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

Paper Reference(s)

1380/3H

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics (Linear) – 1380

Paper 3 (Non-Calculator)

Higher Tier

Monday 18 May 2009 – Afternoon

Time: 1 hour 45 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
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 26 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 must not be used.

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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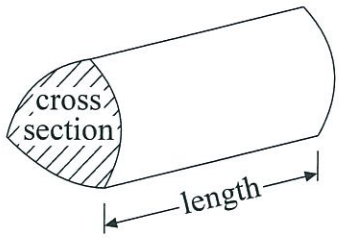
GCSE Mathematics (Linear) 1380

Formulae: Higher Tier

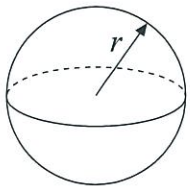
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



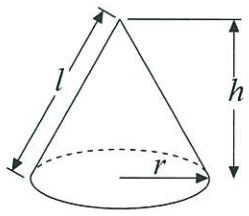
Volume of sphere $= \frac{4}{3}\pi r^3$

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

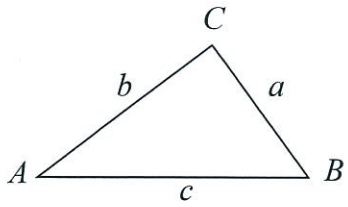


Volume of cone $= \frac{1}{3}\pi r^2 h$

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 SIX questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1. The two-way table gives some information about how 100 children travelled to school one day.

	Walk	Car	Other	Total
Boy	15	25	14	54
Girl	22	8	16	46
Total	37	33	30	100

(a) Complete the two-way table.

(3)

One of the children is picked at random.

(b) Write down the probability that this child walked to school that day.

$\frac{37}{100}$

.....

(1)

(Total 4 marks)

Q1

2. (a) Simplify $4x + 3y - 2x + 5y$

$2x + 8y$

.....

(2)

Compasses cost c pence each.
Rulers cost r pence each.

(b) Write down an expression for the total cost, in pence, of 2 compasses and 4 rulers.

$2c + 4r$ ..... pence

(2)

(Total 4 marks)

Q2

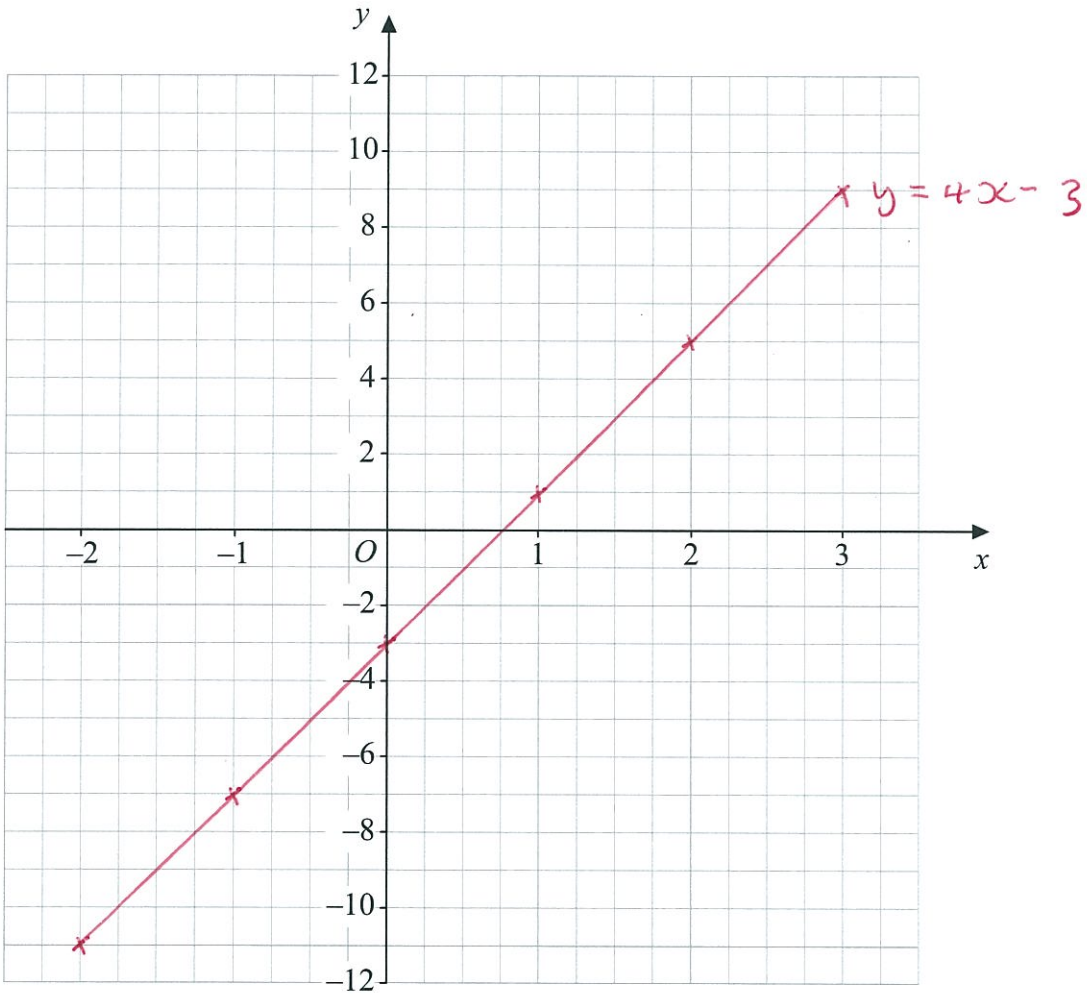
Leave blank

3. (a) Complete the table of values for $y = 4x - 3$

x	−2	−1	0	1	2	3
y	−11	−7	−3	1	5	9

(2)

(b) On the grid, draw the graph of $y = 4x - 3$, for values of x from −2 to 3



(2) **Q3**

(Total 4 marks)

Leave blank

4. $P = 4k - 10$

$P = 50$

(a) Work out the value of k.

$50 = 4k - 10$

$\Rightarrow k = \frac{50+10}{4} = \frac{60}{4} = 15$

15

(2)

$y = 4n - 3d$

$n = 2$
$d = 5$

(b) Work out the value of y.

$y = 4(2) - 3(5)$

$= 8 - 15 = -7$

-7

(2)

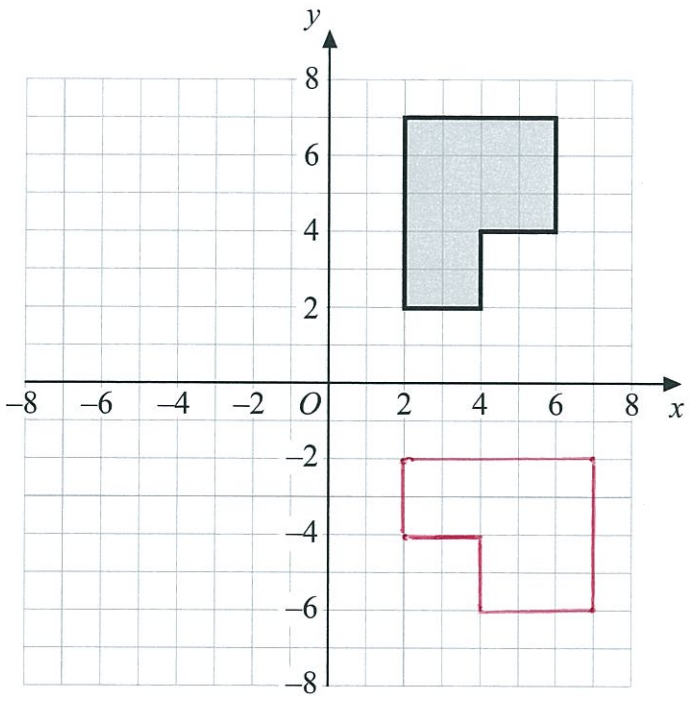
Q4

(Total 4 marks)

Turn over

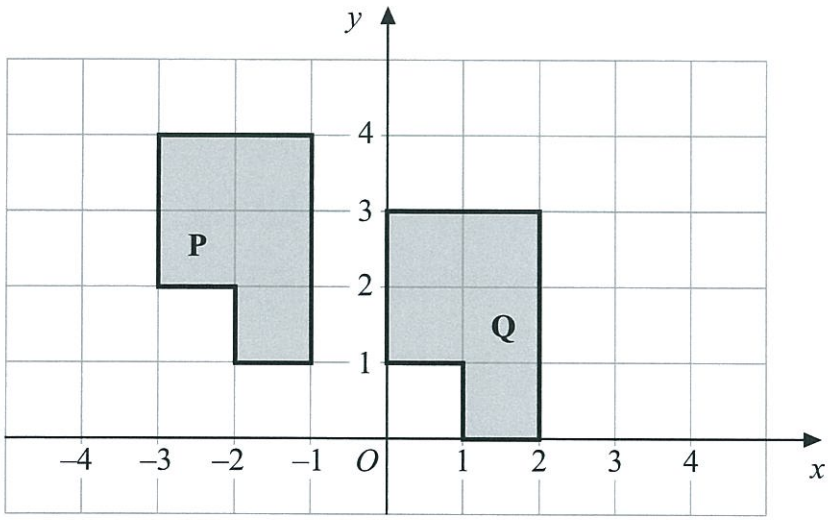
Leave blank

5.



(a) Rotate the shaded shape 90° clockwise about the point O.

(2)



(b) Describe fully the single transformation that will map shape **P** onto shape **Q**.

A translation by the vector $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$

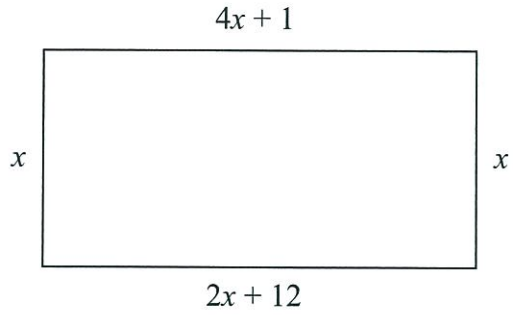
(2) **Q5**

(Total 4 marks)

Leave blank

6.

Diagram **NOT** accurately drawn



The diagram shows a rectangle.
All the measurements are in centimetres.

(a) Explain why $4x + 1 = 2x + 12$

Opposite sides of a rectangle are equal.

(1)

(b) Solve $4x + 1 = 2x + 12$

$2x + 1 = 12$

$\Rightarrow x = \frac{12 - 1}{2} = \frac{11}{2} = 5.5$

$x =$ 5.5

(2)

(c) Use your answer to part (b) to work out the perimeter of the rectangle.

$4(5.5) + 1 + 2(5.5) + 12 + 2(5.5)$

$= 23 + 23 + 11$

$= 57\text{cm}$

57 cm

(2) **Q6**

(Total 5 marks)

Leave blank

7. Use the information that

$$322 \times 48 = 15456$$

to find the value of

(a) 3.22×4.8

$\frac{322}{100} \times \frac{48}{10} = \frac{15456}{1000} = 15.456$

15.456

(1)

(b) 0.322×0.48

$\frac{15456}{100,000} = 0.15456$

0.15456

(1)

(c) $15456 \div 4.8$

$3220 \times 4.8 = 15,456$

$\Rightarrow 15,456 \div 4.8 = 3,220$

3,220

(1)

Q7

(Total 3 marks)

8. $2x^2 = 72$

(a) Find a value of x.

$x^2 = \frac{72}{2} = 36$

$\Rightarrow x = \pm\sqrt{36} = 6$ or -6

6

(2)

(b) Express 72 as a product of its prime factors.

$72 = 2 \times 36$

$= 2 \times 2 \times 18$

$= 2 \times 2 \times 2 \times 9$

$= 2 \times 2 \times 2 \times 3 \times 3$

$2^3 \times 3^2$

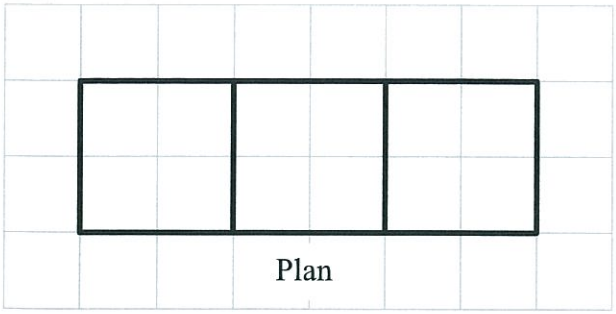
(2)

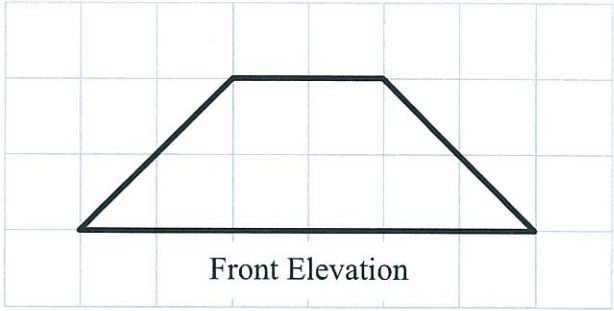
Q8

(Total 4 marks)

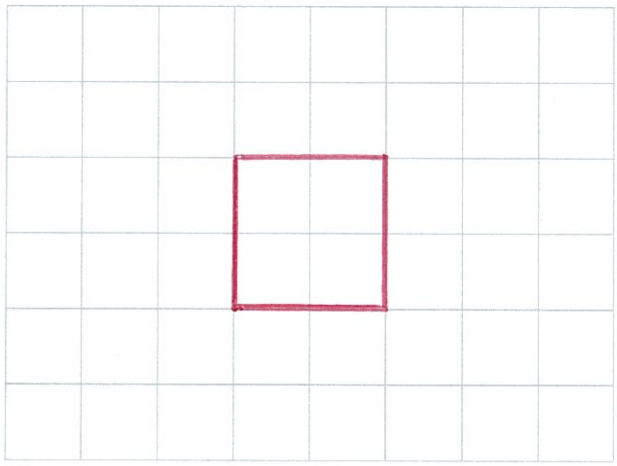
Leave blank

9. Here are the plan and front elevation of a solid shape.



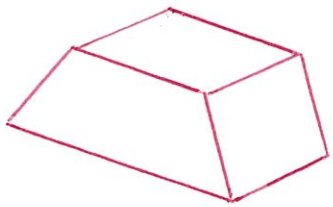


(a) On the grid below, draw the side elevation of the solid shape.



(2)

(b) In the space below, draw a sketch of the solid shape.



(2) **Q9**

(Total 4 marks)

Leave blank

10. There are 40 litres of water in a barrel.

The water flows out of the barrel at a rate of 125 millilitres per second.

1 litre = 1000 millilitres.

Work out the time it takes for the barrel to empty completely.

125 ml ——— 1 s

× 8 ( ) × 8

1 litre ——— 8 s

× 40 ( ) × 40

40 litres ——— 320 seconds

Alternatively, $\frac{40,000}{125} = 320$

320 ..... seconds

Q10

(Total 3 marks)

Leave blank

11. The length of a line is 63 centimetres, correct to the nearest centimetre.

(a) Write down the **least** possible length of the line.

62.5 ..... centimetres
(1)

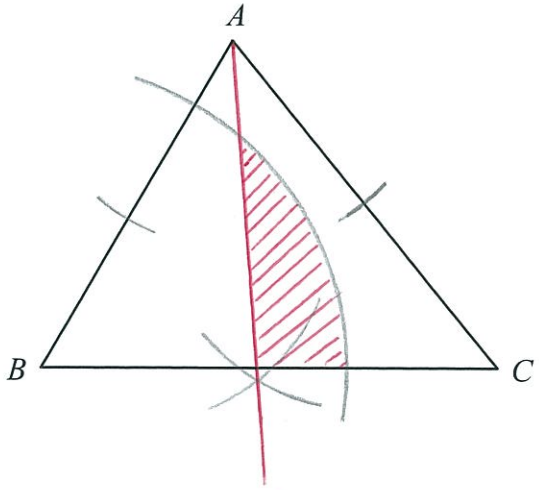
(b) Write down the **greatest** possible length of the line.

63.5 ..... centimetres
(1)

Q11

(Total 2 marks)

12.



→ angle bisector of $B\hat{A}C$ represents the loci of all points which are equidistant from lines AB and AC.

ABC is a triangle.

Shade the region inside the triangle which is **both**

less than 4 centimetres from the point *B*
and closer to the line *AC* than the line *AB*.

Q12

(Total 4 marks)

Leave blank

13. Fred is going to take a survey of the magazines read by students.

He wants to design a questionnaire.

(a) Design a suitable question that he could use to find out what types of magazine students read.

Please indicate which of the following magazines you read.

Health & Lifestyle	☐	Sports	☐
Music	☐	Computing	☐
Tv & Film	☐	Nature and science	☐
Fashion	☐	Hobbies or general interest	☐
Cooking	☐		

(2)

Fred put the question below on his questionnaire.

'How many magazines have you read?'

☐ A few ☐ A lot

(b) Design a better question.
You should include some response boxes.

How many magazines on average would you estimate you read per month?

☐ None ☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-10 ☐ More than 10

(2) **Q13**

(Total 4 marks)

Leave blank

14. Work out an estimate for the value of

$$\frac{6.8\times191}{0.051}$$

$\frac{7\times200}{0.05} = \frac{1400}{0.05}$

$0.05 = \frac{5}{100} = \frac{1}{20}$

$1400 \div \frac{1}{20} = 1400 \times \frac{20}{1} = 28{,}000$

28,000

Q14

(Total 3 marks)

15. (a) Write 64 000 in standard form.

6.4×10^4

(1)

(b) Write 156×10^{-7} in standard form.

$1.56 \times 10^2 \times 10^{-7}$

$= 1.56 \times 10^{(2-7)}$

$= 1.56 \times 10^{-5}$

1.56×10^{-5}

(1) **Q15**

(Total 2 marks)

16. (a) Factorise fully $4x^2 - 6xy$

$2x(2x - 3y)$

$2x(2x-3y)$

(2)

(b) Factorise $x^2 + 5x - 6$

$(x+6)(x-1)$

$(x+6)(x-1)$

(2) **Q16**

(Total 4 marks)

Leave blank

17. Lucy did a survey about the amounts of money spent by 120 men during their summer holidays.

The cumulative frequency table gives some information about the amounts of money spent by the 120 men.

Amount (£A) spent	Cumulative frequency
$0 \leqslant A < 100$	13
$0 \leqslant A < 150$	25
$0 \leqslant A < 200$	42
$0 \leqslant A < 250$	64
$0 \leqslant A < 300$	93
$0 \leqslant A < 350$	110
$0 \leqslant A < 400$	120

(a) On the grid, draw a cumulative frequency diagram.

(2)

(b) Use your cumulative frequency diagram to estimate the median.

£ 240

(2)

A survey of the amounts of money spent by 200 women during their summer holidays gave a median of £205

(c) Compare the amounts of money spent by the women with the amounts of money spent by the men.

The distribution for the amounts of money spent by women is tighter and less spread out with a smaller interquartile range. The amounts spent by men were more widely spread and less consistent.

(1)

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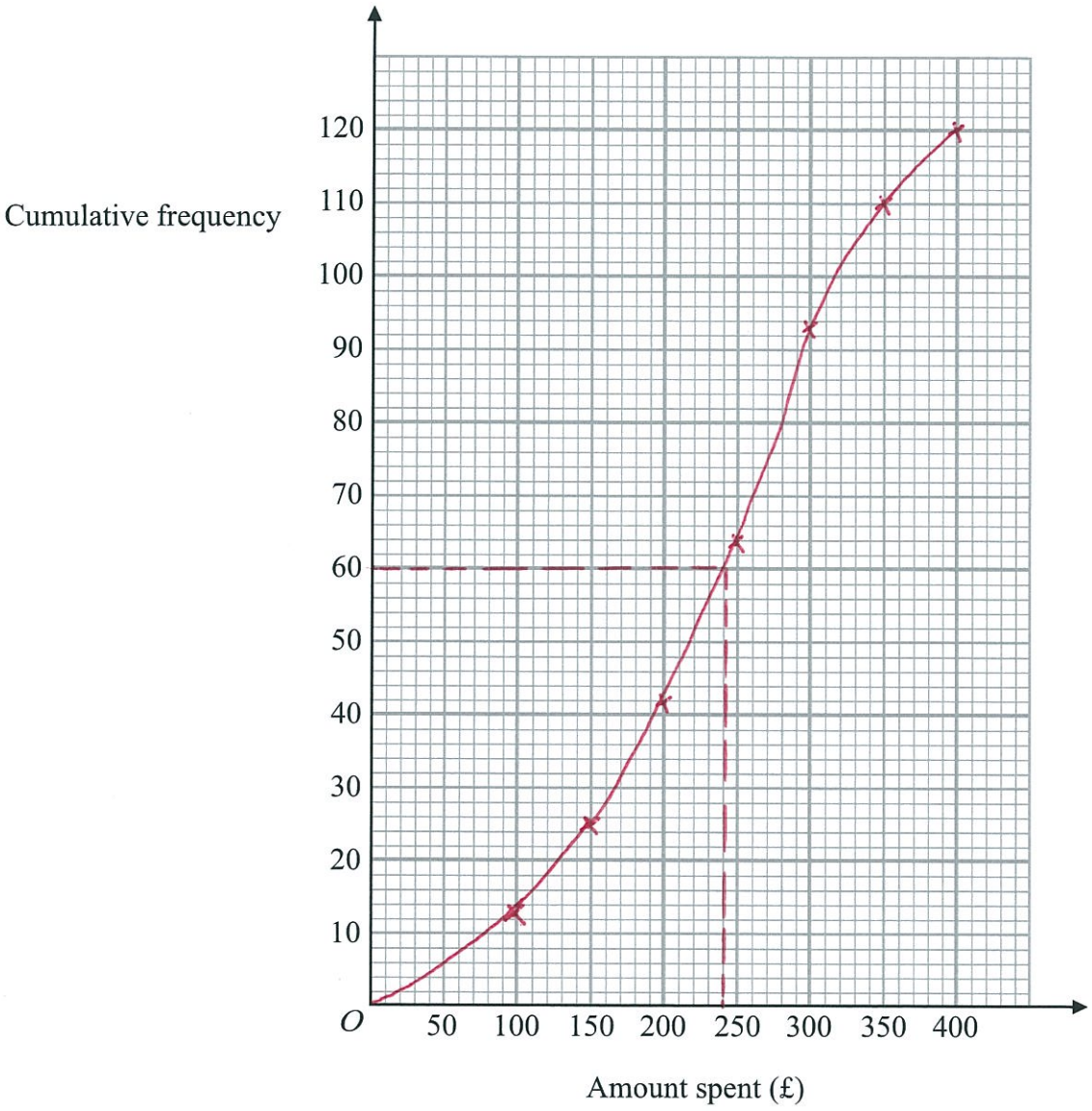


Q17

(Total 5 marks)

Leave blank

18.

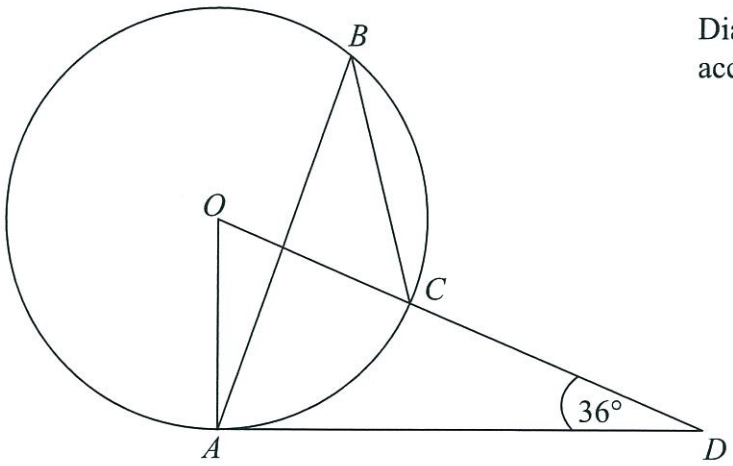


Diagram **NOT** accurately drawn

The diagram shows a circle centre O.
A, B and C are points on the circumference.

DCO is a straight line.
DA is a tangent to the circle.

Angle $ADO = 36°$

(a) Work out the size of angle AOD.

$180-(90+36)$

$= 180 - 126 = 54°$

54 °

(2)

(b) (i) Work out the size of angle ABC.

$\frac{1}{2} \times 54 = 27°$

27 °

(ii) Give a reason for your answer.

Angle subtended by an arc at the centre is twice the angle subtended at the circumference.

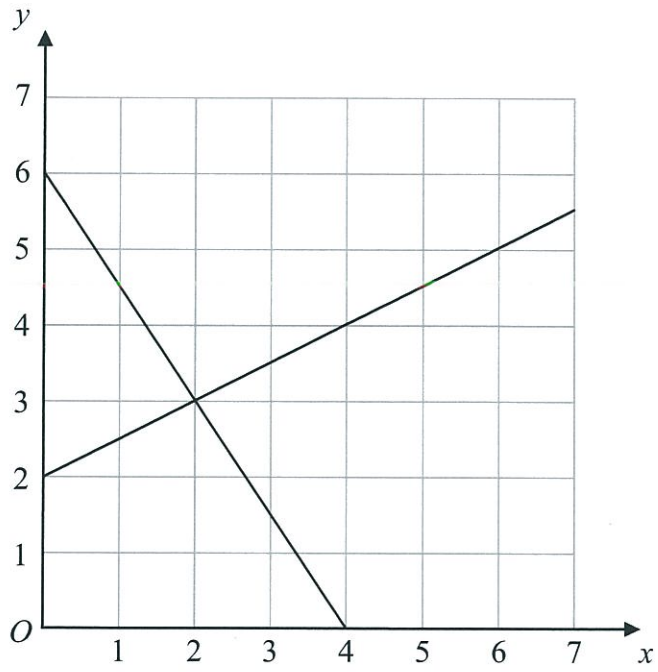
(3)

(Total 5 marks)

Q18

Leave blank

19.



The diagram shows graphs of $y = \frac{1}{2}x + 2$

and $2y + 3x = 12$

(a) Use the diagram to solve the simultaneous equations

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

$$2y + 3x = 12$$

$x =$ 2 $y =$ 3

(1)

(b) Find an equation of the straight line which is parallel to the line $y = \frac{1}{2}x + 2$ and passes through the point (0, 4).

$y = \frac{1}{2}x + c$ passing through $(0, 4)$

$\Rightarrow 4 = \frac{1}{2}(0) + c$

$\Rightarrow c = 4$.

$\therefore y = \frac{1}{2}x + 4$

$y = \frac{1}{2}x + 4$

(2)

(Total 3 marks)

Q19

Leave blank

20. (a) Solve the inequality

$$3t + 1 < t + 12$$

$2t < 11$

$\Rightarrow t < \frac{11}{2}$

$t < 5.5$

$t < 5.5$

(2)

(b) t is a whole number.
Write down the largest value of t that satisfies

$$3t + 1 < t + 12$$

5

(1)

Q20

(Total 3 marks)

21. M is directly proportional to L^3.

When $L = 2$, $M = 160$

Find the value of M when $L = 3$

$M \propto L^3$

$\Rightarrow M = kL^3$

$160 = 2^3 k = 8k$

$\Rightarrow k = \frac{160}{8} = 20$

$\therefore M = 20L^3$

When $L = 3$, $M = 20(3^3) = 20(27)$
$= 540$

540

Q21

(Total 4 marks)

Leave blank

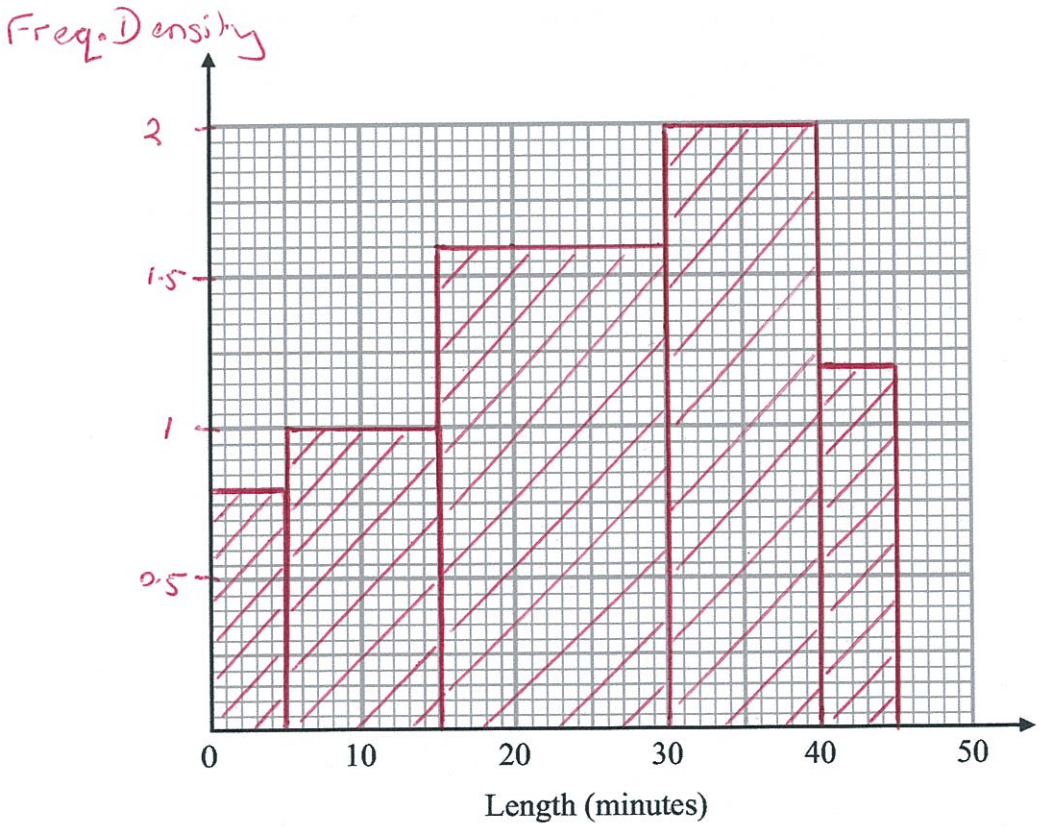
22. A call centre receives 64 telephone calls one morning.
The table gives information about the lengths, in minutes, of these telephone calls.

Length (x) minutes	Frequency
$0 < x \leqslant 5$	4
$5 < x \leqslant 15$	10
$15 < x \leqslant 30$	24
$30 < x \leqslant 40$	20
$40 < x \leqslant 45$	6

Freq. Density = Freq. / class width

0.8
1
1.6
2
1.2

Draw a histogram for this information.



Q22

(Total 4 marks)

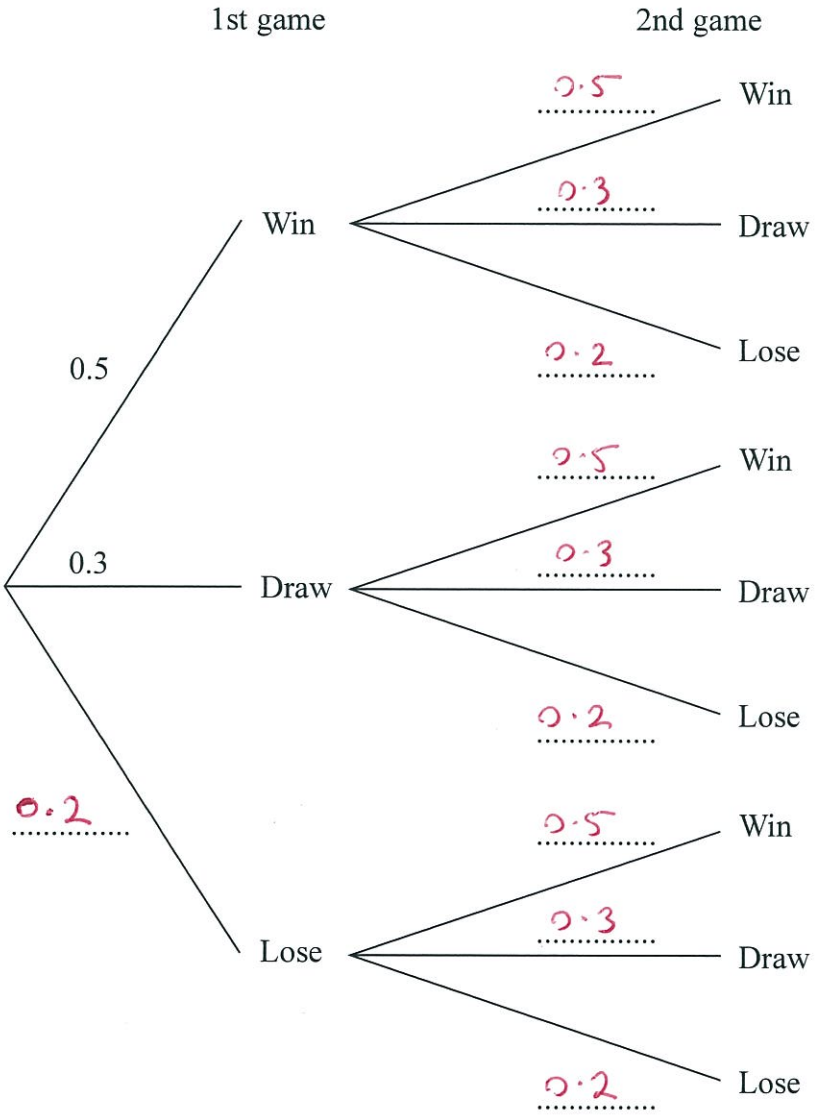
Leave blank

23. In a game of chess, a player can either win, draw or lose.

The probability that Vishi wins any game of chess is 0.5
The probability that Vishi draws any game of chess is 0.3

Vishi plays 2 games of chess.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Vishi will win both games.

P(Win and Win) = 0.5 × 0.5 = 0.25

0.25

(2)

(Total 4 marks)

Q23

Leave blank

24.

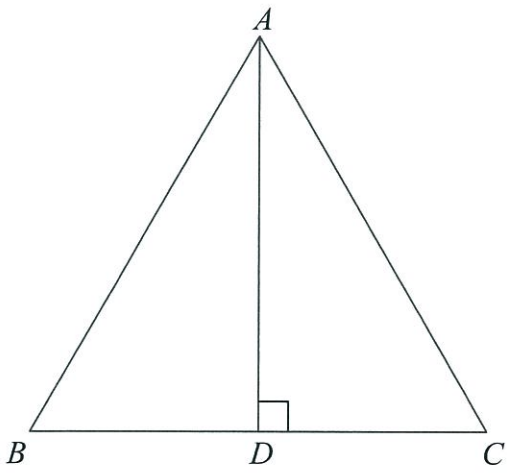


Diagram **NOT** accurately drawn

ABC is an equilateral triangle.
D lies on *BC*.
AD is perpendicular to *BC*.

(a) Prove that triangle *ADC* is congruent to triangle *ADB*.

Angle ABD = Angle ACD = 60° (ABC is an equilateral triangle)

Angle ADB = Angle ADC = 90° (AD is perpendicular to BC)

Both triangles share the same side AD.

∴ Since 2 angles and a side match up, ADC is congruent to ADB.

(3)

(b) Hence, prove that $BD = \frac{1}{2}AB$.

BD = DC (ADC and ADB are congruent)

⇒ 2BD = BC

Since BC = AB (ABC is an equilateral triangle)

then 2BD = AB

and so $BD = \frac{1}{2}AB$

(2) **Q24**

(Total 5 marks)

Leave blank

25.

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

$u = 2\frac{1}{2}$, $v = 3\frac{1}{3}$

Firstly, $2\frac{1}{2} \equiv \frac{5}{2}$ and $3\frac{1}{3} \equiv \frac{10}{3}$

(a) Find the value of f.

$\frac{1}{5/2} + \frac{1}{10/3} = \frac{1}{f}$

$\Rightarrow \frac{2}{5} + \frac{3}{10} = \frac{1}{f}$

$= \frac{4+3}{10} = \frac{1}{f}$

$\frac{7}{10} = \frac{1}{f}$

$\Rightarrow f = \frac{1}{\left(\frac{7}{10}\right)} = \frac{10}{7} = 1\frac{3}{7}$

$1\frac{3}{7}$

.....

(3)

(b) Rearrange $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$

to make u the subject of the formula.

Give your answer in its simplest form.

$\frac{1}{u} = \frac{1}{f} - \frac{1}{v} = \frac{v-f}{fv}$

$\Rightarrow u = 1 \div \frac{v-f}{fv} = \frac{fv}{v-f}$

$u = \frac{fv}{v-f}$

.....

(2) **Q25**

(Total 5 marks)

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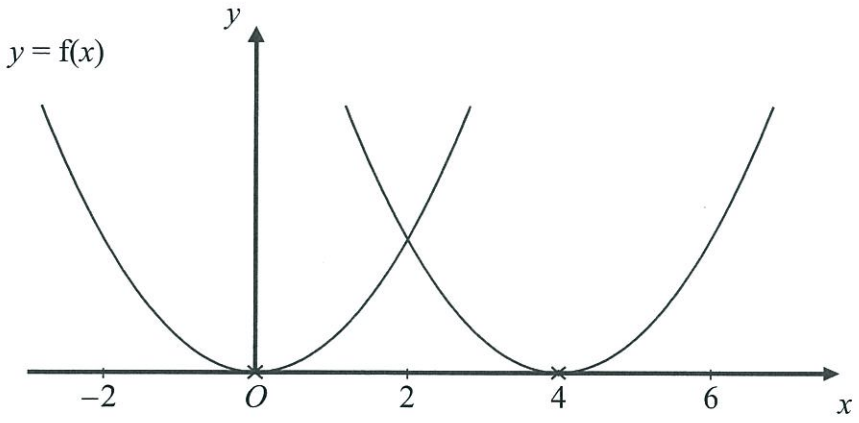
26.

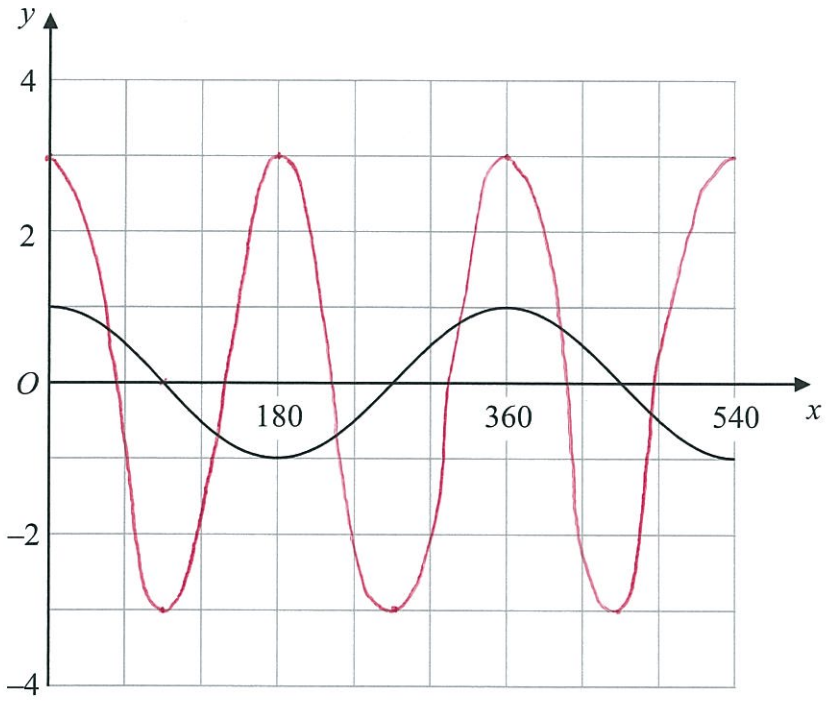


The curve with equation $y = f(x)$ is translated so that the point at (0, 0) is mapped onto the point (4, 0).

(a) Find an equation of the translated curve.

$y = f(x-4)$

(2)



The grid shows the graph of $y = \cos x°$ for values of x from 0 to 540

(b) On the grid, sketch the graph of $y = 3\cos(2x°)$ for values of x from 0 to 540

(2) **Q26**

(Total 4 marks)

TOTAL FOR PAPER: 100 MARKS

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