Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination, 2012

Mathematics
(Project Maths – Phase 3)

Paper 2

Foundation Level

Monday 11 June Morning 9:30 – 12:00

300 marks

Examination number

Centre stamp

Running total	

For examiner	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
Total	

Grade

Instructions

There are **two** sections in this examination paper:

Section A	Concepts and Skills	150 marks	6 questions
Section B	Contexts and Applications	150 marks	2 questions

Answer **all eight** questions, as follows:

In Section A, answer

Questions 1 to 5 and

either Question 6A **or** Question 6B.

In Section B, answer Questions 7 and 8.

Write your answers in the spaces provided in this booklet. You will 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.

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: [ ]

Section A — Concepts and Skills — 150 marks

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

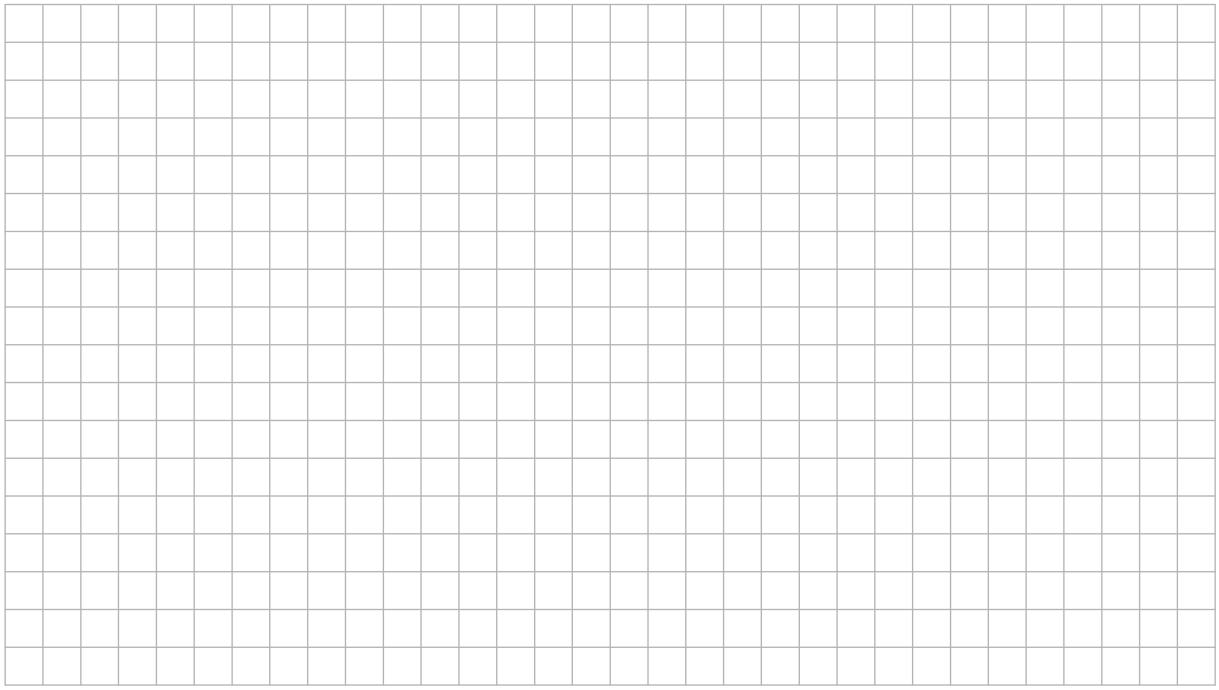
Question 1 (25 marks)

(a) Which of the following best describes how likely it is that each of the following events occurs? Write the letter corresponding to the correct answer in the box in the table.

- **A.** Impossible or almost impossible
- **B.** Not very likely
- **C.** About 50% likely
- **D.** Very likely
- **E.** Certain or almost certain.

Event	*How likely*
A baby will be born in Ireland tomorrow.	
If you pick one card from an ordinary pack of cards you will pick the queen of hearts.	
There will be 400 days in the year 2013.	
If a coin is tossed you will get a head.	
It will not rain in Ireland during the month of November.	
If two ordinary dice are thrown, the sum of the numbers will be 1.	

(b) A small business employs 1 manager, 4 technicians, 2 technical assistants and 2 secretaries. The manager is paid €1020 a week, the technicians are each paid €800 a week, the technical assistants are each paid €500 a week and the secretaries are each paid €450 a week.
Find the difference between the mean weekly wage and the median weekly wage.



Question 2 **(25 marks)**

John has two bags. In one bag there are two balls numbered 1 and 2. In the other bag there are three balls numbered 5, 6 and 7.
John picks one ball at random from each bag and records the two numbers drawn.

(a) How many different possible outcomes are there?

(b) What is the probability that the outcome will be the balls numbered 1 and 5?

(c) What is the probability that both numbers drawn will be odd?

(d) What is the probability that at least one of the numbers will be odd?

Question 3 **(25 marks)**

The number of text messages that a student sent each day over a certain two-week period was as follows. The numbers are in date order, starting on a Monday.

17,	20,	28,	24,	33,	56,	48
12,	19,	32,	2,	37,	50,	42

(a) Construct a stem-and-leaf plot of the data.

(b) Find the median and the range.

Median = _____ Range = _____

(c) There was one day in this two-week period when the student lost her phone in the morning and only found it the following morning. Based on the data, what day of the week do you think that was?

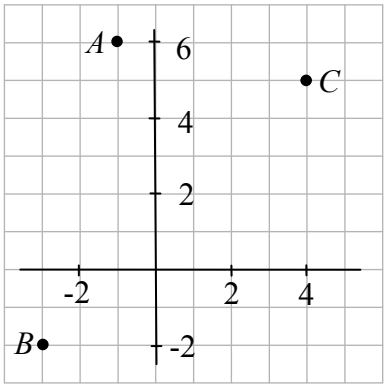
Give a reason for your answer.

Day: _____

Reason:

Question 4 **(25 marks)**

The diagram shows the points A, B and C.



(a) Write down the co-ordinates of

A _____

B _____

C _____

(b) Find the co-ordinates of the midpoint of $[BC]$.

(c) Find the slope of AB.

(d) The point X has co-ordinates (7, 17).
Is the line AB parallel to the line CX? Give a reason for your answer.

Question 5 **(25 marks)**

The line l passes through the point $A\left(3, \frac{1}{2}\right)$ and has slope $\frac{5}{2}$.

(a) Show that the equation of l can be written as $2y = 5x - 14$.

(b) Investigate whether or not the point $B(6, 8)$ is on l.

(c) Find the distance from A to B.

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Question 6 **(25 marks)**

Answer **either** 6A **or** 6B.

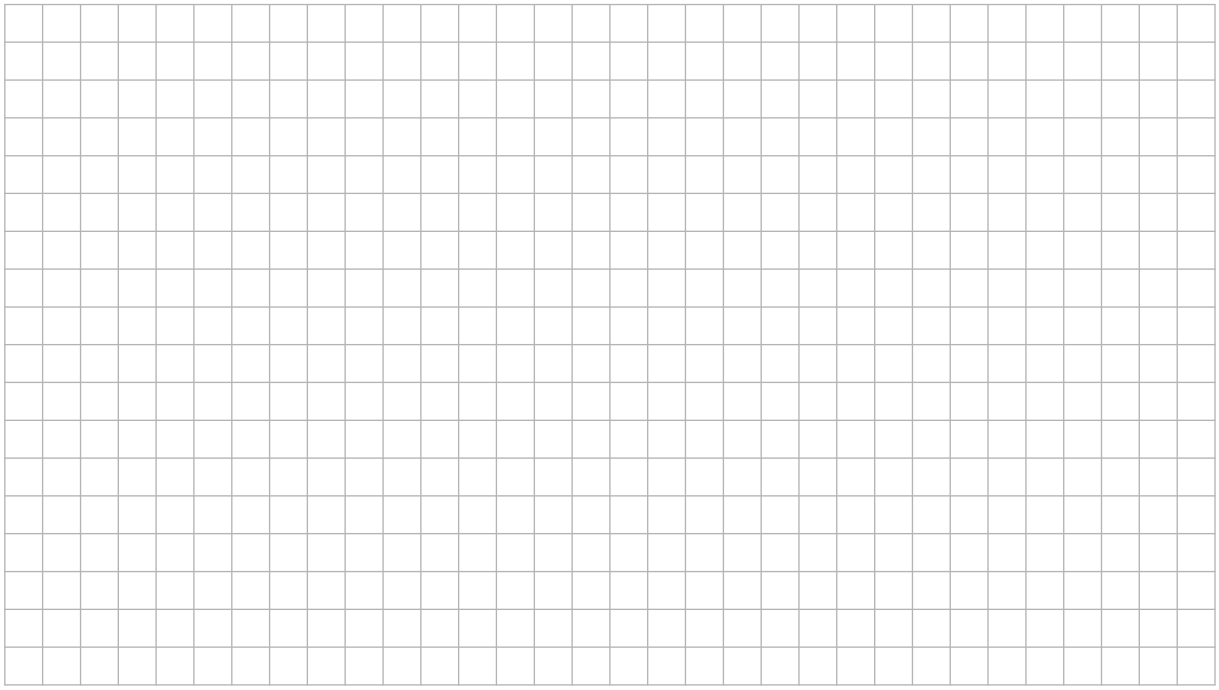
Question 6A

(a) Construct a parallelogram $PQRS$ in which $|PQ| = 7$ cm, $|QR| = 5$ cm and $|\angle PQR| = 120°$. Show all the construction lines clearly.

(b) Use your protractor to measure the angle RSP.

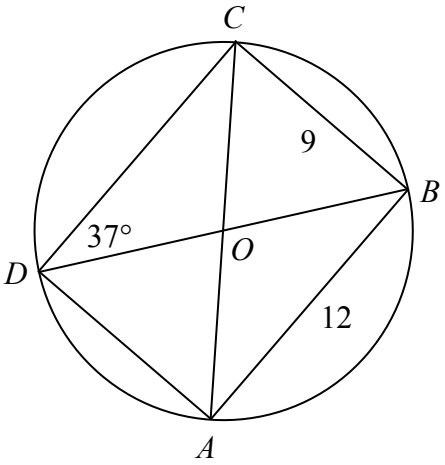
Answer: _____

(c) Explain how you could use the measurement in part **(b)** to check the accuracy of your construction.



OR

Question 6B



ABCD is a parallelogram.
A circle of centre *O* passes through the four vertices of the parallelogram.
The diagonals of the parallelogram intersect at *O*.

$|AB| = 12$, $|BC| = 9$ and $|\angle CDB| = 37°$.

(a) Write down $|\angle BCD|$.

Answer: _____

(b) Calculate $|DB|$.

(c) Name two isosceles triangles in the diagram.

(d) Find $|\angle BOC|$.

(e) Find the area of the triangle *ABD*.

Section B — Contexts and Applications — 150 marks

Answer Question 7 and Question 8 from this section.

Question 7 **(75 marks)**

(a) A researcher is investigating the number of hours that Leaving Certificate students in Ireland spend studying each week. The researcher asks the Principal in her old school to pick some students to be surveyed. Each student was asked how many hours they spent studying, on average, each week. The results are as follows:

9	14	13	17	8
6	8	19	12	9
7	18	13	14	21
6	22	11	6	16
9	7	13	11	22

(i) Complete the following table:

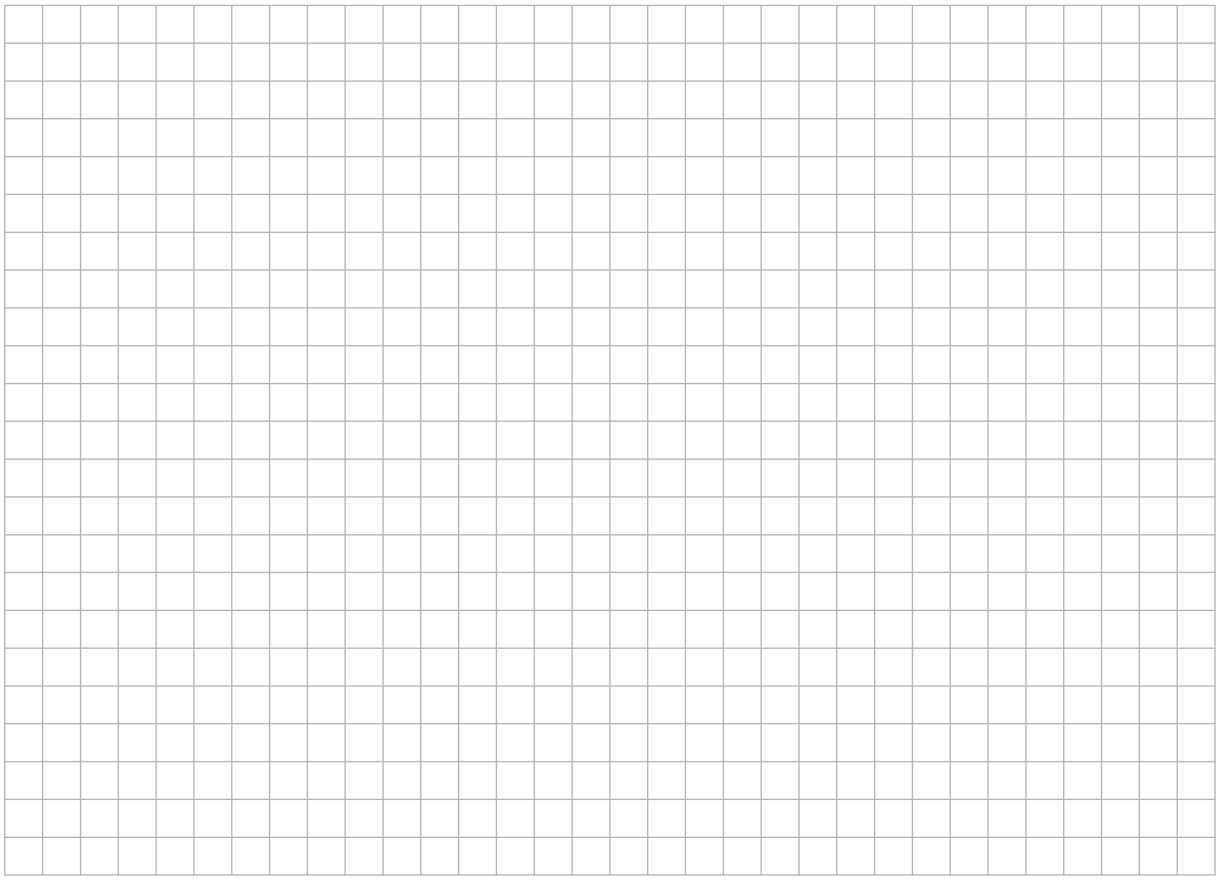
Hours spent studying	5 – 10	10 – 15	15 – 20	20 – 25
Number of students				

Note: "5 – 10" means at least 5 but less than 10, etc.

(ii) How many students took part in the research?

Answer: _____

(iii) Represent the data using a suitable chart.



(iv) A student is picked at random from the group. What is the probability that this student spends less than 10 hours a week studying?

(v) A sample should always be chosen in a way that represents the population fairly. Otherwise, the sample may be *biased*. Give one reason why the sample in this case might be biased.

(vi) State one thing the researcher could have done to avoid bias in the sample.

(b) A shop sells T-shirts. The different choices available are:

Sleeve	Neck shape	Colour
long sleeve	round-neck	White
short sleeve	V-neck	Black
no sleeve		Blue
		Grey

All of the different possible combinations are available.

(i) How many different possible T-shirts are there?

(ii) A customer picks a T-shirt at random from all those available.
What is the probability that the customer picks

- a long-sleeved, round-neck, white T-shirt

Answer: _____

- a short-sleeved grey T-shirt

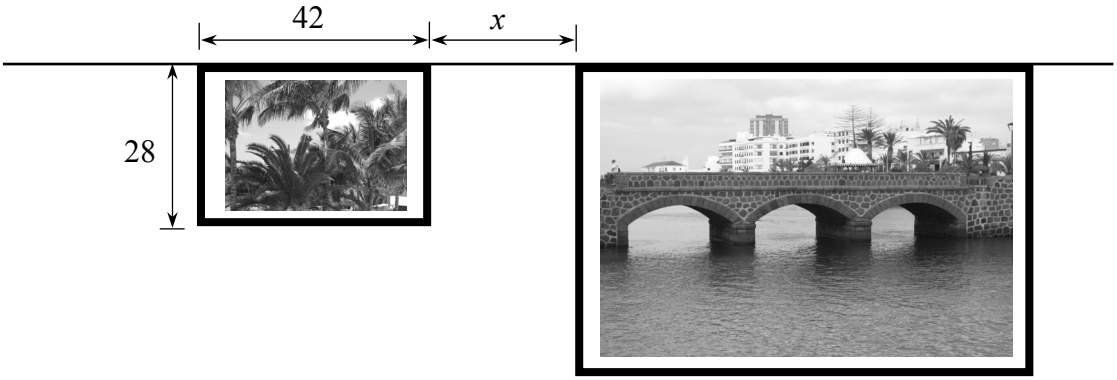
Answer: _____

- a long-sleeved T-shirt.

Answer: _____

Question 8 **(75 marks)**

(a) John hangs two pictures from a horizontal rail.
The smaller picture frame is a rectangle measuring 42 cm by 28 cm. The larger picture frame is an enlargement of the smaller picture frame. The scale factor of the enlargement is 2.



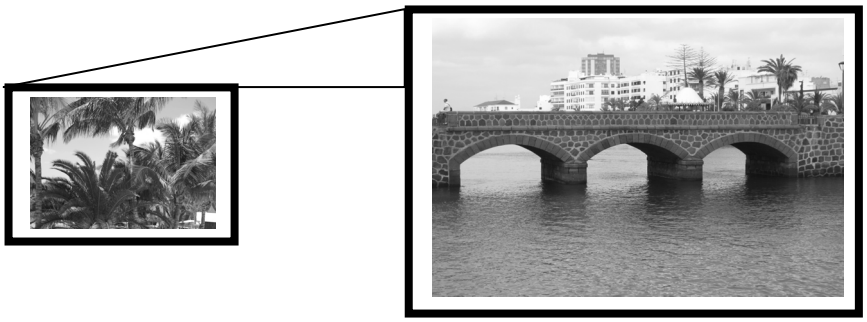
(i) On the diagram, find the centre of enlargement.

(ii) Find the measurements of the larger picture.

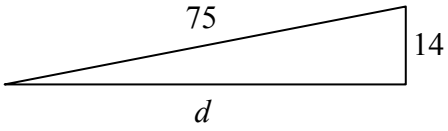
(iii) The centre of enlargement is 70 cm from the nearest corner of the smaller picture. Find x, the distance between the two pictures.

(iv) Verify that the ratio of the area of the larger picture to the area of the smaller picture is equal to the square of the scale factor.

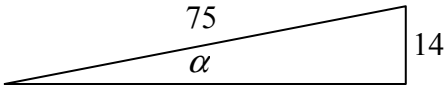
(b) John decides that the pictures might look better if he moves the larger one across and up. To arrange them, he drew the triangle shown and noted the measurements, in centimetres.



(i) Use Pythagoras' theorem to find the length d, correct to the nearest cm.



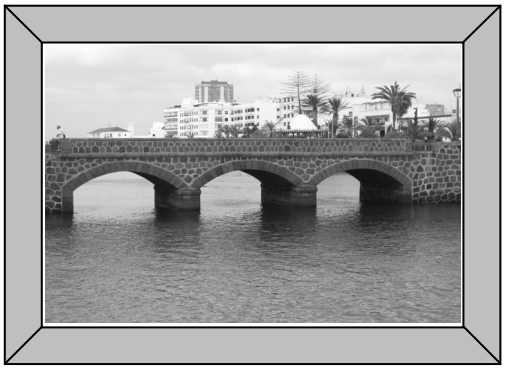
(ii) Find the angle α, correct to the nearest degree.



(c) John decides to make a different frame for the larger picture. The framing material is sold by the metre.

John estimates the length of framing material he needs by calculating the perimeter of the existing picture frame and adding 5%.

How many metres of framing material does he need to buy?



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