

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4353/02

**MATHEMATICS (UNITISED SCHEME)
UNIT 3: Calculator-Allowed Mathematics
HIGHER TIER**

A.M. MONDAY, 17 June 2013

1 $\frac{3}{4}$ hours

ADDITIONAL MATERIALS

A calculator will be required for this paper.

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3.14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

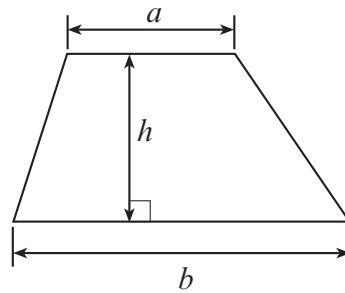
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 5.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	4	
2	5	
3	6	
4	10	
5	6	
6	8	
7	6	
8	6	
9	8	
10	4	
11	3	
12	8	
13	10	
14	4	
15	2	
TOTAL MARK		

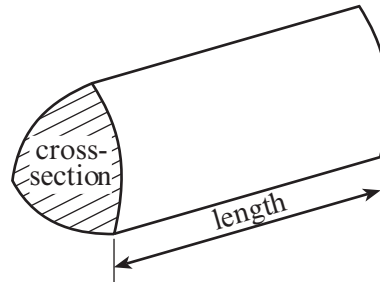


Formula List

Area of trapezium = $\frac{1}{2}(a + b)h$

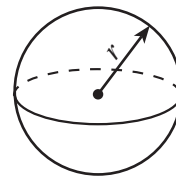


Volume of prism = area of cross-section \times length



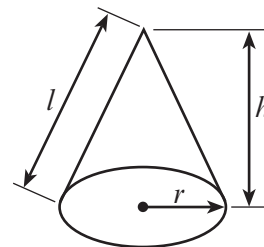
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

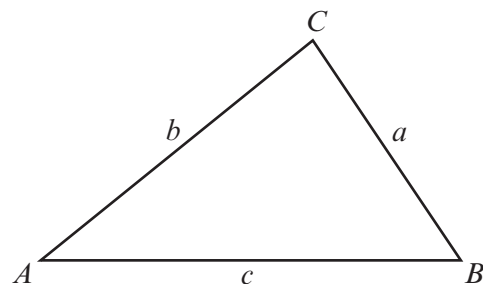


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2}ab \sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$



1. Daisy buys a torch and a battery.
The torch costs eight times as much as the battery.
Daisy pays with a £20 note and gets £15.86 change.
How much does the battery cost?

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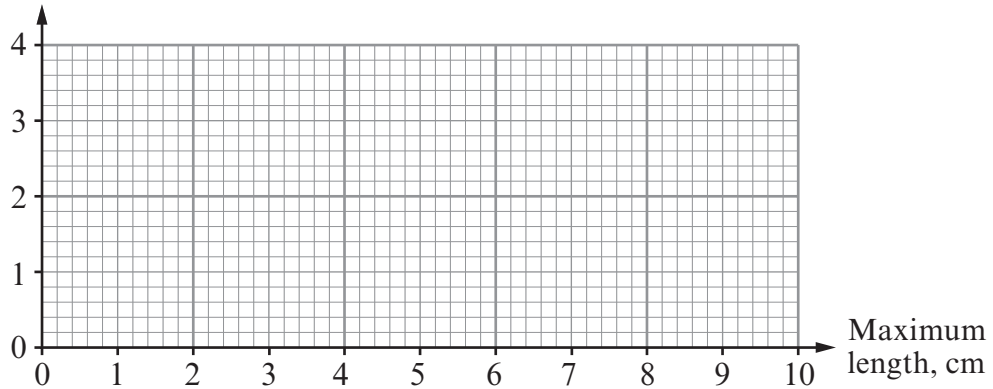


2. The maximum lengths and maximum widths of a number of leaves from one tree were measured.

Maximum length, cm	6.8	7.4	3.2	8.2	9.4	7.6	4.2	2.8	8.4
Maximum width, cm	2.4	2.6	1.2	3.0	3.4	2.8	1.4	1.0	3.2

(a) Draw a scatter diagram to display these measurements. [2]

Maximum width, cm



(b) Draw, by eye, a line of best fit on your scatter diagram. [1]

(c) State the type of correlation shown in your scatter diagram. [1]

(d) Another leaf from the same tree has a maximum length of 5 cm.
Use your line of best fit to estimate the maximum width of this leaf in cm.

..... cm

[1]



3. (a) Factorise $12x^2 - 48x$.

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..... [2]

(b) Find the value of $2x^3$ when $x = -5$.

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..... [1]

(c) Given that $a = 25$, $b = -3$ and $c = 7$, evaluate $\frac{a-b}{8c}$.

Express your answer as a decimal.

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4. Iona went on holiday to Stone Edge last July.
She recorded the temperature at midday each day.

Temperature, t °C	$0 \leq t < 5$	$5 \leq t < 10$	$10 \leq t < 15$	$15 \leq t < 20$	$20 \leq t < 25$
Number of days	0	5	9	17	0

(a) Using Iona's data for the temperatures in Stone Edge last July,

(i) calculate an estimate for the mean,

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[4]

(ii) explain how you know that the modal group is $15 \leq t < 20$,

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[1]

(iii) what is the maximum possible range of the temperatures recorded by Iona?

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[1]



(b) Dewi lives in Caerddu.
 He recorded the midday temperature, in °C, each day in July last year.
 He decided on groups for recording the temperature.
 From his grouped data he worked out the following:

- estimated mean: 18.2°C
- modal group: $10 \leq t < 20$, where t is the temperature in °C
- range: 8°C

Dewi decides to compare his averages and spread of data with Iona's data.

(i)

	Temperature, t °C	
	Estimated mean	Modal group
Caerddu (Dewi's data)	18.2°C	$10 \leq t < 20$
Stone Edge (Iona's data)	$15 \leq t < 20$

Why might Dewi choose to use the estimated mean rather than the modal group to compare the data?

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[1]

(ii)

	Temperature, t °C	
	Estimated mean	Maximum range
Caerddu (Dewi's data)	18.2°C	8°C
Stone Edge (Iona's data)

Why might Dewi find it more useful to use the estimated mean rather than the maximum range to compare the data?

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[1]

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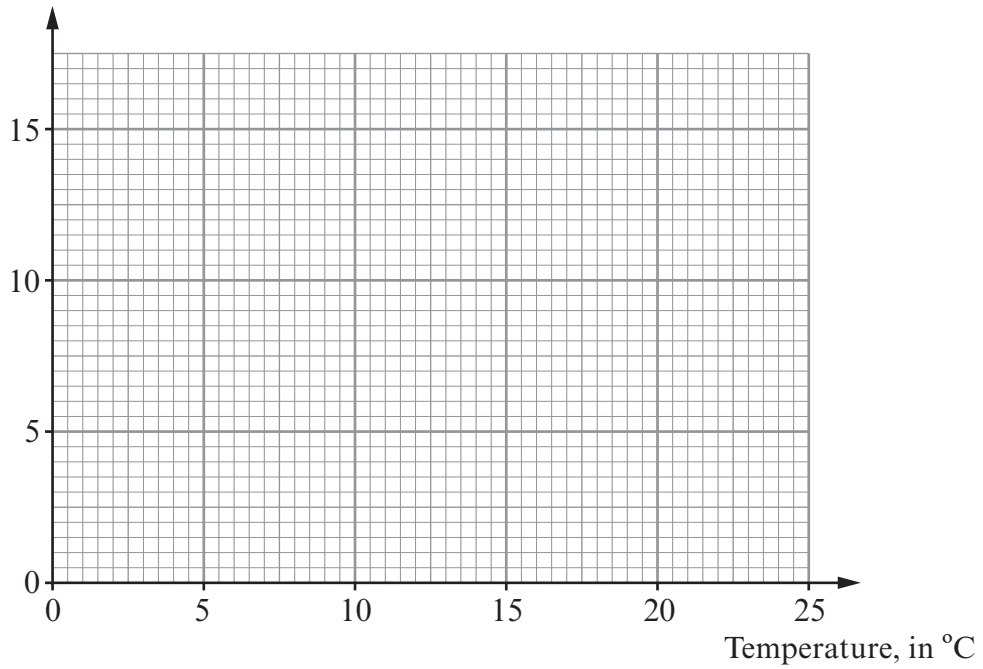


(c) Iona's frequency table is shown again below.

Use the graph paper below to draw a frequency polygon to illustrate the temperatures that Iona recorded on holiday in Stone Edge. [2]

Temperature, t °C	$0 \leq t < 5$	$5 \leq t < 10$	$10 \leq t < 15$	$15 \leq t < 20$	$20 \leq t < 25$
Number of days	0	5	9	17	0

Frequency

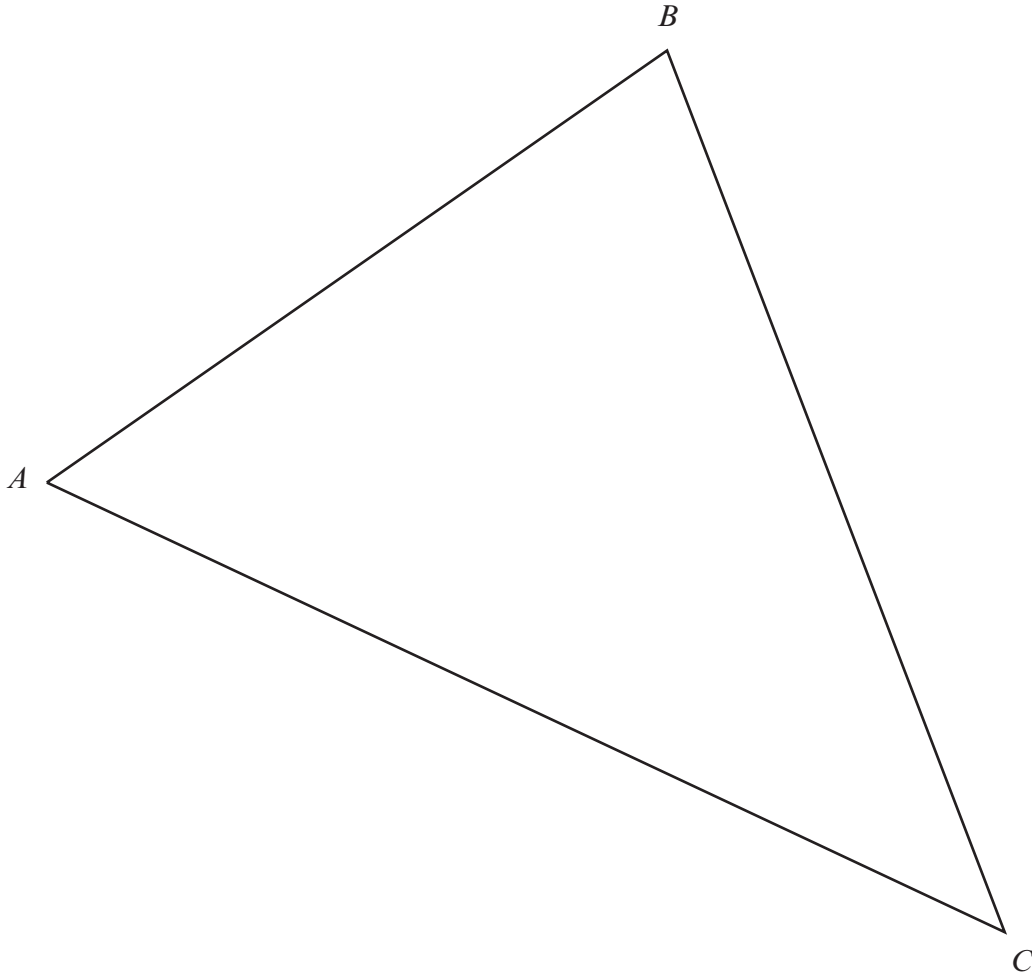


6. (a) A region is found within triangle ABC using the following criteria.
Points in the region are:

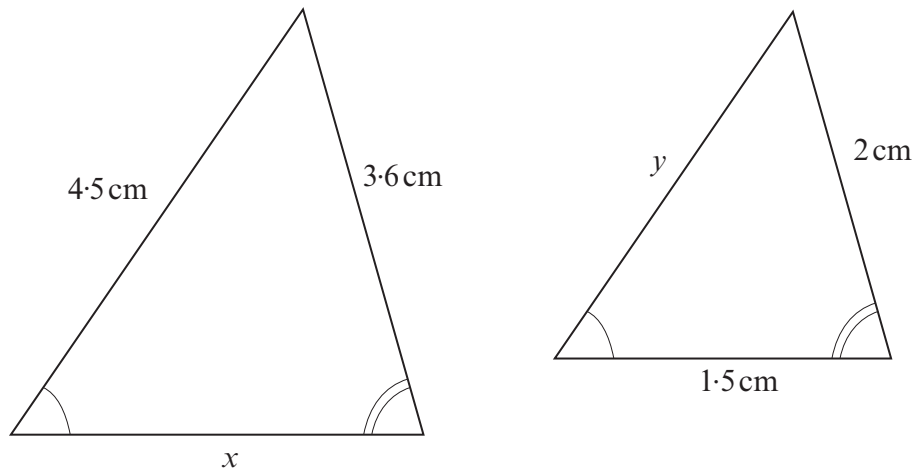
- nearer to B than to C ,
- greater than 4 cm from A .

Shade this region in the triangle ABC .

[3]



7. (a) The triangles shown below are similar.



Diagrams not drawn to scale

Calculate the lengths x and y .

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$x = \dots\dots\dots$ cm

$y = \dots\dots\dots$ cm

[4]



(b) You are given the following information about two congruent triangles.

- The triangles are not right-angled triangles.
- In both triangles, one side is of length 3.4 cm and another side is of length 6.2 cm.

One extra piece of information is needed to prove that the triangles are congruent.
There are two possible options for this extra piece of information.
What are the two possible options?

Option 1:

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Option 2:

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[2]



8. (a) Factorise $6x^2 + 5x - 25$.

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[2]

(b) Solve the following equation.

$$\frac{8x+1}{3} - \frac{4x+7}{2} = \frac{1}{2}$$

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[4]



10. A large rectangular tile has width x cm, length $(x + 5)$ cm and area 2100 cm².
Use the quadratic formula to calculate the width of the tile, giving your answer correct to 1 decimal place.

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11.

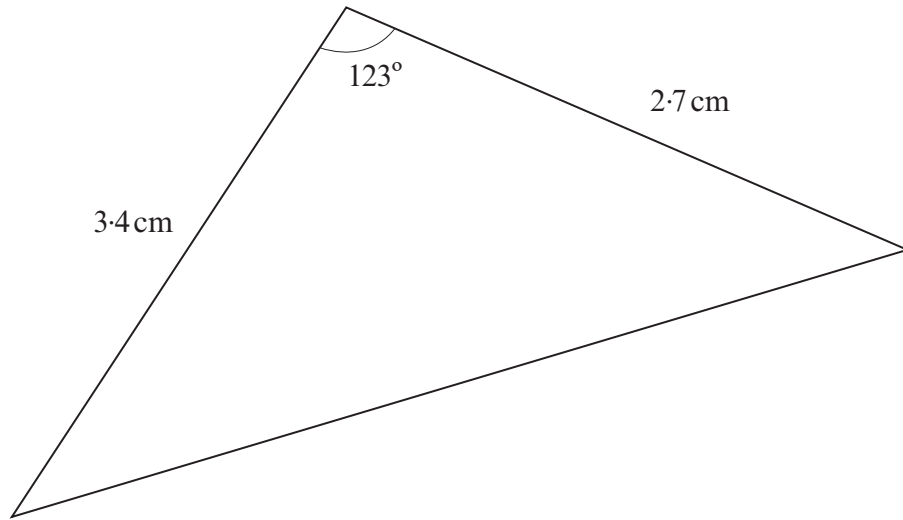


Diagram not drawn to scale

Calculate the area of the triangle.

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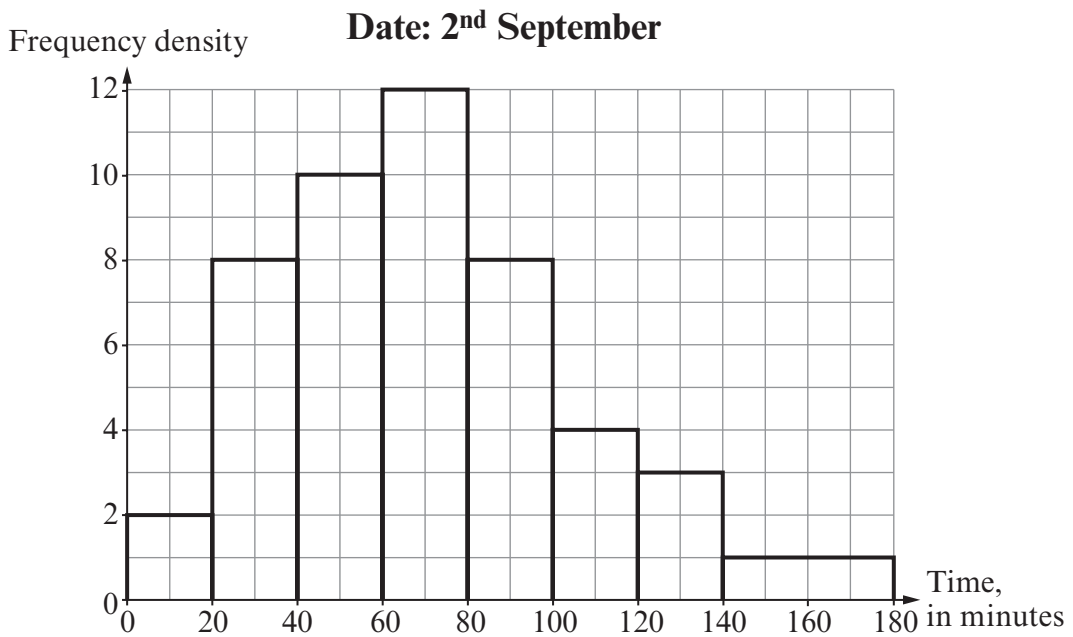
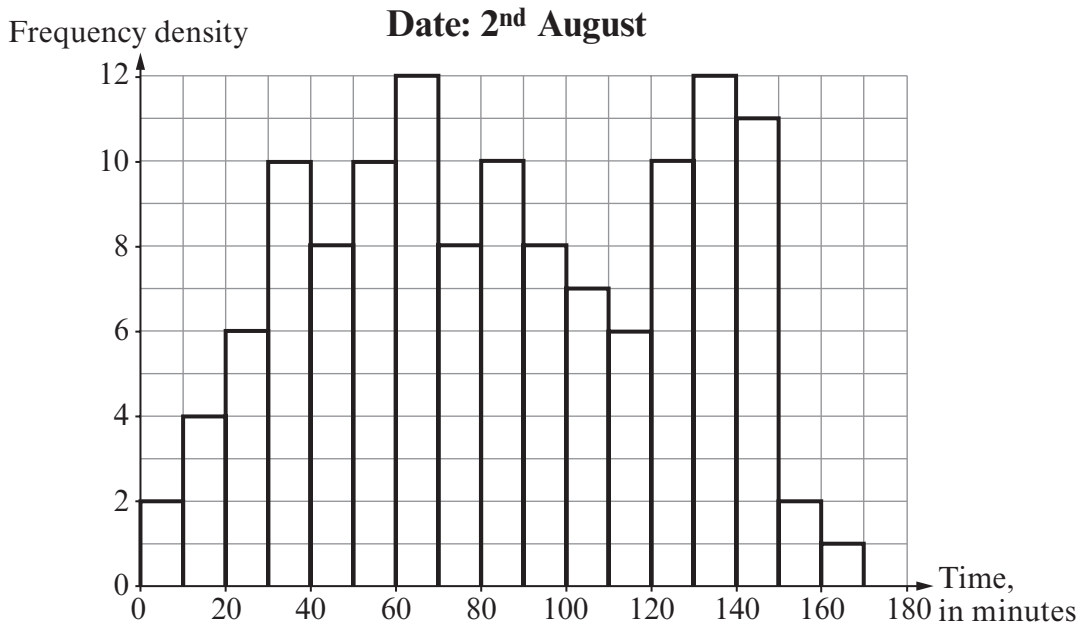
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12. The histograms below show the total times that office workers in a company spent on the phone on 2nd August and on 2nd September.



(a) Calculate the number of office workers who spent a total time of 60 minutes or less on the phone on 2nd August. [3]

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(b) Explain why it is not possible to use the histogram to calculate how many telephone calls were made on 2nd August?

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[1]

(c) Grant suggested that it is not possible to calculate exactly how many office workers spent longer than 130 minutes on the telephone on 2nd September. Is Grant correct? You must give a reason for your answer.

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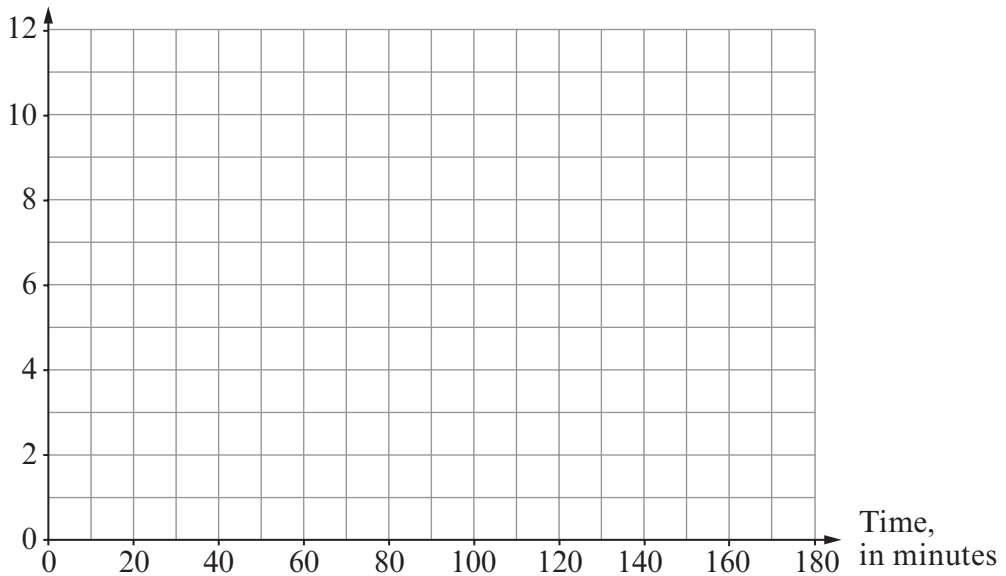
[1]

(d) Use the graph paper below to redraw the 2nd August histogram, using groups of the same width as those in the histogram for 2nd September.

[3]

Date: 2nd August

Frequency density



13. (a) Use the graph paper below to draw a graph of the equation $y = 6 + x - x^2$ for values of x from -2 to 3 .

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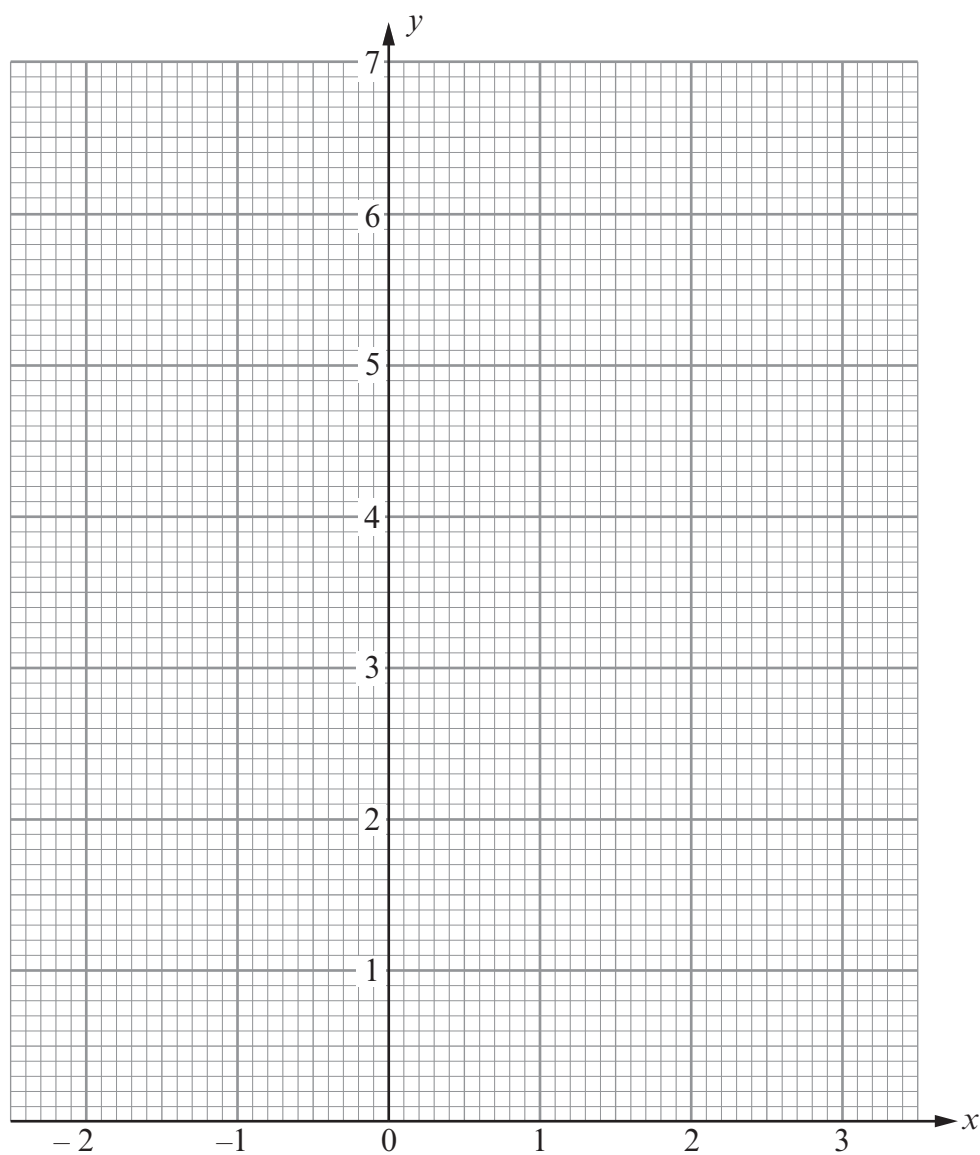
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[3]



(b) Use your graph to solve the following equations.

(i) $6 + x - x^2 = 0$

..... [1]

(ii) $4 + x - x^2 = 0$

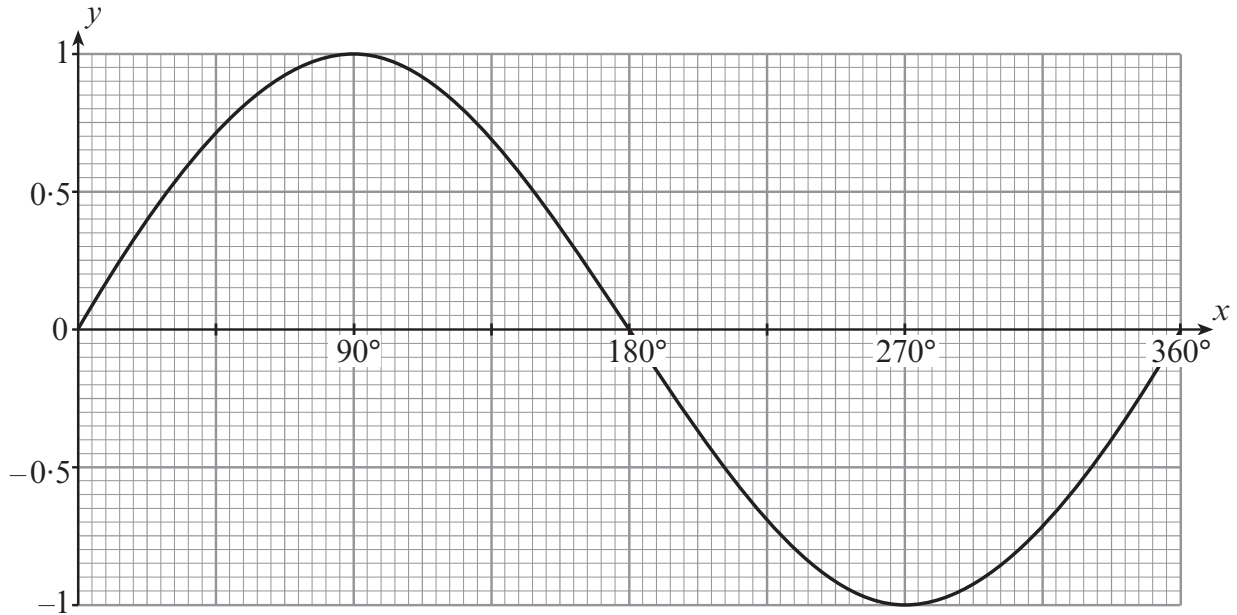
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(c) Use the trapezium rule, with the ordinates $x = 0$, $x = 1$, $x = 2$ and $x = 3$, to estimate the area of the region enclosed by the curve, the positive x -axis and the positive y -axis.

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15. The diagram below shows the graph of $y = \sin x$ for values of x from 0° to 360° .



Calculate all the solutions of the following equation between 0° to 360° .

$$\sin x = -0.26$$

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[2]

END OF PAPER



