*Leaving Certificate Sample and Examination Papers Phase 1*

*For the 2012 Examination*

# FOUNDATION LEVEL

***Includes:***

2011 Leaving Certificate Examination Paper 2
2011 Sample Examination Paper 2
2010 Leaving Certificate Examination Paper 2
2010 Sample Examination Paper 2

***Leaving Certificate 2012 Examination Guidelines***

# *FOUNDATION LEVEL*

***Some Points to Note:***

- **Paper one** will be unchanged from previous years; same structure, same choice.

- **Paper two** will have two questions (100 marks) based on 'applied arithmetic and measure' from the unchanged syllabus material. Section A (4 questions worth 100 marks) will focus on concepts and skills, while Section B (2 questions worth 100 marks) will focus on contexts and applications.

- Paper two will examine ***Area and Volume*** *(unchanged syllabus material)*, **Statistics and Probability** *(Strand 1)* and **Geometry and Trigonometry** *(Strand 2)*.

- Learning outcomes from more than one strand can be examined in a single question.

- All questions must be answered, there is **no*** choice.

  **Section 2.1 of the syllabus indicates that candidates will have the option of answering a question on the synthetic geometry set out in the syllabus, or answering a problem-solving question based on the geometrical results from the corresponding syllabus level at Junior Certificate. This option will apply for a three year period only that is for candidates sitting the Leaving Certificate examination in 2012, 2013 and 2014. There will be no choice after that stage.*

- There is a new type of marking scheme in place for examining the new syllabus; more information and these marking schemes can be found on: *http://www.examinations.ie*

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination, 2011

# Mathematics
# (Project Maths – Phase 2)

## Paper 2

## Foundation Level

## Monday 13 June  Morning 9:30 – 12:00

300 marks

| Examination number |
|---|
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| Centre stamp |
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| Running total | |
|---|---|

| For examiner | |
|---|---|
| Question | Mark |
| 1 | |
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| 5 | |
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| Total | |

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## 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 Question 7 and Question 8.

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:

## Section A — Concepts and Skills — 150 marks

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

**Question 1** **(25 marks)**

**(a)** Give an example of an experiment with two outcomes that are *equally likely*, stating clearly what the two outcomes are.

**(b)** Give an example of an experiment with two outcomes that are **not** equally likely, stating clearly what the two outcomes are.

**Question 2** **(25 marks)**

A girl and a boy are each asked to think of a whole number from 1 to 10. The outcome of this experiment is recorded as a pair of numbers. For example, if the girl picks 3 and the boy picks 1, this is recorded as (3, 1).

**(a)** Write out **three** possible outcomes of this experiment.

**(b)** How many different possible outcomes are there?

**(c)** Write out all of the outcomes in which the two children pick the same number.

**(d)** Suppose that all numbers are equally likely, and that one child's choice has no effect on the other's choice. What is the probability that the two children will pick the same number?

**Question 3** **(25 marks)**

Some scientists were studying a certain kind of ant. They selected a sample of 39 of these ants and measured the length of each ant's body, in millimetres. The results are shown in this stem-and-leaf plot:

| | |
|---|---|
| 4 | 3 |
| 4 | 6 6 8 9 |
| 5 | 0 0 1 1 1 2 4 |
| 5 | 5 7 |
| 6 | 0 |
| 6 | 8 9 |
| 7 | 0 1 2 4 |
| 7 | 5 5 7 8 8 8 9 |
| 8 | 0 0 1 1 2 3 4 4 |
| 8 | 5 5 8 |

Key: 4 | 3 means 4·3 mm.

**(a)** What is the length of the longest ant?

Answer: _____

**(b)** What is the median length of the ants in the sample?

Answer: _____

**(c)** Describe the shape of the distribution.

**(d)** Suggest a reason why the distribution might have this shape.

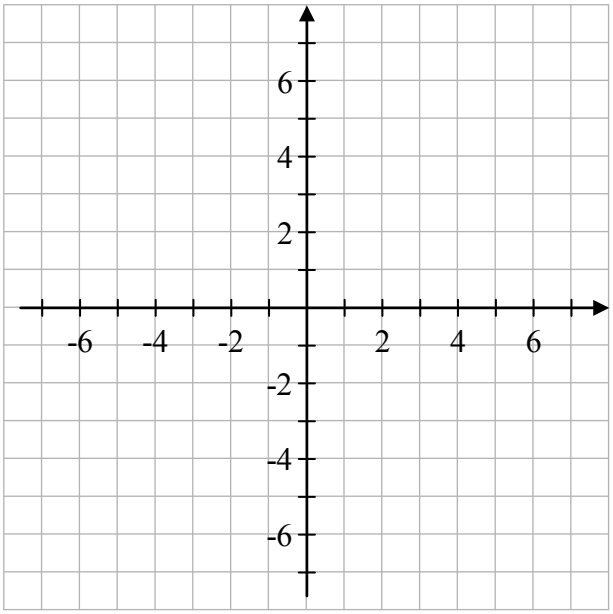
**Question 4** **(25 marks)**

The points $A$, $B$, and $C$ have co-ordinates as follows:

$A$ (–4, 1)

$B$ (–1, –5)

$C$ (4, 5)




**(a)** Plot $A$, $B$, and $C$ on the diagram, and show the triangle $ABC$.

**(b)** Find the slope of $AB$ and the slope of $AC$.

slope of $AB$ = _____ slope of $AC$ = _____

**(c)** Show how to use your answers to part **(b)** to decide whether this triangle is right-angled at $A$.

**Question 5** **(25 marks)**

The line $l$ has equation $5x+12y-60=0$. It cuts the $x$-axis at $A$ and the $y$-axis at $B$.

**(a)** Find the co-ordinates of $A$ and the co-ordinates of $B$.

**(b)** The point $P$ has co-ordinates (5, 3). Show the point $P$ and the line $l$ on a co-ordinate diagram.

**(c)** Prove that $P$ does not lie on $l$.

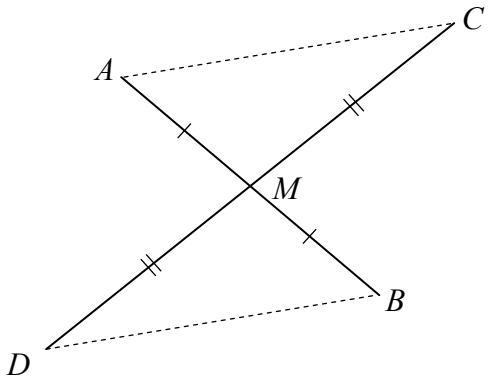
**Question 6** **(25 marks)**

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

**Question 6A**

**(a)** In the diagram, $M$ is the midpoint of $[AB]$ and is also the midpoint of $[CD]$.

Show that $|AC|$ must be equal to $|BD|$.



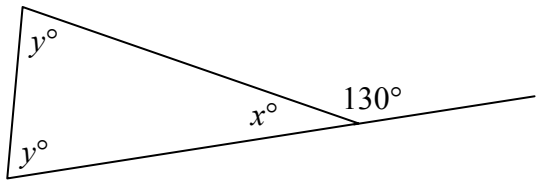

**(b)** Construct an angle of 60°, without using a protractor or setsquare.

Show all construction lines clearly.

**OR**

**Question 6B**

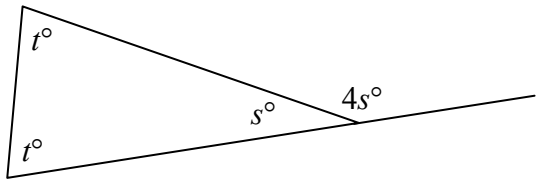
**(a)** The diagram below shows a triangle with one side extended.




**(i)** Find the value of $x$.

**(ii)** The other two angles in the triangle are equal. Each is $y°$. Find the value of $y$.

**(b)** The diagram below shows another triangle with one side extended.
Find the value of $s$ and the value of $t$.

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## Section B — Contexts and Applications — 150 marks

Answer **Question 7** and **Question 8**.

### Question 7 (75 marks)

Whenever a baby is born, one of the things measured and recorded is the baby's weight. The birth-weights of a sample of babies are summarised in the table below.

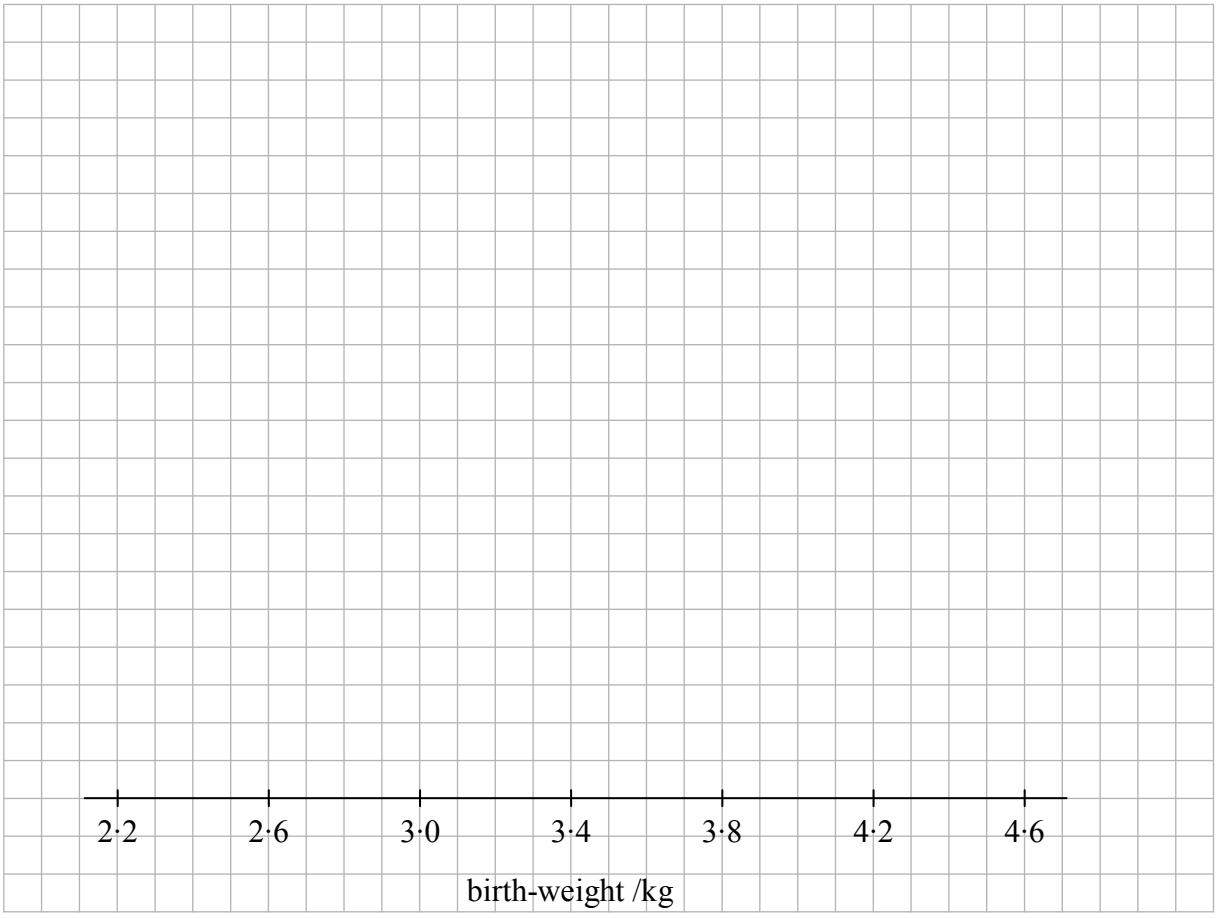
| Weight in kg | 2·2 – 2·6 | 2·6 – 3·0 | 3·0 – 3·4 | 3·4 – 3·8 | 3·8 – 4·2 | 4·2 – 4·6 |
|---|---|---|---|---|---|---|
| Number of babies | 12 | 40 | 64 | 56 | 24 | 4 |

*(Source: simulated data, based on multiple sources)*

**(a)** How many babies were in the sample?

Answer: _____

**(b)** Draw a histogram of the data.




**(c)** Complete the following sentence, by using the table and/or the histogram to make an estimate:

"On average, these babies weighed about _____ kg at birth."

**(d)** One of the babies weighed 3·675 kg when she was born. How would you describe this baby's weight in comparison to the other babies?

**(e)** A weight of less than 2·5 kg is called a "low birth-weight".
Estimate the number of low-birth-weight babies in this sample.

Approximately 60 000 babies were born in Ireland in 2005. According to a survey, 20% of the mothers smoked cigarettes during the pregnancy. Suppose that our sample was chosen from among these babies whose mothers smoked.

**(f)** What is the size of the population from which the sample was drawn?

**(g)** Using the information from the sample, estimate the number of low-birth-weight babies in that population.

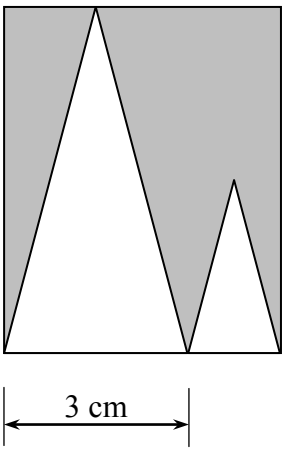
**(h)** Explain why the sample cannot tell us *exactly* how many such babies were in the population.

**(i)** The mean birth-weight for all babies born in Ireland that year was 3·51 kg. Do you think that the information from our sample shows that smoking during pregnancy affects the baby's birth weight? Explain your answer.

**Question 8** **(75 marks)**

**(a)** A jeweller is making a pendant. The design consists of two silver triangles on a rectangular background of copper. The design is shown in the diagram.

The bigger triangle is an enlargement of the smaller triangle. The scale factor of the enlargement is 2.




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

**(ii)** The width of the bigger triangle is 3 cm, as shown. Find the width of the smaller triangle.

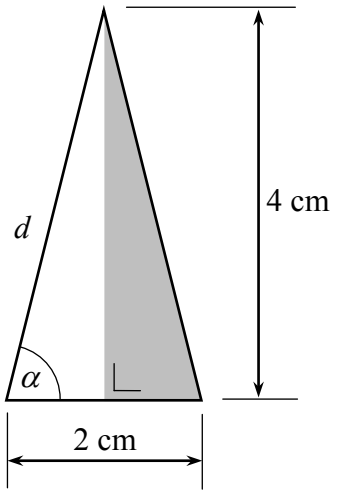
Area and Volume in 2012 will be examined from the Syllabus pre introduction to Project Maths.

**(iii)** The height of the smaller triangle is 2·8 cm. Find the **area** of the bigger triangle.

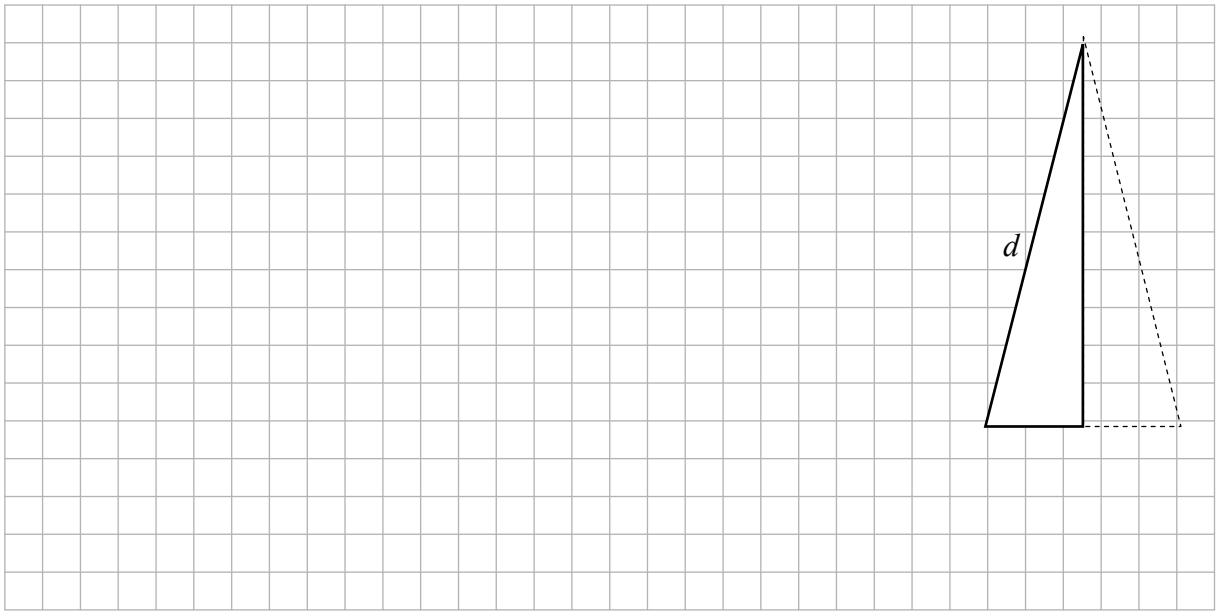
Area and Volume in 2012 will be examined from the Syllabus pre introduction to Project Maths.

**(iv)** What fraction of the area of the copper rectangle is covered by the silver triangles?

**(b)** The jeweller is making some earrings to go with the pendant. Each earring is an isosceles triangle. The triangle is half copper and half silver, as shown in the diagram. The measurements are as shown.




**(i)** Use Pythagoras' theorem to find $d$, the length of one of the sloping sides. Give your answer correct to one decimal place.




**(ii)** Find $|\angle\alpha|$, correct to the nearest degree.

**(c)** The jeweller needs a drawing of the earring design. She wants the drawing to be bigger than the actual earring.

Construct, as accurately as you can, a drawing of the earring at a scale of 2:1. That is, each centimetre in reality should be 2 centimetres in your drawing.

Leaving Certificate 2011 – Foundation Level

# Mathematics (Project Maths – Phase 2) – Paper 2

Monday 13 June
Morning 9:30 – 12:00

Coimisiún na Scrúduithe Stáit
State Examinations Commission

# Leaving Certificate Examination, 2011
# Sample Paper

# Mathematics
# (Project Maths – Phase 2)

## Paper 2

## Foundation Level

## Time: 2 hours, 30 minutes

300 marks

| Examination number |
|---|
| |

| Centre stamp |
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| Running total | |
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| For examiner | |
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| Question | Mark |
| 1 | |
| 2 | |
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| 6 | |
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| Total | |

| Grade |
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## 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 Question 7 and Question 8.

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.

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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.

## Section A — Concepts and Skills — 150 marks

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

### Question 1 (25 marks)

**(a)** Below is a list of experiments with random outcomes. For each one, tick (✓) the correct box to say whether the outcomes should be regarded as *equally likely* or not.

| **Experiment** | outcomes equally likely | outcomes not equally likely |
|---|---|---|
| Rolling a fair die | | |
| Tossing a bent coin | | |
| Predicting the winner of a horse race | | |
| Picking a card from a pack of cards | | |
| Predicting the second ball out of the drum in a lottery | | |
| Deciding whether it will rain tomorrow | | |

**(b)** Explain why it is easier to find the probability of an event when the experiment has *equally likely outcomes*.

**Question 2** **(25 marks)**

An experiment involves asking two different people what day of the week they were born on. The outcome is recorded in this form: (day1, day2).

**(a)** Write out **three** possible outcomes of this experiment.

**(b)** How many different possible outcomes are there?

**(c)** Assuming that every day of the week is equally likely, answer the following.
(You may use the opposite page for extra work, if you need to.)

**(i)** Find the probability that both people were born on a Wednesday.

**(ii)** Find the probability that both people were born at the weekend (Saturday or Sunday).

**(iii)** Find the probability that at least one of them was born at the weekend.

**Question 3** **(25 marks)**

A thousand people were at a concert. A random sample of 25 of them was selected, and the age of each person recorded. Here are the results:

| | | | | |
|---|---|---|---|---|
| 25 | 35 | 28 | 27 | 31 |
| 17 | 21 | 29 | 11 | 25 |
| 27 | 21 | 18 | 23 | 21 |
| 23 | 18 | 21 | 16 | 24 |
| 19 | 25 | 22 | 13 | 28 |

**(a)** Display the data in a stem-and-leaf plot.

**(b)** What is the median age of the sample?

Answer: _____

**(c)** Based on the sample, estimate the number of people at the concert who were in their thirties.

**(d)** Explain why we cannot say for certain that exactly this many were in their thirties.

**Question 4** **(25 marks)**

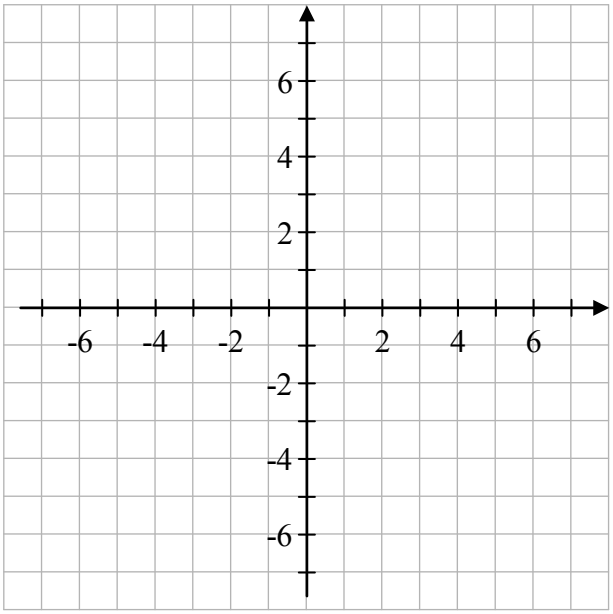
The points $A$, $B$, and $C$ have co-ordinates as follows:

$A$ (3, 5)

$B$ (–6, 2)

$C$ (5, –2)

**(a)** Plot $A$, $B$, and $C$ on the diagram, and show the triangle $ABC$.




**(b)** Find the lengths of the three sides of the triangle.

$|AB| =$ _____ $|BC| =$ _____ $|CA| =$ _____

**(c)** Use your answers to part **(b)** to show that the triangle is **not** right-angled at $A$.

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**Question 5** **(25 marks)**

The line $l_1$ passes through the points (4, 5) and (7, –1).

The line $l_2$ has equation $y = \frac{2}{3}x + 1$.

The line $l_3$ has equation $2x - 3y + 12 = 0$.

**(a)** Find the slopes of the three lines $l_1$, $l_2$, and $l_3$.

slope of $l_1$ = _____ slope of $l_2$ = _____ slope of $l_3$ = _____

**(b)** State whether any of these three lines are parallel or perpendicular to one another, giving reasons for your answers.

**Question 6** **(25 marks)**

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

**Question 6A**

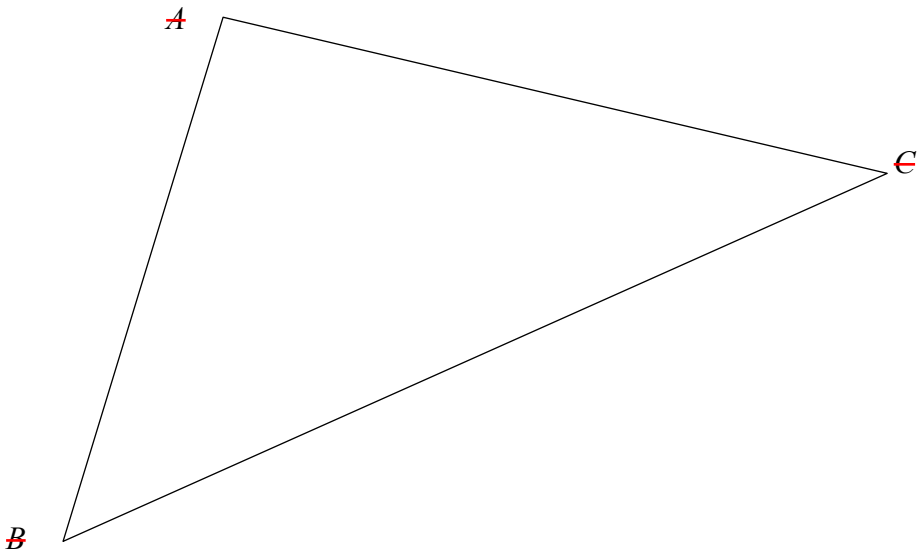
**(a)** Explain what is meant by the *circumcircle* and the *incircle* of a triangle.

The circumcircle of a triangle is…

This topic is no longer on the syllabus.

The incircle of a triangle is…

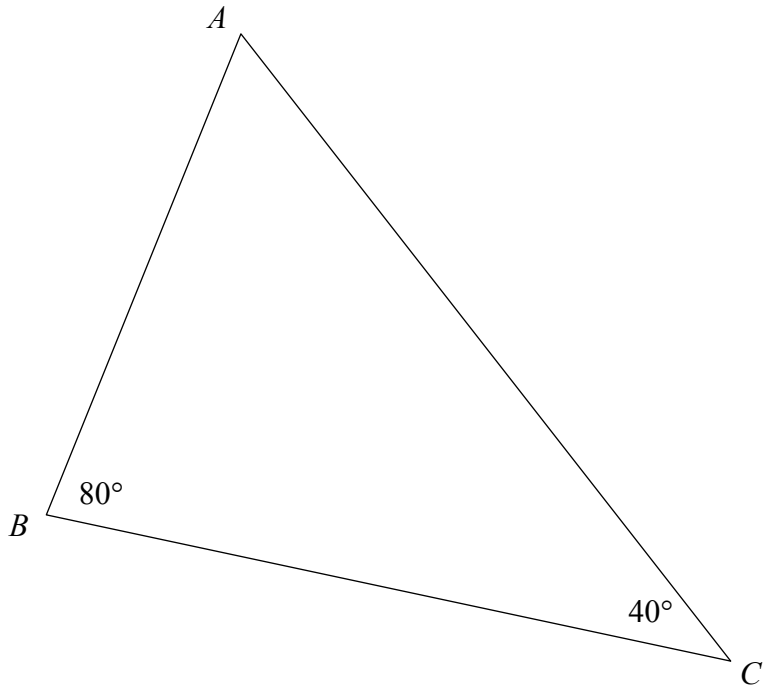
**(b)** Construct the *incircle* of the triangle *ABC* below, using only a compass and straight-edge. Show all construction lines.



**OR**

**Question 6B**

In the triangle $ABC$, $|\angle ABC| = 80°$ and $|\angle ACB| = 40°$, as shown.




**(a)** Construct the bisector of $\angle BAC$, without using a protractor.

**(b)** The bisector that you drew in part **(a)** meets the side $[BC]$ at $D$. Mark and label the point $D$.

**(c)** By measuring as accurately as you can, verify that $|BD| = |AC| - |AB|$.

$|BD|$ = _____, $|AC|$ = _____, $|AB|$ = _____.

*Verification:*

**(d)** Do you think that the result that you verified in part **(c)** is true for every triangle?
Justify your answer.

## Section B — Contexts and Applications — 150 marks

Answer **Question 7** and **Question 8**.

### Question 7 (75 marks)

**(a)** The *Central Statistics Office* gives estimates every year about how the population of Ireland is changing. Here is some of the information for the last five years:

| Year ending April | Components of population change | | | | |
|---|---|---|---|---|---|
| | **Births** | **Deaths** | **Natural increase** | **Net migration** | **Population change** |
| **2006** | 61 200 | 27 000 | 34 200 | 71 800 | 106 000 |
| **2007** | 65 800 | 27 000 | 38 800 | 67 300 | 106 100 |
| **2008** | 72 300 | 27 700 | 44 600 | 38 500 | 83 100 |
| **2009** | 74 500 | 29 400 | 45 100 | – 7 800 | 37 300 |
| **2010** | 74 100 | 28 200 | 45 900 | – 34 500 | 11 400 |

Source: *Population and Migration Estimates*, CSO, September 2010

Note: The **Net migration** column shows the number of people who came to live in Ireland minus the number who left.

**(i)** Which **one** of the following statements about the total population is true? Write the letter corresponding to the correct answer in the box.

**A**. The population has been falling for the last few years
**B.** The population has been rising faster and faster every year
**C.** The population is rising, but more slowly than a few years ago
**D.** The population rose in some years and fell in other years.

**(ii)** The population in April 2006 was 4·240 million. What was it in April 2007?

**(ii)** Explain how the numbers in the **Natural increase** column are related to the numbers in the **Births** and **Deaths** columns.

page | running

**(iii)** The number of people who **left** Ireland in the year ending April 2010 was about the same as it was the year before. What can you say about the number of people who **came** to Ireland in the year ending April 2010?

**(iv)** In your opinion, what is the most notable feature of the information in the table. Explain your answer.

**(v)** Seán says: "The average increase in the population over the last five years is about 69 000 people…"

Verify that Seán's calculation is correct.

**(vi)** Seán goes on to say: "…so I expect that there will be about 69 000 more people in Ireland by April 2011."

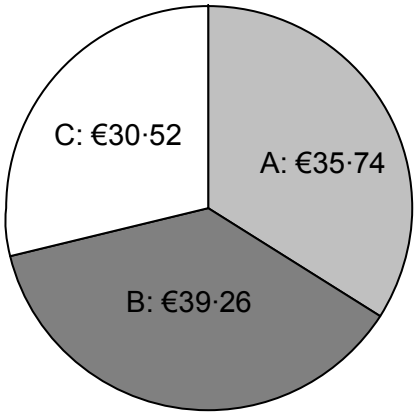
Is Seán's conclusion reasonable? Explain your answer.

**(vii)** Name **one** source of data that the *Central Statistics Office* might have used in order to get some of the information in the table.

**(b)** Jane wanted to compare prices in three different supermarkets. She did a survey of prices for a shopping basket of certain goods in the supermarkets. The total price of the goods in the basket is as follows:

| Supermarket A | Supermarket B | Supermarket C |
|---|---|---|
| €35·74 | €39·26 | €30·52 |

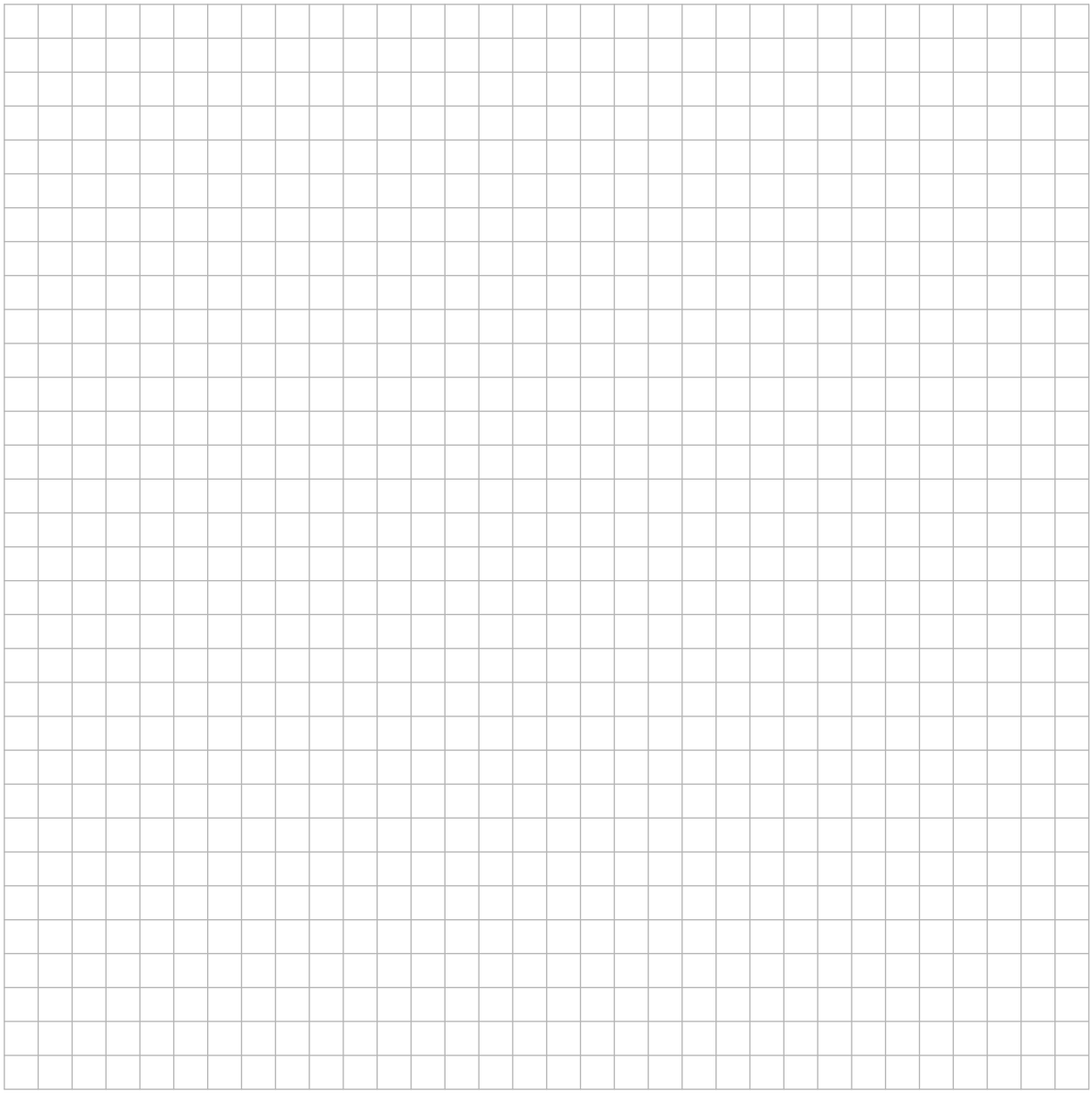
Jane decided to display the results of her survey as a pie chart. Her chart is shown below.




**Price of basket of goods**

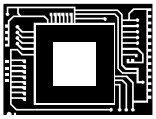
**(i)** Explain why a pie chart is **not** a good way to display this information.

**(ii)** Use a different type of chart to display the results in a better way.



**Question 8** **(75 marks)**

**(a)** A pattern for a circuit board was reduced in size using an enlargement by the ray method. Because the pattern was made smaller, the *scale factor* is less than 1. The diagram below shows the pattern before and after the reduction.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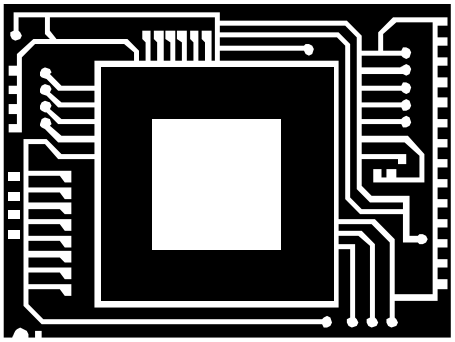
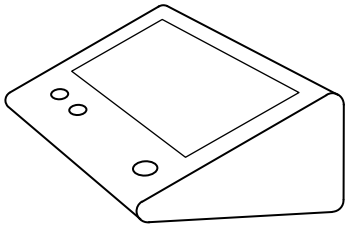

original

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

**(ii)** By measurement and calculation, find the scale factor of the enlargement.

**(iii)** The area of the original pattern is 27 $cm^2$. Find the area of the image.

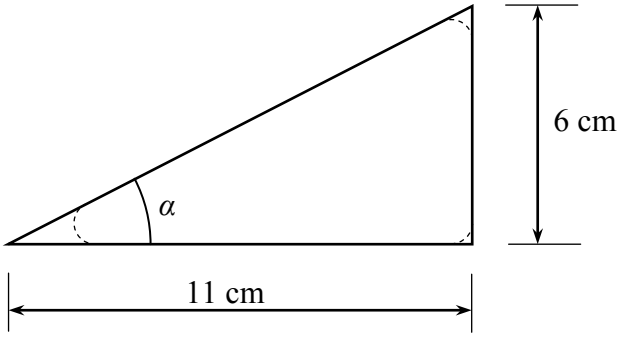
**(b)** The circuit board is for an electronic game.



The side panel of the game is approximately triangular.

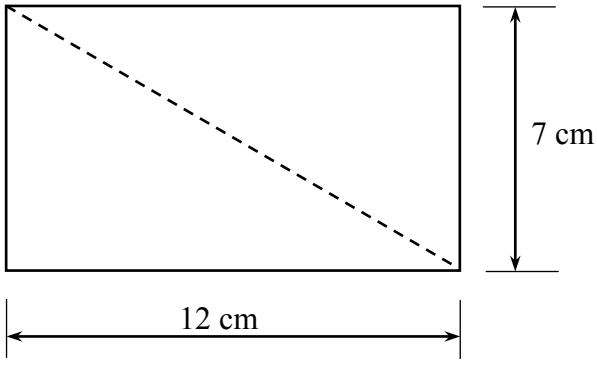
The drawing below is for the side panel.

The measurements are as shown.



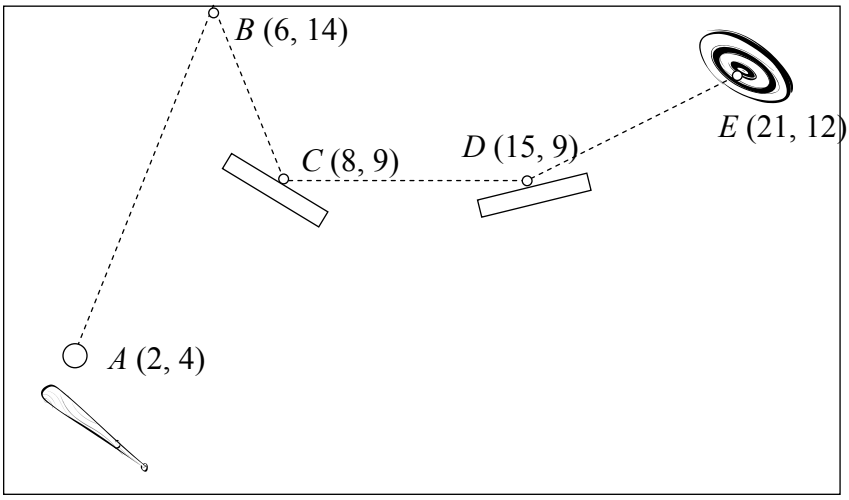

Find $|\angle\alpha|$, correct to the nearest degree.

**(c)** The screen measures 7 cm by 12 cm.
Find the length of the diagonal of the screen.



**(d)** One of the games involves hitting a ball around the screen with a bat. The positions of objects on the screen are described with co-ordinates.

The diagram shows the path of a ball from when it is hit at $A$ until it hits a target at $E$.




**(i)** Find the distance from $A$ to $B$.

**(ii)** Show that the slope of $BC$ is the negative of the slope of $AB$.

**(iii)** The slope of $DE$ is $\frac{1}{2}$. Find the equation of $DE$.

**(iv)** Show that $A$ is **not** on the line $DE$.

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You may use this page for extra work

You may use this page for extra work

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*Note to readers of this document:*

This sample paper is intended to help teachers and candidates prepare for the June 2011 examination in the *Project Maths* initial schools. The content and structure do not necessarily reflect the 2012 or subsequent examinations in the initial schools or in all other schools.

Leaving Certificate 2011 – Foundation Level

# Mathematics (Project Maths – Phase 2) – Paper 2

Sample Paper
Time: 2 hours 30 minutes

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination

# Mathematics (Project Maths)

## Paper 2

## Foundation Level

Monday 14 June Morning 9:30 – 12:00

300 marks

| Examination number |
|---|
| |

| Centre stamp |
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| |

| Running total | |
|---|---|

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

| Grade |
|---|
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## Instructions

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

| | | | |
|---|---|---|---|
| Section 0 | Area and Volume (old syllabus) | 100 marks | 2 questions |
| Section A | Concepts and Skills | 100 marks | 4 questions |
| Section B | Contexts and Applications | 100 marks | 2 questions |

Answer **all eight** questions.

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.

A sheet of formulae will also be given to you by the superintendent.

Marks will be lost if all necessary work is not clearly shown.

Answers should include the appropriate units of measurement, where relevant.

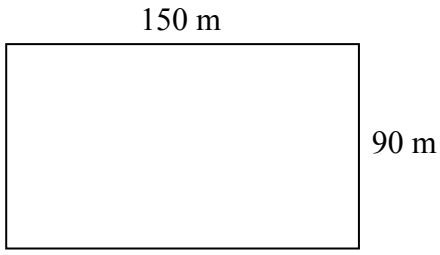
Answers should be given in simplest form, where relevant.

## Section 0 Area and Volume (old syllabus) 100 marks

Answer Question 1 and Question 2 from this section.

**Question 1** **(50 marks)**

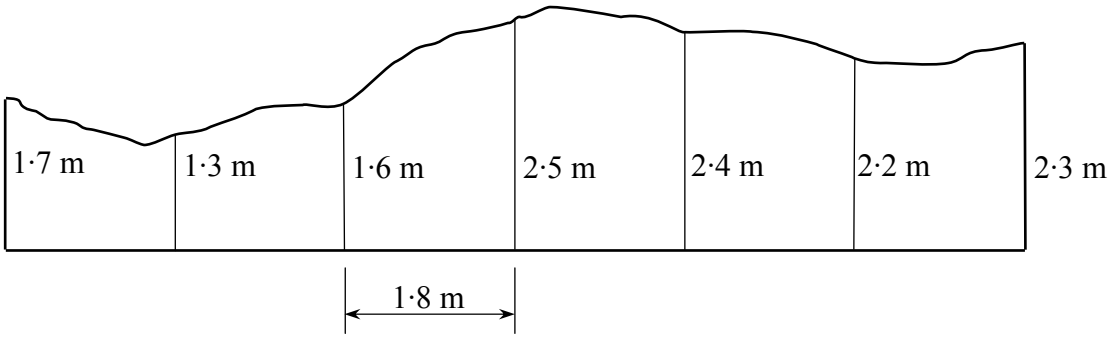
**(a)** A rectangular field is 150 m long and 90 m wide.




**(i)** Find the area of the field.

**(ii)** Find the length of the perimeter of the field.

**(b)** One side of an old garden fence is shown in the diagram.



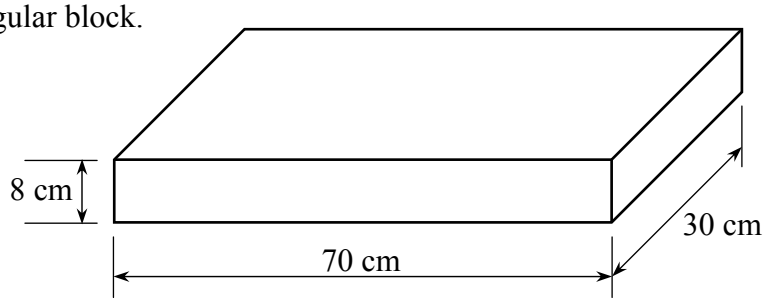

The height of the fence is measured as 1·7, 1·3, 1·6, 2·5, 2·4, 2·2, and 2·3 metres at intervals of 1·8 metres along the base of the fence as shown.

**(i)** Use Simpson's rule to calculate the area of the side of the fence, in $\text{m}^2$.

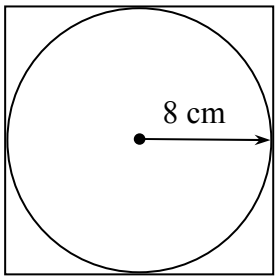
**(ii)** The owner paints this side of his fence.
One tin of paint covers 5·4 square metres.
How many tins of paint does he use?

**Question 2** **(50 marks)**

**(a)** The diagram shows a rectangular block 70 cm long, 30 cm wide and 8 cm high.
Calculate the volume of the rectangular block.



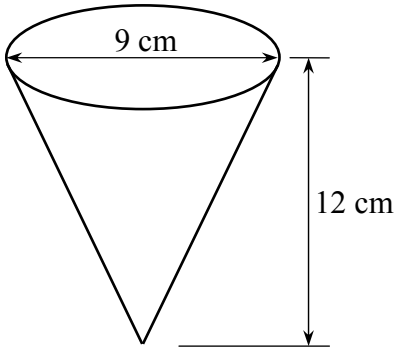

**(b)** The diagram shows a circle inscribed in a square.
The radius of the circle is 8 cm.




**(i)** Find the area of the circle.
Give your answer correct to the nearest $cm^2$.

**(ii)** Find the area of the square.

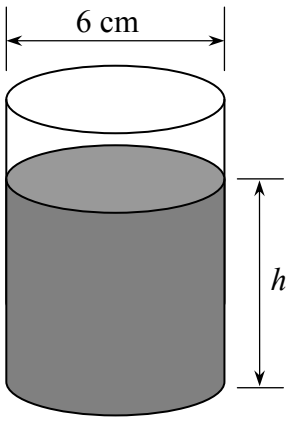
**(c)** A container in the shape of an inverted cone is filled with water.




The diameter of the cone is 9 cm and the height is 12 cm.

**(i)** Find the volume of water in the container, in terms of $\pi$.

**(ii)** The water is then poured out of the cone and into a cylindrical can of diameter 6 cm.




Find $h$, the depth of water in the can.

You may use this page for extra work

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## Section A — Concepts and Skills — 100 marks

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

### Question 3 (25 marks)

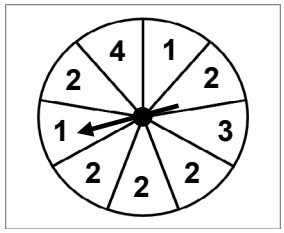
**(a)** A school canteen has the "lunch special" shown.
The following sandwiches and drinks are available.

| Sandwich | Drink |
|---|---|
| chicken | tea |
| cheese | hot chocolate |
| tuna | fruit drink |
| salad | |
| egg | |


**(i)** What is the total number of different options available?

**(ii)** Orla doesn't like tuna or tea. How many different options does she have?

**(b)** A fair spinner is divided into nine equal sections.
The sections are numbered as shown.




Michael says:
"There's a greater than even chance that you'll get a 2."

State whether Michael is correct and give a reason for your answer.

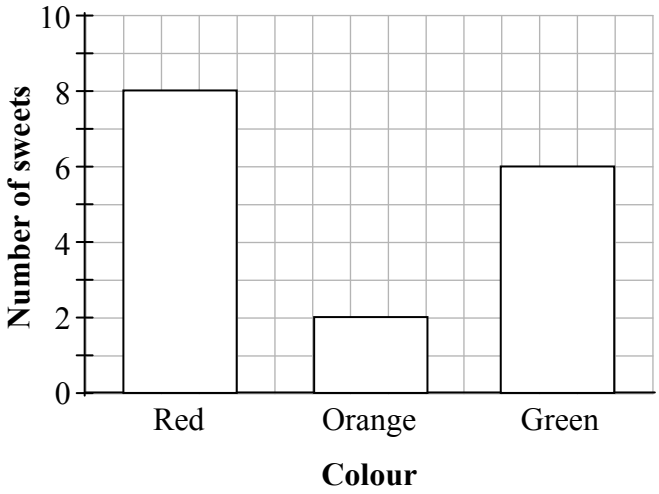
Answer: _____

Reason:

**Question 4** **(25 marks)**

Robert has a bag of sweets.
The chart shows the number of red, orange and green sweets in the bag.

Robert picks one sweet at random from the bag.




**(a)** What is the probability that Robert picks a red sweet?

**(b)** What is the probability that Robert does not pick an orange sweet?

**(c)** The sweet that Robert picks is red. He eats it. He then picks another sweet at random from the bag. Is the probability that this second sweet is red *greater than*, *less than*, or *the same as* the original probability that the first sweet was red? Explain your answer.

Answer: _____

Explanation:

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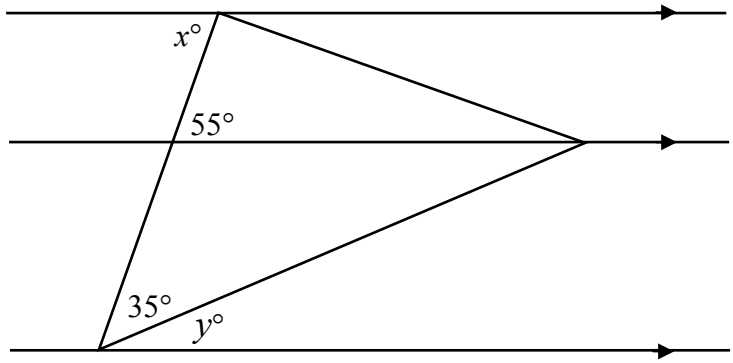
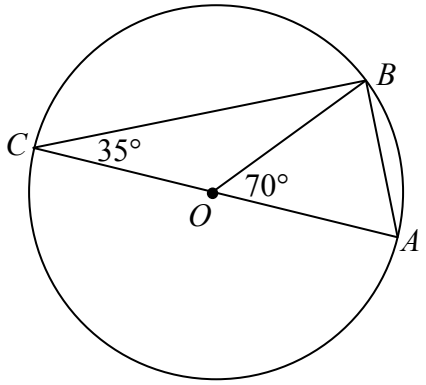
**Question 5** **(25 marks)**

**(a)** The diagram shows a triangle and three parallel lines.
Find the value of $x$ and the value of $y$.




Answer: $x =$ _____ $y =$ _____

**(b)** $[AC]$ is a diameter of a circle with centre $O$.
$B$ is a point on the circle.



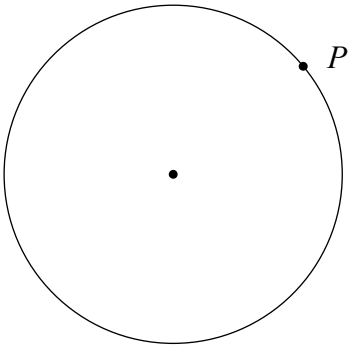

**(i)** Find $|\angle ABC|$.

Answer: $|\angle ABC| =$ _____

**(ii)** Find $|\angle ABO|$.

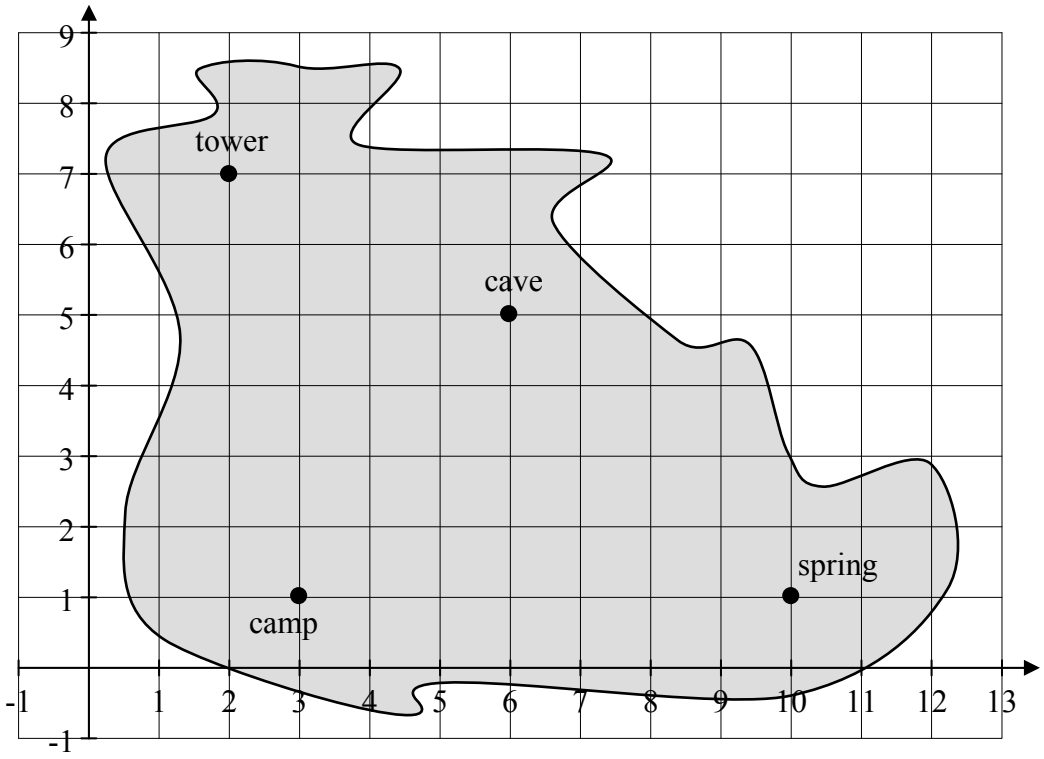
Answer: $|\angle ABO| =$ _____

**(c)** On the diagram, show how to construct
the tangent to the circle at the point $P$.



**Question 6** **(25 marks)**

A map of an island used in a computer game is shown. A co-ordinate grid covers the map.




**(a)** Write down the co-ordinates of the cave and the camp.

cave ( , ) camp ( , )

**(b)** Find the co-ordinates of the point that is exactly halfway between the cave and the camp.

**(c)** Two teams are racing to get to the spring. The red team is at the cave. The blue team is at the point (5, 4). Use the distance formula to decide which team is closer to the spring.

## Section B — Contexts and Applications — 100 marks

Answer Question 7 and Question 8 from this section.

**Question 7** **Probability and Statistics** **(50 marks)**

**(a)** Gary's class was doing a project. They went to the computer room to get information from the internet. Gary recorded the time, in minutes, that each of them spent on the internet. These are his results.

| | | | | |
|---|---|---|---|---|
| 45 | 32 | 29 | 34 | 32 |
| 26 | 30 | 32 | 20 | 36 |
| 27 | 42 | 18 | 24 | 18 |
| 15 | 38 | 27 | 34 | 19 |

**(i)** Display the data in a stem-and-leaf plot.

**(ii)** What percentage of the students spent less than twenty minutes on the internet?

**(iii)** Deirdre asks Gary how long the class spent on the internet. Gary gave an answer that started: "Most of them spent…"
Complete Gary's answer to give a good summary of the data in one sentence.

"Most of them spent

**(b)** The marks Mary got in her maths tests for a term are listed in the table.

| **Test** | Test 1 | Test 2 | Test 3 | Test 4 | Test 5 |
|---|---|---|---|---|---|
| **Mark** | 85 | 92 | 78 | 54 | 82 |

**(i)** What is Mary's median mark for the term?

**(ii)** Calculate Mary's mean mark for the term.

**(iii)** Which one of Mary's marks is out of line with the others?

Answer: _____

**(iv)** Which do you think is a fairer summary of Mary's work for the term: the mean or the median? Give a reason for your answer.

Answer: _____

Reason:

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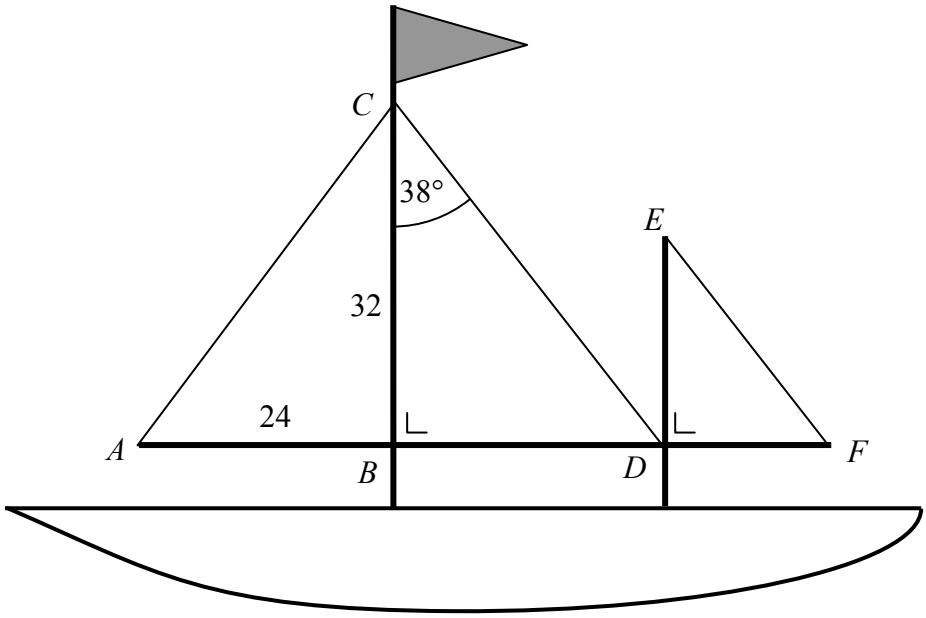
**Question 8** **Geometry and Trigonometry** **(50 marks)**

Seán is making a toy boat. His design is shown below. He is working on the sails.
$|AB| = 24$ cm, $|BC| = 32$ cm and $|\angle BCD| = 38°$.



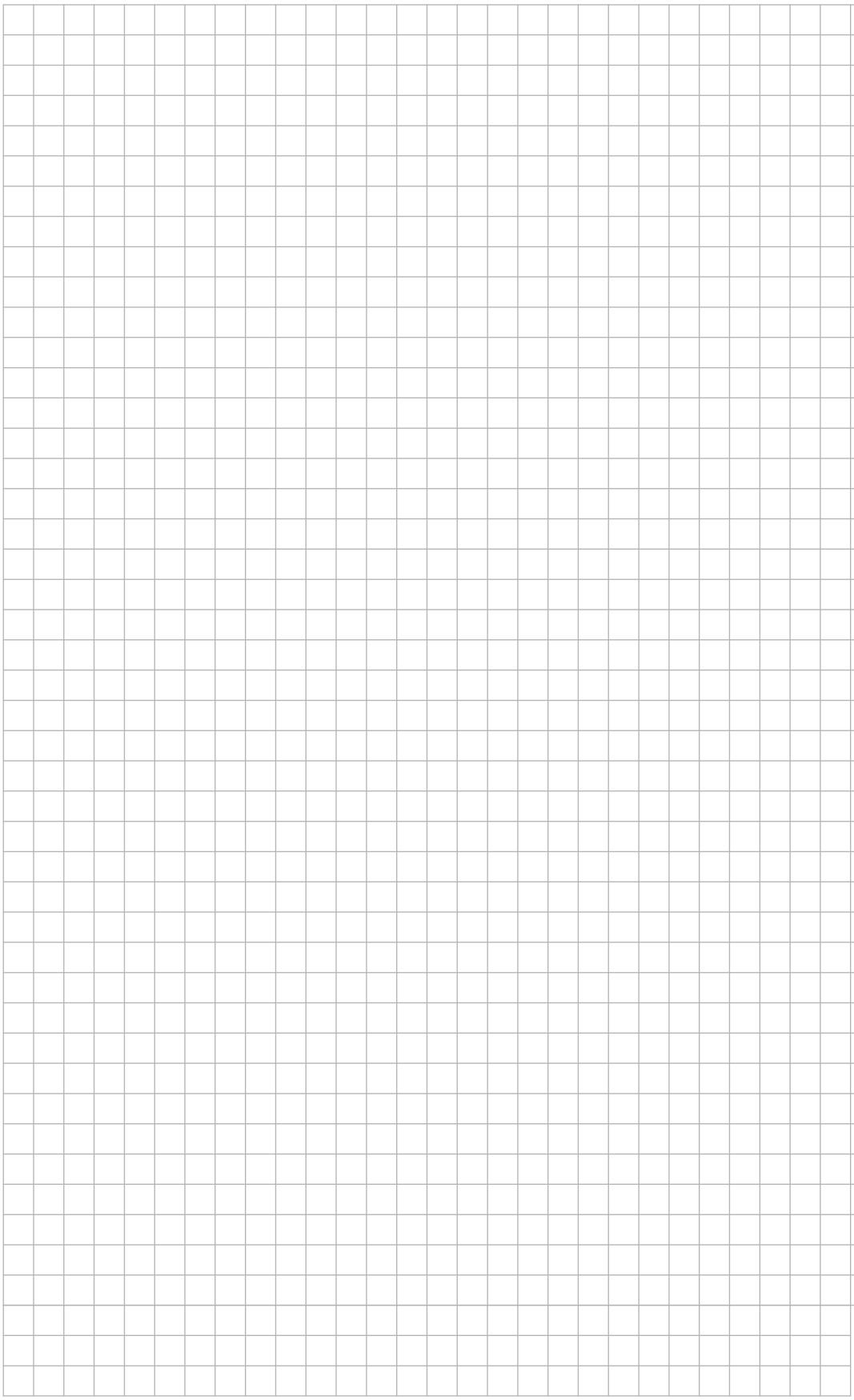

**(a)** Use Pythagoras' theorem to find $|AC|$.

**(b)** Use triangle $BCD$ to find $|BD|$. Give your answer correct to the nearest centimetre.

**(c)** The sail *DEF* is a reduction of *BCD*. The scale factor is $\frac{3}{5}$. Find $|DF|$.

**(d)** Find the total distance from *A* to *F*.

**(e)** Seán needs to make an accurate drawing of the flag at the top of the mast. The flag is a triangle with sides of length 7 cm, 7 cm, and 4 cm.
Construct this triangle accurately in the space below.



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Leaving Certificate – Foundation Level

# Mathematics (Project Maths) – Paper 2

Monday 14 June
Morning 9:30 – 12:00

Coimisiún na Scrúduithe Stáit
State Examinations Commission

# Leaving Certificate Examination
# Sample Paper

# Mathematics (Project Maths)

## Paper 2

## Foundation Level

## Time: 2 hours, 30 minutes

300 marks

| Examination number |
|---|
| |

| Centre stamp |
|---|
| |

| Running total | |
|---|---|

| For examiner | |
|---|---|
| Question | Mark |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| Total | |

| Grade |
|---|
| |

## Instructions

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

| | | | |
|---|---|---|---|
| Section 0 | Area and Volume (old syllabus) | 100 marks | 2 question |
| Section A | Concepts and Skills | 100 marks | 4 questions |
| Section B | Contexts and Applications | 100 marks | 2 questions |

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

In Section 0, answer Questions 1 and 2

In Section A, answer Questions 3, 4, 5 and 6

In Section B, answer Questions 7 and 8.

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.

A sheet of formulae will also be given to you by the superintendent.

Marks will be lost if all necessary work is not clearly shown.

Answers should include the appropriate units of measurement, where relevant.

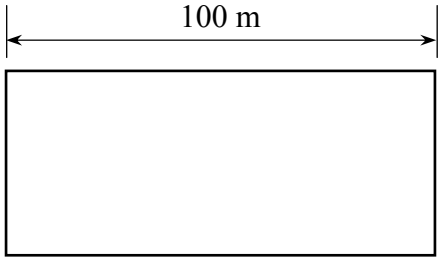
Answers should be given in simplest form, where relevant.

## Section 0 Area and Volume (old syllabus) 50 marks

Answer Question 1 and Question 2 from this section.

**Question 1** **(50 marks)**

**(a)** The perimeter of a rectangular field is 280 m.
The length of the longer side is 100 m.

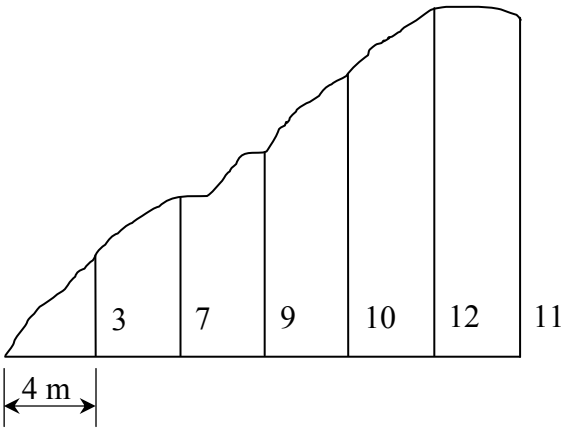



**(i)** Find the length of the shorter side.

**(ii)** Find the area of the field.

**(b)** The diagram shows a garden.

Offsets of lengths 3, 7, 9, 10, 12 and 11 metres are measured at intervals of 4 metres, as shown.




**(i)** Use Simpson's rule to estimate the area of the garden.

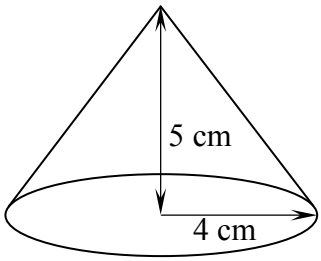
**(ii)** A flower bed takes up 25% of the area of the garden.
Calculate the area of this flower bed.

**Question 2** **(50 marks)**

**(a)** The diagram shows a cone with a height of 5 cm and a base radius of 4 cm.

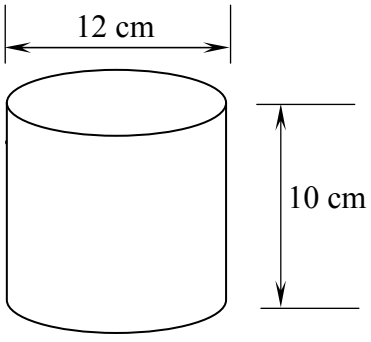
Calculate the volume of this cone.

Give your answer correct to the nearest whole number.




**(b)** The length of the diameter of the empty cylinder in the diagram is 12 cm and the height is 10 cm.

**(i)** Calculate the volume of the cylinder in terms of $\pi$.



**(ii)** A volume of $288\pi$ cm$^3$ of liquid is poured into this cylinder.

Calculate the height of the liquid in the cylinder.

**(iii)** What percentage of the total volume of the cylinder has no liquid in it?

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## Section A — Concepts and Skills — 100 marks

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

**Question 3** **(25 marks)**

**(a)** Fiachra is buying a new laptop computer.

The different choices of memory, screen type and colour are shown below.

| Memory | Screen Type | Colour |
|---|---|---|
| 1 GB RAM | Regular screen | Black |
| 3 GB RAM | Widescreen | Red |
| | | White |

All of the different combinations are possible. For example, Fiachra could order a white 3 GB laptop with regular screen.

How many different versions of the laptop are possible?

**(b)** Seán's French teacher gives tests that are marked out of 10.
Seán got the following results in five tests:

7, 5, 6, 10, 7

**(i)** Find Seán's mean mark for the five tests.

Answer: _____

**(ii)** Áine got the following results in the same five tests. She was not in for the fourth test.

8, 5, 7, - , 7

Is Áine better or worse than Seán at French? Give a reason for your answer.

Answer: _____

Reason:

**Question 4** **(25 marks)**

The table below shows the amount of money spent by a group of students in one month on credit for their mobile phones.

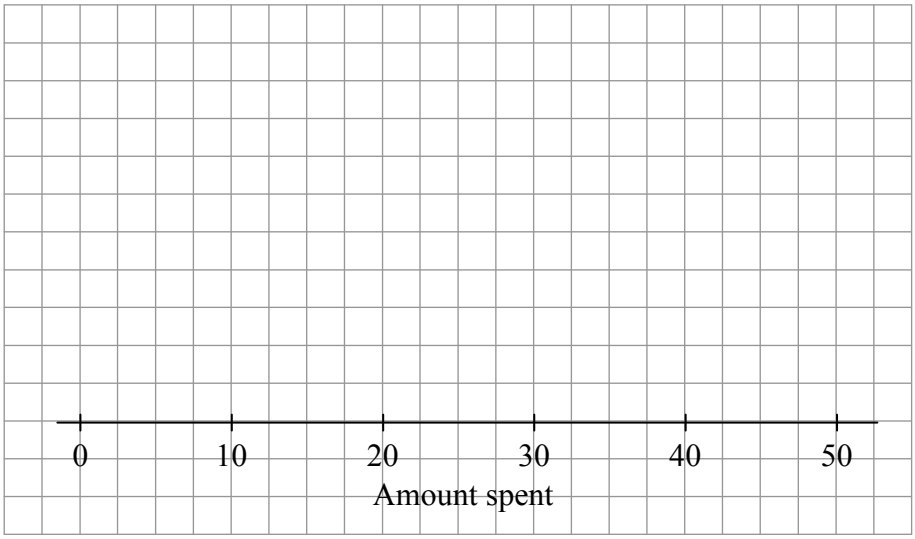
| Amount spent in € | 0 – 10 | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 |
|---|---|---|---|---|---|
| Number of students | 8 | 10 | 8 | 4 | 2 |

Note: each interval includes the lower boundary but not the upper one.

**(a)** How many students were in the group?

Answer: _____

**(b)** Illustrate the data on a histogram.



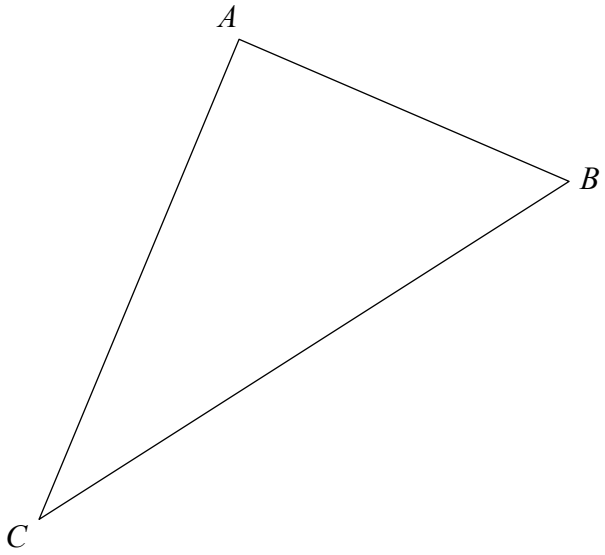

**(c)** Using the table and/or the histogram to help you estimate, complete this sentence:

"On average, these students spend about _____ per month on phone credit."

**(d)** Michael spent €27 on phone credit that month. Describe in one sentence Michael's phone spending compared to the others in the group.

**Question 5** **(25 marks)**

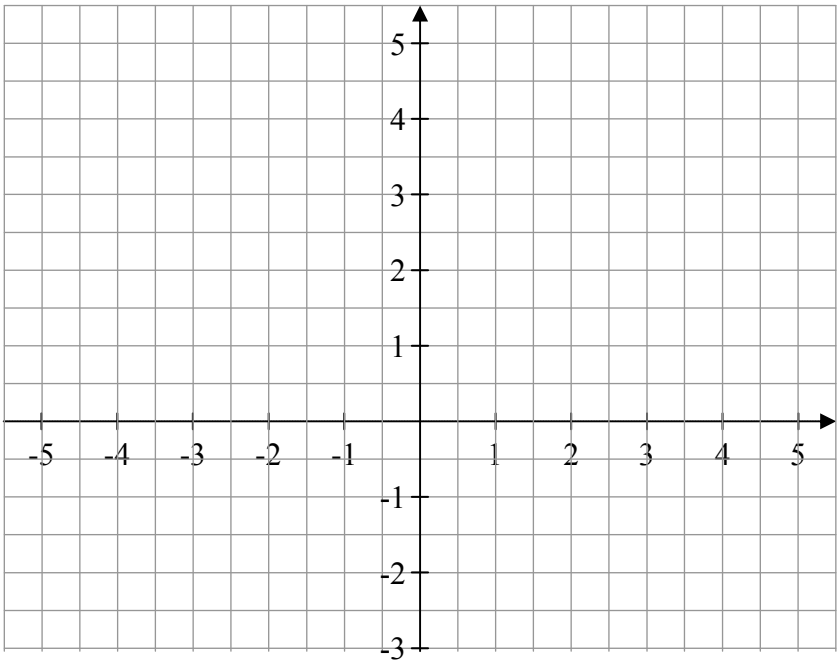
Construct the circumcircle of the triangle *ABC* below using only a compass and straight edge. Show all construction lines clearly.




Describe here the steps in the construction:

**Question 6** **(25 marks)**

**(a)** $P(5, 2)$ and $Q(-3, 4)$ are two points. Plot $P$ and $Q$ on the co-ordinate diagram below.




**(b)** $R$ is the midpoint of $[PQ]$. Find the co-ordinates of $R$.

**(c)** Find the slope of the line $PQ$.

**(d)** Find the equation of the line $PQ$.

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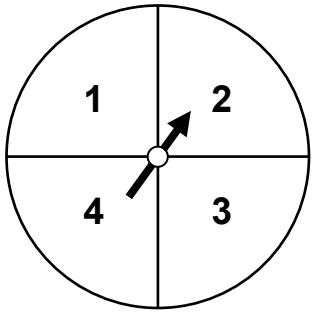
## Section B — Contexts and Applications — 100 marks

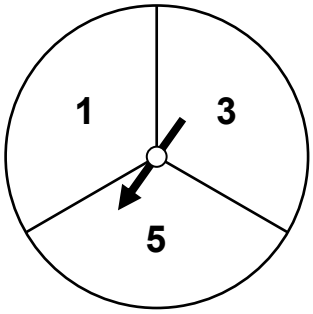
Answer Question 7 and Question 8 from this section.

**Question 7** **Probability and Statistics** **(50 marks)**

A game at a festival involves two spinners. They are spun at the same time and the numbers added. The spinners are fair. (That is, the arrow is just as likely to stop in one sector as in any other.)

Players get a prize if they spin a total equal to four.




**(a)** The table below is partly completed. It shows the total scores for the different ways the spinners could land. Complete the table.

| | | first spinner | | | |
|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** |
| second spinner | **1** | | 3 | | 5 |
| | **3** | | 5 | 6 | |
| | **5** | 6 | | | |

**(b)** Sue plays the game once. Find the probability that she will get a total score of nine.

Answer: _____

**(c)** Find the probability that Sue will win a prize, (that is, get a score of four).

Answer: _____

**(d)** Which of the following best describes Sue's chances of winning a prize?

Write the letter corresponding to the correct answer in the box.

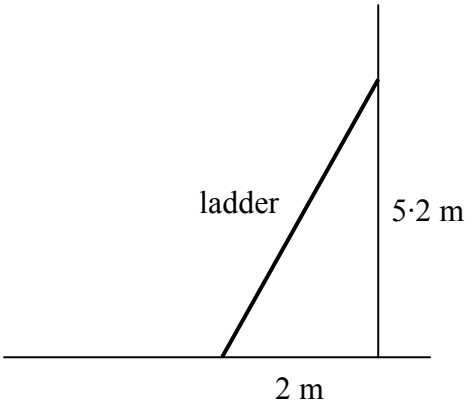
**A**. Impossible
**B.** Not very likely
**C.** About 50% likely
**D.** Very likely
**E.** Certain

**(e)** From watching other people play the game, Sue thinks that the second spinner is not fair after all. She thinks that it is more likely to point to five than to the other two numbers.

Describe how she could find the true probability of getting a five with that spinner.

**Question 8** **Geometry and Trigonometry** **(50 marks)**

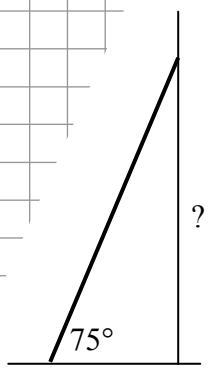
Michael places a ladder against the side of a building to do some work. The top of the ladder is 5·2 metres from the ground, and the bottom of the ladder is 2 metres out from the wall, as shown in the diagram below.




**(a)** Find the length of the ladder, correct to one decimal place.

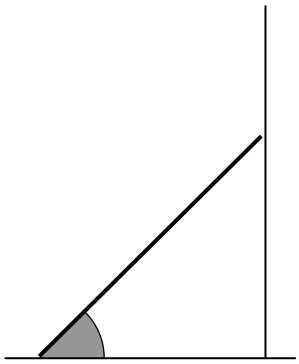
**(b)** John tells Michael that the ladder is not safe at that angle. He says that the angle between the ladder and the ground should be as close as possible to 75°.

If Michael puts the ladder at the correct angle, how far up the wall will it reach?

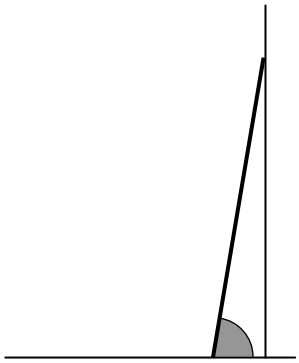


**(c)** There are reasons why a ladder is supposed to be set up at the correct angle.
Name one dangerous thing that could happen if the angle between the ladder and the ground is too small, and one dangerous thing that could happen if the angle is too big.

If the angle is too small, then



If the angle is too big, then



You may use this page for extra work

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*Note to readers of this document:*

This sample paper is intended to help teachers and candidates prepare for the June 2010 examination in the *Project Maths* initial schools. The content and structure do not necessarily reflect the 2011 or subsequent examinations in the initial schools or in all other schools.

Leaving Certificate – Foundation Level

# Mathematics (Project Maths) – Paper 2

Time: 2 hours 30 minutes