2024.S32

2024J003G1EL

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Cycle Final Examination 2024

Mathematics

Ordinary Level

Friday 7 June Afternoon 1:30 - 3:30

270 marks

Examination Number

Date of Birth

For example, 3rd February 2005 is entered as 03 02 05

Centre Stamp

Instructions

There are 12 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. You may lose marks if you do not do so. You may 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.

You may lose marks if your solutions do not include supporting work.

You may lose marks if you do not include the appropriate units of measurement, where relevant.

You may lose marks if you do not give your answers in simplest form, where relevant.

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

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

(a) Find the value of each of the following:

(i) $634 + 297$

(ii) $4{\cdot}8 \times 6$

(iii) $32 \div (7 - 5)^2$

(b) **(i)** Complete the table to show **all** the factors of 8, 12, and 16.
The factors of 8 have already been done.

Number	Factors
8	1, 2, 4, 8
12	
16	

(ii) What is the highest common factor of 8, 12, and 16?

Tick (✓) **one** box only.

1	4	16	48
☐	☐	☐	☐

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

(a) Lily buys the following ingredients:

Fresh milk	Courgettes	Oranges	Spaghetti	Cranberry juice
€2·49	€1·19	€0·99	€1·15	€2·55

(i) Work out the **total cost** of these ingredients.

(ii) Later that week Lily plans a menu for a full week and goes shopping for ingredients. Her bill comes to €72·63. She pays using **one** €50 note and **two** €20 notes. Work out how much **change** she receives.

(b) Lily works as a chef in a restaurant.
The table below shows the hours Lily worked one weekend.
Her basic pay is **€18 per hour.**

Day	Friday	Saturday	Sunday
Numbers of hours worked	7	8	6

(i) How much money in **total** did Lily earn for working on Friday and Saturday?

(ii) Lily is paid 50% extra for working on Sunday.
How much did she earn for working on Sunday?

(c) Lily's gross income was €1900 last month.
She pays tax at a rate of 20%.

(i) Work out Lily's **gross tax** for the month.

(ii) Lily's monthly tax credit is €$312{\cdot}50$.
Work out Lily's **net income** for the month.

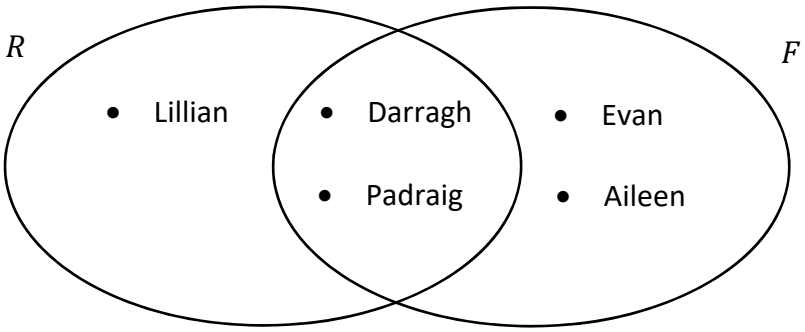
Question 3 **(Suggested maximum time: 10 minutes)**

(a) $A = \{4, 5, 9, 10, 11\}$.

(i) Write down a subset of A that contains **four elements.**

(ii) Write down a subset of A that contains **only prime numbers**.

(b) A restaurant has a choice of rice (R) or fries (F) or both with each main course on the menu.
The Venn diagram shows what 5 people chose.



(i) From the Venn diagram, what did Aileen choose?

(ii) Tick the correct box to show the region of the Venn diagram in which Darragh lies.
Tick (✓) **one** box only.

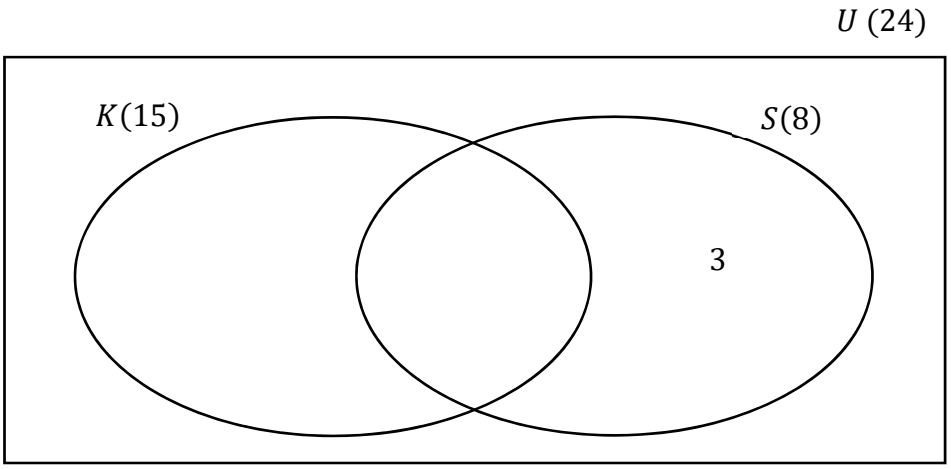
$R \setminus F$	$R \cap F$	$F \setminus R$
☐	☐	☐

(iii) List the elements of the set $F \setminus R$.

(c) A summer camp has two water sports on offer, kayaking and surfing.
In total, 24 students were on the summer camp (U).
Of these:

15 of the students had kayaked before (K).
8 of the students had surfed before (S).
5 of the students had kayaked **and** surfed before.

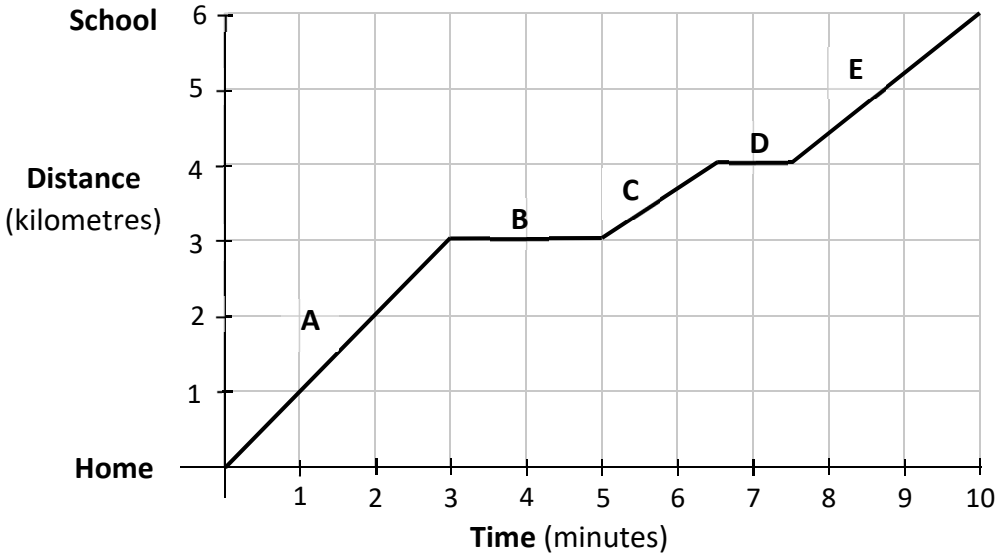
(i) Fill in the Venn diagram to show the above information.
One region is already filled in for you.



(ii) One student is picked at random from the group of students.
Write down the probability that this student has not kayaked **or** surfed before.

Question 4 **(Suggested maximum time: 10 minutes)**

Alex travels on a bus to get to school each morning.
The following graph shows the distance travelled along the route on one particular morning.
The graph is in five stages, labelled **A**, **B**, **C**, **D**, and **E**.



(a) During stage **B**, the bus was stopped.

(i) For how many minutes was the bus stopped during stage **B**?

Answer: ☐

(ii) During which stage, other than stage **B**, was the bus stopped?

Answer: ☐

(b) The bus is moving at its fastest at stage **A**.
How do you know this by looking at the graph?

(c) Fiadh takes a different bus to school.
This bus takes 15 minutes to get to school.

(i) Write 15 minutes as a fraction of one hour.

Answer: _____

(ii) Fiadh's journey is 5 kilometres.
Work out the average speed of the bus, in km/hour.

(d) The cost of a litre of fuel was €1·50 at the end of 2020.
The cost of a litre of the same fuel was €2 at the end of 2022.

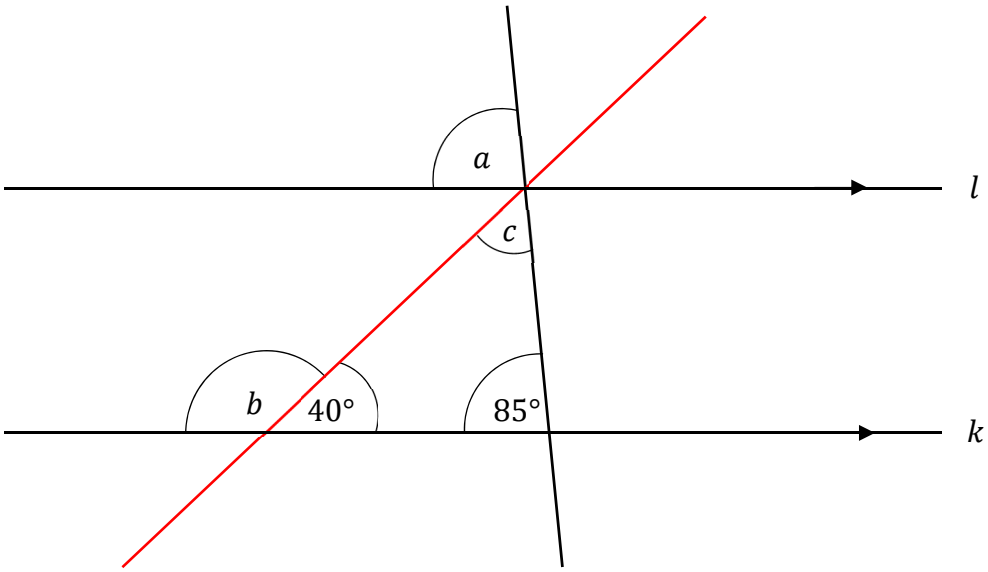
(i) How much has the cost of a litre of fuel increased by in this time period?

(ii) Work out the percentage increase in the cost of a litre of fuel from the end of 2020 to the end of 2022. Give your answer correct to the nearest percent.

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

The lines l and k are parallel, as shown in the diagram below (not to scale).
Two other lines are shown.

The sizes of two of the angles are given.
The sizes of three of the other angles are a, b and c.



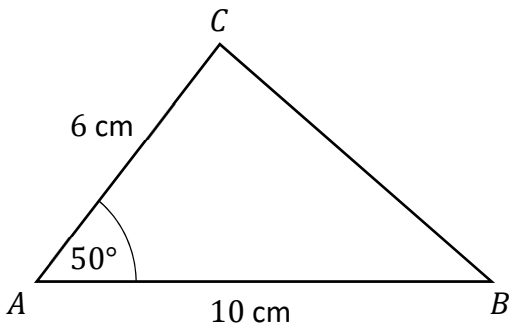
Find the size of the angle a, the angle b, and the angle c, without measuring.

a = ☐ b = ☐ c = ☐

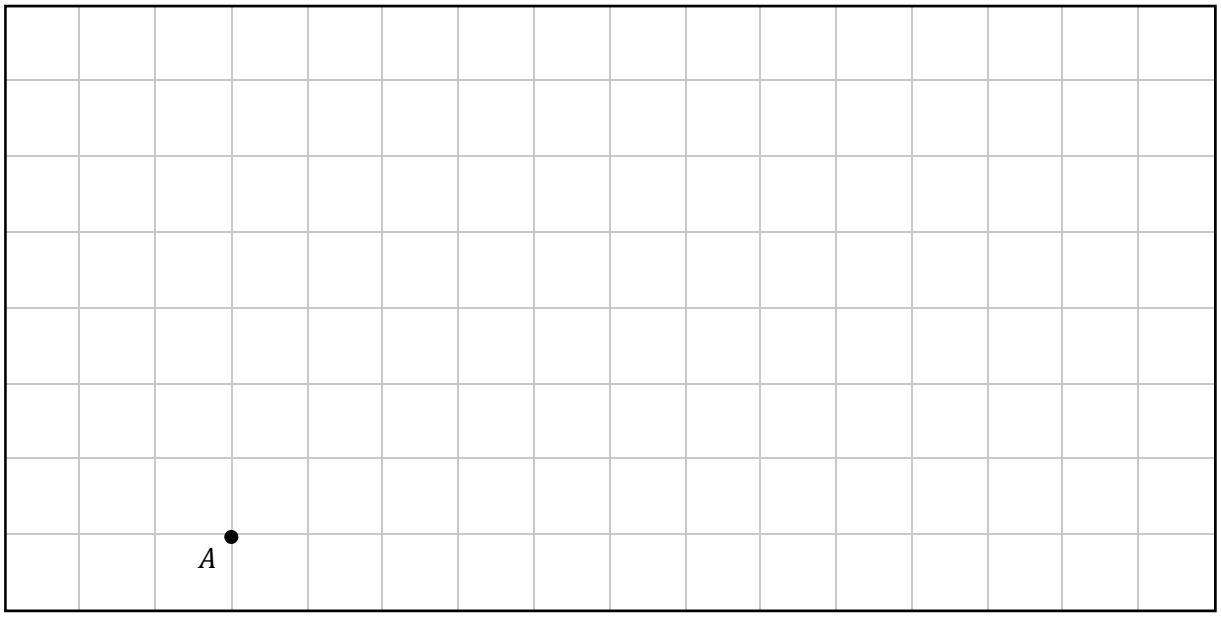
Question 6 **(Suggested maximum time: 10 minutes)**

Construct a triangle ABC where $|AB| = 10$ cm, $|\angle CAB| = 50°$ and $|AC| = 6$ cm.
A sketch of the triangle is shown below (not to scale).

Each small square in the grid has sides of length 1 cm.
The point A is marked for you.



Show your construction lines clearly.



Question 7 **(Suggested maximum time: 5 minutes)**

Margaret is trying to solve the simultaneous equations:

$$x + y = 5$$

$$x - 2y = -4$$

She says the answer is $x = 3$ and $y = 2$.

Is Margaret correct?
Tick (✓) **one** box only.
Justify your answer by suitable calculations.

Yes	No
☐	☐

Calculations:

Question 8 **(Suggested maximum time: 15 minutes)**

The ages (in months) of 12 third year students are shown in the table below.

179	185	186	187
187	189	190	191
192	196	197	200

(a) Complete the stem and leaf diagram below to show this data.

17						
18						
19						
20						

Key: | 19 | 1 | = | 191 |

(b) **(i)** Work out the **mean age** of these students.

(ii) Find the **median age** of these students.

(iii) Find the **range** of the ages of these students.

This question continues on the next page.

(iv) In 6 months, which one of these measures will **not** have changed for this group of students?
Tick (✓) **one** box only.

Mean age	Median age	Range of the ages
☐	☐	☐

Give a reason for your answer.

Reason:

(c) The 12 students were asked their favourite subject from the list: **Maths**, **Science** and **History**.
The results are displayed in the table.

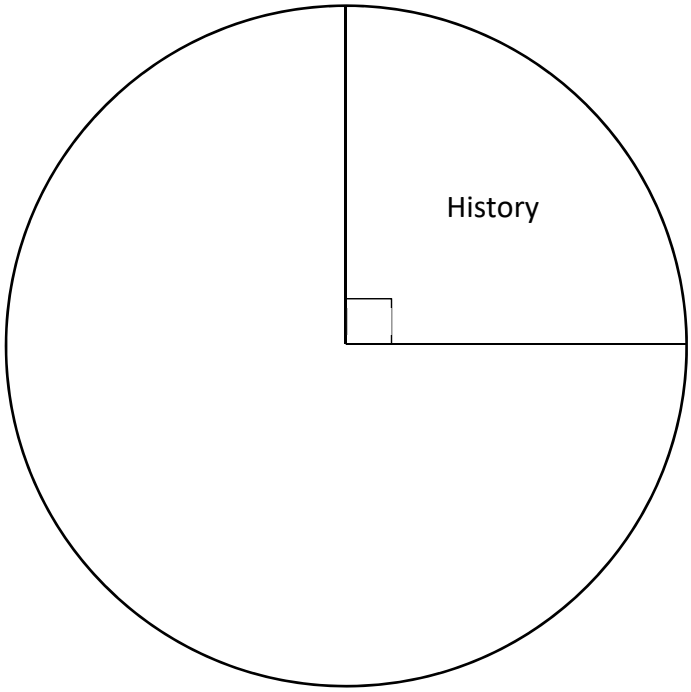
Favourite Subject	Number of students	Fraction	Angle in Pie Chart
Maths	4	$\frac{4}{12}$	
Science	5		
History			90°

(i) Work out the number of students who chose **History**.
Write your answer in the appropriate space **in the table above**.

(ii) Work out the two missing fractions of the students who chose Science and History.
Write your answer in the appropriate space **in the table above**.

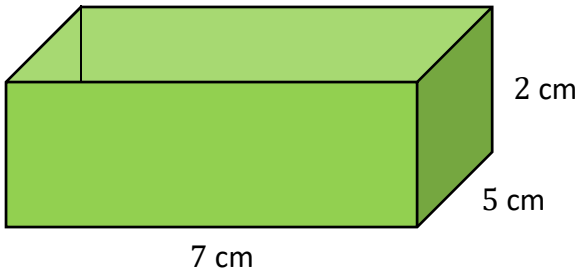
(iii) Work out the sizes of the two missing angles in the pie chart.
Write each answer in the appropriate space **in the table** on the previous page.

(iv) Use the information in the table to complete the pie chart.
Label each sector clearly with the name of the subject (**Maths** and **Science**).

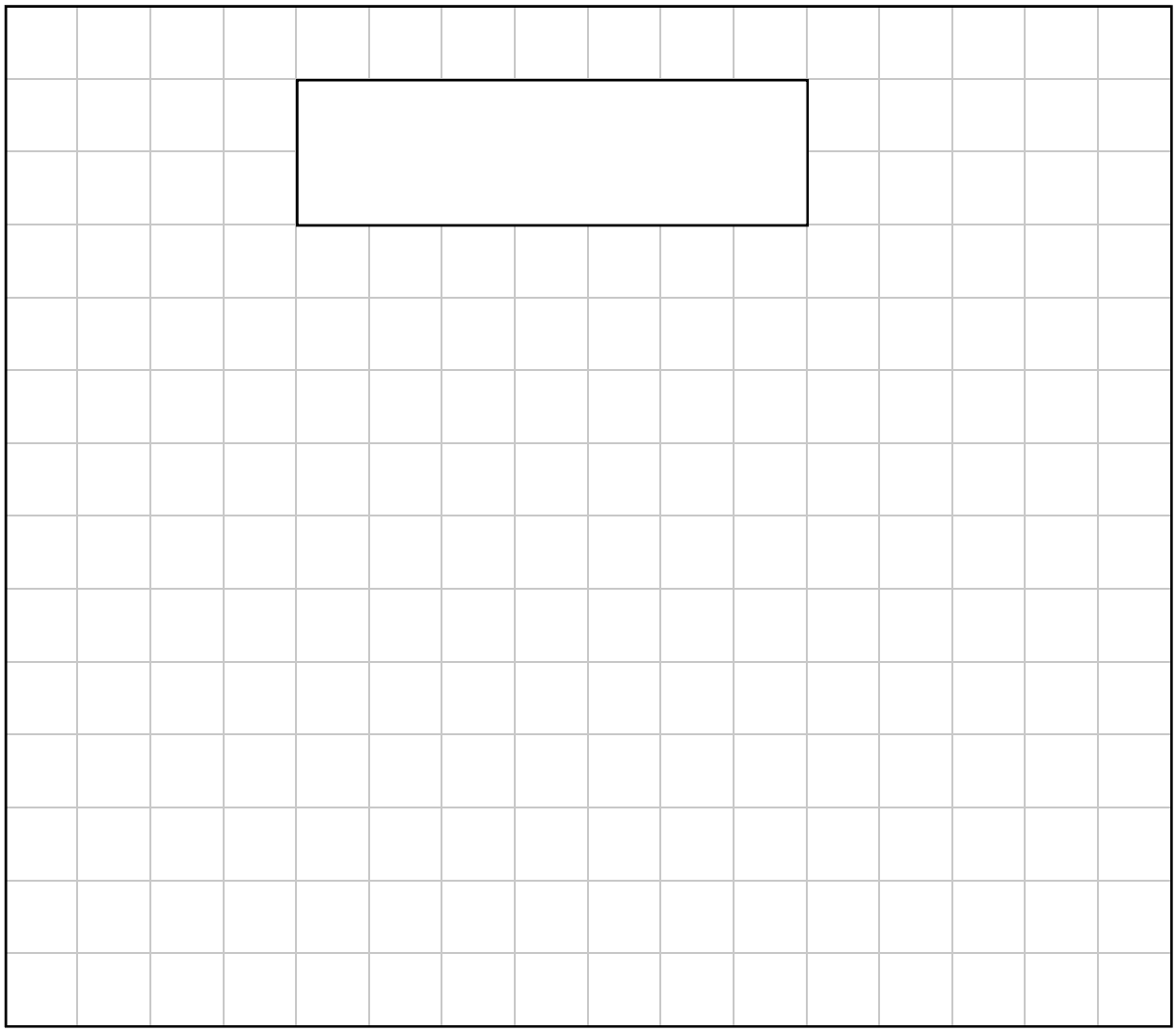


Question 9 **(Suggested maximum time: 10 minutes)**

A baking tin is in the shape of an **open rectangular box**.
Alex makes a scaled model of the tin.
It is 7 cm long, 5 cm wide, and 2 cm high, as shown in the diagram below.



(a) Use the lengths in the diagram above to draw a net of the **open rectangular box**.
One side has already been done for you.
Each small square in the grid has a side of length 1 cm.



(b) Find the **surface area** of Alex's **open rectangular box**.

(c) Alex made his model using a scale of $\mathbf{1 : 3}$.
Complete the table to show the lengths of the sides of the actual tin.
One has already been done for you.

Scaled length (cm)	7	5	2
Actual length (cm)	21		

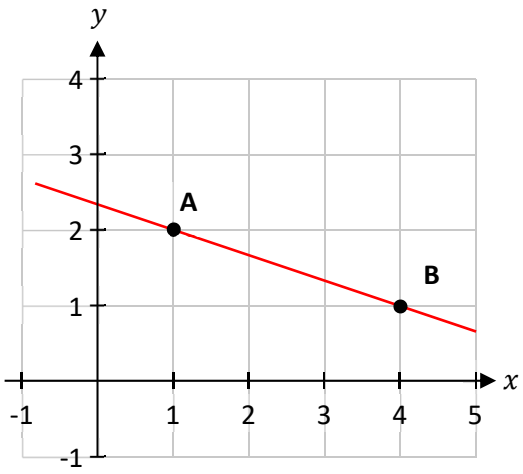
(d) The instructions for cooking an item are:

25 minutes for every **500 g**, plus an **extra 20 minutes**.

Work out how many minutes an item of mass **1·4 kg** should be cooked for.

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

(a) The points **A** and **B** are shown on the graph.

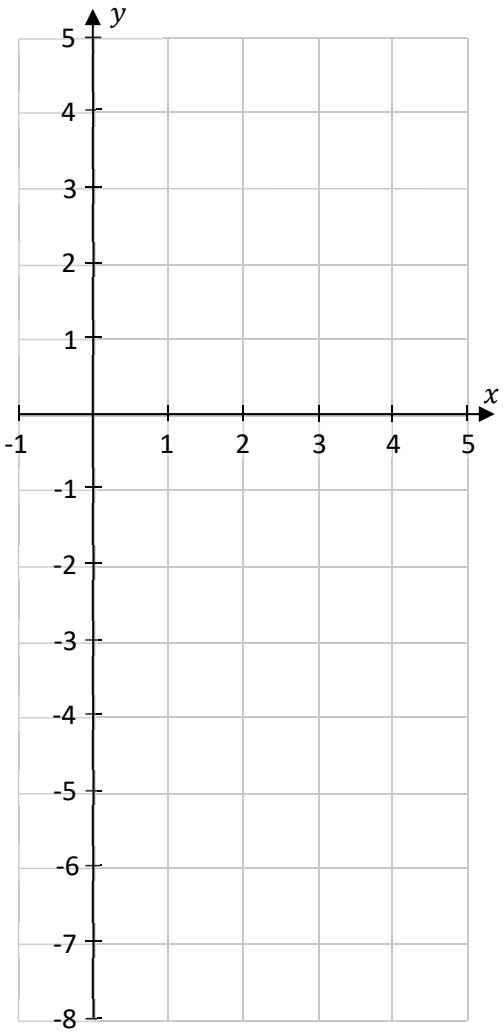


(i) Write down the coordinates of **A** and **B**.

A (,) **B** (,)

(ii) Hence, or otherwise, work out the distance between the points **A** and **B**.
Give your answer correct to 1 decimal place.

(b) On the co-ordinate diagram below, draw the graph of the line $y = 2x - 5$, for $-1 \leq x \leq 5$, $x \in \mathbb{R}$.



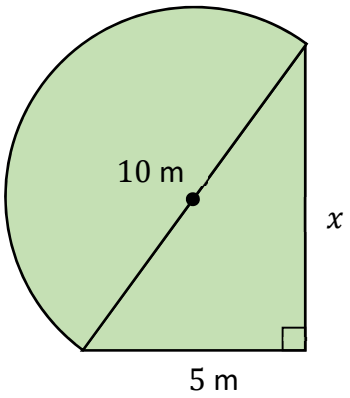
(c) The equation of line $\boldsymbol{l}$ is $\boldsymbol{y = 3x - 2}$.

(i) Write down the equation of **another** line that is parallel to l.

(ii) Write down the equation of **another** line that crosses the y-axis at the same point as l.

Question 11 **(Suggested maximum time: 10 minutes)**

A plan for a flower bed is shown in the diagram below (not to scale).
It is in the shape of a right-angled triangle with a semicircle on the hypotenuse.



(a) **(i)** The diameter of the semicircle is 10 m.
Write down the length of the radius (r) of the semicircle.

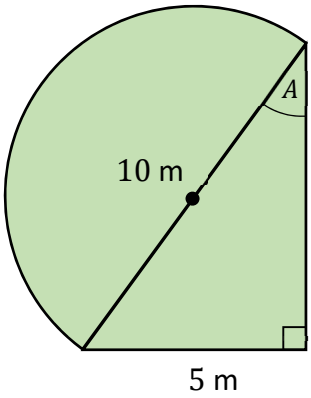
$r =$ ☐

(ii) Use the formula $L = \pi \times r$ to find the length of the semi-circular arc.
Give your answer correct to the nearest metre.

$\pi \times r =$

(b) Use the **Theorem of Pythagoras** to work out the value of x.
Give your answer correct to 1 decimal place.

(c) The angle A is marked on the diagram below.



(i) Write $\sin A$ as a fraction.

$$\sin A = \frac{\square}{\square}$$

(ii) Hence, find the size of the angle A.

Question 12 **(Suggested maximum time: 10 minutes)**

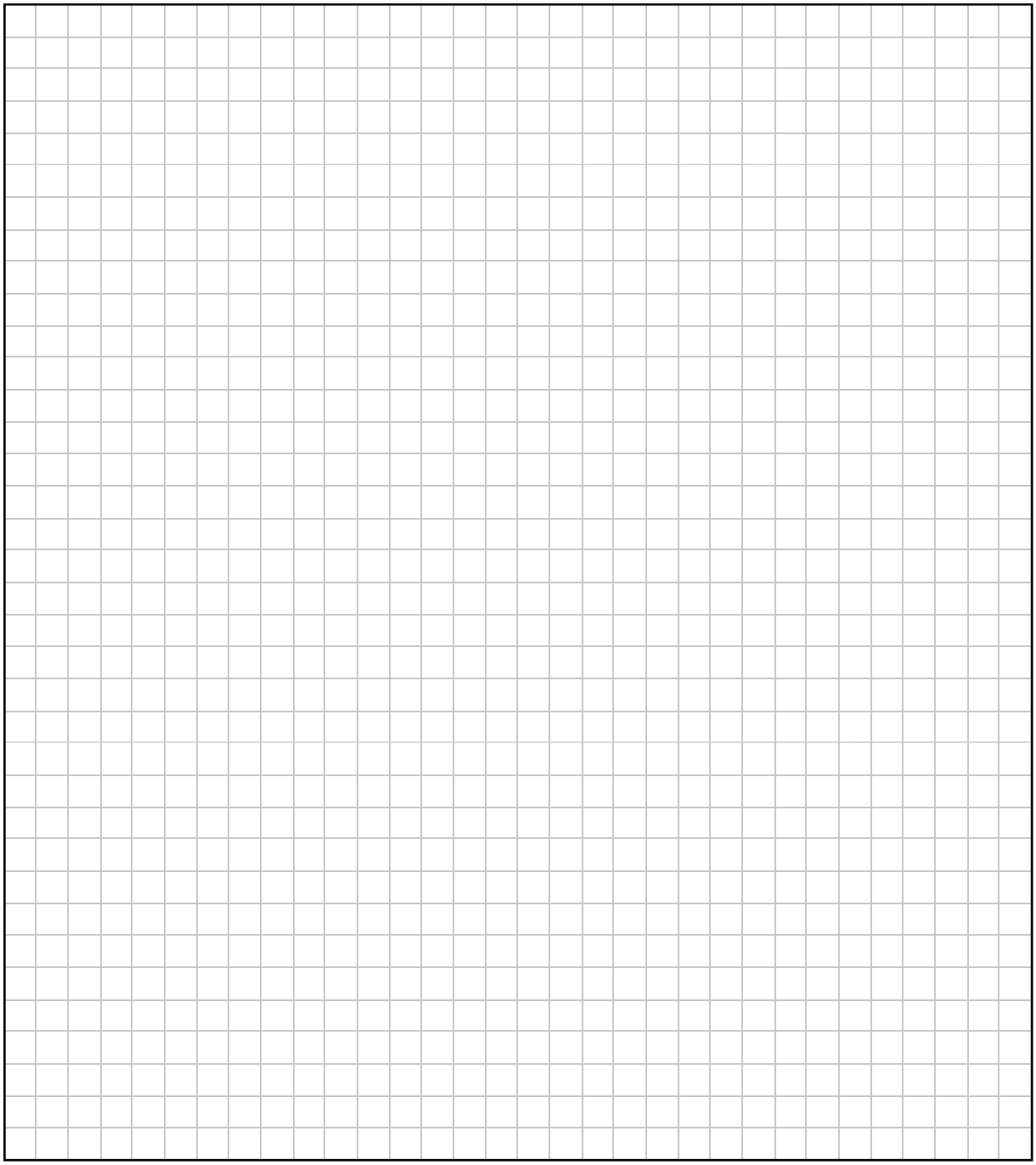
(a) Find the value of $5(a + 3b)$, when $a = 4$ and $b = -3$.

(b) Factorise $x^2 + 5x - 24$. One of the factors is $(x + 8)$.

$(x + 8)($ $)$

(c) Multiply out and simplify fully $(2x + 3)(x - 4)$.

Page for extra work.
Label any extra work clearly with the question number and part.



Acknowledgements

Image on page 4: www.tesco.ie. Altered
Image on page 7: www.pexels.com. Altered
Image on page 9: www.pexels.com. Altered

Do not write on this page

Junior Cycle Final Examination – Ordinary Level

Mathematics

Friday 7 June

Afternoon 1:30 - 3:30