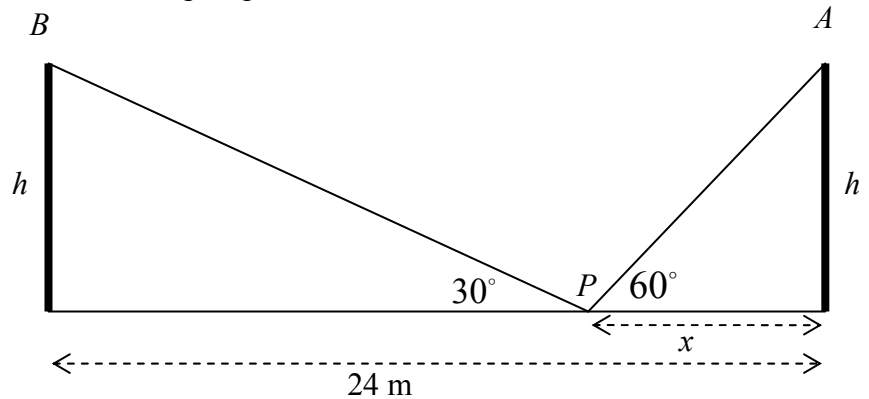
A homeowner wishes to replace the three identical steps leading to her front door with a ramp. Each step is 10 cm high and 35 cm long. Find the length of the ramp. Give your answer correct to one decimal place.



Question 13 (Suggested maximum time: 10 minutes)

Question 13 (Suggested maximum time: 10 minutes)

Two vertical poles A and B , each of height h , are standing on opposite sides of a level road. They are 24 m apart. The point P , on the road directly between the two poles, is a distance x from pole A . The angle of elevation from P to the top of pole A is 60° .



- (a)** Write h in terms of x .

[illegible]

- (b)** From P the angle of elevation to the top of pole B is 30° . Find h , the height of the two poles.

[illegible]

Question 14

(Suggested maximum time: 10 minutes)

Prove that the angle at the centre of a circle standing on a given arc is twice the angle at any point of the circle standing on the same arc.

Diagram:

Given:

<i>To Prove:</i>

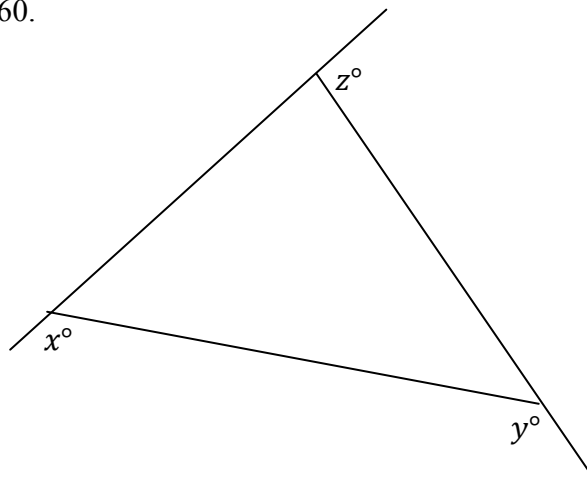
Construction:

Proof:

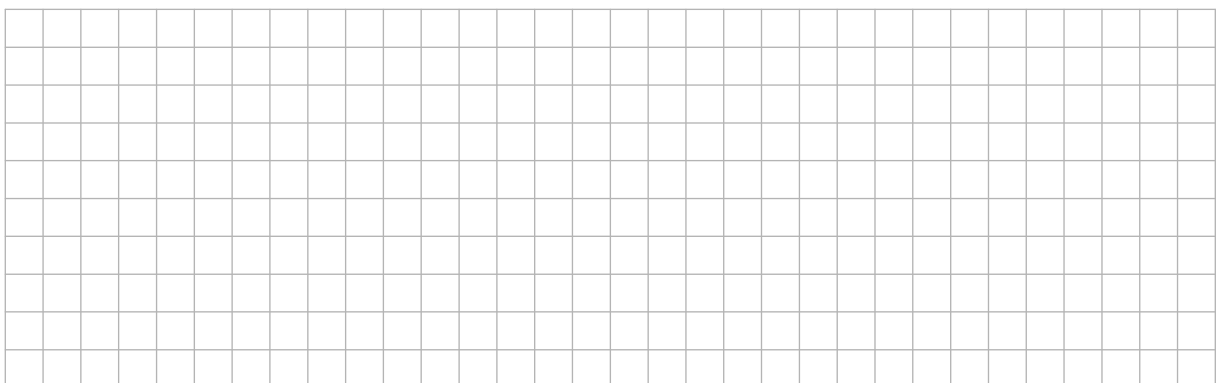
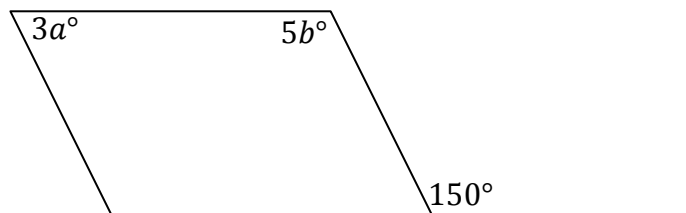
Question 15

(Suggested maximum time: 5 minutes)

- (a) Prove that $x + y + z = 360$.

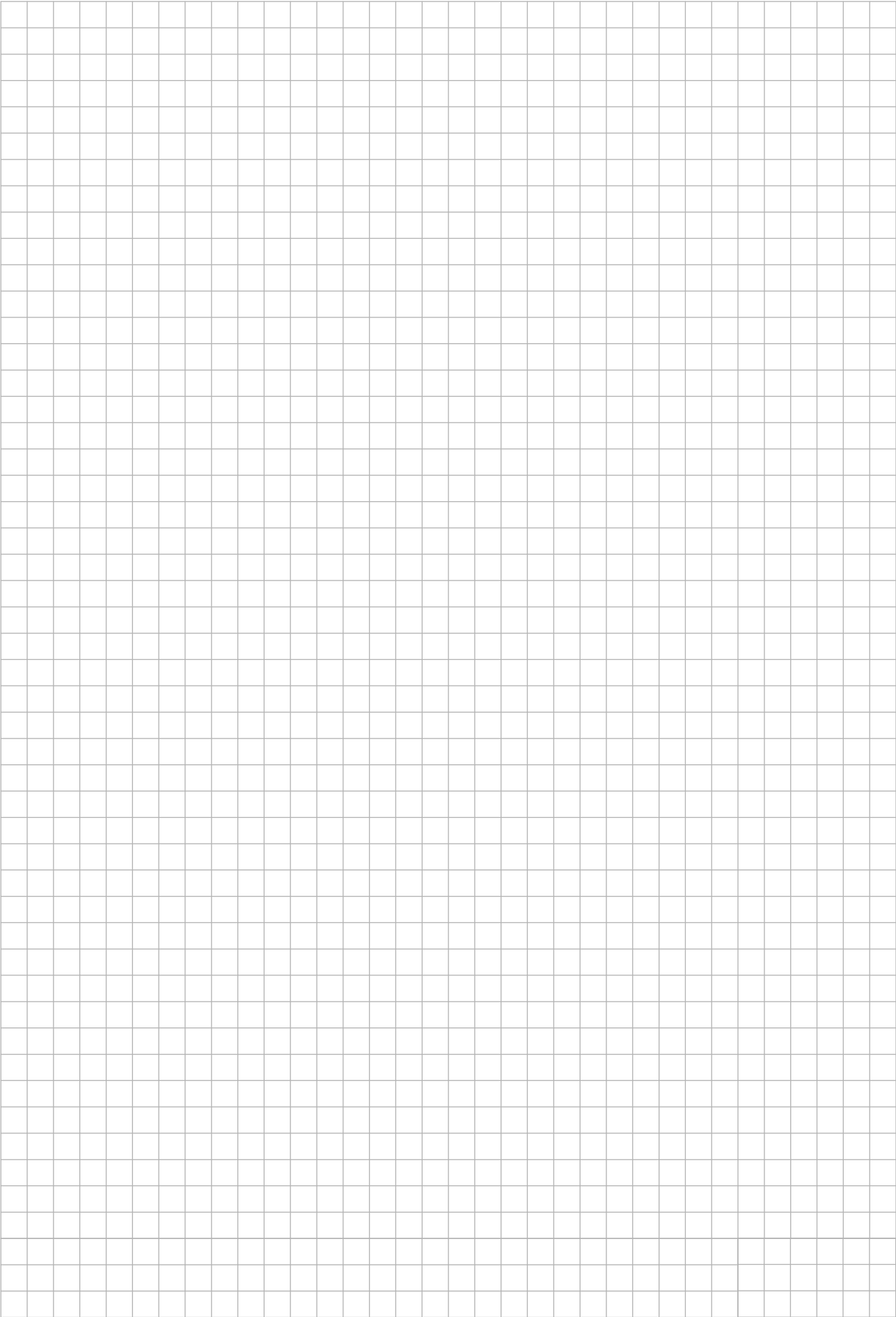


- (b) The diagram below shows a parallelogram and one exterior angle. Find the value of a and the value of b .

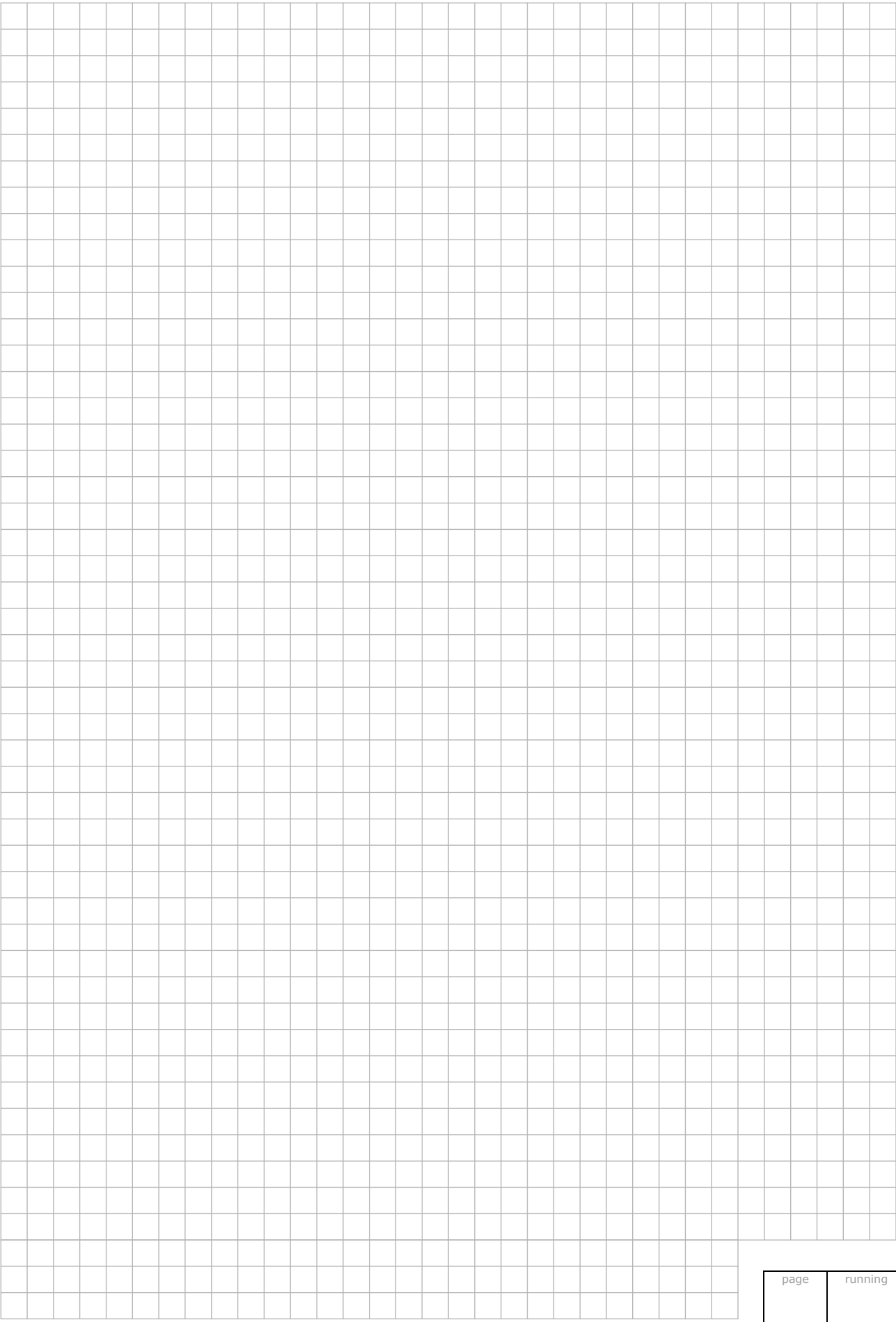


page	running
------	---------

You may use this page for extra work.

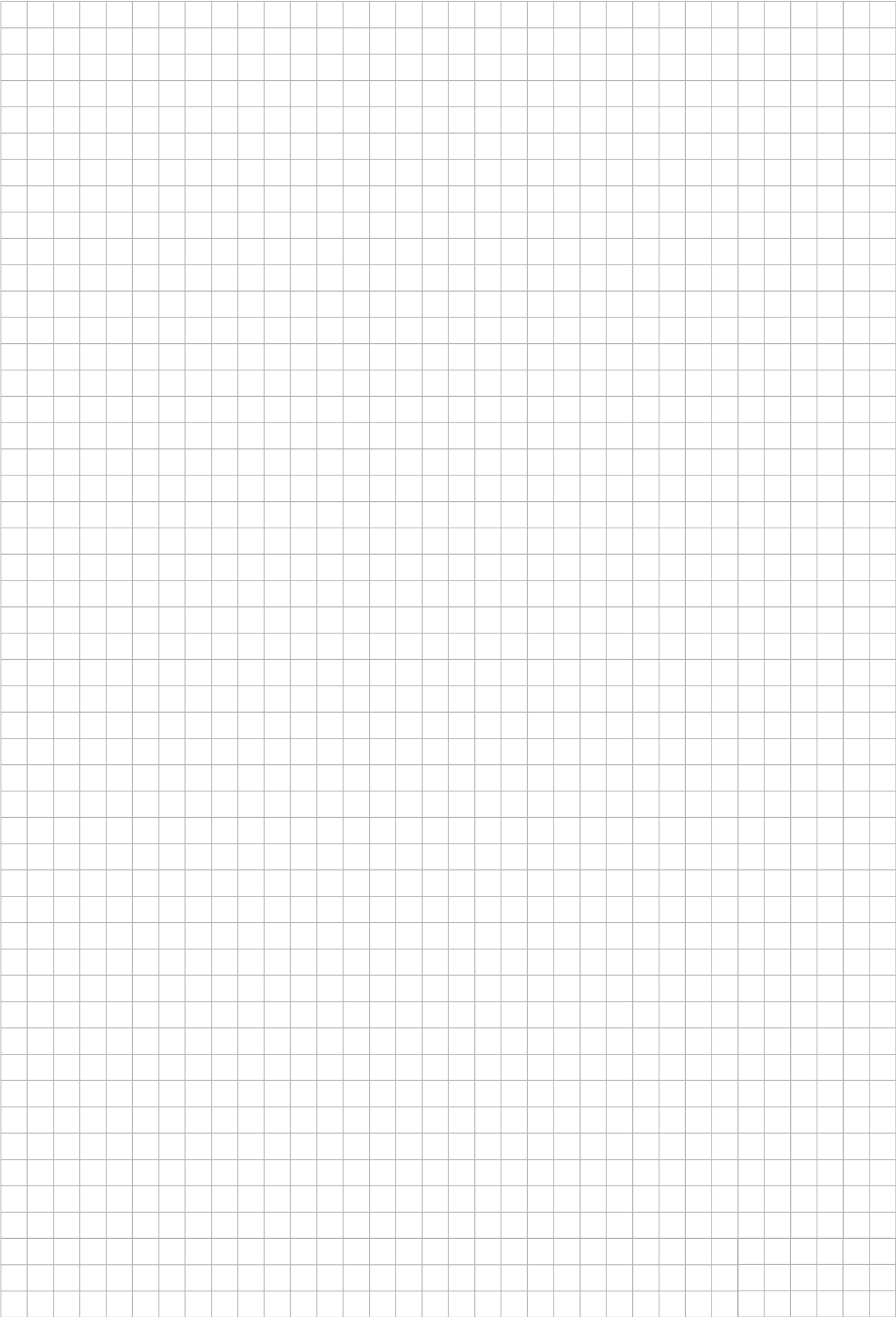


You may use this page for extra work.

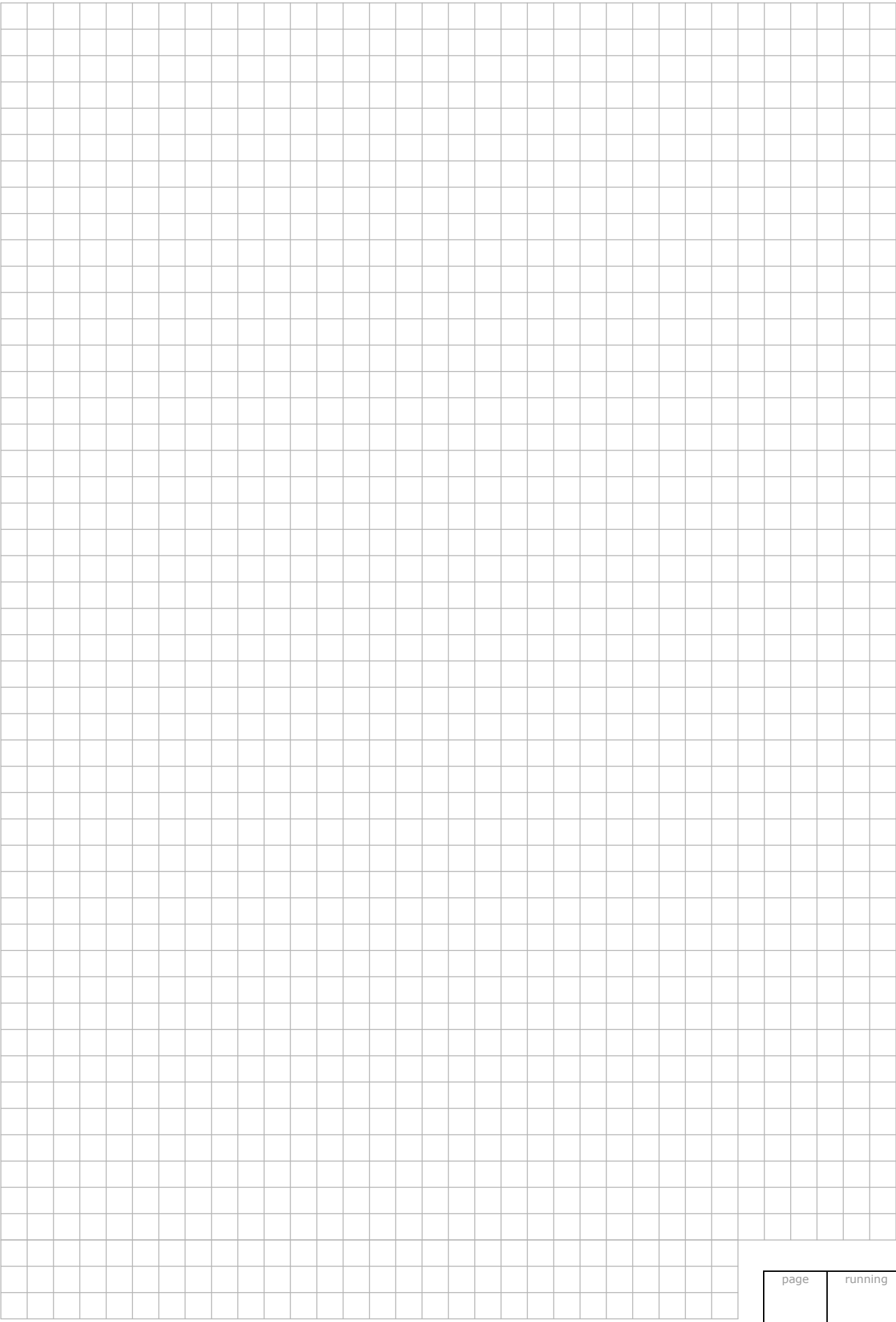


page	running
------	---------

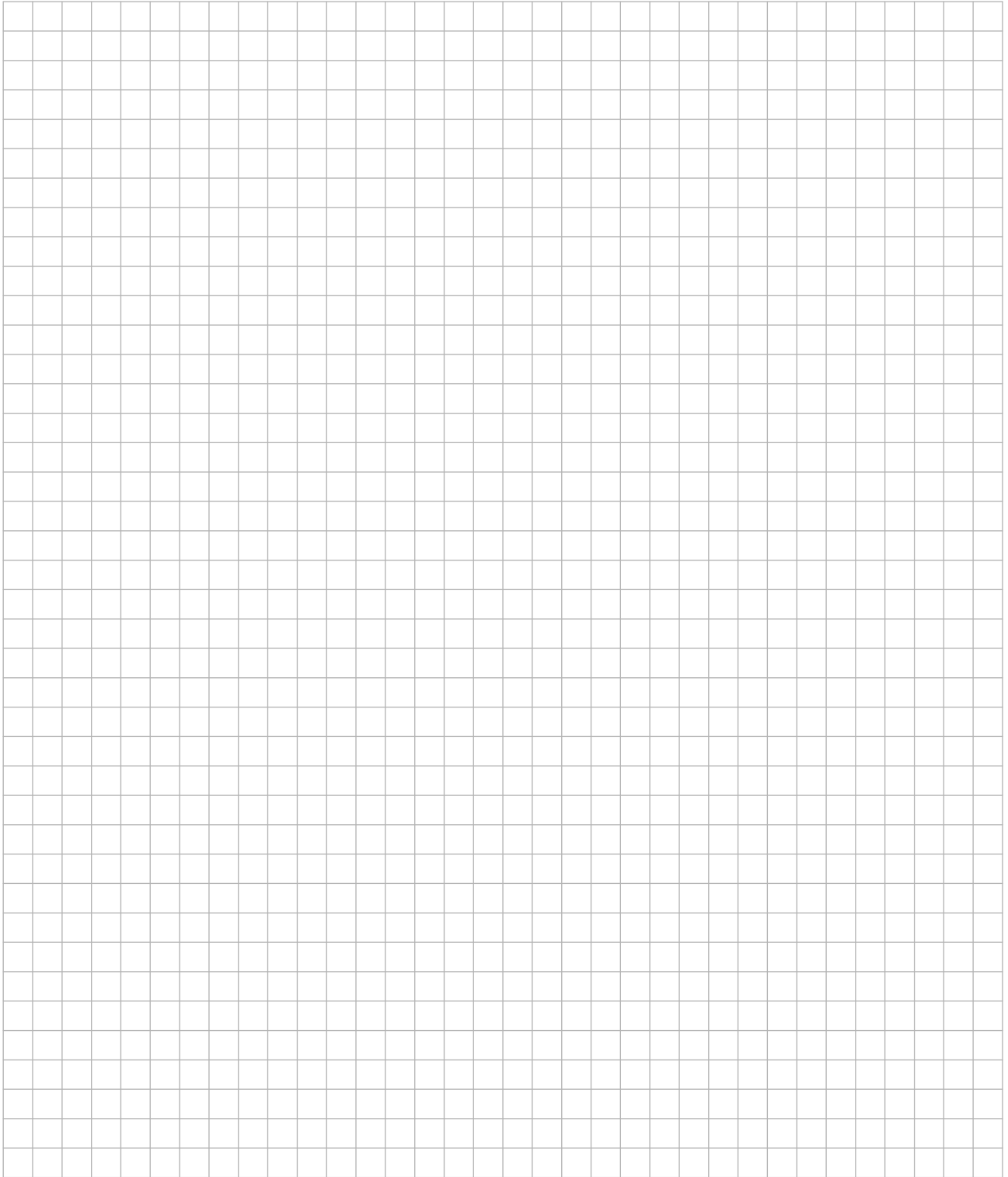
You may use this page for extra work.



You may use this page for extra work.



page	running
------	---------



Junior Certificate 2012 – Higher Level

Mathematics (Project Maths – Phase 2) – Paper 2

Monday 11 June

Morning 9:30 to 12:00