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	**Items included with question papers**
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser. Tracing paper may be used.	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.
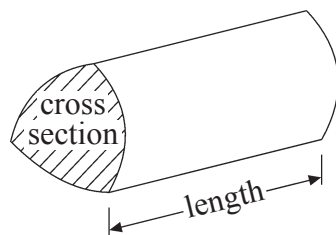Return at the end to those you have left out.

Turn over

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GCSE Mathematics (Linear) 1380
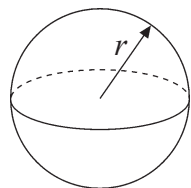
Formulae: Higher Tier

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 $= \pi r l$
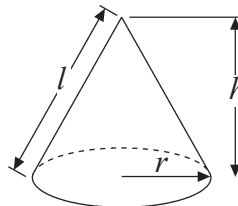
In any triangle ABC

Sine Rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

Area of triangle $= \frac{1}{2}ab\sin C$
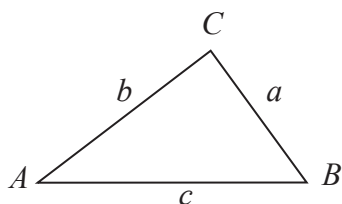
The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

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

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		14	54
Girl		8	16	
Total	37			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.

....

(1) **Q1**

(Total 4 marks)

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

....

(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.

.... pence **Q2**

(2)

(Total 4 marks)

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

x	-2	-1	0	1	2	3
y	-11		-3			9

(2)

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

(2)

(Total 4 marks)

Q3

4. $P = 4k - 10$

$P = 50$

(a) Work out the value of k.

....

$y = 4n - 3d$

$n = 2$
$d = 5$

(b) Work out the value of y.

....
(2)

(Total 4 marks)

Q4

5.
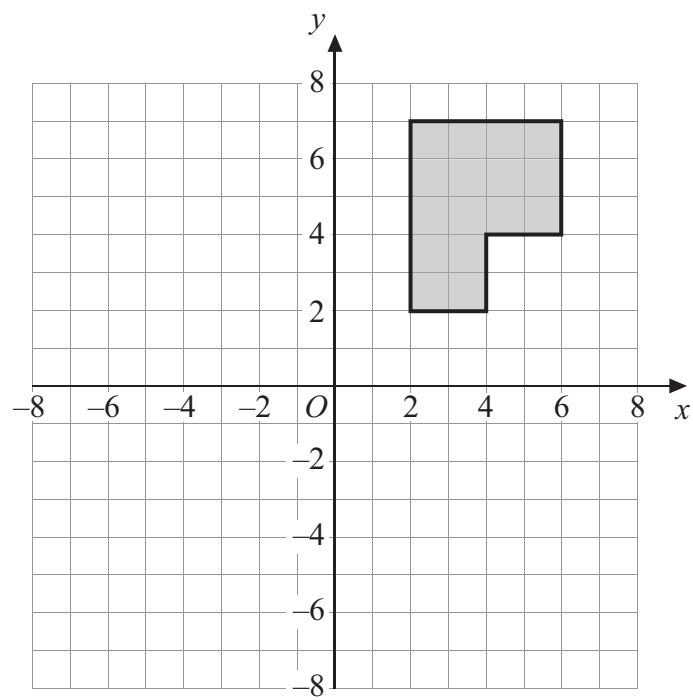
(a) Rotate the shaded shape 90° clockwise about the point *O*.

(2)

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

....

(2)

(Total 4 marks)

6.

Diagram **NOT**
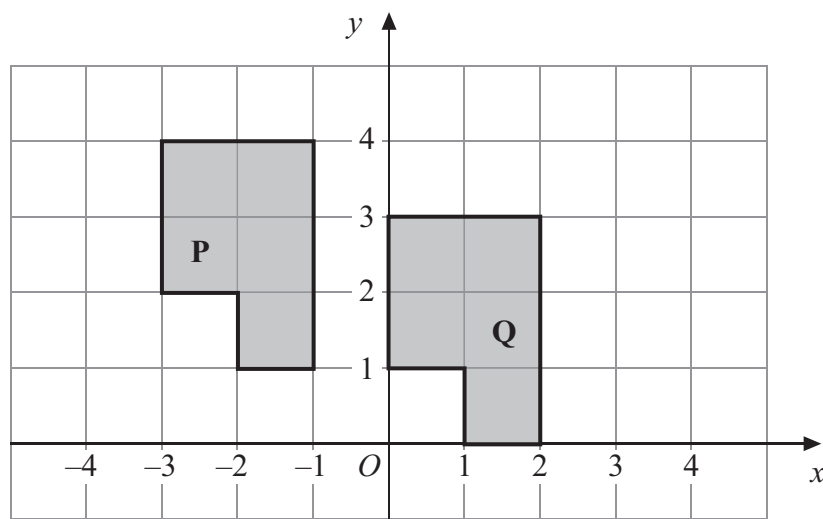accurately drawn

$4x + 1$

x x
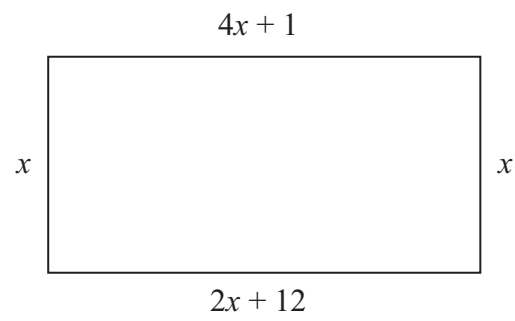
$2x + 12$

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

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

....
(1)

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

$x =$ ....
(2)

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

.... cm
(2)

(Total 5 marks)

7. Use the information that

$$322 \times 48 = 15\,456$$

to find the value of

(a) 3.22×4.8

....
(1)

(b) 0.322×0.48

....
(1)

(c) $15\,456 \div 4.8$

....
(1)   Q7

(Total 3 marks)

8. $2x^2 = 72$

(a) Find a value of x.

....
(2)

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

....
(2)   Q8

(Total 4 marks)

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

Plan

Front Elevation
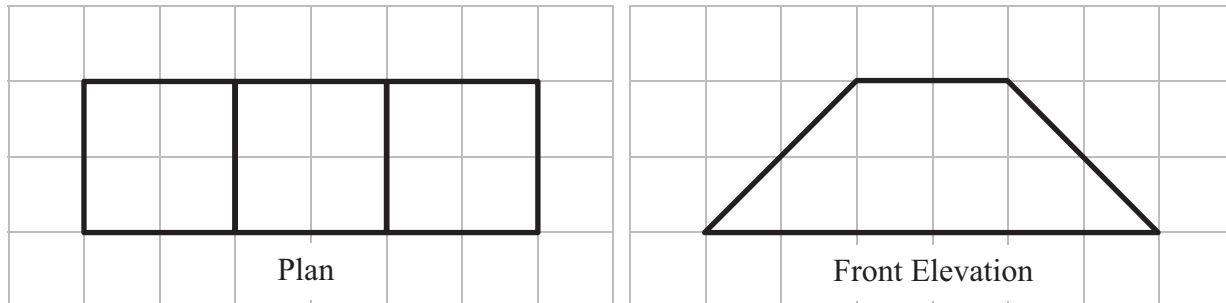
(a) On the grid below, draw the side elevation of the solid shape.
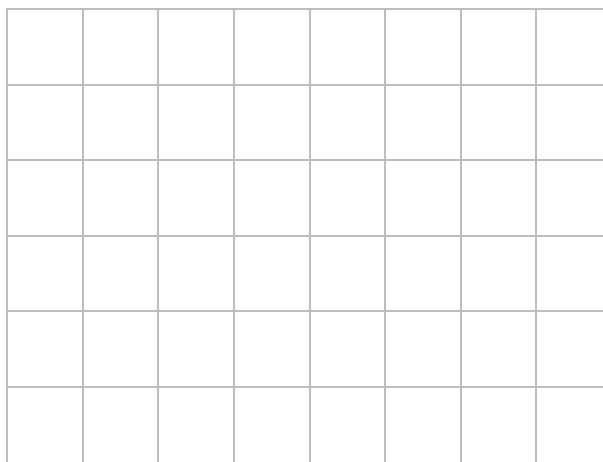
(2)

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

(2) Q9

(Total 4 marks)

Turn over

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.

.... seconds

Q10

(Total 3 marks)

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

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

.... centimetres

(1)

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

.... centimetres

(1) Q11

(Total 2 marks)

12.

A

B   C
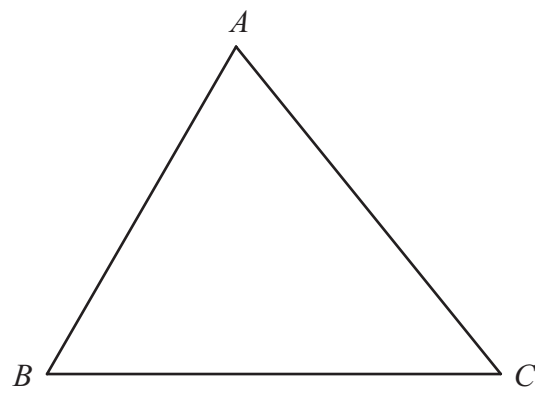
ABC is a triangle.

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)

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.

(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.

(2)

Q13

(Total 4 marks)

14. Work out an estimate for the value of

$$\frac{6.8 \times 191}{0.051}$$

....

(Total 3 marks)

Q14

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

....
(1)

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

....
(1)

(Total 2 marks)

Q15

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

....
(2)

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

....
(2)

(Total 4 marks)

Q16

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.

£ ....

(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.

....

....

(1)

Cumulative frequency

120
110
100
90
80
70
60
50
40
30
20
10

O   50   100   150   200   250   300   350   400

Amount spent (£)

(Total 5 marks)
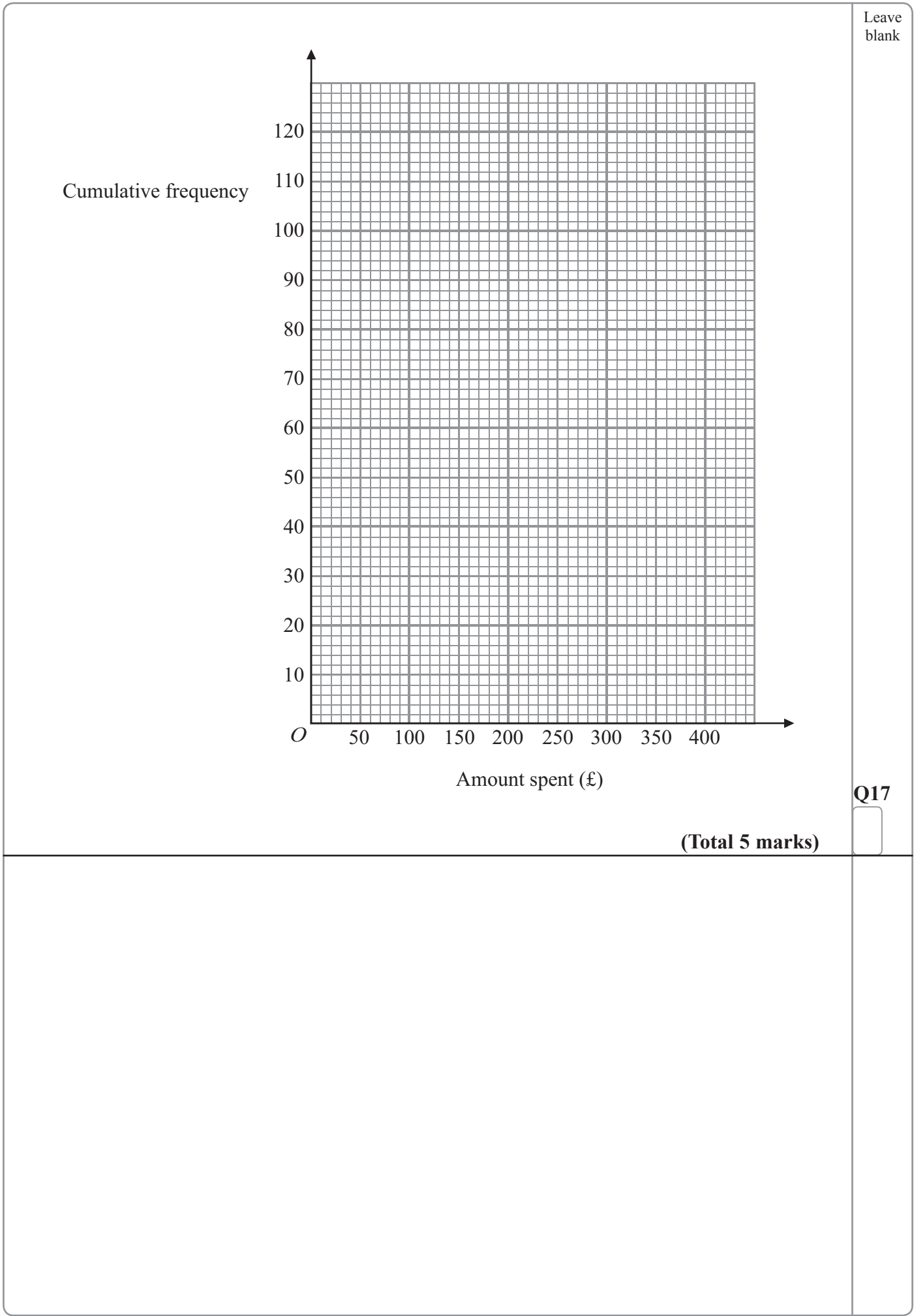
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18.

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*.
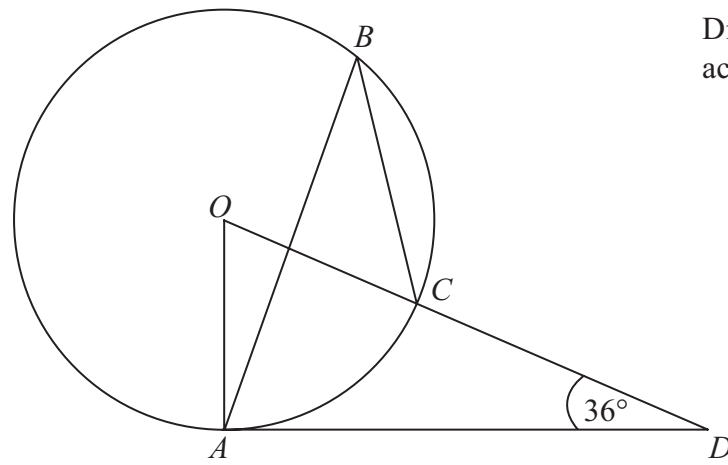
.....................................°

(2)

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

.....................................°

(ii) Give a reason for your answer.

....

(3)

Q18

(Total 5 marks)

19.
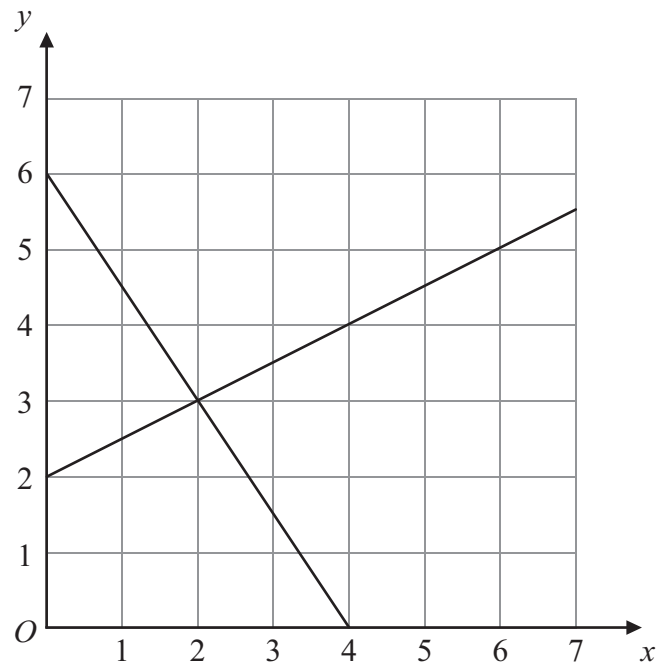
The diagram shows graphs of $\quad y = \dfrac{1}{2}x + 2$

and $\qquad\qquad\qquad\qquad 2y + 3x = 12$

(a) Use the diagram to solve the simultaneous equations

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

$$2y + 3x = 12$$

$x = $ .... $y = $ ....

(1)

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

....

(2)

Q19

(Total 3 marks)

20. (a) Solve the inequality

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

....
(2)

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

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

....
(1)   Q20

(Total 3 marks)

21. M is directly proportional to L^3.

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

Find the value of M when $L = 3$

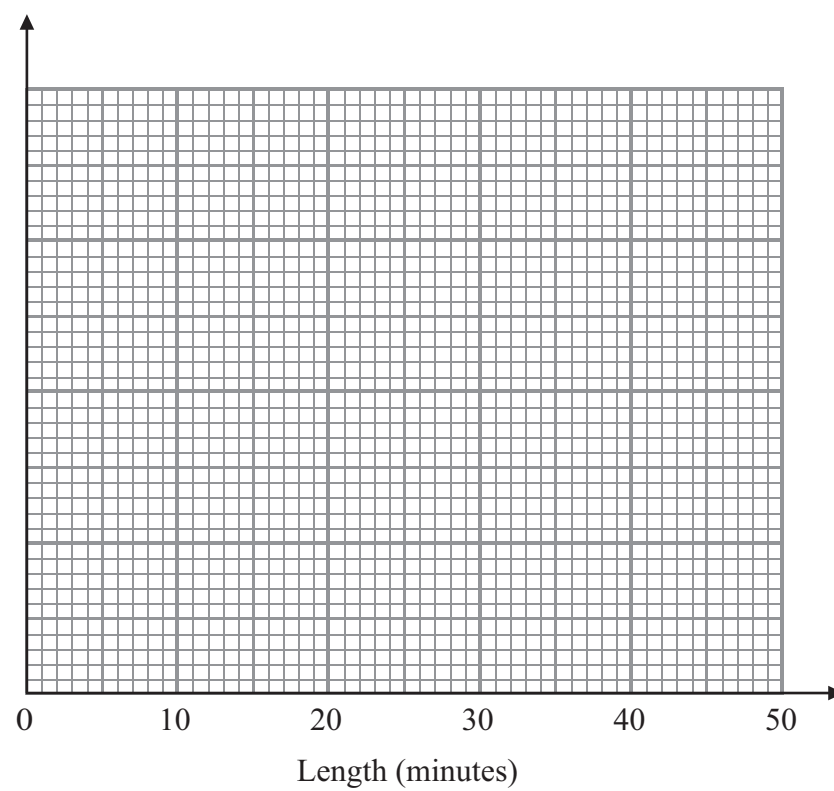.......................................
(Total 4 marks)   Q21

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

Draw a histogram for this information.

0   10   20   30   40   50
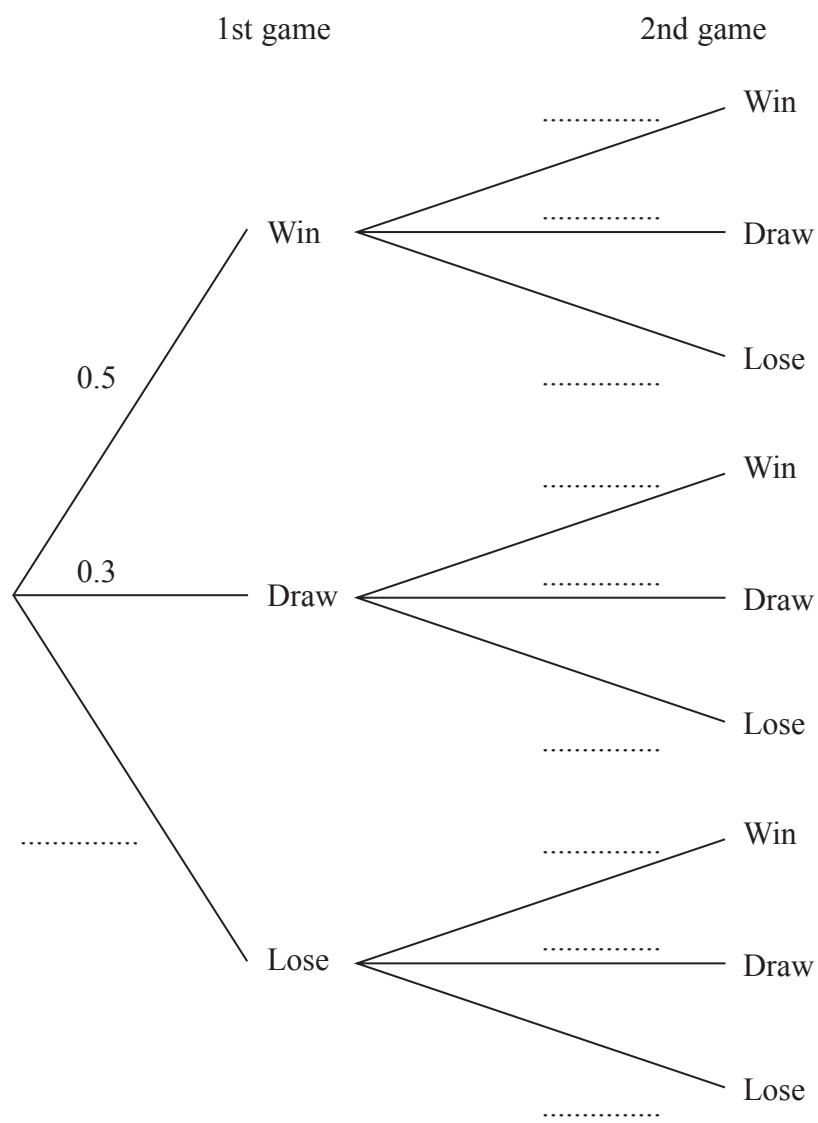
Length (minutes)

(Total 4 marks)

Q22

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.

1st game   2nd game

```
                                    ...............    Win
                          Win  <    ...............    Draw
               0.5   /                                 Lose
                    /                ...............
                   /
                  /  0.3             ...............    Win
                  ----- Draw  <      ...............    Draw
                  \                                     Lose
                   \                 ...............
                ...............
                    \                ...............    Win
                     \       Lose  < ...............    Draw
                                                        Lose
                                     ...............
```

(2)

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

....
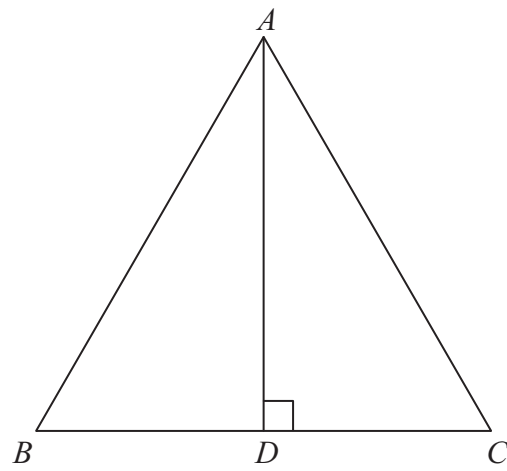
(2)

(Total 4 marks)

Q23

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*.

(3)

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

(2) Q24

(Total 5 marks)

25.
$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

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

(a) Find the value of f.

....

(3)

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

to make u the subject of the formula.

Give your answer in its simplest form.

....

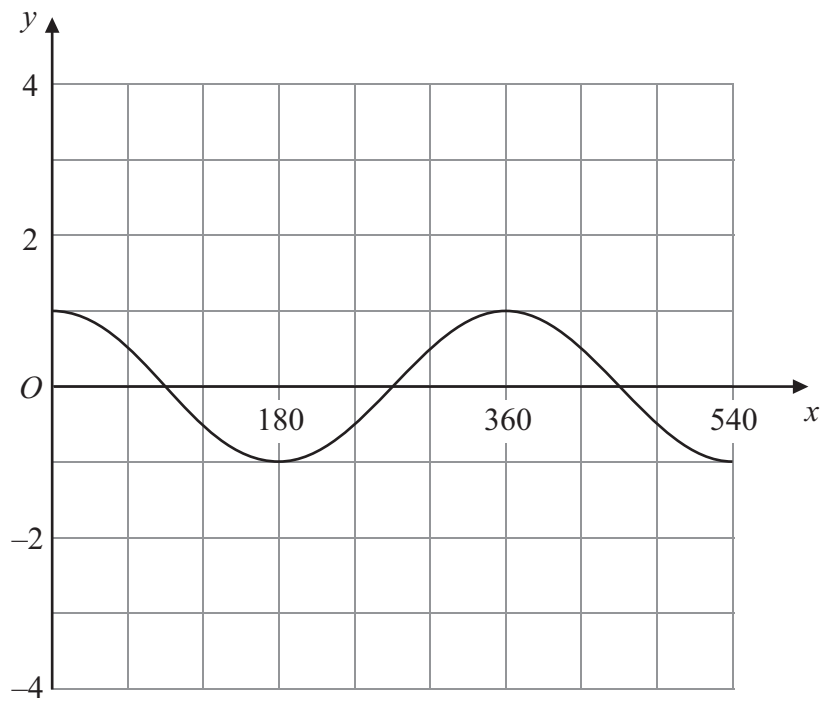**(2)**

Q25

(Total 5 marks)

26.

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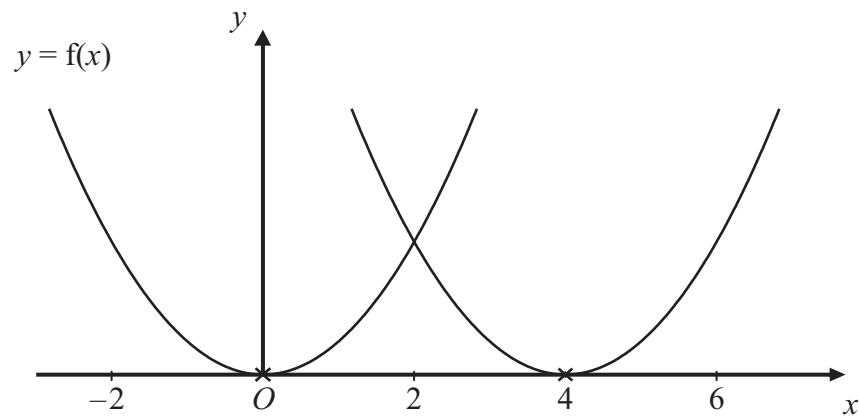
The curve with equation $y = f(x)$ is translated so that the point at $(0, 0)$ is mapped onto the point $(4, 0)$.

(a) Find an equation of the translated curve.

....

(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

END

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