



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate Examination, 2012

Mathematics
(Project Maths – Phase 2)

Paper 2

Ordinary Level

Monday 11 June – Morning 9:30 to 11:30
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		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.

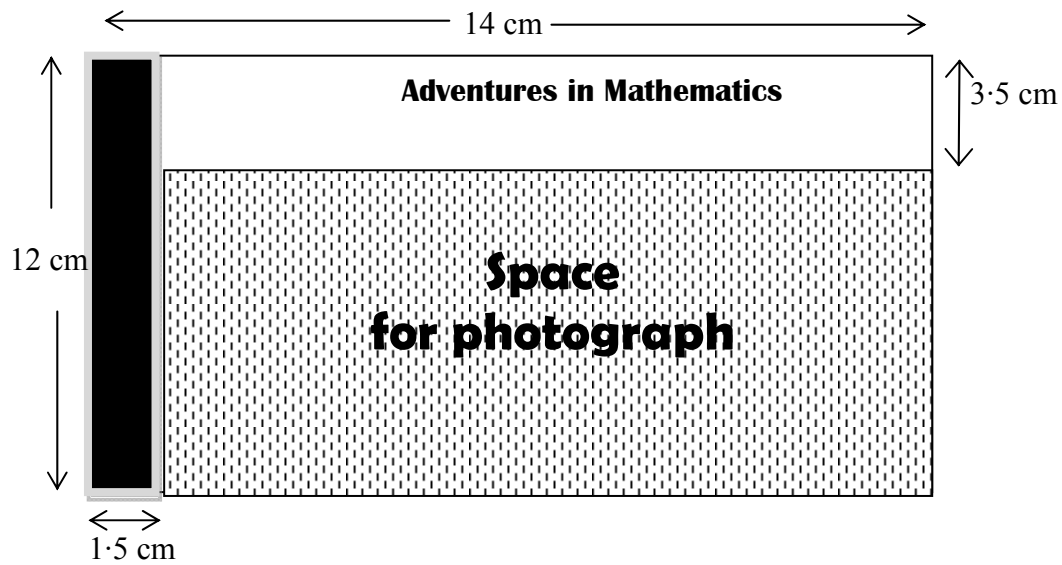
Write the make and model of your calculator(s) here:

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Question 1

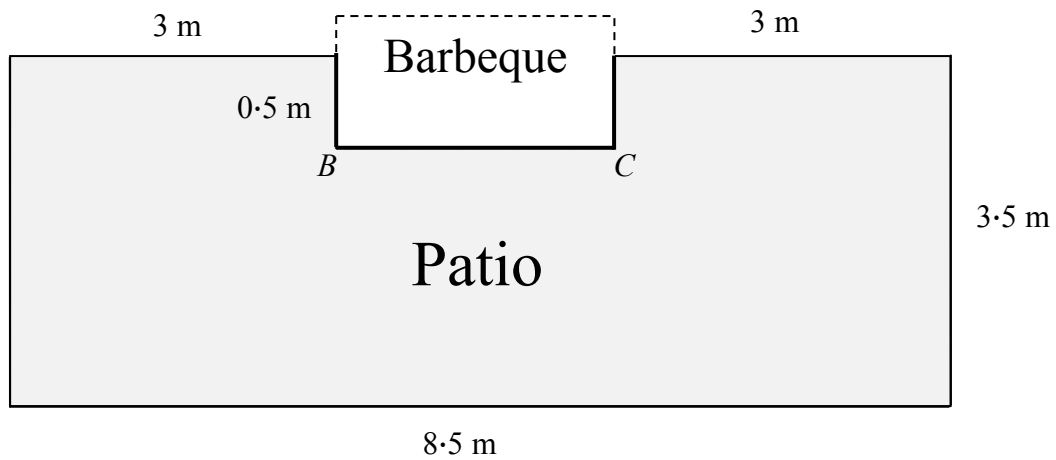
(suggested maximum time: 2 minutes)

A designer is making a DVD cover as shown below (diagram not to scale). He has left a space for a photograph. Find the area of the space for the photograph.

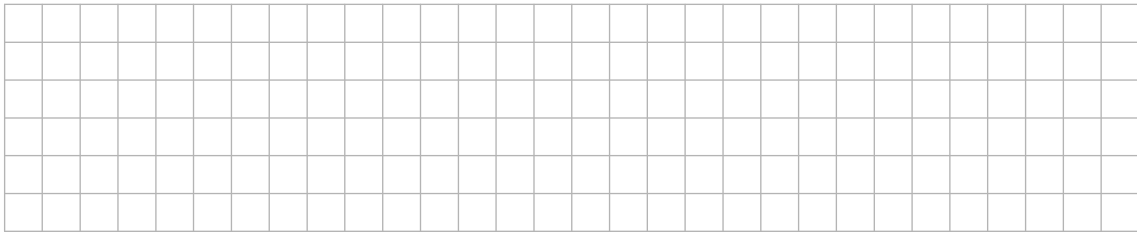


Question 2**(suggested maximum time: 10 minutes)**

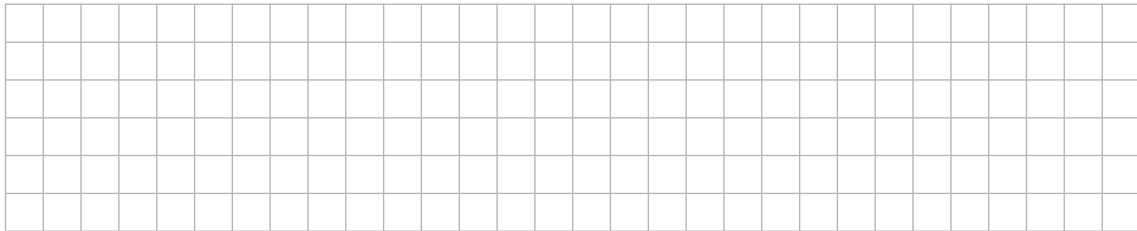
A gardener wants to build a patio in her garden and a space for a barbeque.
Below is a plan of the patio and barbeque she wants to build.



- (a) Find the length of $[BC]$.



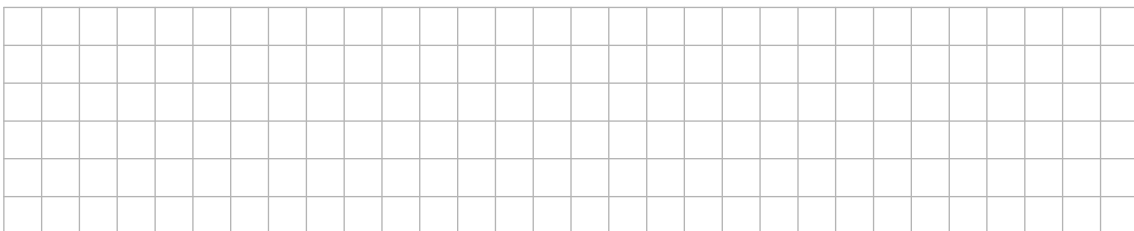
- (b) Find the perimeter of the patio.



- (c) The owner wants to cover the patio with slabs. Find the area to be covered.



- (d) The slabs are squares of side 0.5 m. Find the number of slabs required.



- (e) She has €500 to spend on slabs. The slabs cost €4.50 each. Does she have enough money to cover the entire patio? Explain your answer.

Answer: _____

Explanation: _____

Question 3

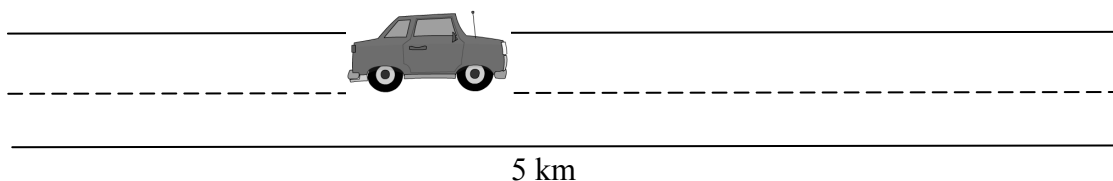
(suggested maximum time: 10 minutes)

- (a) Caoimhe travelled by car from Athlone to Sligo. She left Athlone at 8:45 a.m. and arrived in Sligo at 10:30 a.m. How long did it take Caoimhe to travel from Athlone to Sligo? Give your answer in hours and minutes.

- (b)** The distance from Athlone to Sligo is 112 km.
Find Caoimhe's average speed, in km per hour.

[illegible]

- (c) Caoimhe travels a certain 5 km stretch of road in 4 minutes at a constant speed. Find how far she travels in one minute, on this stretch.

[illegible]

- (d)** Find her speed for this stretch of road in km/h.

[illegible]

- (e) The speed limit for this stretch of road is 80 km/h. From your answer in part (d) above, was Caoimhe driving over the speed limit? Give a reason for your answer.

Answer:	
Reason:	



Question 4

(suggested maximum time: 2 minutes)

- (a)** Let A be the set of months of the year. List the elements of A .

[illegible]

- (b)** What is the probability that a month chosen at random from set A begins with the letter J?

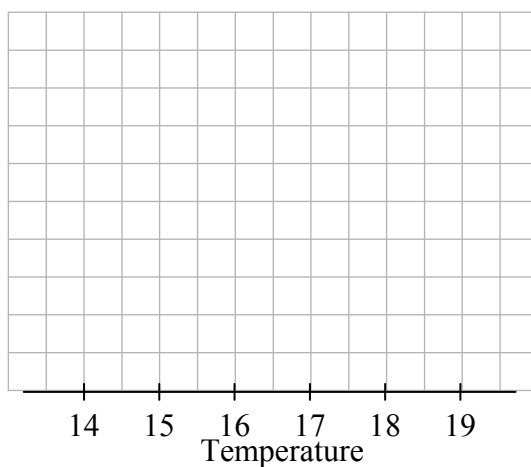
$$P(J) =$$

Question 5**(suggested maximum time: 10 minutes)**

Karen went on holidays for two weeks in August 2011. Below is a record of the daily temperatures for the two weeks in August 2011.

Day	Temperature
Monday 15 th	17°
Tuesday 16 th	18°
Wednesday 17 th	16°
Thursday 18 th	17°
Friday 19 th	16°
Saturday 20 th	18°
Sunday 21 st	17°
Monday 22 nd	19°
Tuesday 23 rd	17°
Wednesday 24 th	15°
Thursday 25 th	15°
Friday 26 th	15°
Saturday 27 th	14°
Sunday 28 th	17°

- (a) What was the temperature on Thursday 18th of August? _____.
- (b) Use a line plot to show the number of times each temperature was recorded.



- (c) What is the range of the data? _____.

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- Answer:**

Explanation:

(suggested maximum time: 10 minutes)

180, 188, 185, 180, 183, 177, 180, 183, 198, 191, 191,
185, 185, 180, 185, 196, 180, 188, 180, 183, 191, 193

- [illegible]

180, 184, 188, 178, 182, 176, 180, 185, 201, 190, 189,
185, 186, 182, 182, 196, 181, 189, 178, 184, 190, 193

- (d)** Find the median arm span.

- (e) Complete the table below to show the height and arm span of the tallest and shortest player in the squad.

Player	Height	Armspan
Tallest (cm)		
Shortest (cm)		

- (f)** Write the ratio of height to arm span for (i) the tallest player and (ii) the shortest player in part **(e)**.

[illegible]

- (g)** Write each ratio in **(f)** above as a decimal. Give your answer correct to two decimal places.

[illegible]

- (h)** The coach is 170 cm tall. What would you expect his arm span to be? Give a reason for your answer.

[illegible]

Question 7 (suggested maximum time: 10 minutes)

Question 7 (suggested maximum time: 10 minutes)

In a survey, 1500 people were asked which national radio station they normally listen to.

The results of the survey are given in the table below.

	RTE1	Today FM	Newstalk	Lyric FM	2FM	No national station
Frequency	375	195	120	45	165	
Relative frequency (as a fraction)	$\frac{375}{1500}$					
Relative frequency (as a decimal)			0.08			

- (a)** How many of the people surveyed do not listen to a national radio station?

- (b)** Complete the table above.

- (c)** Find the sum of the relative frequencies written as fractions.

[illegible]

- (d)** Find the sum of the relative frequencies written as decimals.

- (e) Jackie wrote the relative frequencies as percentages. She found their sum to be 80%. Do you think her calculations are correct? Give a reason for your answer.

[illegible]

- (f) Denis looked at the data and said “I can find out how many people in the survey normally listen to local radio”. Do you agree or disagree with Denis? Explain your answer.

Answer: _____

Explanation: _____

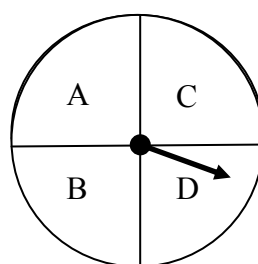
Question 8

(suggested maximum time: 5 minutes)

Jack rolls a fair die and spins a fair spinner as shown.



Die



Spinner

- (a) Complete the table below showing all possible outcomes.

		Spinner			
Die		A	B	C	D
	1	(1,A)			
	2				
	3				
	4				
	5				
	6				(6,D)

- (b) How many possible outcomes are there?

- (c) How many outcomes consist of an odd number and B?

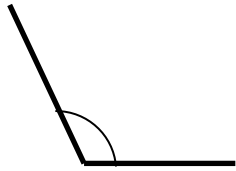
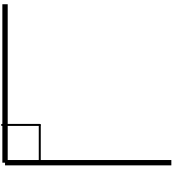
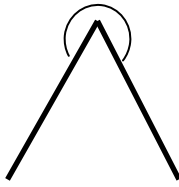
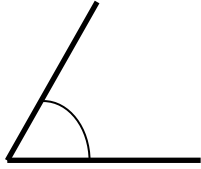
- (d) What is the probability that an outcome will contain an even number?

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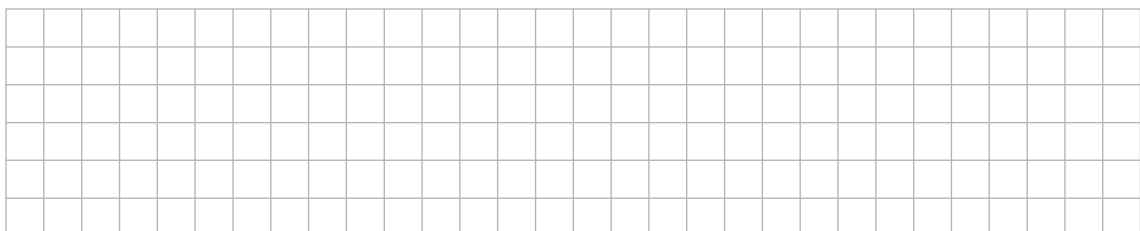
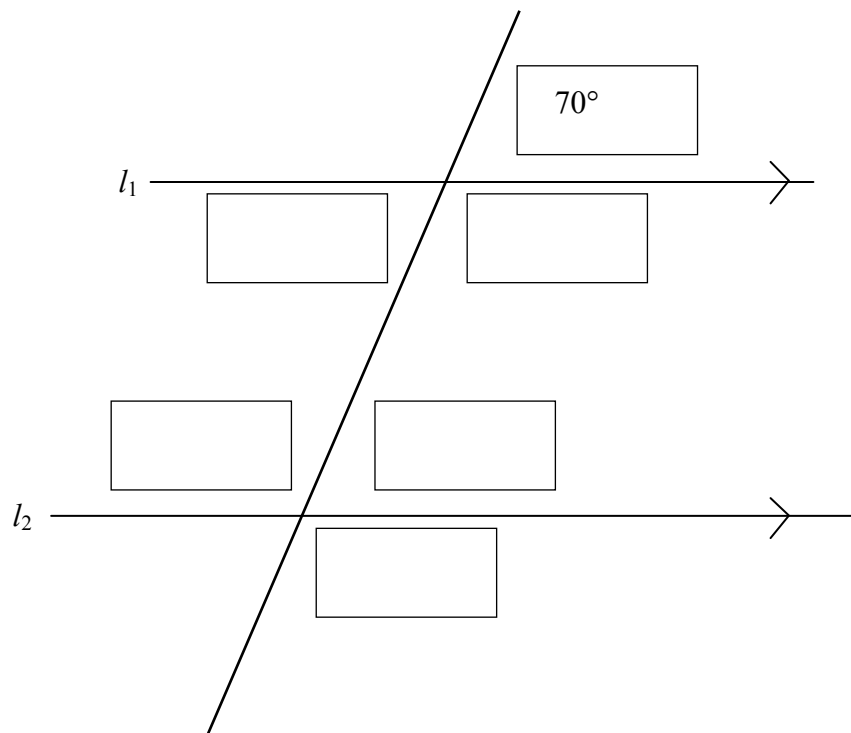
Question 9

(suggested maximum time: 5 minutes)

- (a) Four angles are shown below. Write in the space below each diagram whether the angle is straight, acute, obtuse, right or reflex.

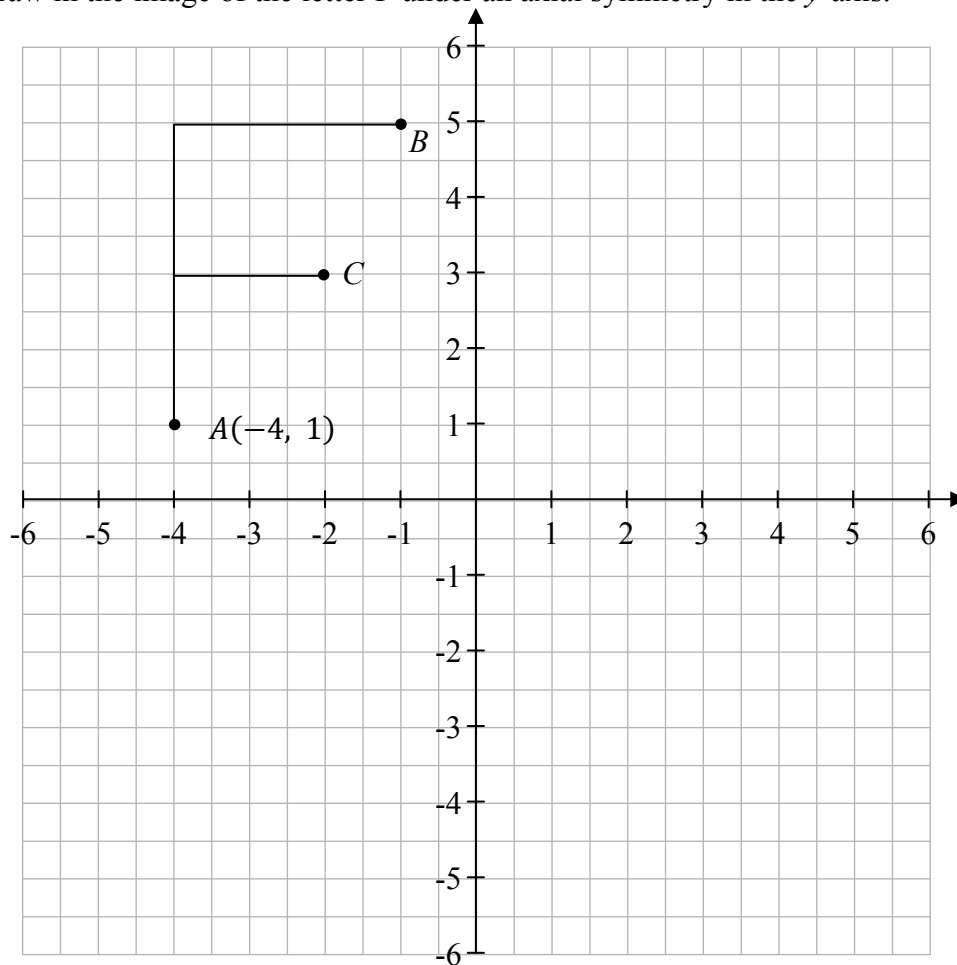
- (b) In the diagram below $l_1 \parallel l_2$. Write the measure of each angle shown by an empty box into the diagram, without using a protractor.



Question 10**(suggested maximum time: 5 minutes)**

The diagram below shows the letter F on the co-ordinate plane.

- (a) Draw in the image of the letter F under an axial symmetry in the y -axis.



- (b) Write down the coordinates of the points B and C .

B (,) C (,)

- (c) A , B and C are mapped onto A' , B' and C' under the transformation above. Write down the co-ordinates of A' , B' and C' .

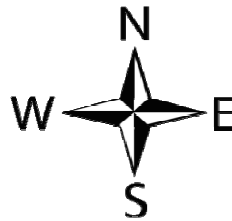
A' (,) B' (,) C' (,)

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Question 11 (suggested maximum time: 5 minutes)

Question 11 (suggested maximum time: 5 minutes)

A boat travels due north from A for 30 minutes at 20 km/h. It reaches B and then travels due east for 24 minutes at 10 km/h. It is then at C .



- (a)** How many kilometers has the boat travelled?

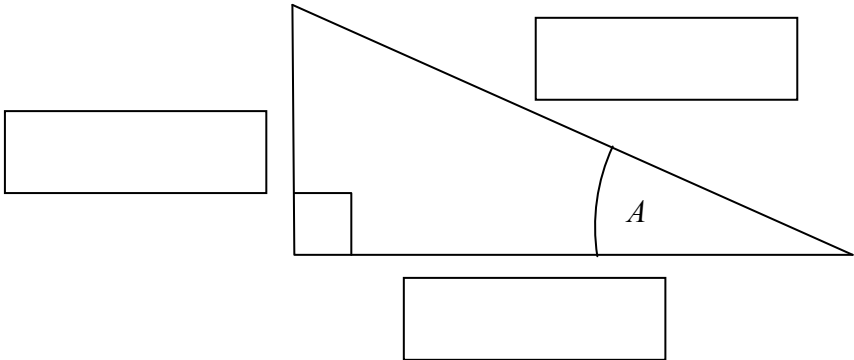
- (b)** On the diagram, draw a line segment that shows the shortest distance from C back to A .

- (c) Use Pythagoras' theorem to calculate the shortest distance from C to A . Give your answer correct to the nearest metre.

Question 12

(suggested maximum time: 5 minutes)

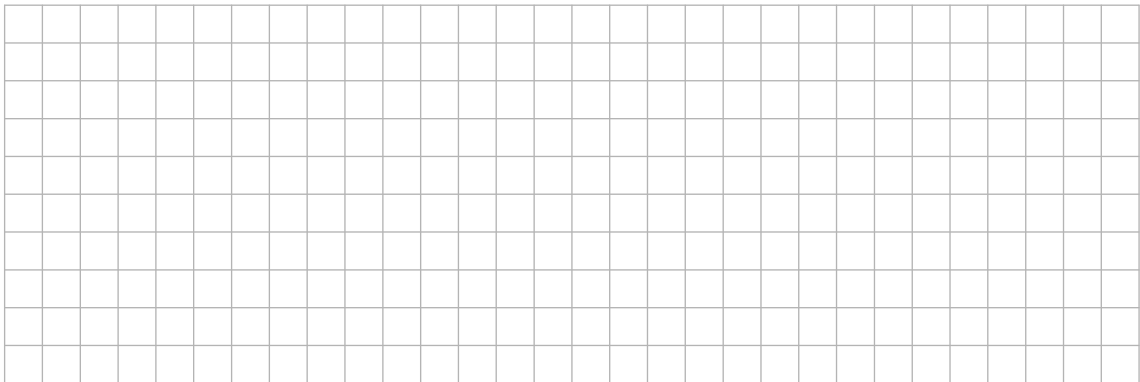
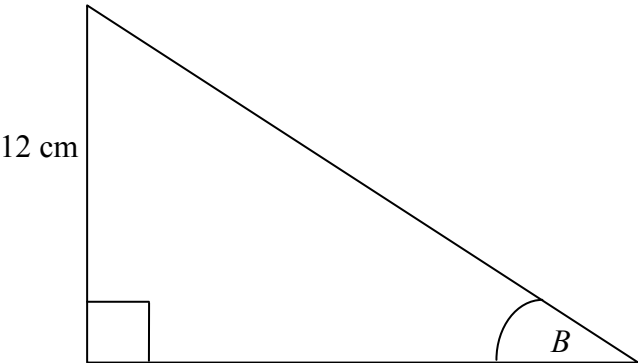
- (a) The diagram below shows the angle A in a right-angled triangle. Indicate which side is adjacent and which is opposite in relation to the angle A , and which side is the hypotenuse.



- (b) Fill in the appropriate ratios in the table below.

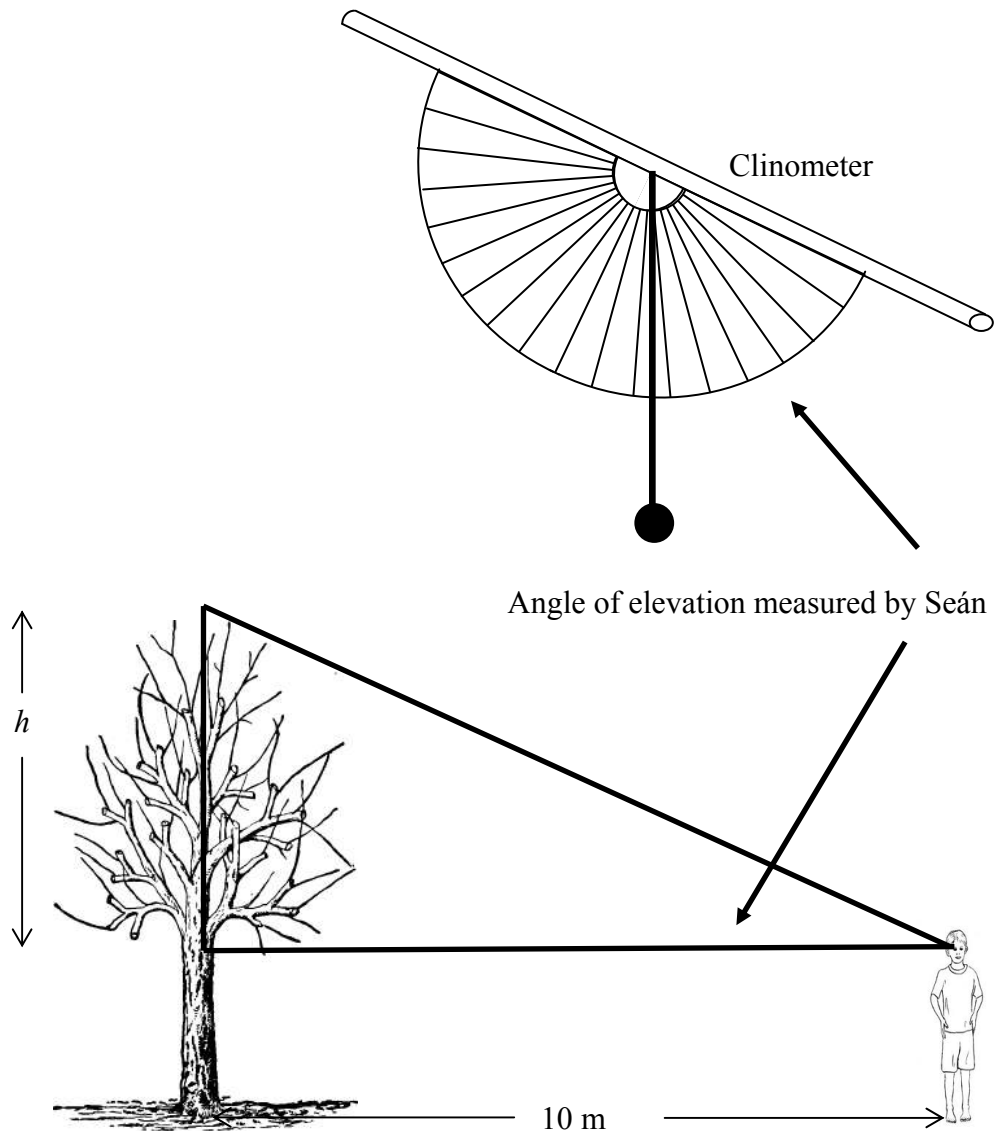
Trigonometric Ratio	Ratio
	$\frac{\textit{opposite}}{\textit{hypotenuse}}$
$\text{Cos } A$	
	$\frac{\textit{opposite}}{\textit{adjacent}}$

- (c) In the right angled triangle below $B = 35^\circ$ and the opposite side is 12 cm. Find the length of the hypotenuse correct to the nearest centimetre.



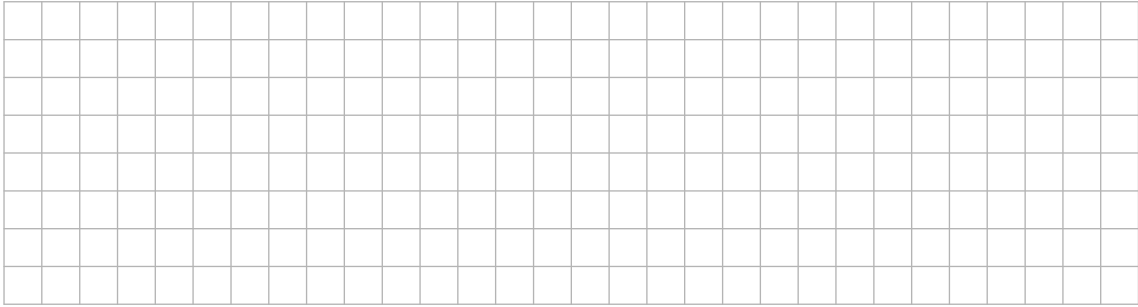
Question 13**(suggested maximum time: 10 minutes)**

Seán makes a clinometer using a protractor, a straw, a piece of thread and a piece of plasticine (used as a weight). He stands 10 m from a tree and uses his clinometer to measure the angle of elevation to the top of the tree as shown. Seán is 1.75 m in height.

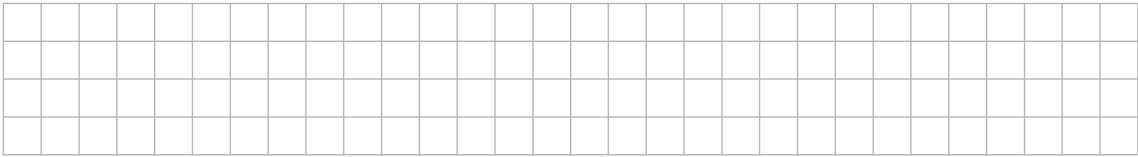


- (a) Find the angle of elevation by reading the clinometer above. _____.

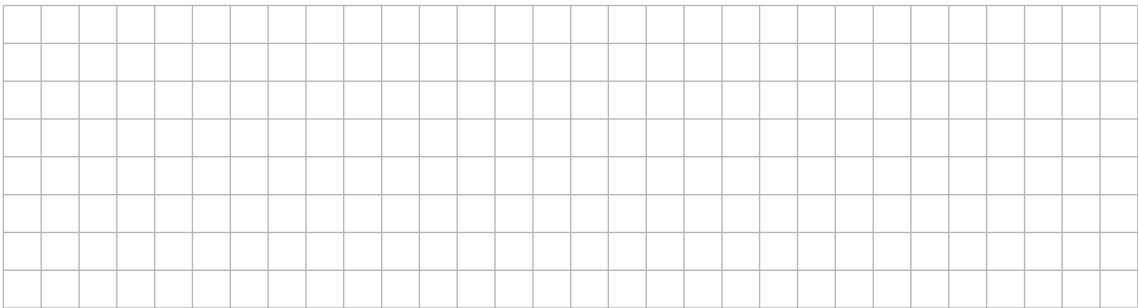
- (b) Calculate the height h as shown in the diagram. Give your answer correct to two decimal places.



- (c) Find the total height of the tree.



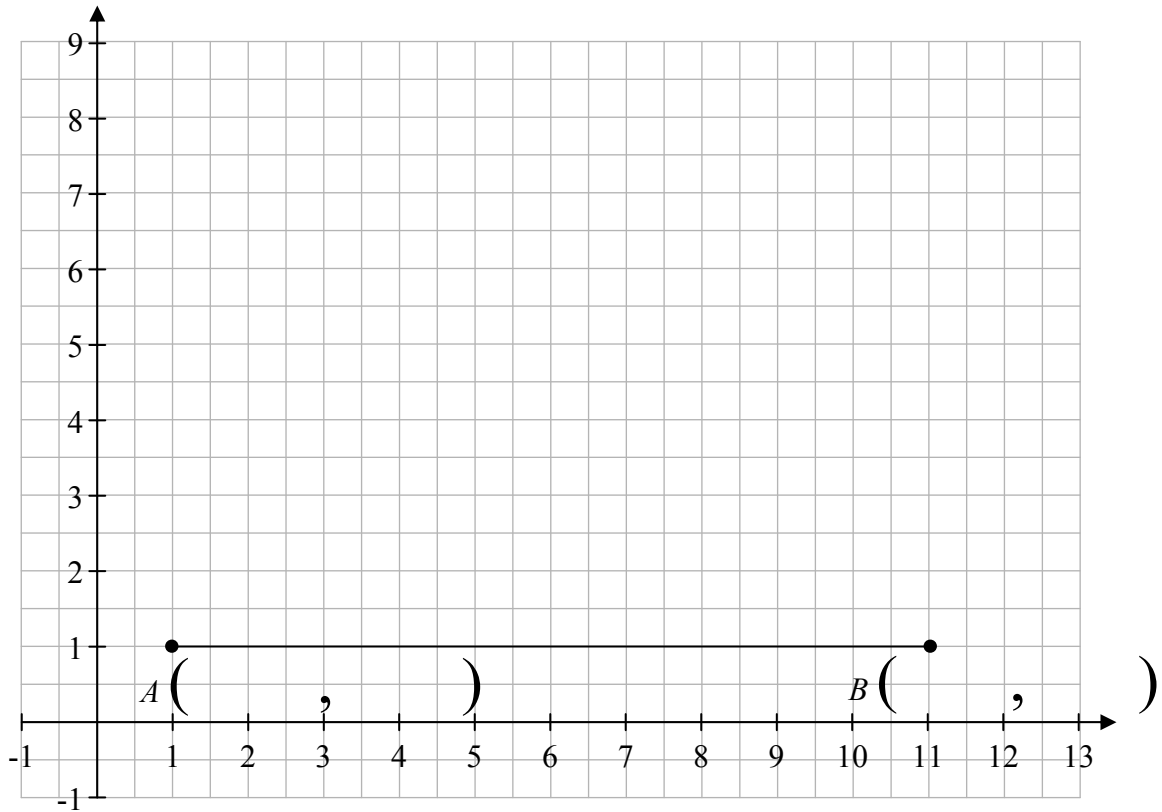
- (d) Another student uses the same method as Seán and finds the height of the tree to be 23.1 m. Seán did not get this answer. Give one possible reason why the answers might be different.



Question 14 (suggested maximum time: 10 minutes)

Question 14 (suggested maximum time: 10 minutes)

- (a)** Write down the coordinates of point A and point B on the diagram.



- (b)** Mark in the point $D(6, 8)$ on the diagram.

- (c)** Find the co-ordinates of C , the midpoint of $[AB]$.

[illegible]

- (d)** Join A to D . Join B to D . Join C to D .

- (e) Use the distance formula to find $|AD|$ and $|BD|$.

[illegible]

- (f) What type of triangle is ABD ? Give a reason for your answer.

[illegible]

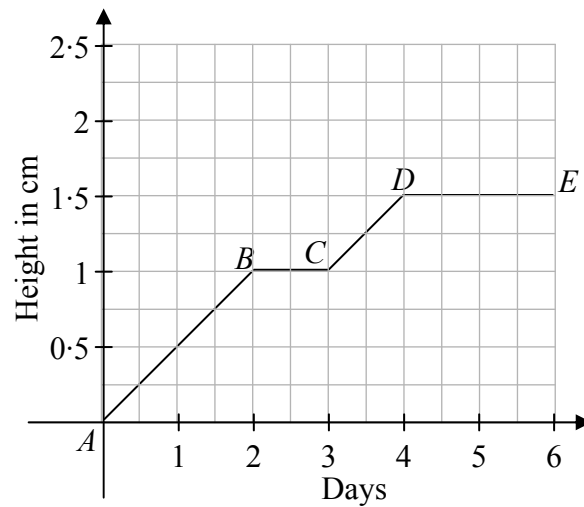
- (g) State whether the triangles ACD and BCD are congruent. Give a reason for your answer.

Answer:	
Reason:	

Question 15 (suggested maximum time: 10 minutes)

Question 15 (suggested maximum time: 10 minutes)

The height of a watercress seedling over six days is shown in the diagram below.



- (a) The plant grows steadily between A and B . It does not grow during two periods. Identify these two periods from the graph.

[illegible]

- (b)** Find the slope of $AB =$

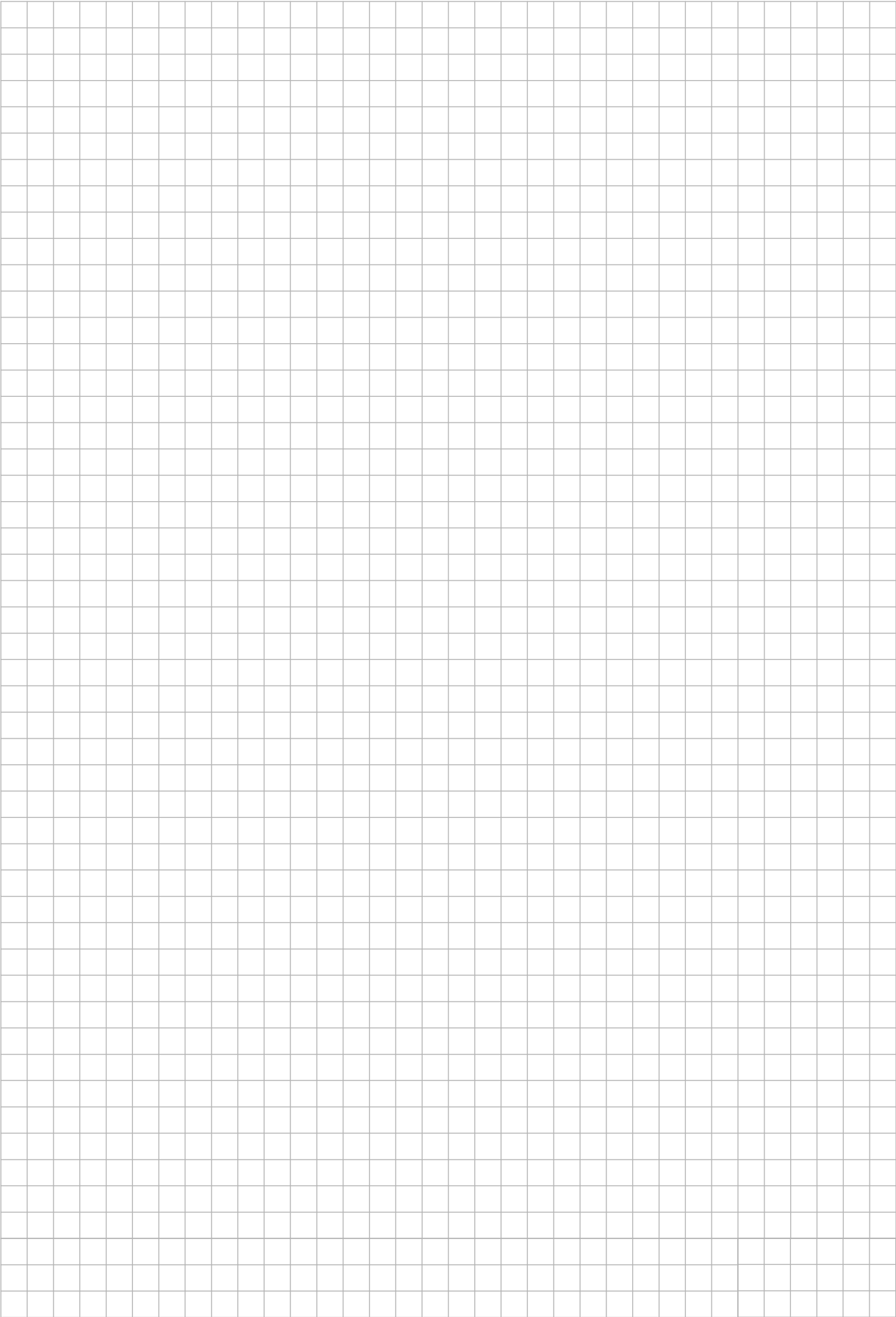
[illegible]

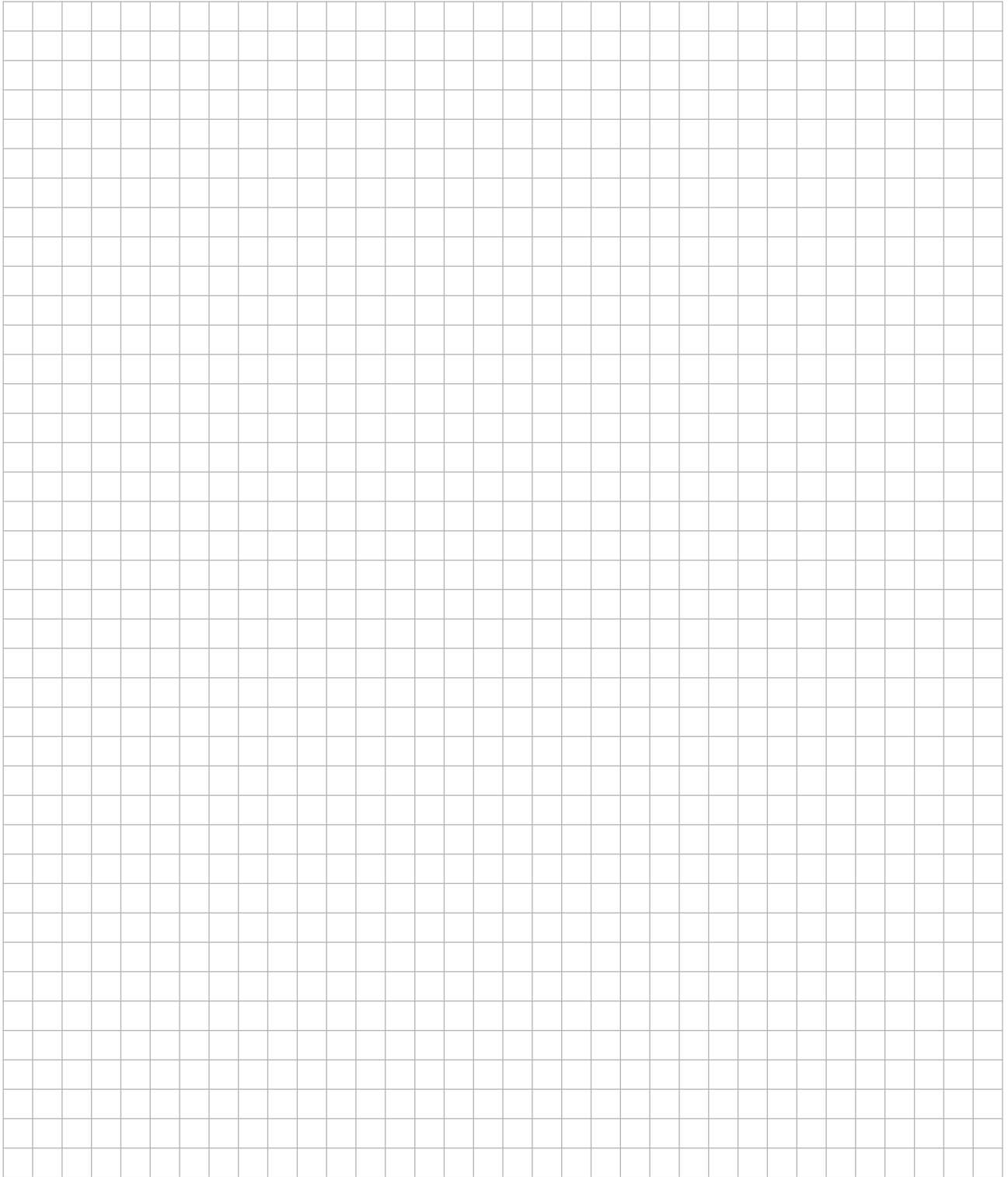
- (c) Find the slope of $CD =$

- [illegible]

-
- A full-page sheet of white graph paper featuring a uniform grid of small squares. The grid consists of 20 columns and 15 rows, creating a total of 300 square units. The lines are thin and gray, providing a clean background for mathematical or technical drawing.

You may use this page for extra work.





Junior Certificate 2012 – Ordinary Level

Mathematics (Project Maths – Phase 2) – Paper 2

Monday 11 June

Morning 9:30 to 11:30