Centre No.						Paper Reference						Surname	Initial(s)
Candidate No.						1	3	8	0	/	4	H	Signature M. Semar -

Paper Reference(s)

1380/4H

Edexcel GCSE

Mathematics (Linear) – 1380

Paper 4 (Calculator)

Higher Tier

Monday 5 March 2012 – Afternoon

Time: 1 hour 45 minutes

Examiner's use only

Team Leader's use only

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 24 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.
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.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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Turn over

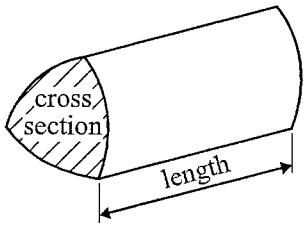
PEARSON

GCSE Mathematics (Linear) 1380

Formulae: Higher Tier

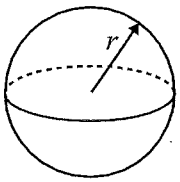
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



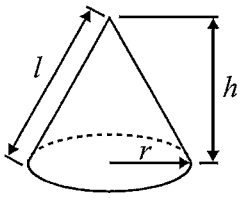
Volume of sphere $= \frac{4}{3}\pi r^3$

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

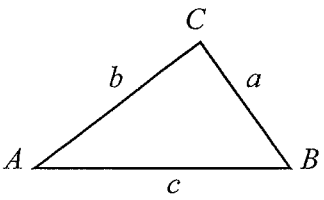


Volume of cone $= \frac{1}{3}\pi r^2 h$

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

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

Leave blank

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.

5 9 13 17 21

term to term rule +4

Find the 10th term in this number sequence.

1st term $1 \times 4 + 1 = 5$

2nd term $2 \times 4 + 1 = 9$

⋮

10th term $10 \times 4 + 1 = 41$

41

Q1

(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.

Total score for 6 games $= 14.5 \times 6 = 87$

Total score for 7 games $= 16 \times 7 = 112$

For the 7th game: $112 - 87$

25 points

Q2

(Total 2 marks)

Leave blank

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.

Jim gets 350 x 1.34

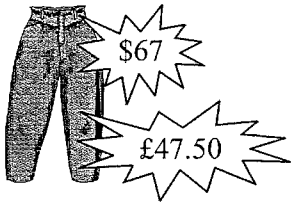
$ 469

(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 (£).

London:

£47.50

USA:

67 ÷ 1.34 = £50

Difference = 50 - 47.50

£ 2.50

(3)

Q3

(Total 5 marks)

Leave blank

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.

Cost of 3 tyres = 3 x 65
= 195

VAT on 3 tyres = $\frac{20}{100}$ x 195 = 39

Total cost = 195 + 39

£ 234

Q4

(Total 4 marks)

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

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

$(\sqrt{(2.5^2+3.75)}) \div (3.9-1.7) =$

1.4373398

(3)

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

1.44

(1)

Q5

(Total 4 marks)

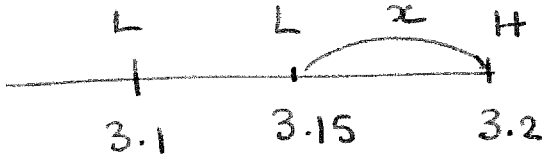
Leave blank

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	$x^3 + 3x$	
3	$3^3 + 3 \times 3 = 36$	Low.
4	$4^3 + 3 \times 4 = 76$	High.
3.5	$3.5^3 + 3 \times 3.5 = 53.375$	High.
3.1	$3.1^3 + 3 \times 3.1 = 39.091$	Low
3.2	$3.2^3 + 3 \times 3.2 = 42.368$	High
3.15	$3.15^3 + 3 \times 3.15 = 40.705$	Low.



$x =$ 3.2

Q6

(Total 4 marks)

Leave blank

7.

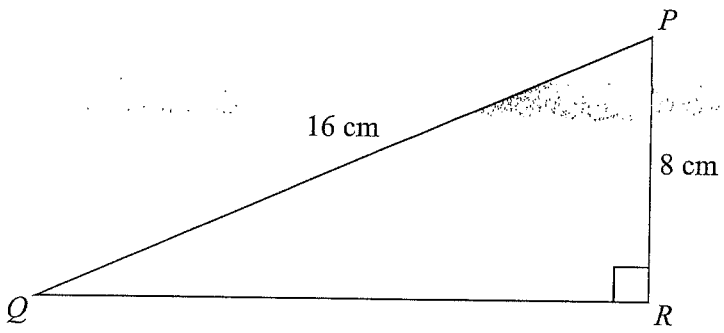


Diagram **NOT** accurately drawn

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.

$QR^2 + RP^2 = QP^2$

$QR^2 = QP^2 - RP^2$

$QR^2 = 16^2 - 8^2$

$QR = \sqrt{256-64}$

$QR = \sqrt{192}$

13.86 cm

(Total 3 marks)

Q7

Leave blank

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

x^{5+4}

x^9

(1)

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

y^{7-2}

y^5

(1)

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

$3 \times 2a + 3 \times 5 + 5 \times a - 5 \times 2$

$6a + 15 + 5a - 10$

$11a + 5$

(2)

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

$y^2 + 7y + 5y + 35$

$y^2 + 12y + 35$

(2)

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

$? + ? = -6$ $\quad -2, -4$

$? \times ? = 8$

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

(2)

Q8

(Total 8 marks)

Leave blank

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.

$P(\text{white}) = 1 - (0.15 + 0.25 + 0.20 + 0.16)$

$P(\text{white}) = 0.24$

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.

$\text{Number of red} = 0.25 \times 300$

$= 75$

75 flowers

(2) **Q9**

(Total 4 marks)

Leave blank

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	Midpoint	Total height
$0 < h \leqslant 10$	2	5	2 x 5
$10 < h \leqslant 20$	8	15	8 x 15
$20 < h \leqslant 30$	9	25	9 x 25
$30 < h \leqslant 40$	7	35	7 x 35
$40 < h \leqslant 50$	4	45	4 x 45

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

$$\text{Mean height} = \frac{\text{Total height of 30 flowers}}{\text{Total number of flowers}}$$

$$\text{Mean} = \frac{2 \times 5 + 8 \times 15 + 9 \times 25 + 7 \times 35 + 4 \times 45}{30}$$

Mean = 26

26 ..... cm

Q10

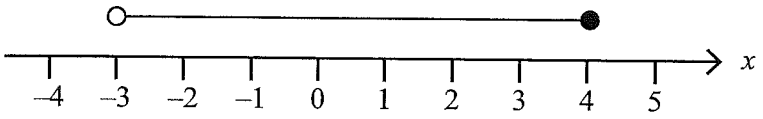
(Total 4 marks)

Leave blank

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 $4t - 5 > 9$

$4t - 5 + 5 > 9 + 5$

$4t > 14$

$t > \frac{14}{4}$

$t > 7/2$

$t > 3.5$

(2)

(Total 5 marks)

Q11

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

Work out the amount each person gets.

Total shares = $2 + 3 + 4 = 9$.

Each share is worth $45 \div 9 = £5$

Ann $2 \times 5 = £10$

Bob $3 \times 5 = £15$

Cath $4 \times 5 = £20$

(Total 3 marks)

Q12

Leave blank

13. *ABCD* is a trapezium.

$A = \frac{a+b}{2} \times h.$

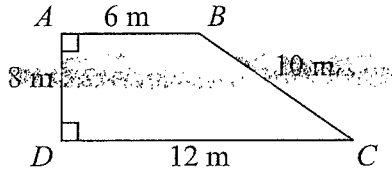


Diagram **NOT** accurately drawn

height = 8

Work out the area of the trapezium.

$\text{Area} = \frac{12+6}{2} \times 8$

$= 9 \times 8$

72 ..... m^2

(Total 2 marks)

Q13

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

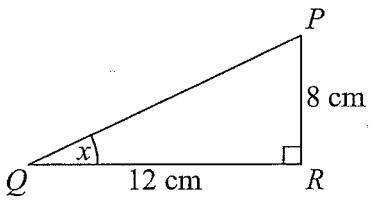


Diagram **NOT** accurately drawn

× ✓ × × ✓ × × ✓ ✓
SOH CAH TOA

PR = 8 cm.
QR = 12 cm.

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

$\text{Tan}x = \frac{8}{12}$

$x = \text{Tan}^{-1}(8 \div 12)$

$= 33.6900$

33.7 ° .....

(3)

Leave blank

XYZ is a different right-angled triangle.

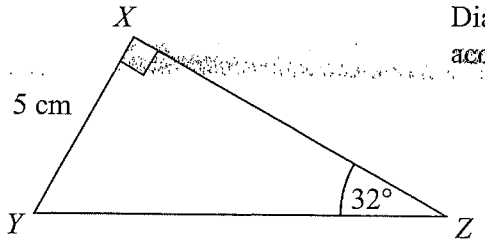


Diagram **NOT** accurately drawn

✓ ✓ × ✓ × ✓ ✓ ×
SOH CAH TOA

XY = 5 cm.
Angle *Z* = 32°.

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

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

$YZ = 9.435$

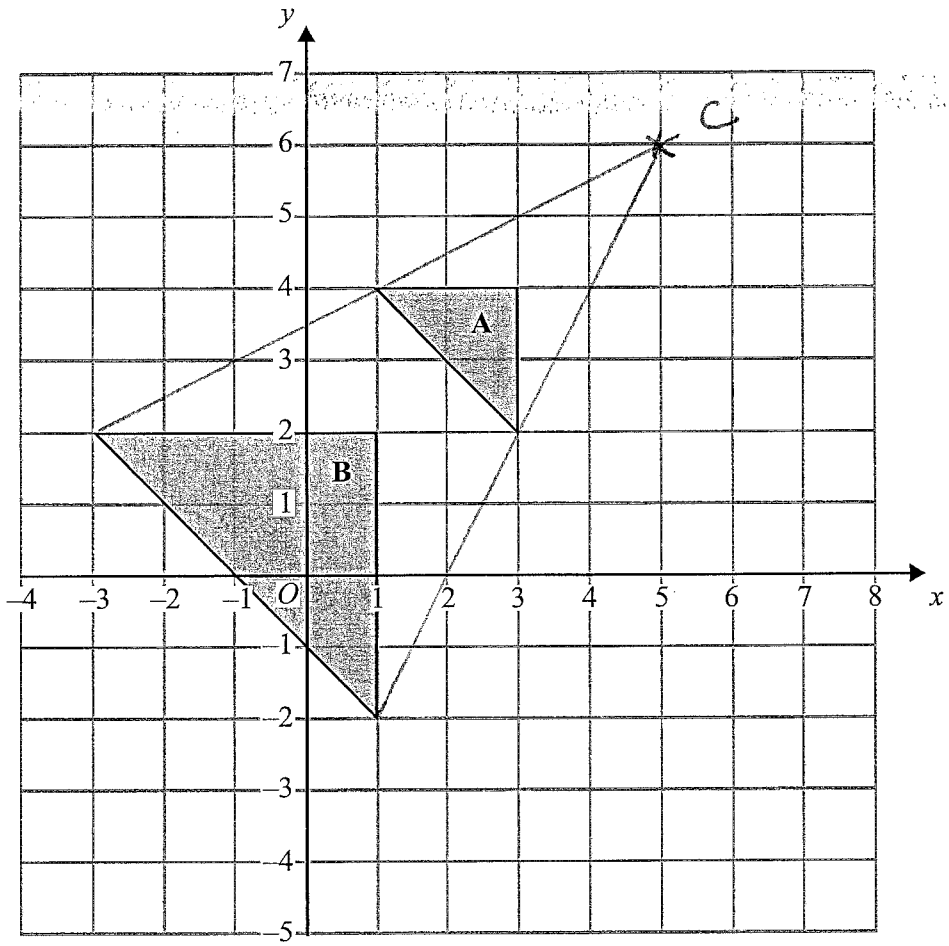
9.44 cm

(3) Q14

(Total 6 marks)

Leave blank

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 centre (5,6),
scale factor 2.

(3)

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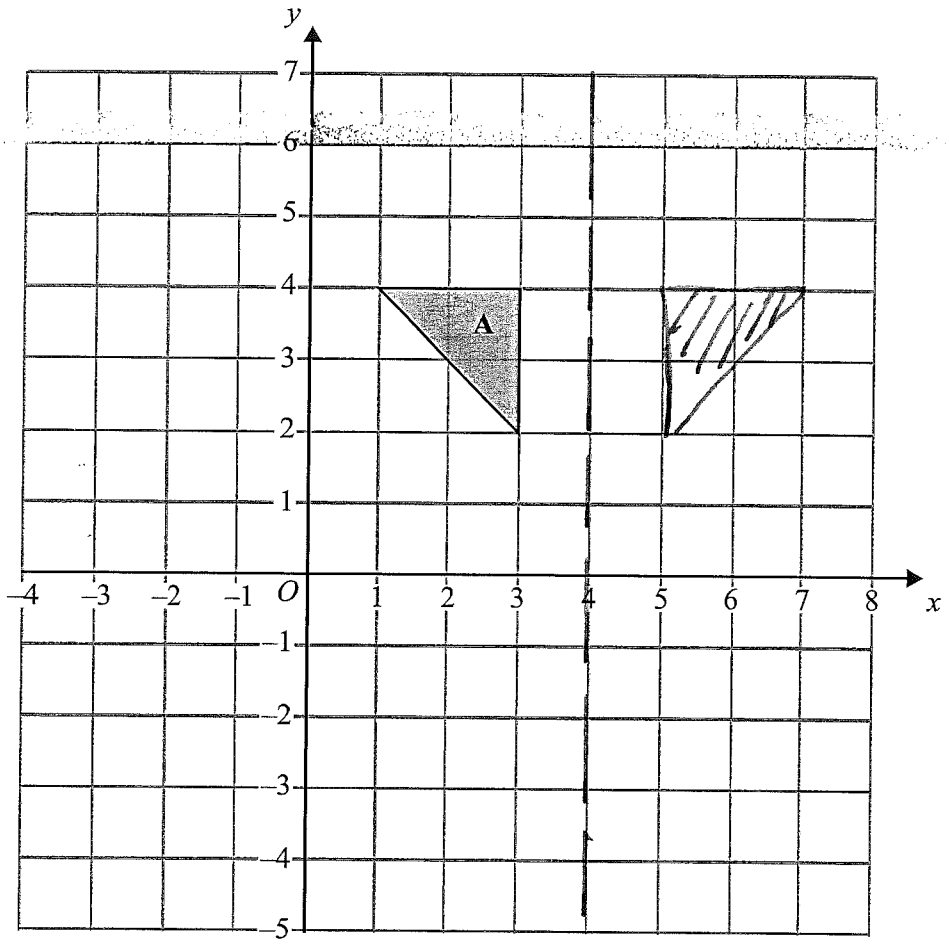

x=4

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

(2) Q15

(Total 5 marks)

Turn over

Leave blank

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	12
$20 < A \leqslant 40$	12+15 = 27	27
$20 < A \leqslant 50$	27+18 = 45	45
$20 < A \leqslant 60$	45+12 = 57	57
$20 < A \leqslant 70$	57+3 = 60	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.

42 years

(2)

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

60 − 50

10

Accept 8|9

(2)

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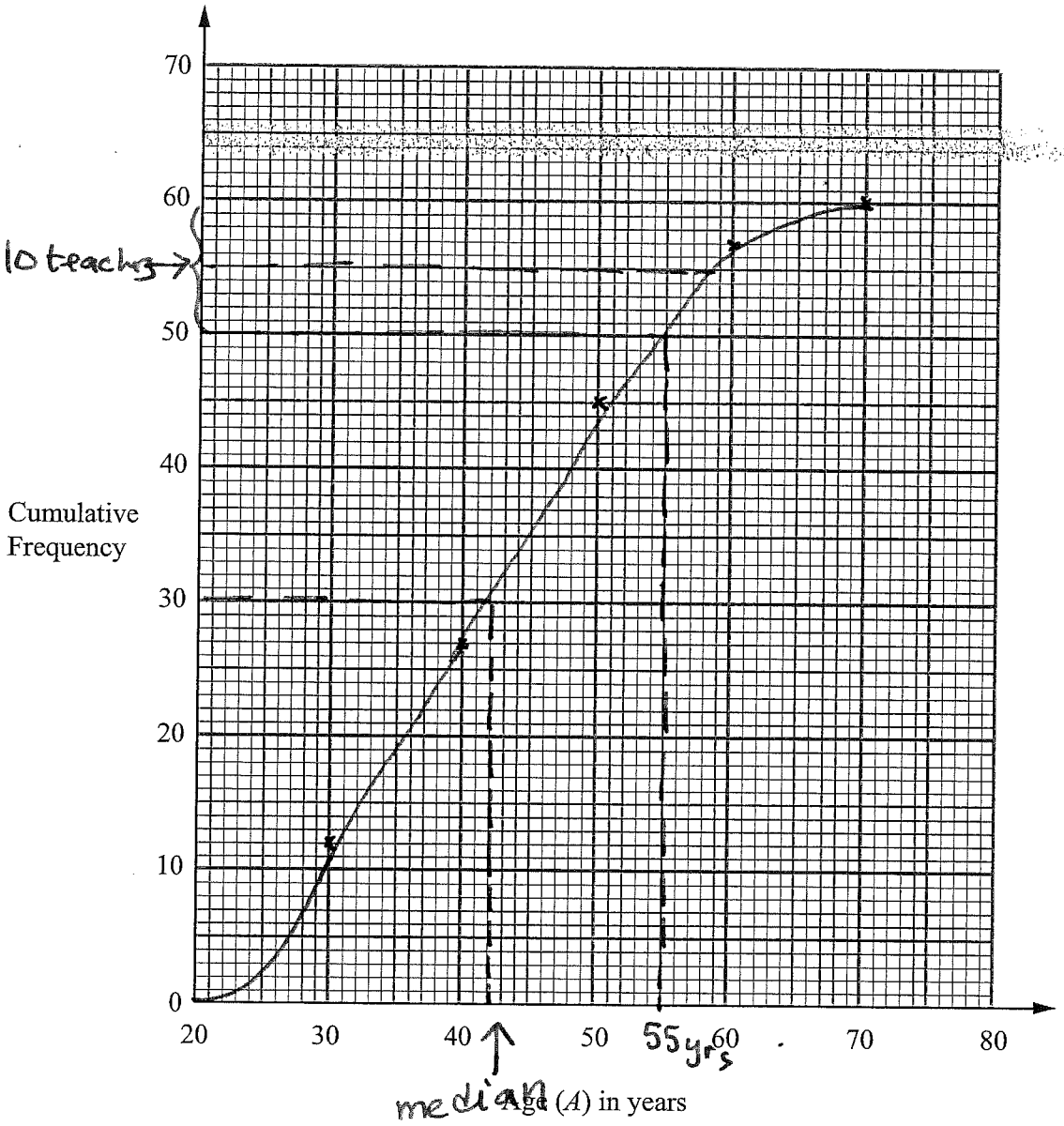

Q16

(Total 7 marks)

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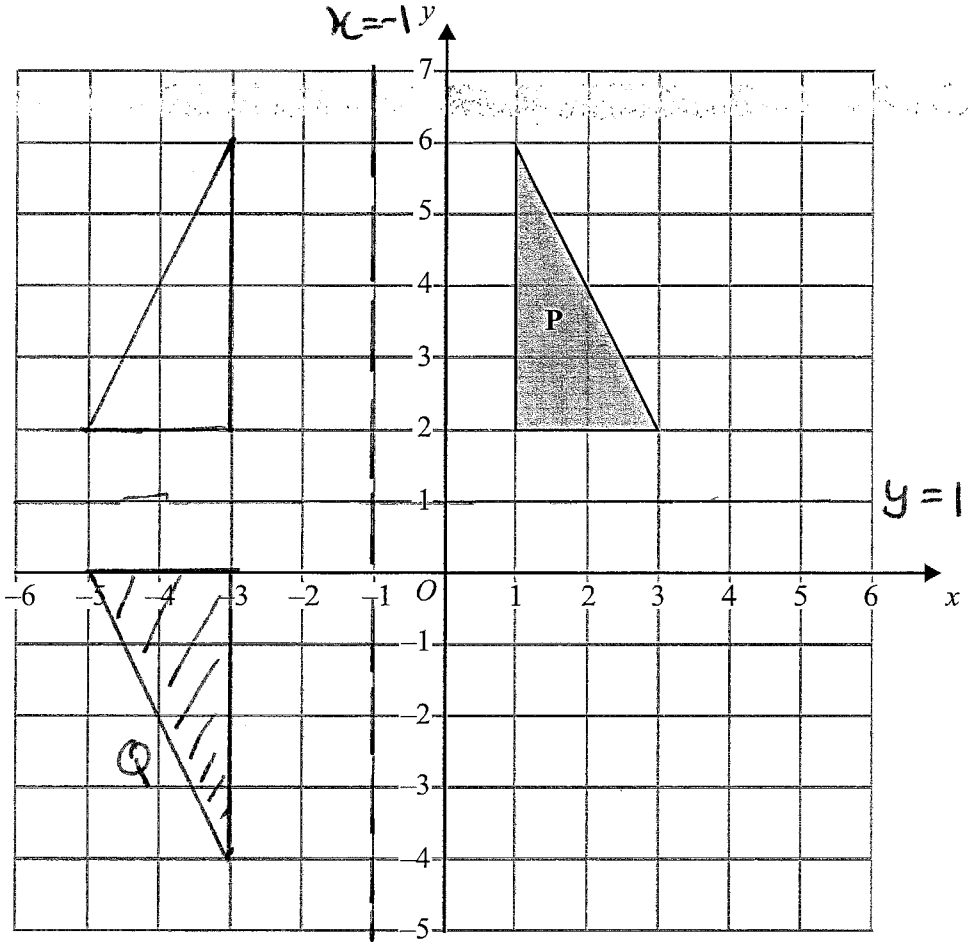
17.



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, centre (−1, 1), 180°

Q17

(Total 3 marks)

Leave blank

18. Solve the equations

(1) $3x + 5y = 19$ $\times 2$
(2) $4x - 2y = -18$ $\times 5$

$6x + 10y = 38$

$20x - 10y = -90$

$6x + 20x = 38 - 90$

$26x = -52$

$x = \frac{-52}{26} = -2$

Substitute $x = -2$ into (1).

$3(-2) + 5y = 19$

$-6 + 5y = 19$

$5y = 19 + 6$

$5y = 25 \therefore y = 5$

$x =$ -2

$y =$ 5

Q18

(Total 4 marks)

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

Using quadratic formula from p2.

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

$a = 5$, $b = 8$, $c = -6$.

$x = \frac{-8 \pm \sqrt{8^2 - 4(5)(-6)}}{2 \times 5}$

$x = \frac{-8 \pm \sqrt{184}}{10}$

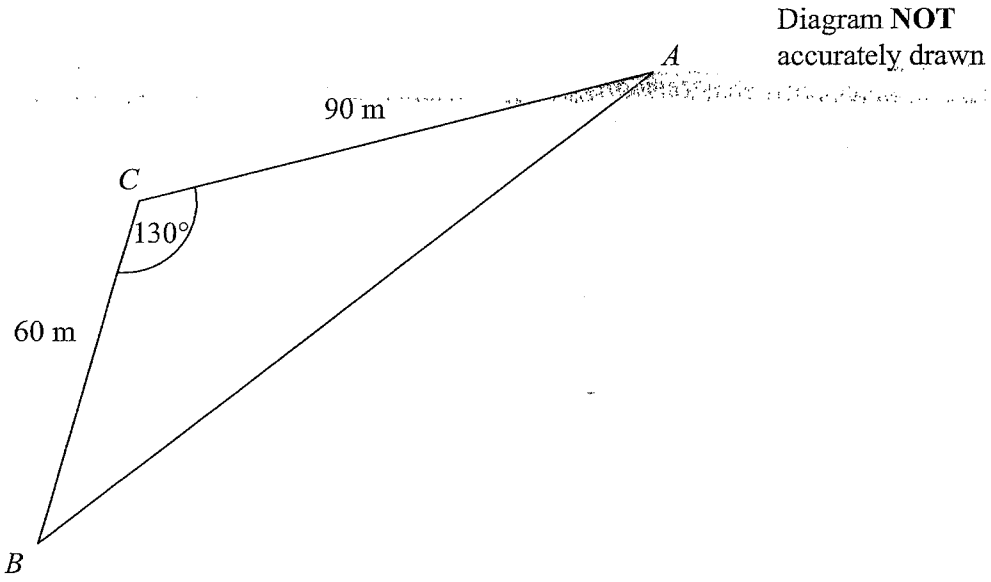
$x = 0.56$ or $x = -2.16$

Q19

(Total 3 marks)

Leave blank

20. Here is a triangle ABC.



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

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

Perimeter = CB + CA + BA.

Using cosine rule:

$BA^2 = BC^2 + AC^2 - 2 \times BC \times AC \cos 130°$.

$BA^2 = 60^2 + 90^2 - 2 \times 60 \times 90 \times \cos 130°$

$BA^2 = 18642.106$

$BA = \sqrt{18642.106} = 136.536$

Perimeter = $60 + 90 + 136.536$

286.5 m

Q20

(Total 4 marks)

Leave blank

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

Freq. Density

$4 \div 10 = 0.4$

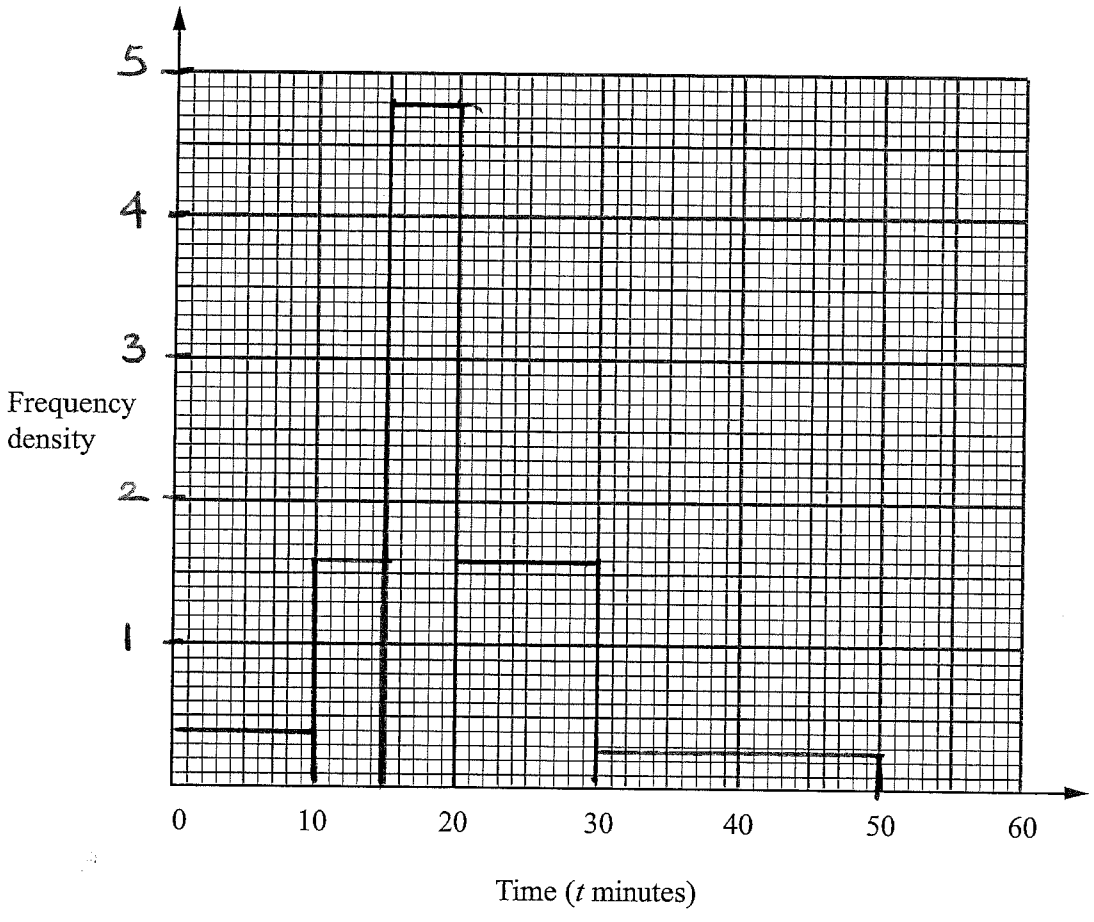
$8 \div 5 = 1.6$

$24 \div 5 = 4.8$

$16 \div 10 = 1.6$

$5 \div 20 = 0.25$

Draw a histogram for this information.



Q21

(Total 3 marks)

Leave blank

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.

$d = 163$ (3sf) → $U_b = 163.5$, $L_b = 162.5$.

$f = 45.3$ (3sf) → $U_b = 45.35$, $L_b = 45.25$

$$U_b\ C = \frac{U_b\ d}{L_b\ f} = \frac{163.5}{45.25} = 3.613259.$$

$$L_b\ C = \frac{L_b\ d}{U_b\ f} = \frac{162.5}{45.35} = 3.5832$$

Reason: $U_b\ C = L_b\ C = 3.6$ (1dp)
$= 3.6$ (2sf) ✓

$c =$ 3.6

Q22

(Total 5 marks)

Upper bound = Lower bound to 2 sf.

Leave blank

23.

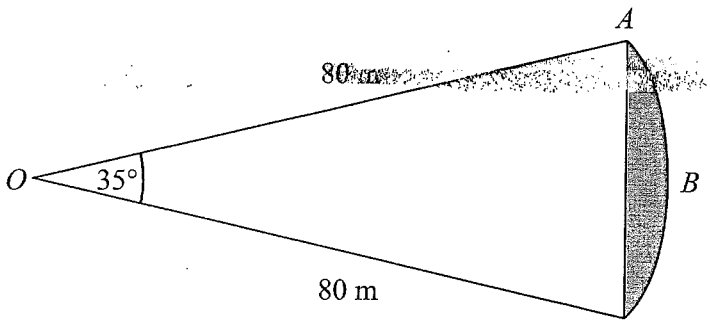


Diagram **NOT** accurately drawn

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

Formulas:
Area of sector $= \frac{\theta}{360} \times \pi r^2$
Area of $\Delta = \frac{1}{2} ab \sin C$.

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

Area Region = Area of sector − Area triangle

$$\text{Region} = \frac{35}{360} \times \pi \times 80^2 - \frac{1}{2} \times 80 \times 80 \times \sin 35^\circ$$

$$\text{Region} = 1954 - 1835$$

Area of region = 119 cm^2.

119 ..... m^2 **Q23**

(Total 5 marks)

Leave blank

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

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

$5(4x^2+1+4x) = (20x^2 - 4x + 25x - 5)$.

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

$20x^2 + 20x + 5 - 20x^2 - 21x + 5 = 0$

$-x + 10 = 0$.

$x = 10$

$x = 10$

Q24

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END