Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics A

Paper 2 (Calculator)

Higher Tier

Thursday 9 June 2016 – Morning
Time: 1 hour 45 minutes

Paper Reference
1MA0/2H

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 100
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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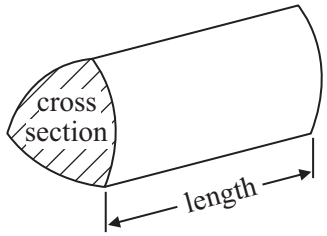
PEARSON

GCSE Mathematics 1MA0

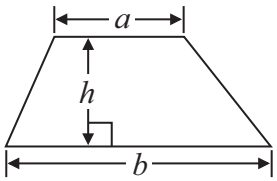
Formulae: Higher Tier

You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of prism = area of cross section × length

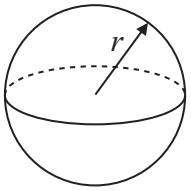


Area of trapezium = $\frac{1}{2}(a + b)h$



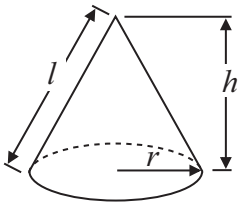
Volume of sphere = $\frac{4}{3}\pi r^3$

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

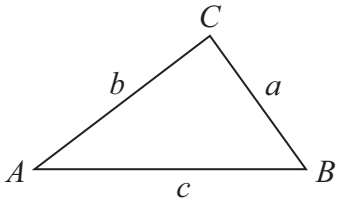


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



In any triangle *ABC*



The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

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

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 = $\frac{1}{2}ab \sin C$

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Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Chloe recorded the test marks of 20 students.

22	29	38	16	36	18	30	21	27	43
14	41	25	38	46	19	48	34	23	46

(a) Show this information in an ordered stem and leaf diagram.

(3)

One of these students is going to be chosen at random.

(b) Find the probability that this student has a test mark less than 28

.....

(2)

(Total for Question 1 is 5 marks)

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2 (a) Simplify $3a \times 5b \times 2c$

.....

(1)

(b) Factorise $3y + 6$

.....

(1)

(c) Expand $x(x - 3)$

.....

(1)

(Total for Question 2 is 3 marks)

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3 The diagram shows a rectangle.

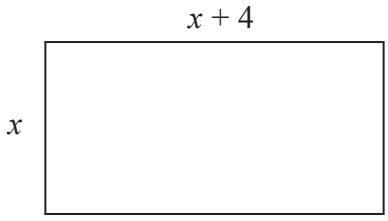

Diagram **NOT** accurately drawn

All measurements are given in centimetres.

The perimeter of the rectangle is 45 cm.

Work out the value of x.

$x =$ .....

(Total for Question 3 is 3 marks)

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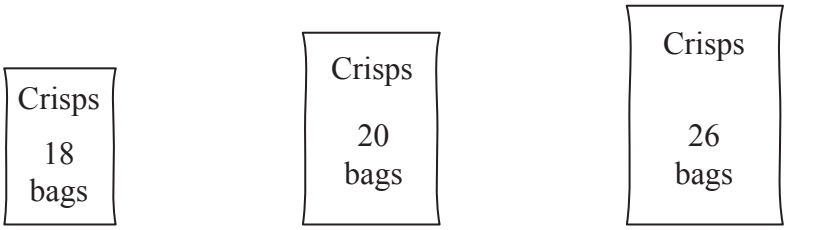
***4** A shop sells bags of crisps in different size packs.

There are

18 bags of crisps in a small pack
20 bags of crisps in a medium pack
26 bags of crisps in a large pack



£4 each pack £4.99 each pack £6.00 each pack

Which size pack is the best value for money?
You must show all your working.

(Total for Question 4 is 4 marks)

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5 There are only blue counters, green counters, red counters and yellow counters in a bag.
Olga is going to take at random a counter from the bag.

The table shows the probability that Olga will take a blue counter and the probability that she will take a yellow counter.

Colour	blue	green	red	yellow
Probability	0.4			0.15

The number of red counters in the bag is 4 times the number of green counters in the bag.

Complete the table.

(Total for Question 5 is 3 marks)

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6 The body mass index, B, for a person of mass m kg and height h metres is given by the formula

$$B = \frac{m}{h^2}$$

Usman has a mass of 50 kg.
He has a height of 1.57 m.

(a) Work out Usman's body mass index.
Give your answer correct to one decimal place.

.....

(2)

Tom's height is 1.80 m.
He wants his body mass index to be 21

(b) Work out the mass that will give Tom a body mass index of 21

..... kg

(2)

Tom is a ski jumper.

The maximum length of skis he can use is 145% of his height.
Tom's height is 1.80 m.

(c) Work out the maximum length of skis Tom can use.

..... m

(3)

(Total for Question 6 is 7 marks)

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7 The equation

$$x^3 - 5x = 34$$

has a solution between 3 and 4

Use a trial and improvement method to find this solution.
Give your answer correct to 1 decimal place.
You must show all your working.

$x =$ .....

(Total for Question 7 is 4 marks)

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8 Emma has a digital photo.

Diagram **NOT** accurately drawn

The photo has a width of 720 pixels.
The photo has a height of 540 pixels.

(a) Write down the ratio of the width of the photo to the height of the photo.
Give your ratio in its simplest form.

.....

(2)

Emma wants the ratio of the width of the photo to the height of the photo to be 3 : 2
She reduces the number of pixels in the height of the photo.
The width of the photo is still 720 pixels.

The ratio of the width of the photo to the new height of the photo is 3 : 2

(b) Work out the new height of the photo.

..... pixels

(2)

(Total for Question 8 is 4 marks)

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***9**

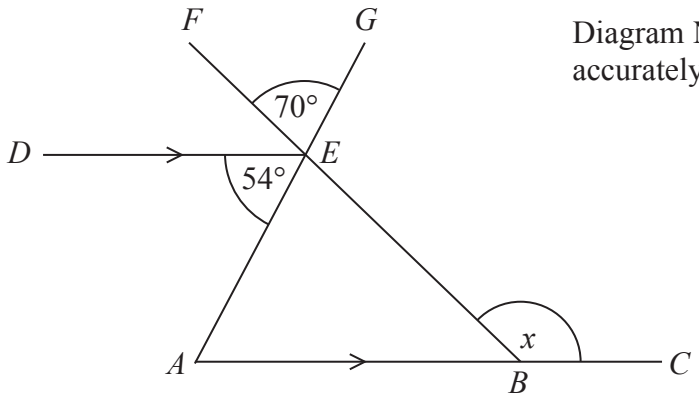

Diagram **NOT** accurately drawn

ABC and *DE* are parallel lines.
AEG and *BEF* are straight lines.

Angle *AED* = 54°
Angle *FEG* = 70°

Work out the size of the angle marked *x*.
Give a reason for each stage of your working.

(Total for Question 9 is 4 marks)

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10 The table gives information about the heights of 50 trees.

Height (h metres)	Frequency
$0 < h \leqslant 4$	8
$4 < h \leqslant 8$	21
$8 < h \leqslant 12$	12
$12 < h \leqslant 16$	7
$16 < h \leqslant 20$	2

Work out an estimate for the mean height of the trees.

..... m

(Total for Question 10 is 4 marks)

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11 Colin works on 5 days each week.
Each day he drives from his home to work and from work to his home.

Colin pays £3.50 each day to use the car park at work.

The distance from Colin's home to work is 18 miles.
Colin's car uses one gallon of petrol every 45.2 miles.

1 litre of petrol costs 136.9p
1 gallon = 4.546 litres

Work out the total cost for Colin to use his car for work each week.
You must show all your working.

£ .....

(Total for Question 11 is 5 marks)

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12

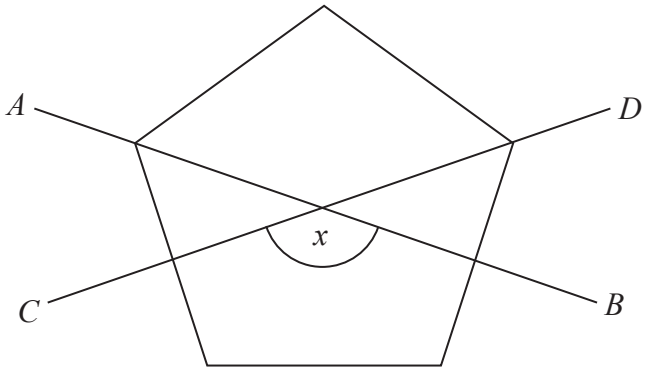

Diagram **NOT** accurately drawn

The diagram shows a regular pentagon.
AB and *CD* are two of the lines of symmetry of the pentagon.

Work out the size of the angle marked *x*.
You must show all your working.

.....°

(Total for Question 12 is 4 marks)

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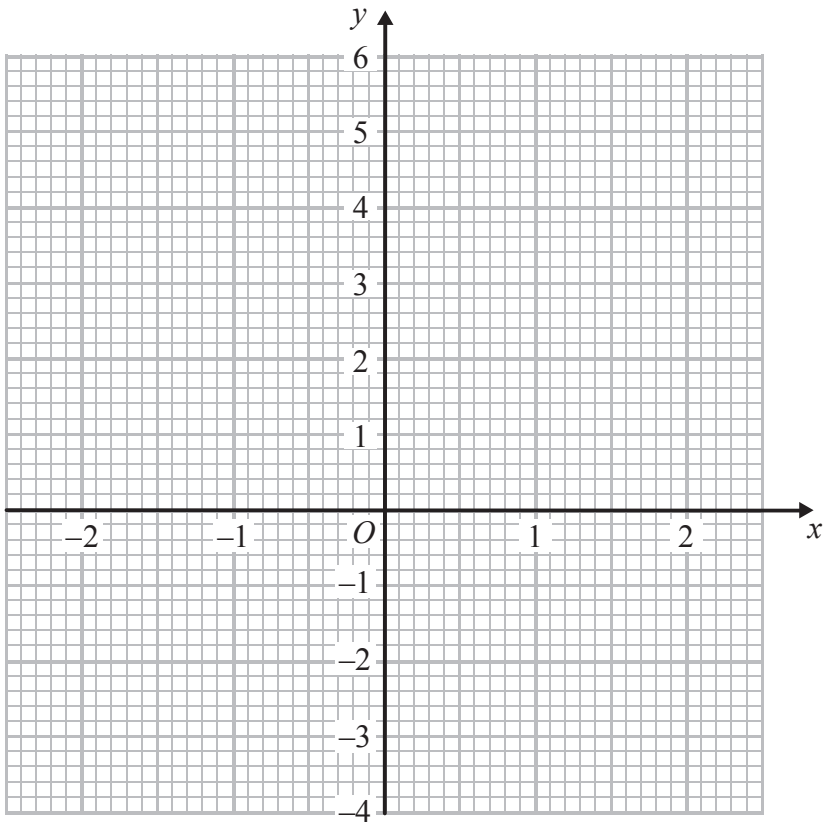
13 (a) Complete the table of values for $y = x^3 - 3x + 1$

x	–2	–1	0	1	2
y		3			3

(2)

(b) On the grid, draw the graph of $y = x^3 - 3x + 1$ for values of x from –2 to 2



(2)

(Total for Question 13 is 4 marks)

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14 The diagram shows a metal bar in the shape of a prism.

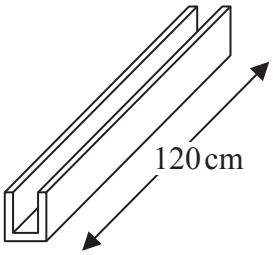

Diagram **NOT** accurately drawn

The length of the metal bar is 120 cm.
The cross section of the metal bar is shown below.

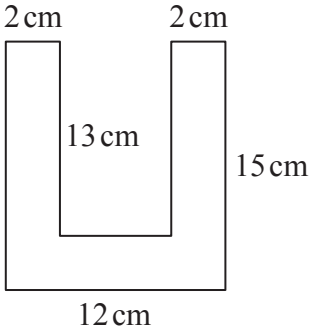

Diagram **NOT** accurately drawn

All corners are right angles.

The metal bar is made from steel with density 8 g/cm^3.

Sean has a trolley.
The trolley can carry a maximum mass of 250 kg.

How many metal bars can the trolley carry at the same time?
You must show your working.

.....

(Total for Question 14 is 5 marks)

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***15** This notice was in a car magazine.

> Most new cars lose more than half of their value in the first three years

Paul bought a new car.
The value of the car was £15 000

In the first year, the value of the car depreciated by 23%.
After the first year, the value of the car depreciated by 18% each year.

Work out if Paul's car lost more than half of its value by the end of three years.

(Total for Question 15 is 4 marks)

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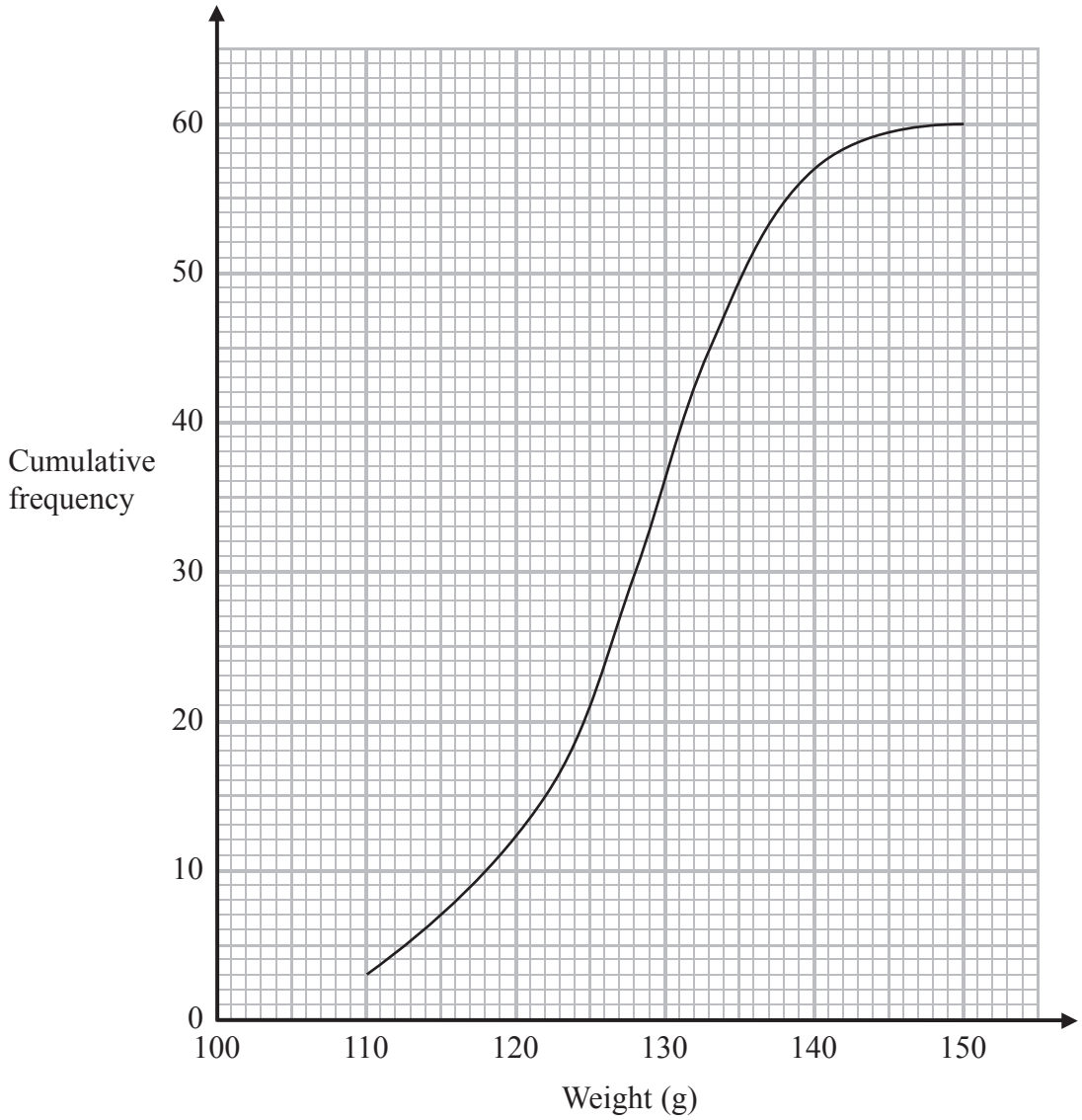
16 The cumulative frequency graph shows information about the weights of 60 apples.



(a) Use the graph to find an estimate for the median weight.

.....g

(1)

(b) Use the graph to find an estimate for the interquartile range of the weights.

.....g

(2)

(Total for Question 16 is 3 marks)

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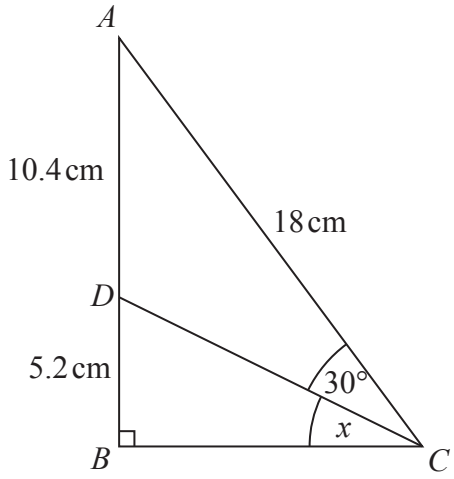

Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
D is a point on *AB*.

Angle *ACD* = 30°
AD = 10.4 cm
DB = 5.2 cm
AC = 18 cm

Work out the size of the angle marked *x*.
Give your answer correct to 1 decimal place.

.....°

(Total for Question 17 is 4 marks)

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18 (a) Simplify $2a^3b \times 5a^2b^3$

(2)

(b) Make y the subject of the formula $p = \sqrt{\dfrac{x + y}{5}}$

(3)

(Total for Question 18 is 5 marks)

19 The table gives information about 234 students in a school.

Year group	Number of female students	Number of male students
Year 12	77	51
Year 13	53	31
Year 14	13	9

Sadia is doing a survey of these students.
She is using a sample of 50 students stratified by year group and by gender.

Work out the number of Year 12 male students in the sample.

(Total for Question 19 is 2 marks)

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20 Solve $3x^2 + 6x - 2 = 0$
Give your solutions correct to 2 decimal places.

.....

(Total for Question 20 is 3 marks)

21 $I = 5(v - u)$

$v = 14$ correct to 2 significant figures
$u = 8.7$ correct to 2 significant figures

Work out the upper bound for the value of I.
You must show your working.

.....

(Total for Question 21 is 3 marks)

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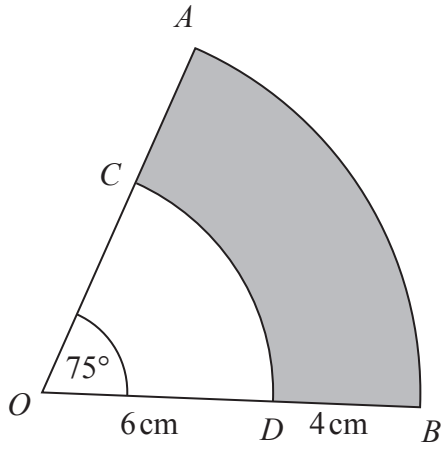

Diagram **NOT** accurately drawn

OAB is a sector of a circle, centre *O*.
OCD is a sector of a circle, centre *O*.
OCA and *ODB* are straight lines.

Angle *AOB* = 75°
OD = 6 cm
DB = 4 cm

Calculate the perimeter of the shaded region.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 22 is 3 marks)

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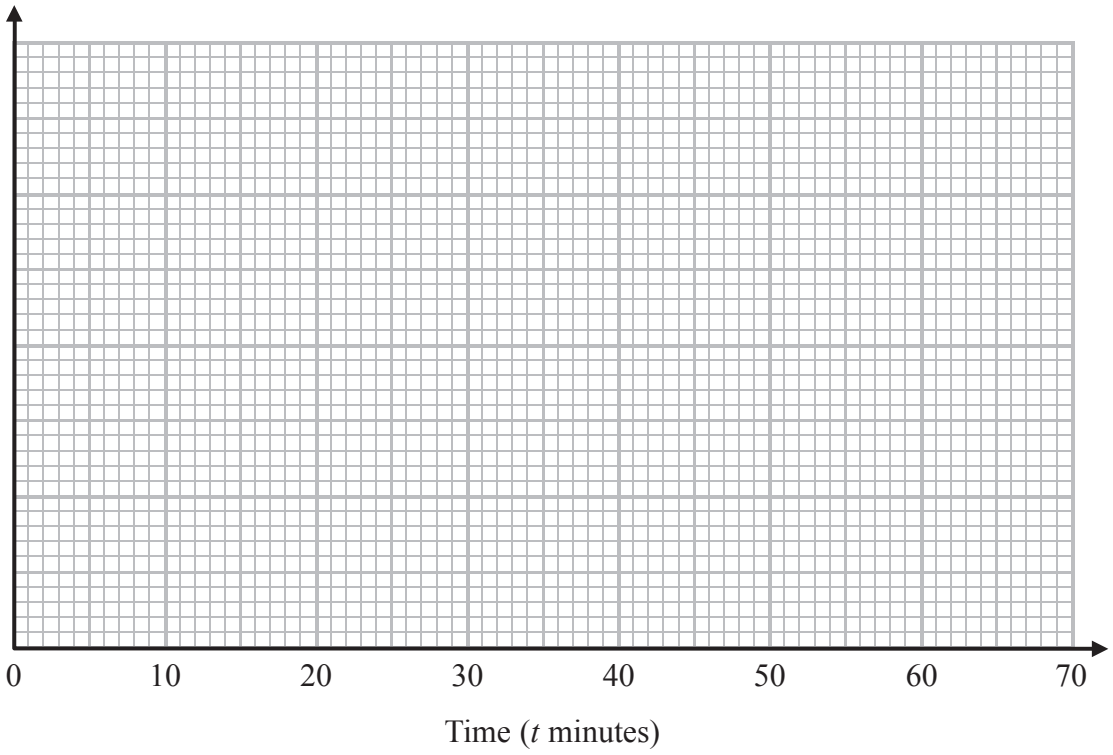
23 The table gives information about the lengths of time some people were in a supermarket.

Time (t minutes)	Frequency
$0 < t \leqslant 5$	8
$5 < t \leqslant 15$	32
$15 < t \leqslant 30$	36
$30 < t \leqslant 40$	18
$40 < t \leqslant 60$	6

Draw a histogram for the information in the table.



(Total for Question 23 is 3 marks)

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24 (a) Simplify fully $\dfrac{3-x}{3x^2-5x-12}$

(2)

(b) Write $\dfrac{x}{x-1}-\dfrac{x}{x+1}$ as a single fraction in its simplest form.

(3)

(Total for Question 24 is 5 marks)

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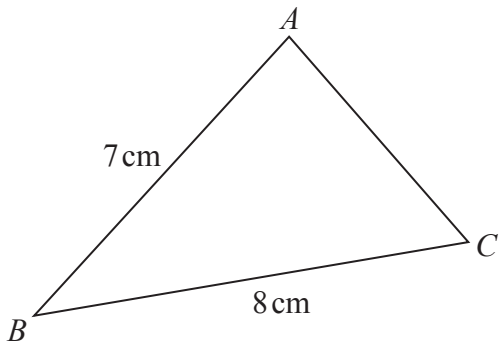

Diagram **NOT** accurately drawn

ABC is an acute-angled triangle.
BA = 7 cm
BC = 8 cm

The area of triangle *ABC* is 18 cm^2.

Work out the size of angle *BAC*.
Give your answer correct to 3 significant figures.
You must show all your working.

.....°

(Total for Question 25 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

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