Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2013

# Mathematics
# (Project Maths – Phase 2)

## Paper 2

## Foundation Level

## Monday 10 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 | |
| 9 | |
| 10 | |
| | |
| Total | |

| Grade |
|---|
| |

## Instructions

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

| | | | |
|---|---|---|---|
| Section A | Concepts and Skills | 200 marks | 8 questions |
| Section B | Contexts and Applications | 100 marks | 2 questions |

Answer all ten questions, as follows:

In Section A, answer

Questions 1 to 7 and

**either** Question 8A **or** Question 8B.

In Section B, answer Question 9 and Question 10.

Write your answers in the spaces provided in this booklet. You may 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 | 200 marks |
|---|---|---|

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

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

**(a)** **(i)** Answer each of the following:

What is the probability of an event that is certain to happen? _____.

What is the probability of an event that will never happen? _____.

What is the probability of an event that has a 50:50 chance of happening? _____.

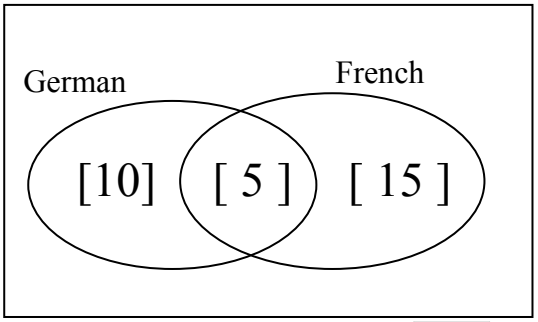
**(ii)** In an experiment a standard fair die is tossed. In the context of that experiment give one example of each of the following:

an event that has a 50:50 chance of happening;

an event that will never happen;

an event that is certain to happen.

**(b)** The sets in the Venn diagram below represent the students in a class of 30 students who study German and French.




**(i)** How many students study both German and French?

Answer: _____

A student is picked at random from the class.

**(ii)** Find the probability that the student studies both German and French.

**(iii)** Find the probability that the student studies French but not German.

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

There are four main blood groups: Group O, Group A, Group B and Group AB.

The blood in each group is further classed as either rhesus positive (+) or rhesus negative (-).

In Ireland the percentage of the population in each blood group is given in the following table:

| Blood group | O | | A | | B | | AB | |
|---|---|---|---|---|---|---|---|---|
| Rhesus positive (+) or rhesus negative (-) | $O^+$ | $O^-$ | $A^+$ | $A^-$ | $B^+$ | $B^-$ | $AB^+$ | $AB^-$ |
| Percentage | 8 | 47 | 5 | 26 | 2 | 9 | 1 | 2 |

**(a)** **(i)** Find the percentage of the population in blood group O.

**(ii)** Find the percentage of the population with rhesus positive blood.

**(b)** The table below has statements about a person's blood group. A person is picked at random from the population. In each case, find the probability that the statement is true for that person.

| **Statement** | **Probability** |
|---|---|
| Is in blood group $A^+$ | |
| Is in blood group AB | |
| Is in blood group A or B | |
| Has blood which is rhesus negative | |
| Not in blood group O | |

**(c)** Over a period, 8000 people donate blood at a clinic.
How many of these 8000 people would you expect to donate each of the following blood types?

**(i)** Type AB blood.

**(ii)** Rhesus negative blood.

**(iii)** Rhesus positive blood.

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

Sarah has a three-course lunch at a restaurant. She selects a starter, a main course and a dessert from the menu below.

| Starters | Main course | Dessert |
|---|---|---|
| Melon | Roast beef | Fruit salad |
| Soup | Fish of the day | Chocolate brownie |
| Goats cheese salad | Vegetation curry | Apple crumble |
| Smoked salmon | | Pear flan |
| | | Ice cream |

**(a)** Write one three-course lunch that Sarah could select.

**(b)** How many possible different selections can Sarah make?

**(c)** Assuming that each selection is equally likely, what is the probability that she selects:

- smoked salmon for her starter

Answer:_____

- smoked salmon for her starter followed by roast beef for her main course

Answer:_____

- smoked salmon for her starter followed by roast beef followed by fruit salad or ice cream for her dessert?

Answer:_____

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

The stem and leaf plot shows the age, in years, of each patient who visited the accident department in a hospital over a two hour period.

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

Key: 4 | 3 = 43

**(a)** How many patients visited the accident department during the two hour period?

**(b)** What was the age of the oldest patient who visited the accident department?

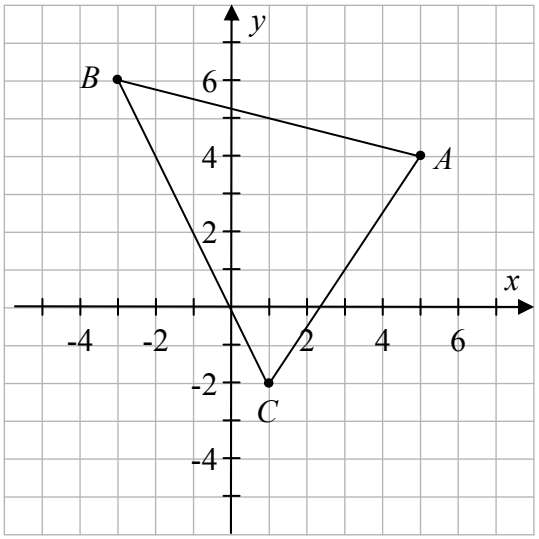
**(c)** What was the modal age of the patients who visited the accident department?

**(d)** Find the median age of the patients who visited the accident department.

**(e)** List the ages of the patients, aged between 30 and 60, who visited the accident department.

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

The diagram shows the triangle $ABC$.
The co-ordinates of the point $A$ are (5, 4).




**(a)** Write down the co-ordinates of the points:

$B$ ( , )

$C$ ( , )

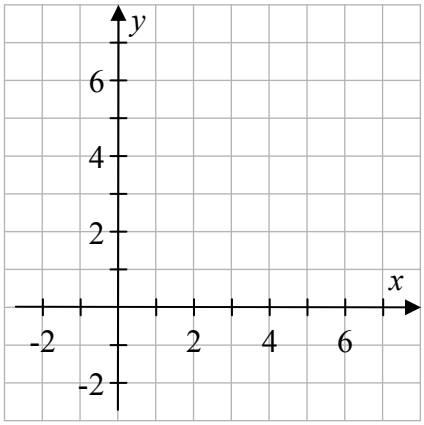
**(b)** **(i)** On the diagram, mark the point $M$, the midpoint of $[AB]$.

**(ii)** Use a formula to find the co-ordinates of $M$.

**(c)** Use a formula to find the length of $[BC]$, the longest side of the triangle.

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

The line $l_1$ passes through the points $P(1, 6)$ and $Q(4, 2)$.
The line $l_2$ has equation $3x - 4y - 4 = 0$.




**(a)** Plot $P$ and $Q$ on the diagram and show the line $l_1$.

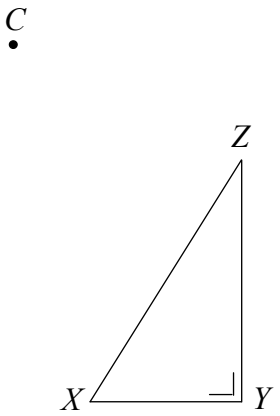
**(b)** Find the slope of the line $l_1$.

**(c)** State whether or not the two lines $l_1$ and $l_2$ are perpendicular to each other.
Give a reason for your answer.

**Question 7** **(25 marks)**

The diagram shows the point $C$ and the right angled triangle $XYZ$.

**(a)** Construct $X'Y'Z'$, the image of the triangle $XYZ$, under an enlargement of centre $C$ and scale factor 2·5.



**(b)** **(i)** The length $|XY| = 2\,\text{cm}$. Find the length $|X'Y'|$.

**(ii)** The length $|Z'Y'| = 8\,\text{cm}$. Find the length $|ZY|$. Show your calculations below.

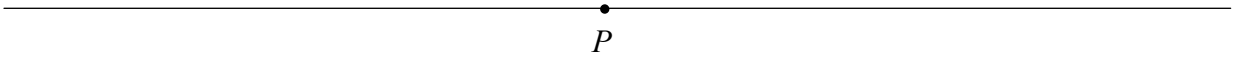
**(iii)** Find the area of the triangle *XYZ*.

**Question 8** **(25 marks)**

Answer **either** 8A **or** 8B.

**Question 8A**

**(a)** Construct a triangle $PQR$ in which $|PQ| = 7$ cm, $|QR| = 5$ cm and $|\angle PQR| = 80°$.
The point $P$ is marked for you.




**(b)** On the diagram in part **(a)**, construct the image of the triangle $PQR$ under the central symmetry in the point $P$.

**(c)** Use your protractor to measure the angle $RPQ$.

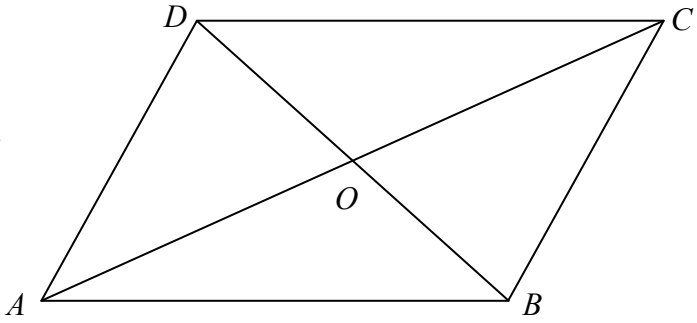
Answer:_____

**OR**

**Question 8B**

*ABCD* is a parallelogram.
The diagonals of *ABCD* intersect at *O*.

$|AB| = 9$ cm, $|BC| = 6$ cm and $|\angle DAB| = 60°$.




**(a)** Find $|DC|$.

Answer: _____

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

Answer: _____

**(c)** Name one pair of parallel lines in the diagram.

Answer:_____

**(d)** Is the statement
$|DO| = |OB|$ and $|AO| = |OC|$
true or false?
Give a reason for your answer.

**(e)** Construct the image of the parallelogram *ABCD* under the axial symmetry in the line *AB* on the diagram above.

## Section B — Contexts and Applications — 100 marks

Answer **Question 9** and **Question 10**.

### Question 9 (50 marks)

Michelle and Jerry visit their local shop each day. The amount each of them spent in the shop during one week is given in the table below.

| | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|---|---|---|---|---|---|---|---|
| Michelle | €16 | €12 | €20 | €5 | €24 | €8 | €27 |
| Jerry | €10 | €18 | €25 | €19 | €26 | | |

**(a)** On which day of the week did Michelle spend the most?

Answer:_____

**(b)** Find the difference between the most and the least amount that Michelle spent in a day.

**(c)** Draw a bar chart to illustrate the amount Michelle spent each day.

**(d)** Calculate the mean amount per day spent by Michelle during that week.

**(e)** Jerry spent a total of €140 during the week. He spent equal amounts on Saturday and Sunday. How much did he spend on Saturday?

**(f)** On average Jerry spent €4 per day more than Michelle.
Justify this statement.

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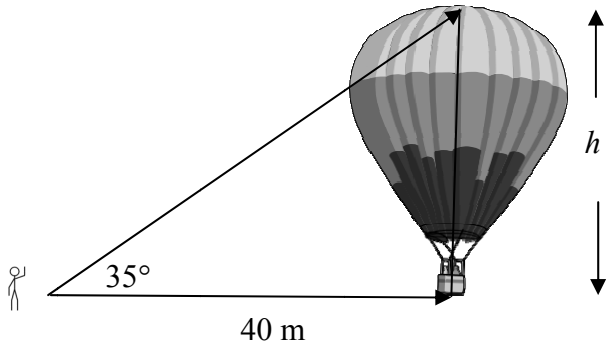
**Question 10** **(50 marks)**

Tom stands 40 m from the base of the basket of a hot-air balloon. The angle of elevation to the top of the balloon is $35°$.

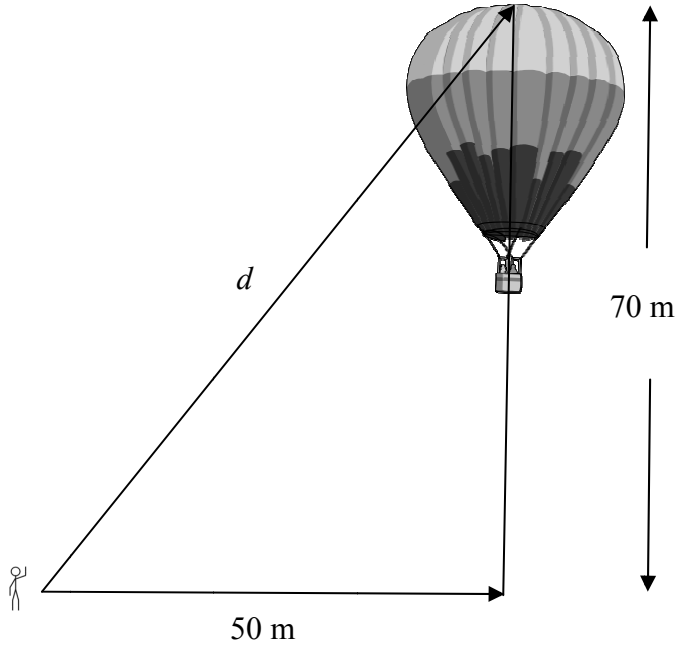



**(a)** **(i)** Find $\tan 35°$.

Answer: _____

**(ii)** Find the height, $h$, of the balloon.

**(b)** The balloon rises vertically until the highest point on the balloon is 70 m above the ground. Tom moves to a new position 50 m from the point vertically under the basket of the balloon, as shown.




**(i)** Find the new angle of elevation to the top of the balloon.

**(ii)** Use the Theorem of Pythagoras to find the distance $d$ from Tom's position to the top of the balloon.

**(c)** Tom estimates that the volume of air in the balloon is the same as the volume of a sphere of radius 11 m. Find Tom's estimate of the volume of air in the balloon.

You may use this page for extra work

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