MARCH 12
4H

Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Here are the first five terms in a number sequence.

1 5 9 13 17 21

Find the 10th term in this number sequence.

$4n+1$ $n=10$ $40+1$

41

..... 41

(Total 2 marks)

2. A rugby team played six games.
The mean score for the six games is 14.5

The rugby team played one more game.
The mean score for all seven games is 16

Work out the number of points the team scored in the seventh game.

$16 \times 7 = 112$

$14.5 \times 6 = 87$

$112 - 87 = 25$

..... 25 ..... points

(Total 2 marks)

3. Rosie and Jim are going on holiday to the USA.

Jim changes £350 into dollars ($).

The exchange rate is £1 = $1.34

(a) Work out how many dollars ($) Jim gets.

350×1.34

$ 469

(2)

In the USA Rosie sees some jeans costing $67

In London the same make of jeans costs £47.50

The exchange rate is still £1 = $1.34

(b) Work out the difference between the cost of the jeans in the USA and in London. Give your answer in pounds (£).

$67 \div 1.34 = £50$

$£47.50$

£ 2.50

(3)

(Total 5 marks)

4. John needs 4 tyres for his car.

He pays for 3 tyres and gets one tyre free.
The tyres cost £65 each plus VAT at 20%.

Work out how much in total John pays for the tyres.

$3 \times £65 = £195$

$20\% = £39$ +

£ 234

(Total 4 marks)

5. (a) Use your calculator to work out $\dfrac{\sqrt{2.5^2 + 3.75}}{3.9 - 1.7}$

Write down all the figures on your calculator display.
You must give your answer as a decimal.

1.437398936

(3)

(b) Write your answer to part (a) correct to 2 decimal places.

1.44

(1)

(Total 4 marks)

6. The equation $x^3 + 3x = 41$

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.

$x = 3 \rightarrow 36$

$x = 4 \rightarrow 76$

$x = 3.1 \rightarrow 39.1$

$x = 3.2 \rightarrow 42.4$

$x = 3.15 \rightarrow 40.7$ (too low)

$x =$ 3.2

(Total 4 marks)

7.

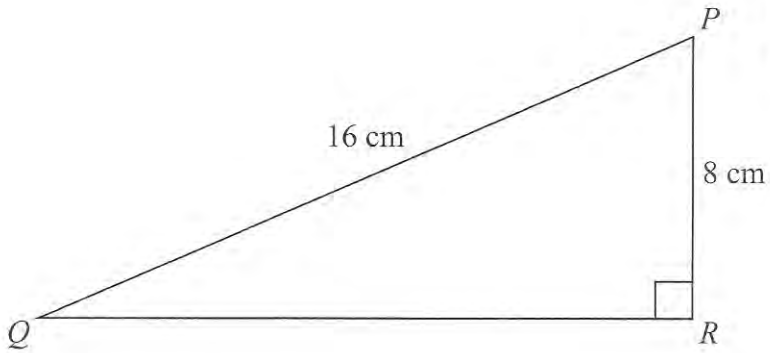


Diagram **NOT** accurately drawn

PQR is a right-angled triangle.
PQ = 16 cm.
PR = 8 cm.

Calculate the length of *QR*.
Give your answer correct to 2 decimal places.

$\sqrt{16^2 - 8^2}$

13·86 ..... cm

(Total 3 marks)

8. (a) Simplify $x^5 \times x^4$

x^9

(1)

(b) Simplify $y^7 \div y^2$

y^5

(1)

(c) Expand and simplify $3(2a + 5) + 5(a - 2)$

$6a + 15$
$5a - 10$

$11a + 5$

(2)

(d) Expand and simplify $(y + 5)(y + 7)$

$y^2 + 12y + 35$

(2)

(e) Factorise $p^2 - 6p + 8$

$(p - 4)(p - 2)$

(2)

(Total 8 marks)

9. Riki has a packet of flower seeds.

The table shows each of the probabilities that a seed taken at random will grow into a flower that is pink or red or blue or yellow.

Colour	pink	red	blue	yellow	white
Probability	0.15	0.25	0.20	0.16	

(a) Work out the probability that a seed taken at random will grow into a white flower.

$1 - 0.15 - 0.25 - 0.20 - 0.16$

0.24

(2)

There are 300 seeds in the packet.

All of the seeds grow into flowers.

(b) Work out an estimate for the number of red flowers.

300×0.25

75

(2)

(Total 4 marks)

10. Caleb measured the heights of 30 plants.

The table gives some information about the heights, h cm, of the plants.

Height (h cm) of plants	Frequency	mv	mv × f
$0 < h \leqslant 10$	2	5	10
$10 < h \leqslant 20$	8	15	120
$20 < h \leqslant 30$	9	25	225
$30 < h \leqslant 40$	7	35	245
$40 < h \leqslant 50$	4	45	180
			780

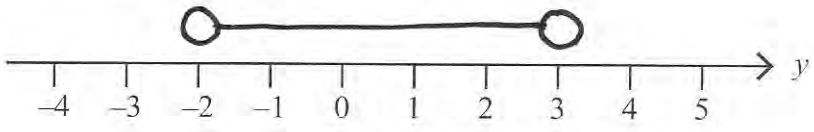
Work out an estimate for the mean height of a plant.

$\frac{780}{30} = 26$

.....26..... cm

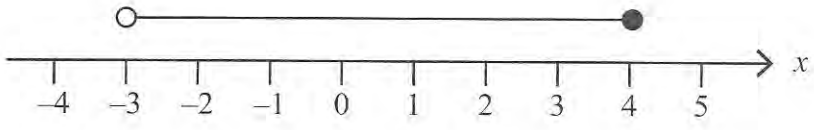
(Total 4 marks)

11. (a) On the number line below, show the inequality $-2 < y < 3$



(1)

(b) Here is an inequality, in x, shown on a number line.



Write down the inequality.

$-3 < x \leq 4$

(2)

(c) Solve the inequality $4t - 5 > 9$

$4t > 14$

$t > 3.5$

(2)

(Total 5 marks)

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12. Sylvie shares £45 between Ann, Bob and Cath in the ratio 2 : 3 : 4

Work out the amount each person gets.

$2+3+4 = 9$

$\frac{£45}{9} = £5$

£10 £15 £20

Ann £10

Bob £15

Cath £20

(Total 3 marks)

13. *ABCD* is a trapezium.

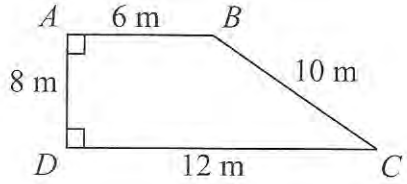

Diagram **NOT** accurately drawn

Work out the area of the trapezium.

$$\frac{(12+6)\times 8}{2}$$

72 ..... m^2

(Total 2 marks)

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14. *PQR* is a right-angled triangle.

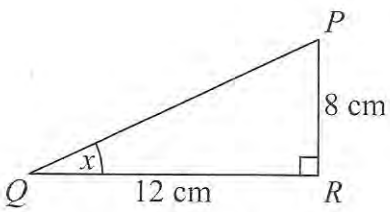


Diagram **NOT** accurately drawn

opp

adj

PR = 8 cm.
QR = 12 cm.

(a) Find the size of the angle marked *x*.
Give your answer correct to 1 decimal place.

$$x = \tan^{-1}\left(\frac{8}{12}\right)$$

33.7 .....°

(3)

XYZ is a different right-angled triangle.

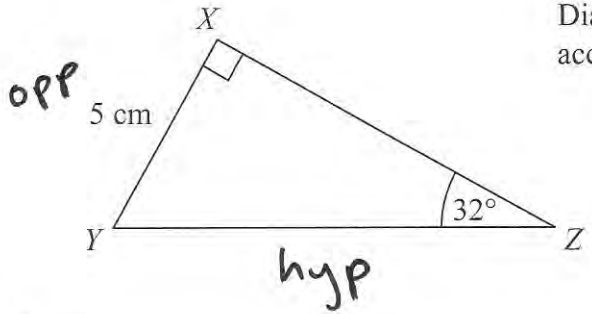
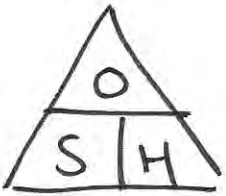


Diagram **NOT** accurately drawn



$XY = 5$ cm.
Angle $Z = 32°$.

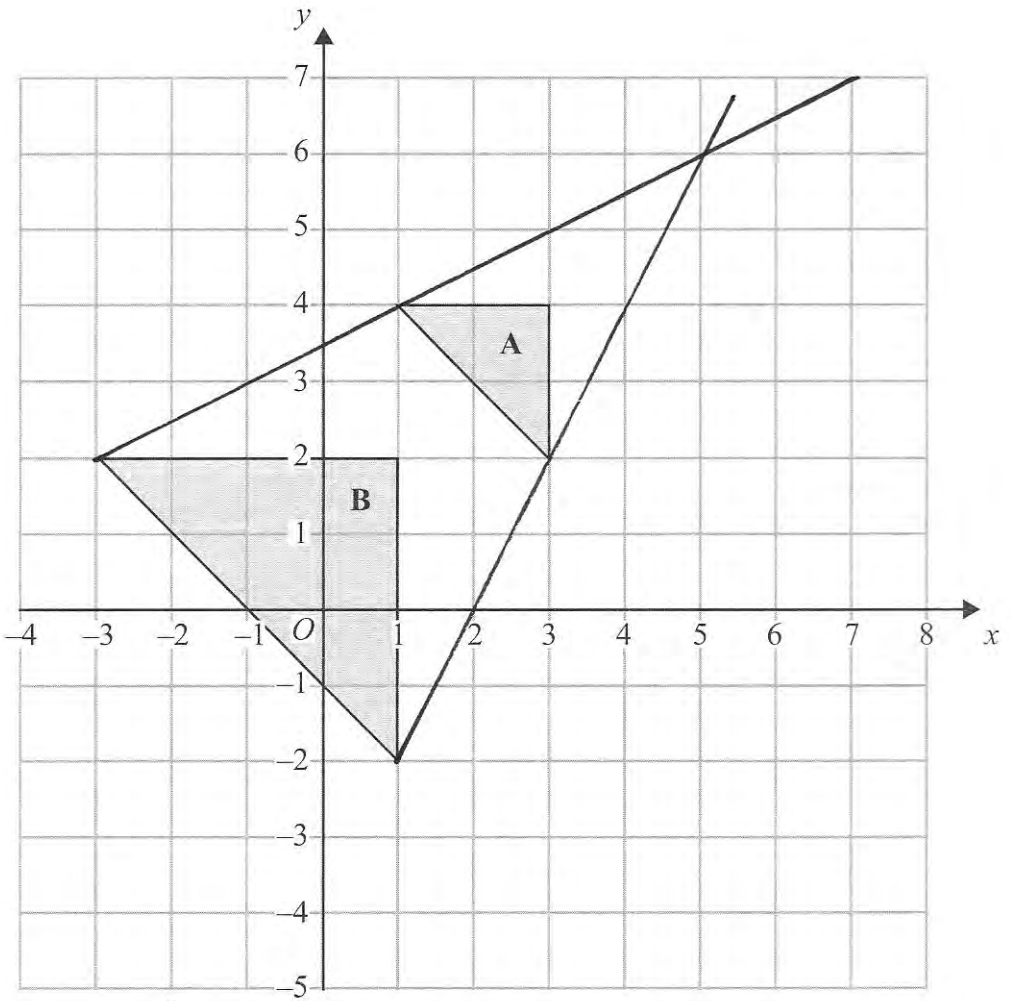
(b) Calculate the length *YZ*.
Give your answer correct to 3 significant figures.

$$YZ = \frac{5}{\sin 32}$$

9.44 ..... cm
(3)

(Total 6 marks)

15.

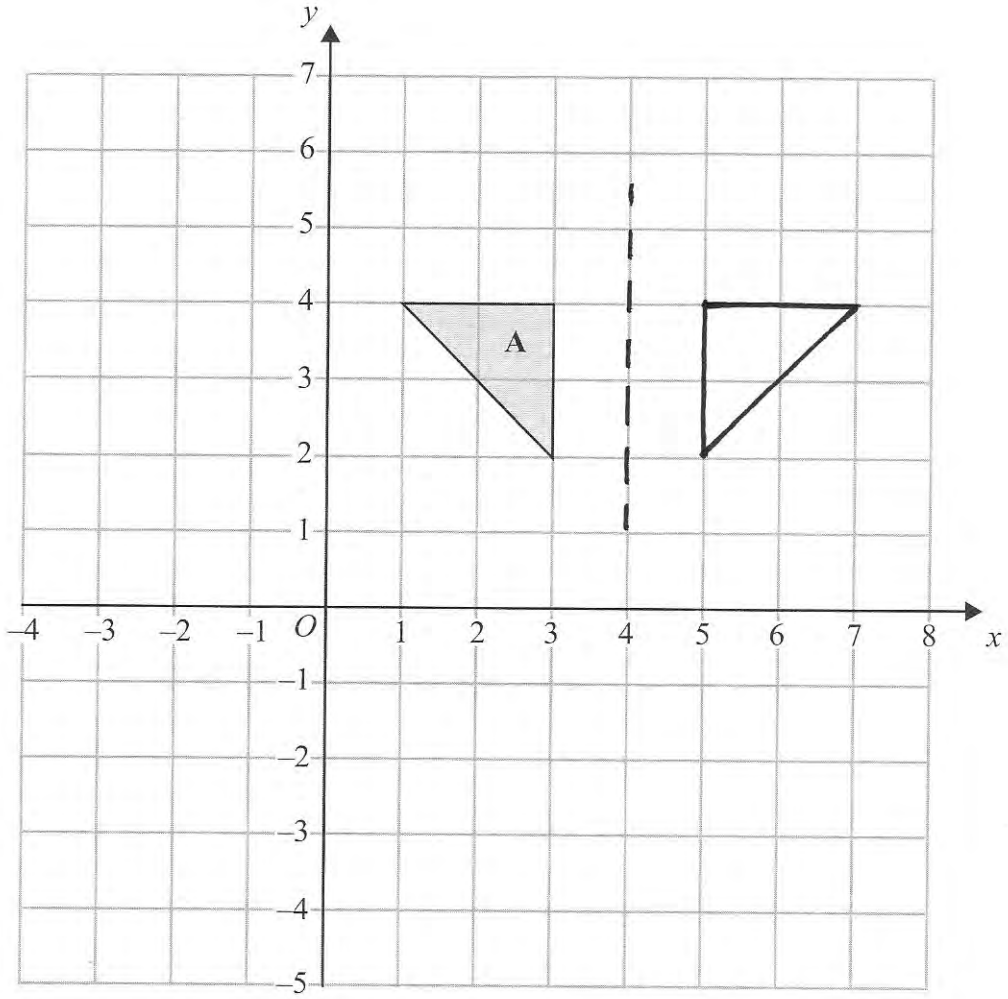


Triangle **A** and triangle **B** are drawn on the grid.

(a) Describe fully the single transformation which maps triangle **A** onto triangle **B**.

enlargement, sf = 2, centre (5,6)

(3)



(b) Reflect triangle **A** in the line $x = 4$

(2) **Q15**

(Total 5 marks)

16. This frequency table gives information about the ages of 60 teachers.

Age (A) in years	Frequency
$20 < A \leqslant 30$	12
$30 < A \leqslant 40$	15
$40 < A \leqslant 50$	18
$50 < A \leqslant 60$	12
$60 < A \leqslant 70$	3

(a) Complete the cumulative frequency table.

Age (A) in years	Cumulative frequency
$20 < A \leqslant 30$	12
$20 < A \leqslant 40$	27
$20 < A \leqslant 50$	45
$20 < A \leqslant 60$	57
$20 < A \leqslant 70$	60

(1)

(b) On the grid opposite, draw a cumulative frequency graph for this information.

(2)

(c) Use your cumulative frequency graph to find an estimate for the median age.

41 years

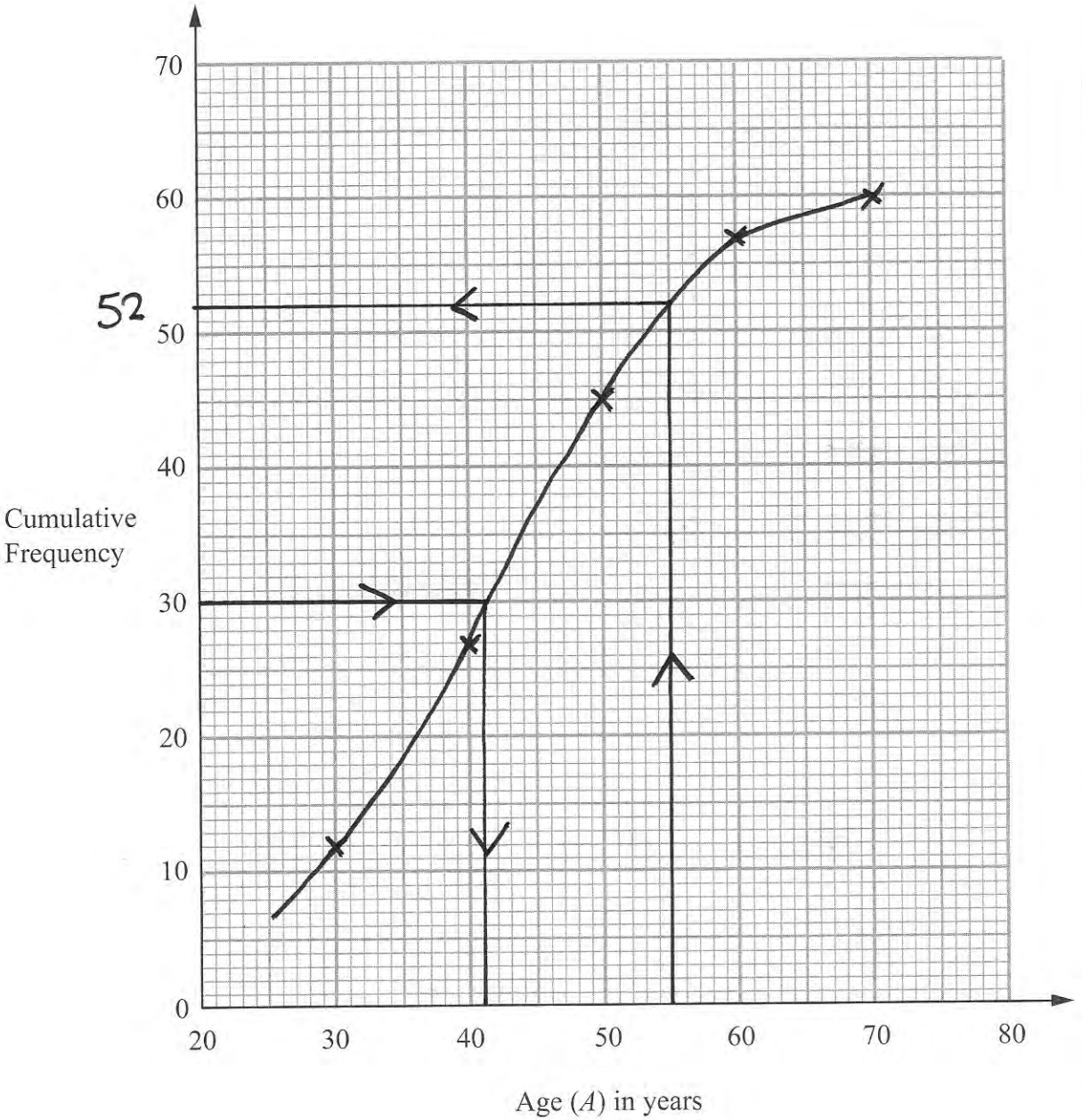
(2)

(d) Use your cumulative frequency graph to find an estimate for the number of teachers older than 55 years.

60 − 52

8

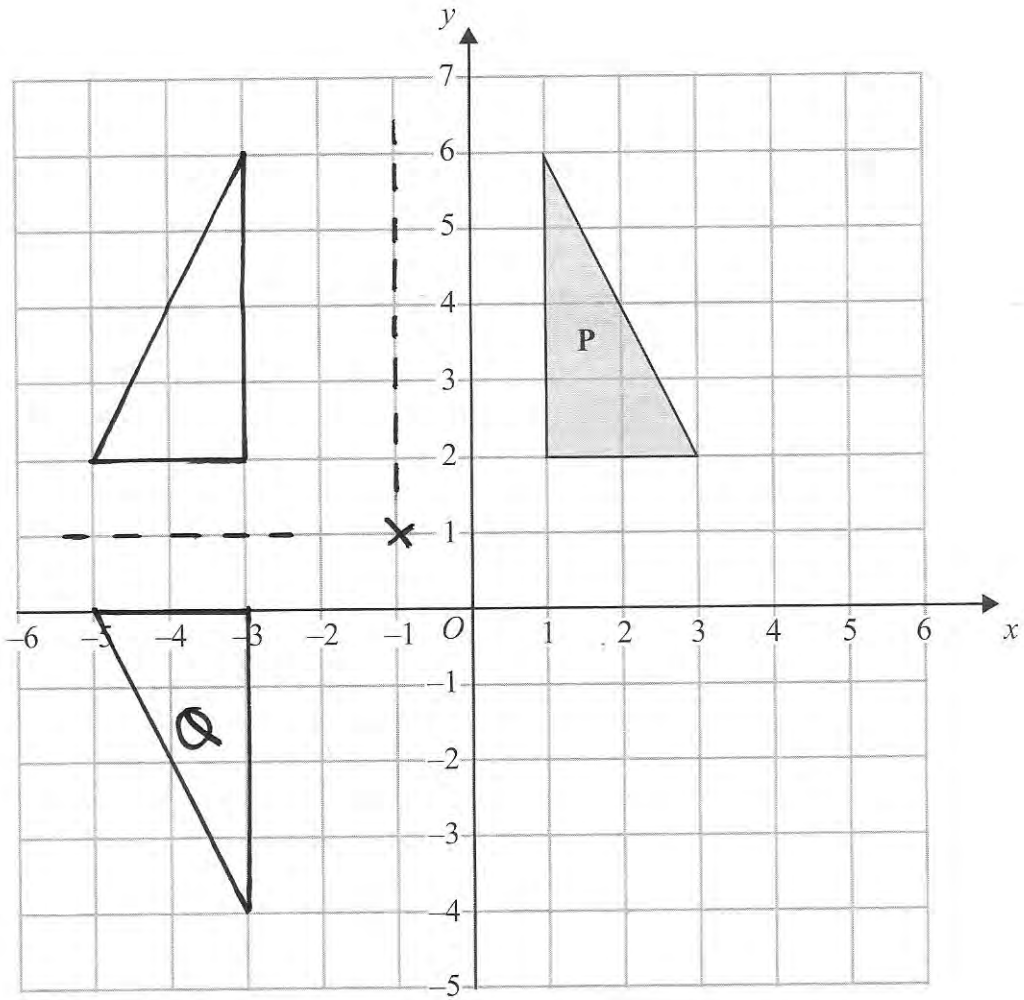
(2)



Q16

(Total 7 marks)

17.



Triangle **P** is drawn on a coordinate grid.

The triangle **P** is reflected in the line $x = -1$ and then reflected in the line $y = 1$ to give triangle **Q**.

Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

Rotation, 180°, about (−1, 1)

(Total 3 marks)

18. Solve the equations

$3x + 5y = 19$
$4x - 2y = -18$

×2
×5

$6x + 10y = 38$ +
$20x - 10y = -90$

$26x = -52$ $\quad x = -2$

$4x - 2y = -18$
$-8 - 2y = -18$
$-2y = -10$
$y = 5$

$x =$ −2
$y =$ 5

(Total 4 marks)

19. Solve the equation $5x^2 + 8x - 6 = 0$
Give each solution correct to 2 decimal places.

$a = 5 \quad b = 8 \quad c = -6$

$$\frac{-8 \pm \sqrt{8^2 - 4 \times 5 \times -6}}{2 \times 5}$$

0·56, −2·16

(Total 3 marks)

20. Here is a triangle ABC.

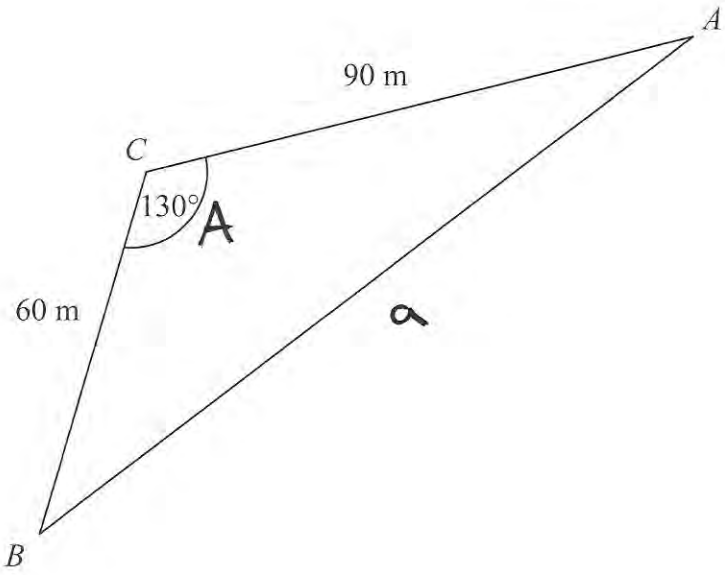


Diagram **NOT** accurately drawn

$AC = 90$ m.
$BC = 60$ m.
Angle $ACB = 130°$.

Calculate the perimeter of the triangle.
Give your answer correct to one decimal place.

$a^2 = 60^2 + 90^2 - 2(60)(90)\cos 130$

$a^2 = 18642.10618$

$a = 136.5$

$+ 60 + 90$

286.5 ..... m

(Total 4 marks)

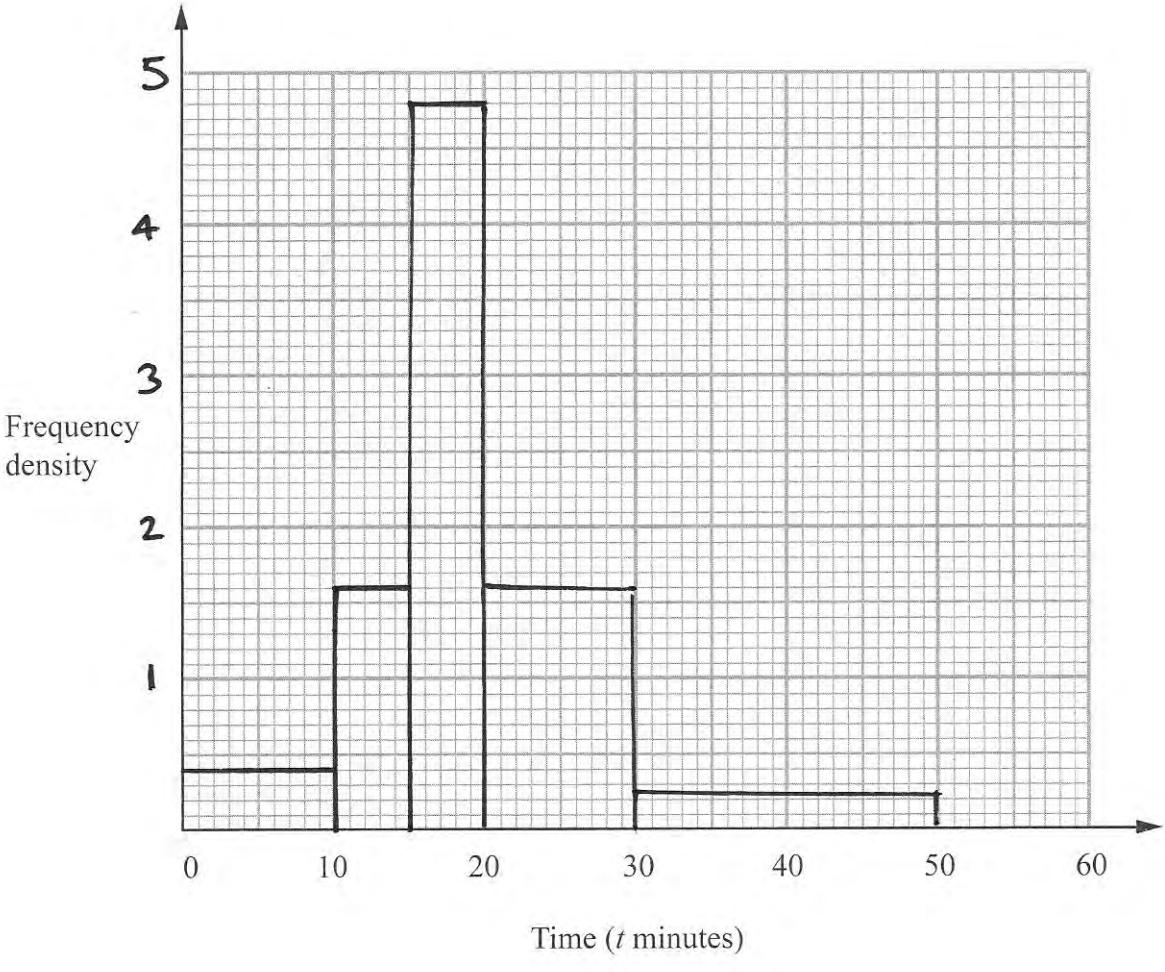
Q20

21. The table shows information about the lengths of time, t minutes, it took some students to do their maths homework last week.

Time (t minutes)	Frequency
$0 < t \leqslant 10$	4
$10 < t \leqslant 15$	8
$15 < t \leqslant 20$	24
$20 < t \leqslant 30$	16
$30 < t \leqslant 50$	5

CW	f.d.
10	0·4
5	1·6
5	4·8
10	1·6
20	0·25

Draw a histogram for this information.



22. The average fuel consumption (c) of a car, in kilometres per litre, is given by the formula

$$c = \frac{d}{f}$$

where d is the distance travelled, in kilometres, and f is the fuel used, in litres.

$d = 163$ correct to 3 significant figures.
$f = 45.3$ correct to 3 significant figures.

By considering bounds, work out the value of c to a suitable degree of accuracy.
You must show **all** of your working **and** give a reason for your final answer.

$162.5 \leq d < 163.5$

$45.25 \leq f < 45.35$

upper bound $c = \frac{163.5}{45.25} = 3.613259669$

lower bound $c = \frac{162.5}{45.35} = 3.583241414$

$\therefore$ $c = 3.6$ (2sf)
as both upper and lower bound first round to the same value at 2sf.

$c =$ 3.6

(Total 5 marks)

23.

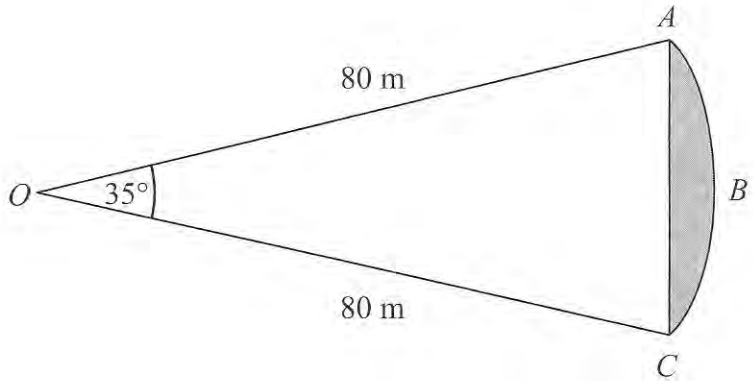


Diagram **NOT** accurately drawn

ABC is an arc of a circle centre *O* with radius 80 m.
AC is a chord of the circle.
Angle *AOC* = 35°.

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

area of sector $= \frac{35}{360} \times \pi \times 80^2 = 1954.769$

area of triangle $= \frac{1}{2} \times 80 \times 80 \times \sin 35$

$= 1835.4446$

$\therefore$ area of segment $= 1954.769\ldots$

$- 1835.4446\ldots$

119.324

119 ..... m^2

(Total 5 marks)

Q23

Leave blank

24. Solve $\dfrac{5(2x+1)^2}{4x+5} = 5x - 1$

$\times x$

$$5(2x+1)(2x+1) = (5x-1)(4x+5)$$

$$5[4x^2+4x+1] = 20x^2+25x-4x-5$$

$$20x^2+20x+5 = 20x^2+21x-5$$

$$\Rightarrow x = 10$$

10 .....

Q24

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END