

Write your name here

Surname

Other names

Pearson
Edexcel GCSE

Centre Number

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Candidate Number

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Nov 2015 Predicted Paper 2

Higher Tier

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

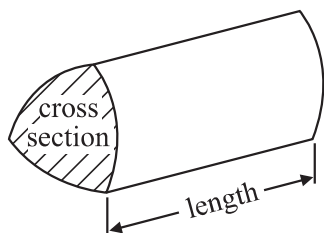
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

GCSE Mathematics 1MA0

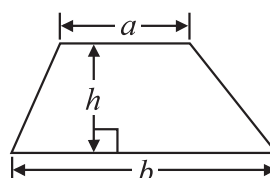
Formulae: Higher Tier

**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 \times length

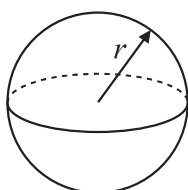


Area of trapezium = $\frac{1}{2} (a + b)h$



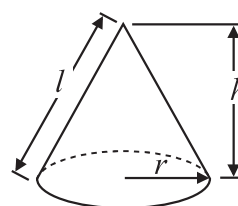
Volume of sphere = $\frac{4}{3} \pi r^3$

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

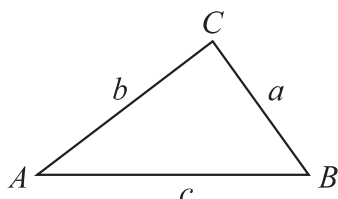


Volume of cone = $\frac{1}{3} \pi r^2 h$

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



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

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

- 1 The cost of 6 cups is £7.80
Work out the cost of 10 of these cups.

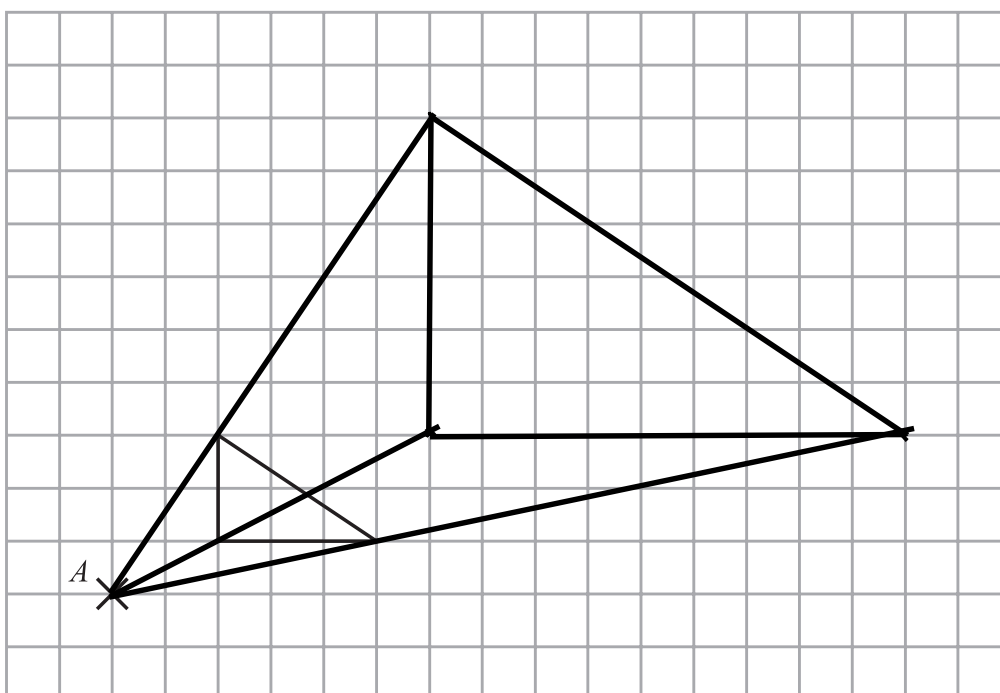
$$7.80 \div 6 = 1.30$$

$$1.30 \times 10 = 13$$

£ 13

(Total for Question 1 is 2 marks)

2



On the grid, enlarge the shape with scale factor 3, centre A .

(Total for Question 2 is 3 marks)

3 Use your calculator to work out

$$\frac{\sqrt{6700 - 2.38^2}}{3.6^2 + 5.71}$$

You must give your answer as a decimal.
Give your answer to three significant figures.

4.080831694

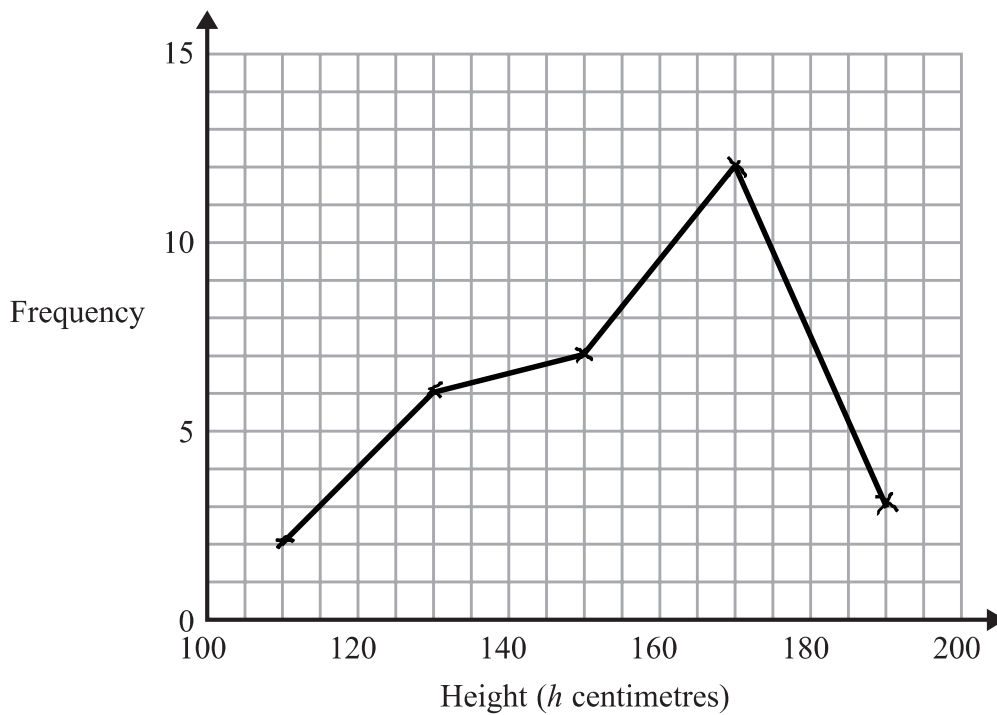
4.08

(Total for Question 3 is 3 marks)

4 The table shows information about the heights, in centimetres, of 30 sunflower plants.

Height (h centimetres)	Frequency
$100 < h \leq 120$	2
$120 < h \leq 140$	6
$140 < h \leq 160$	7
$160 < h \leq 180$	12
$180 < h \leq 200$	3

(a) On the grid, draw a frequency polygon for this information.



(2)

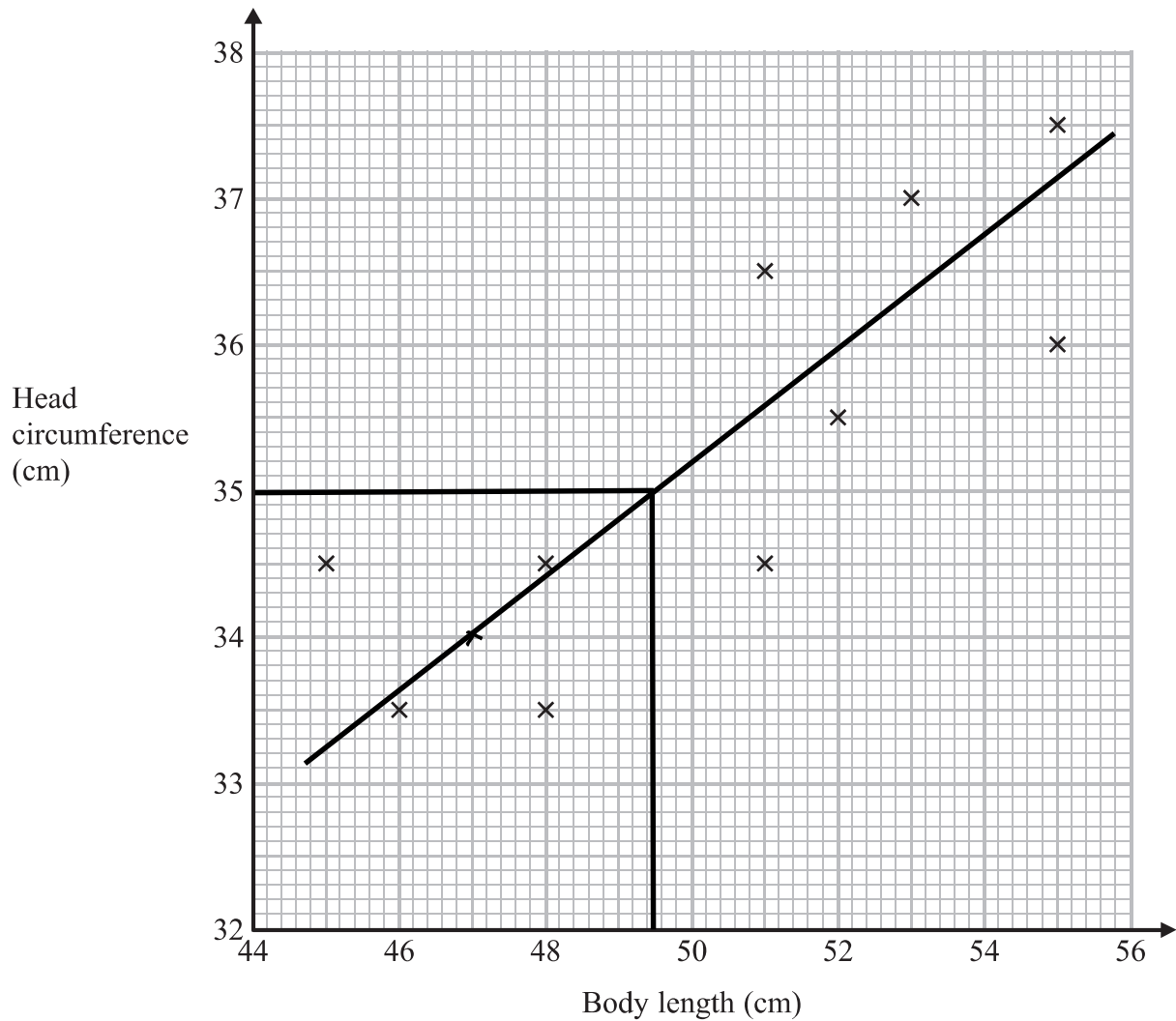
(b) Write down the modal class interval.

$160 < h \leq 180$

(1)

(Total for Question 4 is 3 marks)

- 5 The scatter graph shows information about 10 newborn babies. It shows each baby's body length and head circumference.



Another baby has a body length of 47 cm and head circumference 34 cm.

- (a) Show this information on the scatter graph.

(1)

- (b) What type of correlation does the scatter graph show?

positive

(1)

A baby has head circumference 35 cm.

- (c) Estimate the body length of this baby.

49.5 cm

(2)

(Total for Question 5 is 4 marks)

*6 A shop sells toothpaste in 3 different sizes of tube.

A 70 ml tube of toothpaste costs £1.79

A 100 ml tube of toothpaste costs £2.75

A 150 ml tube of toothpaste costs £3.99

Which size of tube is the best value for money?

You must show all your working.

70ml

$$\frac{179}{70} = 2.56 \text{ p per ml}$$

100ml

$$\frac{275}{100} = 2.75 \text{ p per ml}$$

150ml

$$\frac{399}{150} = 2.66 \text{ p per ml}$$

The 70ml tube is the best value for money

(Total for Question 6 is 4 marks)

7 The diagram shows a tile.

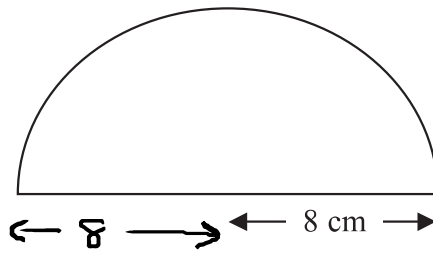


Diagram **NOT**
accurately drawn

The tile is in the shape of a semicircle of radius 8 cm.

Work out the perimeter of the tile.

Give your answer correct to one decimal place.

$$\begin{aligned}\text{Circumference} &= 2 \times \pi \times r \\ &= 2 \times \pi \times 8 \\ &= 16\pi\end{aligned}$$

$$\therefore \text{perimeter} = 16 + \frac{16\pi}{2}$$

$$= 41.13274123$$

41.1

cm

(Total for Question 7 is 3 marks)

8

One day a supermarket has 8420 customers.

65% of the customers pay with a debit card.

$\frac{1}{5}$ of the customers pay with a credit card.

The rest of the customers pay with cash.

Work out how many customers pay with cash.

$$0.65 \times 8420 = 5473$$

$$\frac{1}{5} \times 8420 = 1684$$

$$8420 - 5473 - 1684$$

1263

(Total for Question 8 is 4 marks)

9 The equation $x^3 + 4x = 60$ has a solution between 3 and 4

Use a trial and improvement method to find this solution.

Give your answer correct to one decimal place.

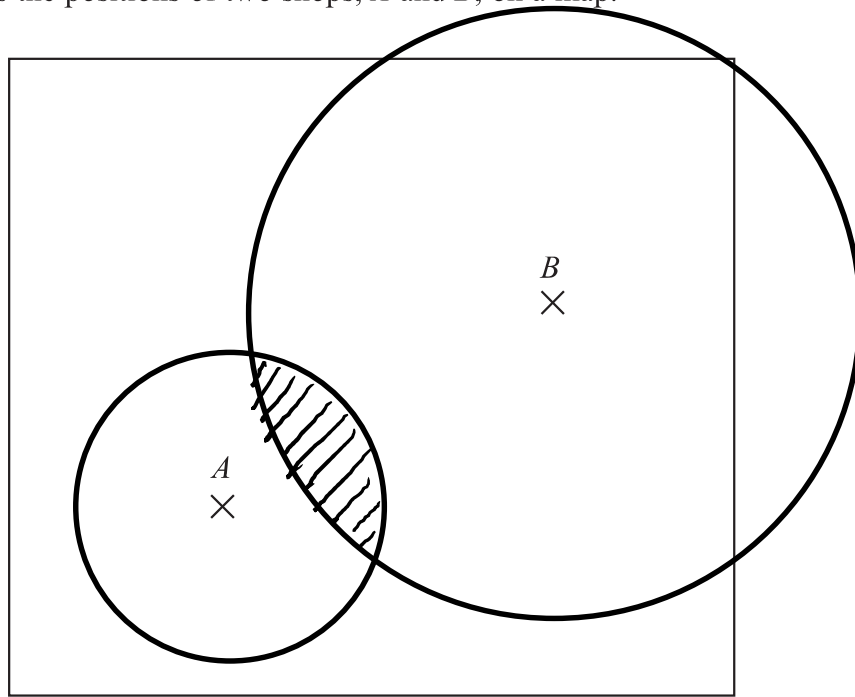
You must show **all** your working.

x	$(x)^3 + 4(x)$	Comment
3.5	$(3.5)^3 + 4(3.5)$ $= 56.875$	too small
3.6	$(3.6)^3 + 4(3.6)$ $= 61.056$	too big
3.55	58.938875	too small

$x = 3.6$

(Total for Question 9 is 4 marks)

10 The diagram shows the positions of two shops, A and B , on a map.



The scale of the map is 1 cm represents 5 km.

Yannis wants to build a warehouse.

The warehouse needs to be

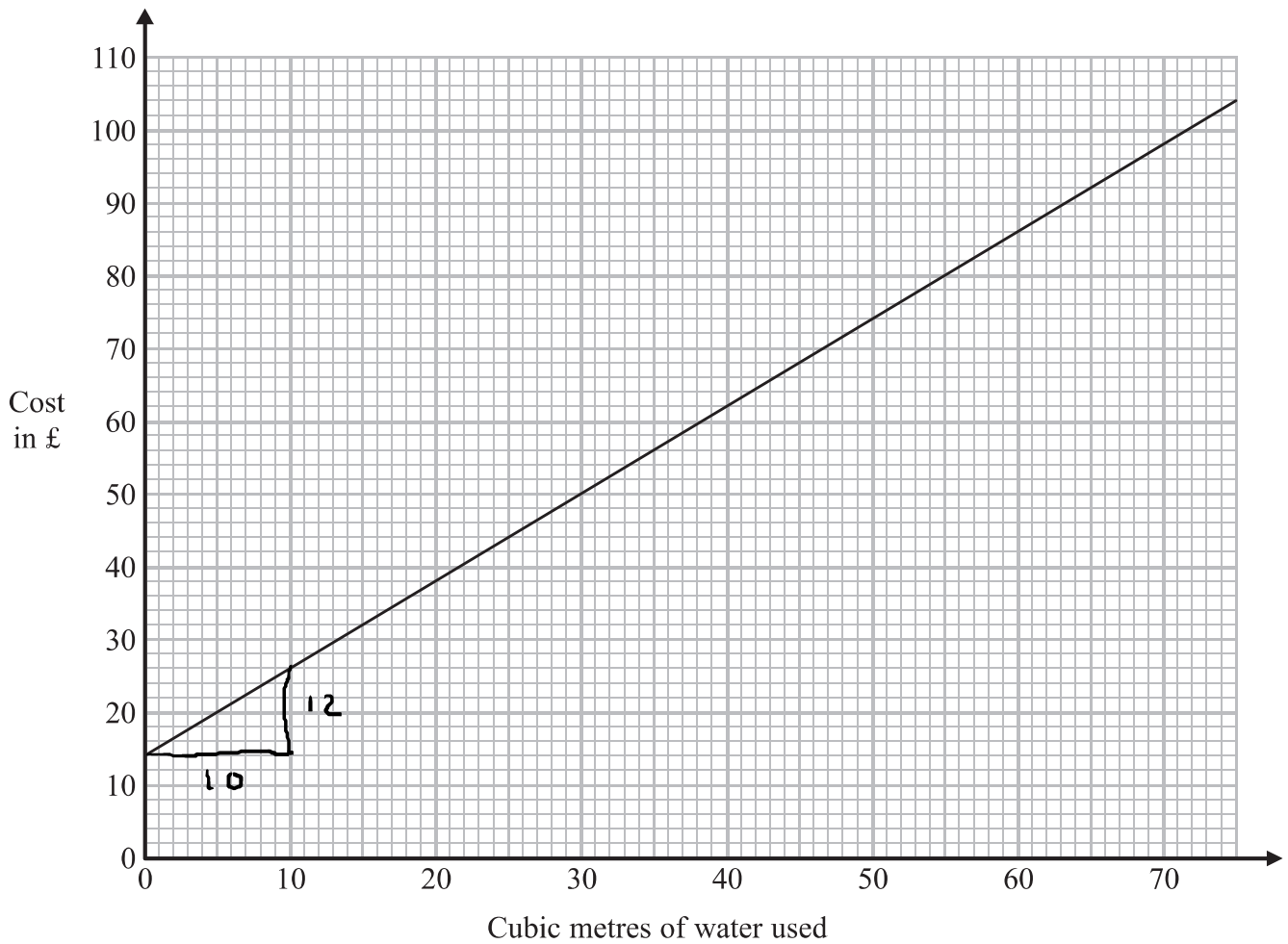
- less than 10 km from A ,
- less than 20 km from B .

Show by shading where Yannis can build the warehouse.

(Total for Question 10 is 3 marks)

11 A water company charges customers a fixed standing charge plus an additional cost for the amount of water, in cubic metres, used.

The graph shows information about the total cost charged.



(a) Write down the fixed standing charge.

£ 14
(1)

(b) Work out the additional cost for each cubic metre of water used.

£12 for 10 cubic metres

£ 1.20
(2)

(Total for Question 11 is 3 marks)

12 $-2 \leq n < 3$

n is an integer.

(a) Write down all the possible values of n .

$-2, -1, 0, 1, 2$

(2)

(b) Solve $4 - x < 2x - 5$

$$4 < 3x - 5$$

$$9 < 3x$$

$$\underline{3 < x} \quad \text{or} \quad \underline{x > 3}$$

$x > 3$

(2)

(Total for Question 12 is 4 marks)

13 (a) Simplify $x^2 \times x^4$

$$x^6$$

(1)

(b) Simplify $y^8 \div y^6$

$$y^2$$

(1)

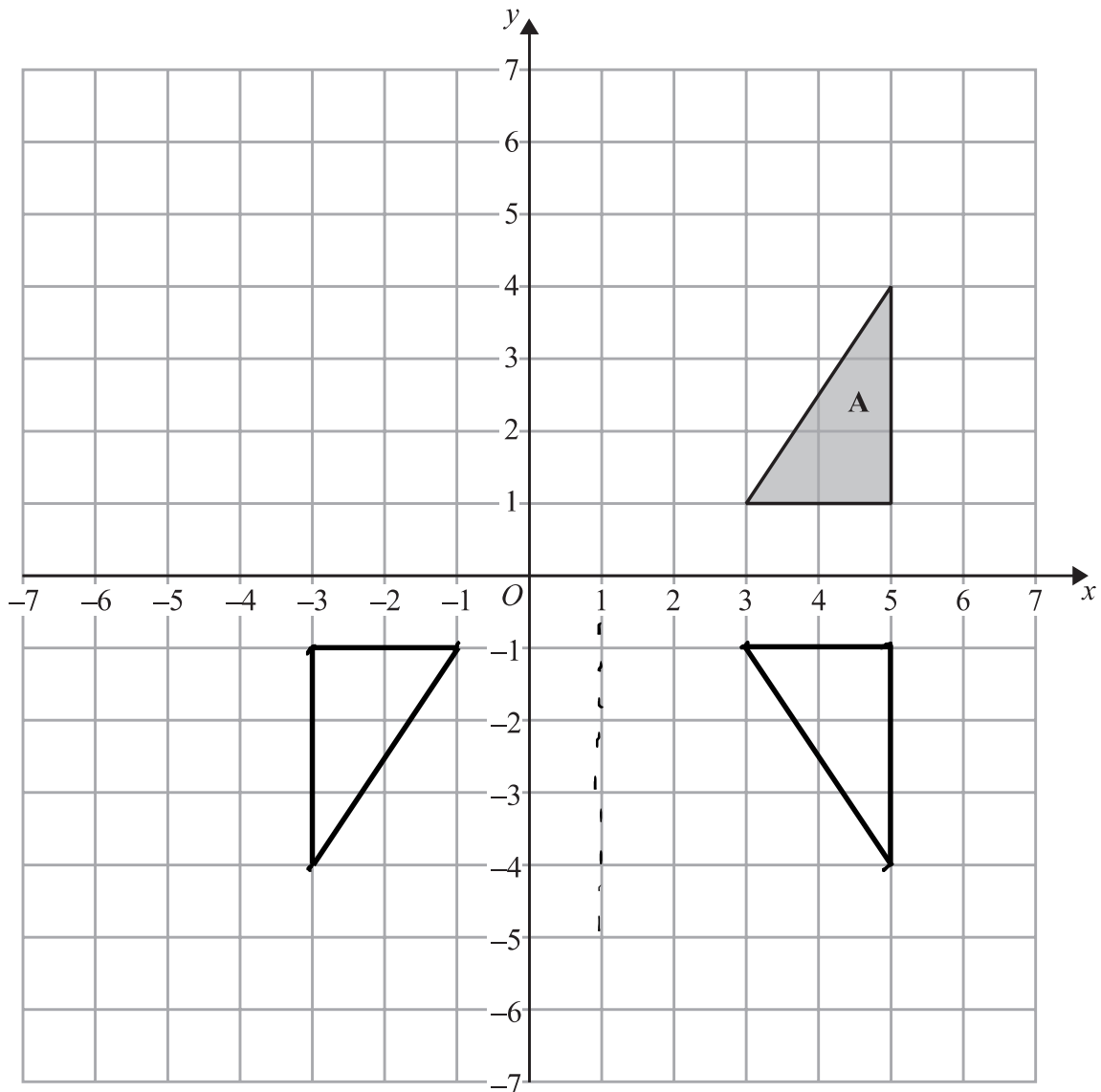
(c) Simplify $(t^2)^3$

$$t^2 \times t^2 \times t^2$$

$$t^6$$

(1)

(Total for Question 13 is 3 marks)



Triangle **A** is reflected in the x -axis to give triangle **B**.

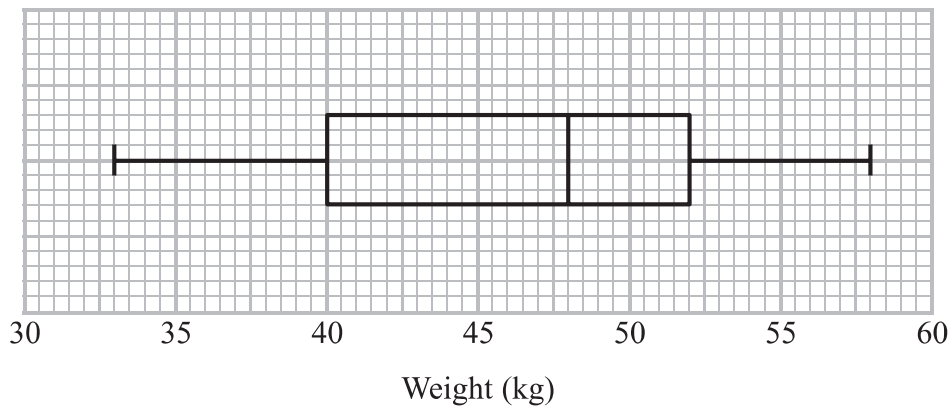
Triangle **B** is then reflected in the line $x = 1$ to give triangle **C**.

Describe fully the single transformation that maps triangle **A** onto triangle **C**.

Rotation, 180° , centre $(1, 0)$

(Total for Question 14 is 3 marks)

15 The box plot gives information about the weights of a group of children.



(a) Write down the median.

48 kg
(1)

(b) Work out the interquartile range.

$$52 - 40$$

12 kg
(1)

There are 80 children in the group.

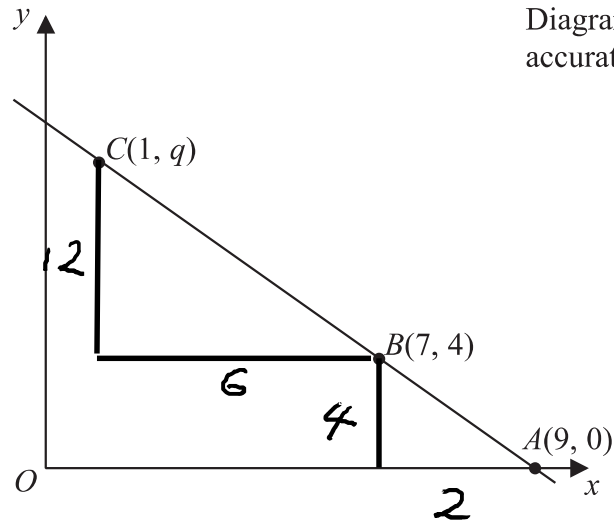
(c) Work out an estimate for the number of children who weigh 52 kg or more.

$$\frac{1}{4} \text{ of } 80$$

20
(2)

(Total for Question 15 is 4 marks)

Diagram **NOT**
accurately drawn



The points A , B and C lie on a straight line.

The coordinates of A are $(9, 0)$.

The coordinates of B are $(7, 4)$.

The coordinates of C are $(1, q)$.

Work out the value of q .

2 Back 4 Up

6 Back 12 UP

↑
12

$$4 + 12 = 16$$

16

(Total for Question 16 is 3 marks)

17 GHJ is a right-angled triangle.

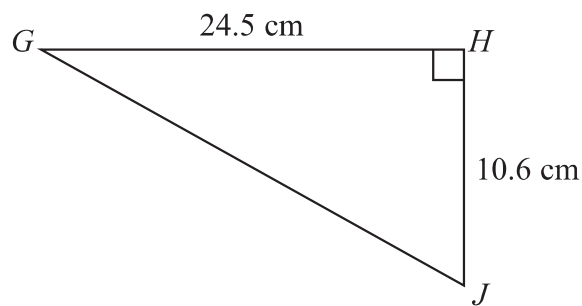


Diagram **NOT** accurately drawn

- (a) Calculate the length of GJ .
Give your answer correct to one decimal place.

$$GJ^2 = 24.5^2 + 10.6^2$$

$$GJ = \sqrt{24.5^2 + 10.6^2}$$

$$= 26.69475604 \quad \underline{26.7} \text{ cm}$$

(3)

LMN is a different right-angled triangle.

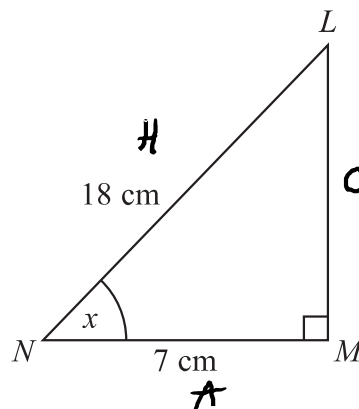


Diagram **NOT** accurately drawn

- (b) Calculate the size of the angle marked x .
Give your answer correct to one decimal place.

$$\cos x = \frac{7}{18}$$

$$x = \cos^{-1}\left(\frac{7}{18}\right)$$

$$= 67.11461952 \quad \underline{67.1}^\circ$$

(3)

(Total for Question 17 is 6 marks)

18 D is directly proportional to x .

$$D = 36 \text{ when } x = 5$$

Work out the value of D when $x = 8$

$$D = kx$$

$$36 = k(5)$$

$$k = 7.2$$

$$D = 7.2x$$
$$= 7.2(8)$$

$$D = \underline{57.6}$$

(Total for Question 18 is 2 marks)

19 (a) Write 4.5×10^{-3} as an ordinary number.

$$\underline{0.0045}$$

(1)

(b) Work out the value of $(2.5 \times 10^{-2}) \div (3.8 \times 10^3)$

Give your answer in standard form correct to 3 significant figures.

type into calc!

$$\underline{6.58 \times 10^{-6}}$$

(2)

(Total for Question 19 is 3 marks)

20 (a) Helen's savings increased from £155 to £167.40

Work out the percentage increase in Helen's savings.

$$\frac{167.40 - 155}{155}$$

$$\frac{\text{change}}{\text{original}} \times 100$$

$$\frac{8}{(3)} \%$$

(b) Joe's savings increased by 4.5%.

His savings are now £125.40

What were his savings before the increase?

$$125.40 = 104.5\%$$

$$1.20 = 1\%$$

$$120 = 100\%$$

$$\frac{£120}{(3)}$$

(Total for Question 20 is 6 marks)

21 The value of a car depreciates by 25% each year.

At the end of 2013 the value of the car was £4800

Work out the value of the car at the end of 2015

$$4800 \times 0.75^2$$
$$= 2700$$

£ 2700

(Total for Question 21 is 3 marks)

22 The table shows some information about the students in a school.

Age	Number of male students	Number of female students	Total number of students
16	90	85	175
17	110	115	225
18	87	117	204
19	104	76	180
20 and over	123	127	250
Total number of students	514	520	1034

Alice wants to give a questionnaire to some of these students.
She takes a sample of 150 students stratified by age and gender.

Work out the number of 18-year-old female students there should be in the sample.

$$\frac{117}{1034} \times 150 = 17 \text{ (nearest whole no.)}$$

17

(Total for Question 22 is 2 marks)

23 Solve $5x^2 + 6x - 2 = 0$

Give your solutions correct to 2 decimal places.

$$a = 5 \quad b = 6 \quad c = -2$$

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

$$= \frac{-(6) \pm \sqrt{(6)^2 - 4(5)(-2)}}{2(5)}$$

$$= 0.27 \text{ or } -1.47$$

0.27 and -1.47

(Total for Question 23 is 3 marks)

24 ABC is a triangle.

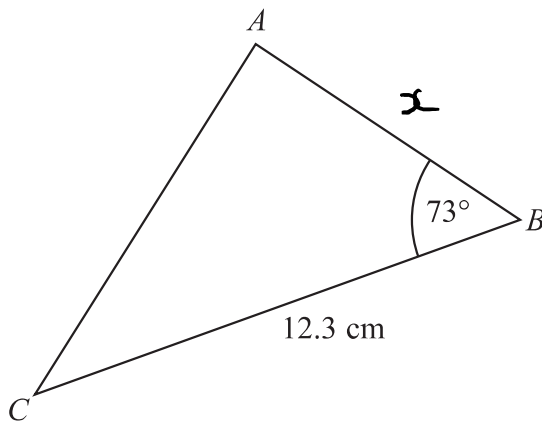


Diagram **NOT**
accurately drawn

$BC = 12.3$ cm
Angle $ABC = 73^\circ$

The area of triangle ABC is 50 cm^2 .

Work out the length of AC .

Give your answer correct to 3 significant figures.

$$\frac{1}{2} ab \sin C = 50$$

$$\frac{1}{2} (12.3)(x) \sin(73) = 50$$

$$x = \frac{50}{\frac{1}{2}(12.3) \sin(73)}$$

$$= 8.501558996$$

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

$$a^2 = 12.3^2 + \text{ANS}^2 - 2(12.3)(\text{ANS}) \cos(73)$$

$$= 162.4203691$$

$$a = \sqrt{162.4203691} = 12.7 \text{ (3sf)}$$

12.7

..... cm

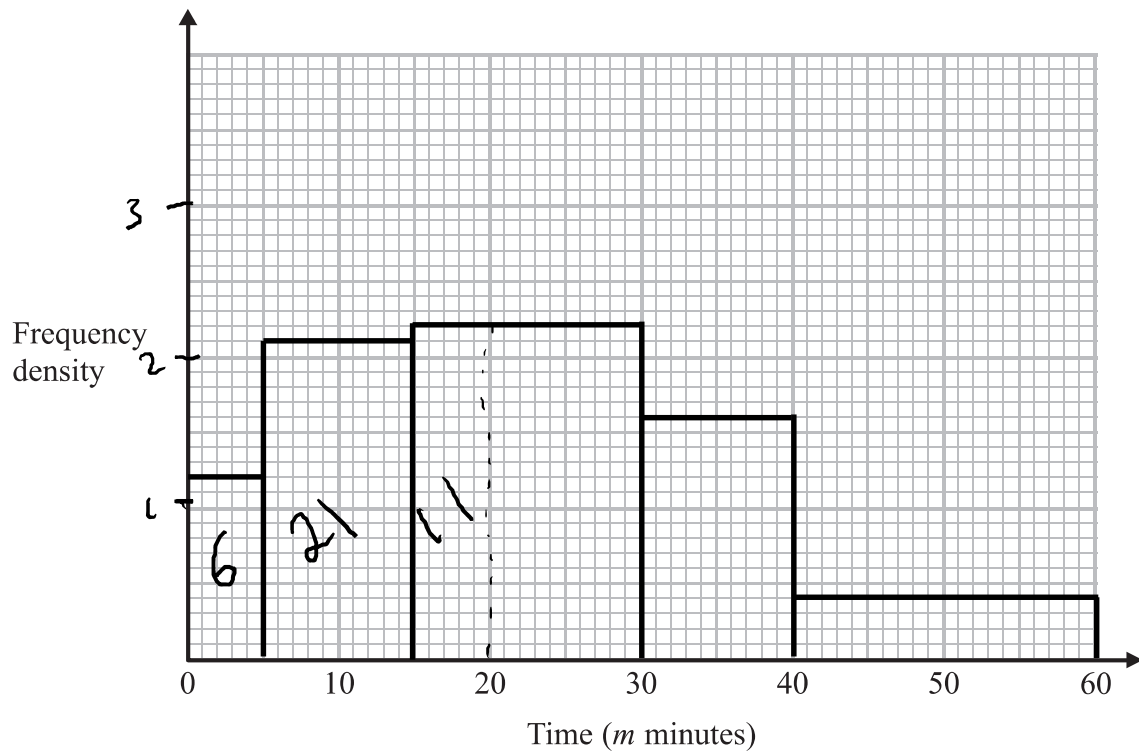
(Total for Question 24 is 6 marks)

25 The table shows information about the times, in minutes, that 84 customers spent in a cafe.

Time (m minutes)	Frequency
$0 < m \leq 5$	6
$5 < m \leq 15$	21
$15 < m \leq 30$	33
$30 < m \leq 40$	16
$40 < m \leq 60$	8

$F \cdot d$
 $1 \cdot 2$
 $2 \cdot 1$
 $2 \cdot 2$
 $1 \cdot 6$
 $0 \cdot 4$

(a) Draw a histogram for the information in the table.



(3)

(b) Work out an estimate for the number of customers who spent 20 minutes or less in the cafe.

38

(2)

(Total for Question 25 is 5 marks)

26 The straight line **L** has equation $y = 2x - 5$

Find an equation of the straight line perpendicular to **L** which passes through $(-2, 3)$.

$$\text{perp gradient} = -\frac{1}{2}$$

$$y = -\frac{1}{2}x + c \quad \begin{matrix} (-2, 3) \\ x \quad y \end{matrix}$$

$$3 = -\frac{1}{2}(-2) + c$$

$$3 = 1 + c$$

$$c = 2$$

$$y = -\frac{1}{2}x + 2$$

(Total for Question 26 is 3 marks)

27 There are 10 cakes on a plate.

1 fruit slice
6 doughnuts
3 iced buns

Barry takes a cake at random and eats it.
He then takes at random a second cake.

Work out the probability that Barry takes two different types of cake.

$$\begin{array}{l} FD \quad \frac{1}{10} \times \frac{6}{9} = \frac{6}{90} \\ FI \quad \frac{1}{10} \times \frac{3}{9} = \frac{3}{90} \\ DF \quad \frac{6}{10} \times \frac{1}{9} = \frac{6}{90} \\ DI \quad \frac{6}{10} \times \frac{3}{9} = \frac{18}{90} \\ IF \quad \frac{3}{10} \times \frac{1}{9} = \frac{3}{90} \\ ID \quad \frac{3}{10} \times \frac{6}{9} = \frac{18}{90} \end{array}$$

$$\frac{54}{90} \quad \text{or} \quad \frac{3}{5}$$

$$\frac{54}{90}$$

(Total for Question 27 is 4 marks)

28 Sasha drops a ball from a height of d metres onto the ground.

The time, t seconds, that the ball takes to reach the ground is given by

$$t = \sqrt{\frac{2d}{g}}$$

where g m/s² is the acceleration due to gravity.

$d = 35.6$ correct to 3 significant figures.

$g = 9.8$ correct to 2 significant figures.

(a) Write down the lower bound of d .

35.55

(1)

(b) Calculate the lower bound of t .
You must show all your working.

$$\text{upper } g = 9.85$$

$$\text{Lower } t = \sqrt{\frac{2(35.55)}{9.85}}$$

$$= 2.686684595$$

2.69 (3sf)

(3)

(Total for Question 28 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS