Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						5	5	2	5	/	0	5	Signature	

Paper Reference(s)

5525/05

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics A – 1387

Paper 5 (Non-Calculator)

Higher Tier

Monday 5 June 2006 – Afternoon

Time: 2 hours

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 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 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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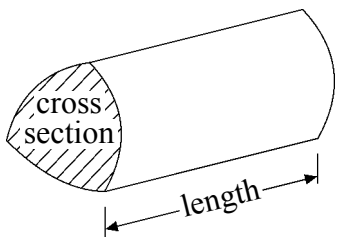
edexcel

GCSE Mathematics 1387/8

Formulae: Higher Tier

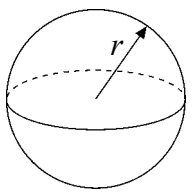
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



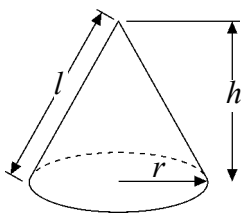
Volume of sphere $= \frac{4}{3}\pi r^3$

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

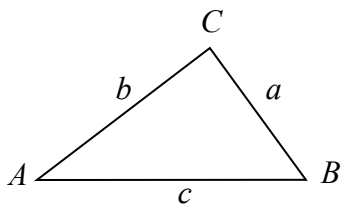


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



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

Leave blank

Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1. $3x^2 = 108$

(a) Find the value of x.

$x =$.....

(2)

(b) Express 108 as a product of its prime factors.

.....

(3) **Q1**

(Total 5 marks)

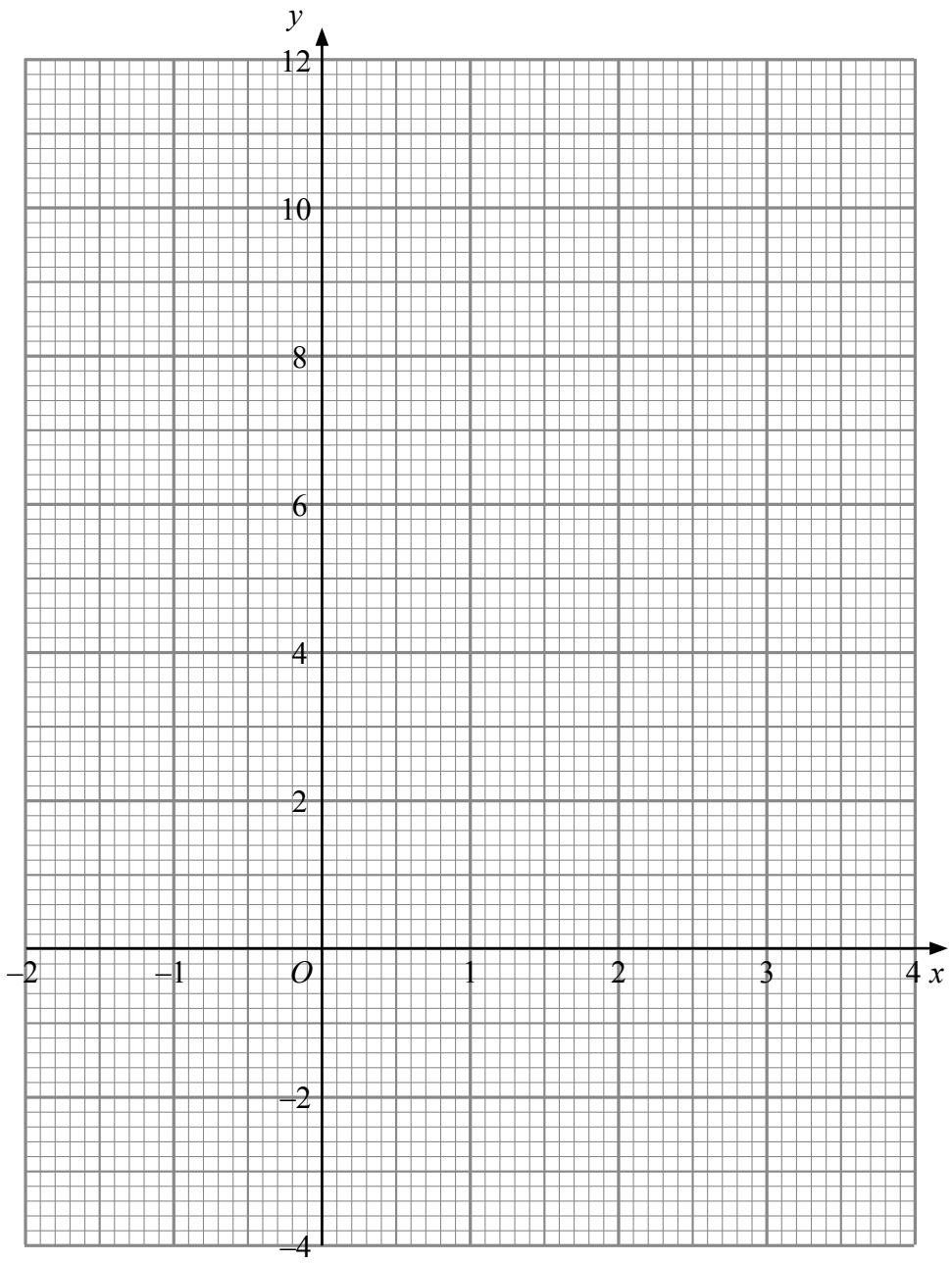
Leave blank

2. (a) Complete the table of values for $y = x^2 - 3x + 1$

x	–2	–1	0	1	2	3	4
y	11		1	–1			5

(2)

(b) On the grid, draw the graph of $y = x^2 - 3x + 1$



(2)

(c) Use your graph to estimate the values of x for which $y = 3$

$x =$.....

$x =$.....

(2)

Q2

(Total 6 marks)

Leave blank

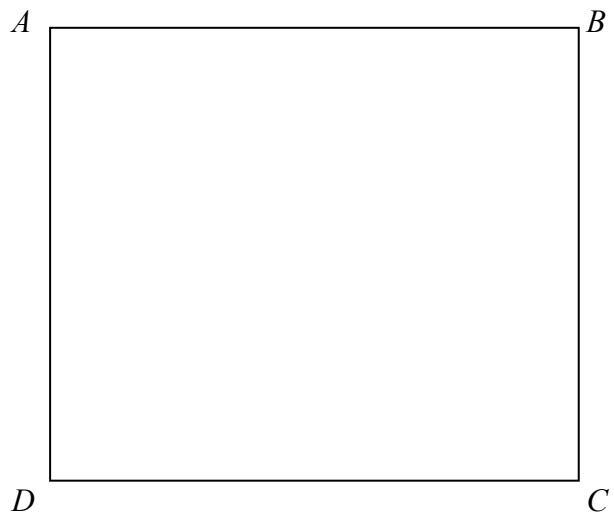
3. A silver chain has a volume of 5 cm^3.
The density of silver is 10.5 grams per cm^3.

Work out the mass of the silver chain.

..... grams **Q3**

(Total 2 marks)

4.



ABCD is a rectangle.
Shade the set of points inside the rectangle which are **both**

more than 4 centimetres from the point *A*
and more than 1 centimetre from the line *DC*.

Q4

(Total 4 marks)

Turn over

Leave blank

5. Fred did a survey of the time, in seconds, people spent in a queue at a supermarket. Information about the times is shown in the table.

Time (t seconds)	Frequency
$0 < t \leqslant 40$	8
$40 < t \leqslant 80$	12
$80 < t \leqslant 120$	14
$120 < t \leqslant 160$	16
$160 < t \leqslant 200$	10

A person is selected at random from the people in Fred's survey.

Work out an estimate for the probability that the person selected spent more than 120 seconds in the queue.

.....

(Total 2 marks)

Q5

6. Work out an estimate for $\dfrac{412 \times 5.904}{0.195}$

.....

(Total 3 marks)

Q6

Leave blank

7. A gold necklace has a mass of 127 grams, correct to the nearest gram.

(a) Write down the **least** possible mass of the necklace.

..... grams
(1)

(b) Write down the **greatest** possible mass of the necklace.

..... grams
(1)

Q7

(Total 2 marks)

8. A student wanted to find out how many pizzas adults ate.

He used this question on a questionnaire.

'How many pizzas have you eaten?'

☐ A few ☐ A lot

This is not a good question.

Design a better question that the student can use to find out how many pizzas adults ate.
You should include some response boxes.

Q8

(Total 2 marks)

Leave blank

9. Write in standard form

(a) 456 000

.....

(1)

(b) 0.00034

.....

(1)

(c) 16×10^7

.....

(1) **Q9**

(Total 3 marks)

10. (a) Factorise $x^2 + 6x + 8$

.....

(2)

(b) Solve $x^2 + 6x + 8 = 0$

$x =$ .....

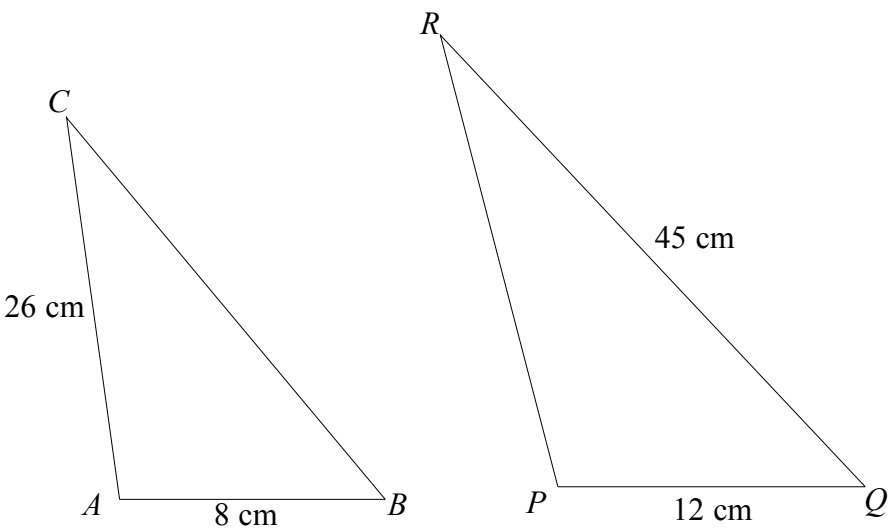
or $x =$ .....

(1) **Q10**

(Total 3 marks)

Leave blank

11. Diagrams **NOT** accurately drawn



The two triangles ABC and PQR are mathematically similar.

Angle A = angle P.
Angle B = angle Q.
AB = 8 cm.
AC = 26 cm.
PQ = 12 cm.
QR = 45 cm.

(a) Work out the length of PR.

..... cm
(2)

(b) Work out the length of BC.

..... cm
(2)

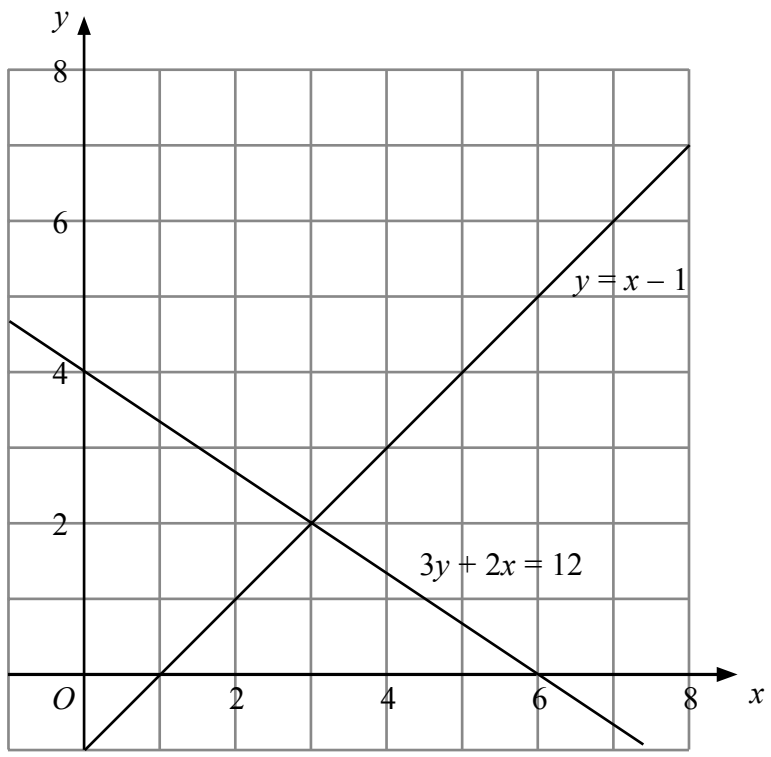
Q11

(Total 4 marks)

Turn over

Leave blank

12. The graphs of the straight lines with equations $3y + 2x = 12$ and $y = x - 1$ have been drawn on the grid.



(a) Use the graphs to solve the simultaneous equations

$3y + 2x = 12$
$y = x - 1$

$x =$ .....

$y =$ .....

(1)

(b) $3y + 2x > 12$ $y < x - 1$ $x < 6$

x and y are integers.

On the grid, mark with a cross (×) each of the **four** points which satisfies **all** these 3 inequalities.

(3)

(Total 4 marks)

Q12

Leave blank

13. Hajra's weekly pay this year is £240
This is 20% more than her weekly pay last year.

Bill says 'This means Hajra's weekly pay last year was £192'.

Bill is wrong.

(a) Explain why.

.....

.....

(1)

(b) Work out Hajra's weekly pay last year.

£ .....

(2) **Q13**

(Total 3 marks)

Leave blank

14. A company tested 100 batteries.

The table shows information about the number of hours that the batteries lasted.

Time (t hours)	Frequency
$50 \leqslant t < 55$	12
$55 \leqslant t < 60$	21
$60 \leqslant t < 65$	36
$65 \leqslant t < 70$	23
$70 \leqslant t < 75$	8

(a) Complete the cumulative frequency table for this information.

(1)

Time (t hours)	Cumulative frequency
$50 \leqslant t < 55$	12
$50 \leqslant t < 60$	
$50 \leqslant t < 65$	
$50 \leqslant t < 70$	
$50 \leqslant t < 75$	

(b) On the grid, draw a cumulative frequency graph for your completed table.

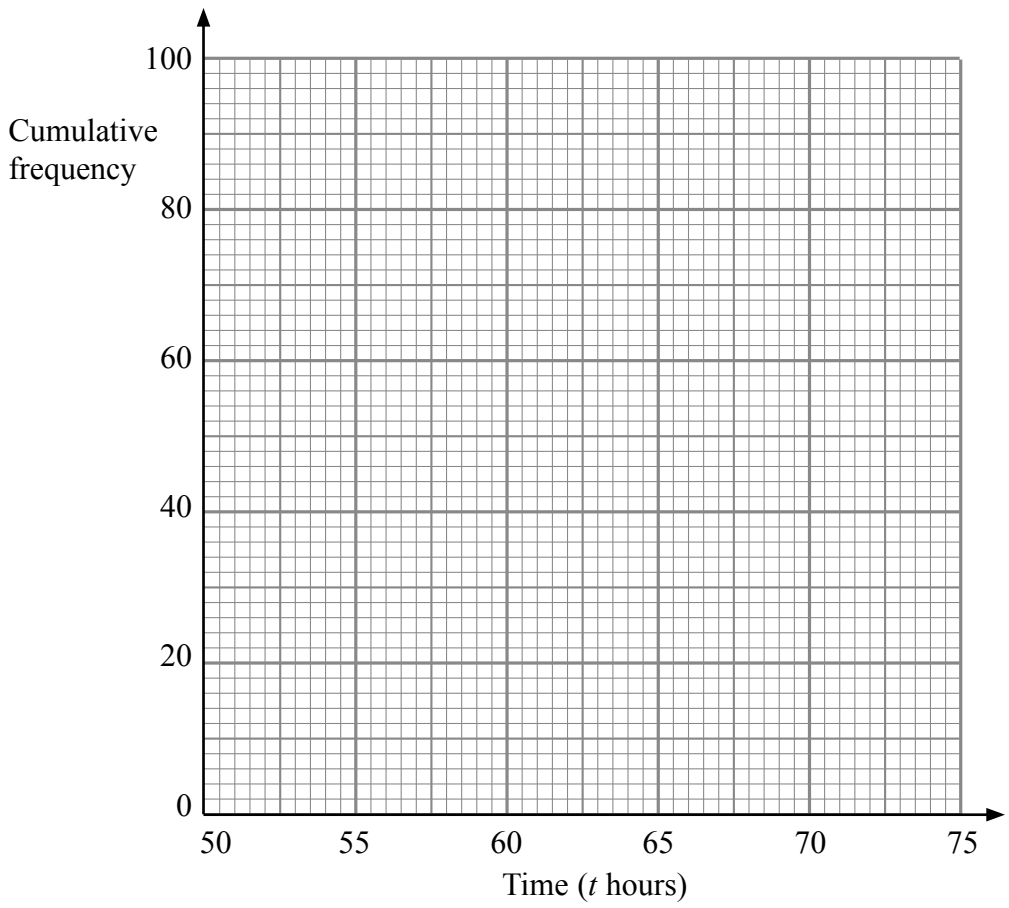
(2)

(c) Use your completed graph to find an estimate for the median time.
You must state the units of your answer.

.....

(2)

Leave blank



Q14

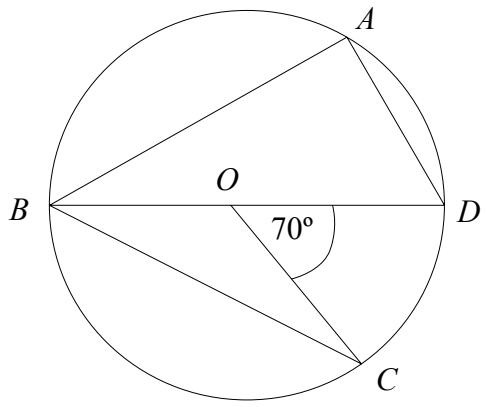
(Total 5 marks)

Turn over

Leave blank

15.

Diagram **NOT** accurately drawn



A, *B*, *C* and *D* are points on the circumference of a circle, centre *O*.
BOD is a straight line.
Angle *COD* = 70º

(a) Find the size of angle *BAD*.
Give a reason for your answer.

..... º
(2)

(b) Find the size of angle *CBD*.
Give a reason for your answer.

..... º
(2)

Q15

(Total 4 marks)

Leave blank

16. The time, T seconds, it takes a water heater to boil some water is directly proportional to the mass of water, m kg, in the water heater.

When $m = 250$, $T = 600$

(a) Find T when $m = 400$

$T =$ .....

(3)

The time, T seconds, it takes a water heater to boil a constant mass of water is inversely proportional to the power, P watts, of the water heater.

When $P = 1400$, $T = 360$

(b) Find the value of T when $P = 900$

$T =$ .....

(3) **Q16**

(Total 6 marks)

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17.

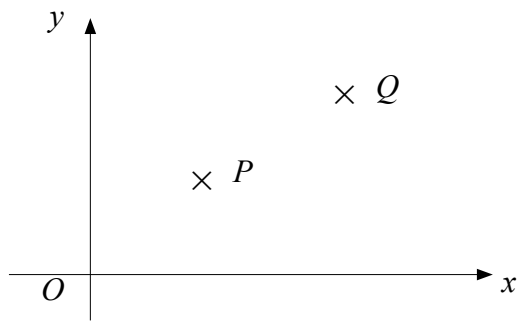


Diagram **NOT** accurately drawn

The diagram is a sketch.

P is the point (2, 3)
Q is the point (6, 6)

(a) Write down the vector $\overrightarrow{PQ}$

Write your answer as a column vector $\begin{pmatrix} x \\ y \end{pmatrix}$

( )

(2)

$PQRS$ is a parallelogram.

$\overrightarrow{PR} = \begin{pmatrix} 4 \\ 7 \end{pmatrix}$

(b) Find the vector $\overrightarrow{QS}$

Write your answer as a column vector $\begin{pmatrix} x \\ y \end{pmatrix}$

( )

(2)

Q17

(Total 4 marks)

Leave blank

18. (a) Solve $\frac{3}{x} + \frac{3}{2x} = 2$

$x =$.....

(2)

(b) Using your answer to part (a), or otherwise,

solve $\frac{3}{(y-1)^2} + \frac{3}{2(y-1)^2} = 2$

$y =$.....

or $y =$.....

(3) **Q18**

(Total 5 marks)

Leave blank

19. The table and histogram show information about the length of time it took 165 adults to connect to the internet.

Time (t seconds)	Frequency
$0 < t \leqslant 10$	20
$10 < t \leqslant 15$	
$15 < t \leqslant 17.5$	30
$17.5 < t \leqslant 20$	40
$20 < t \leqslant 25$	
$25 < t \leqslant 40$	

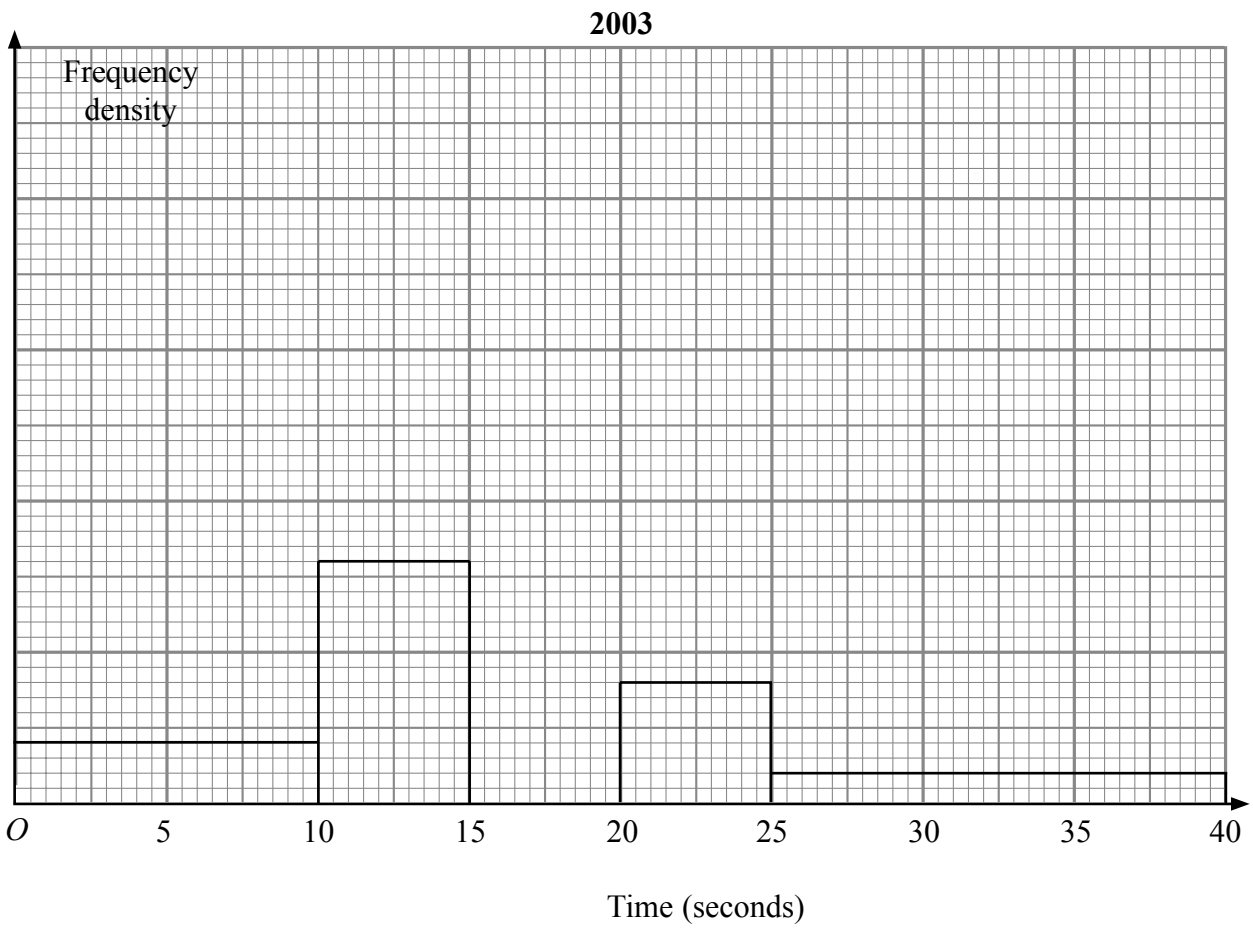
None of the adults took more than 40 seconds to connect to the internet.

(a) Use the table to complete the histogram.

(2)

(b) Use the histogram to complete the table.

(2)



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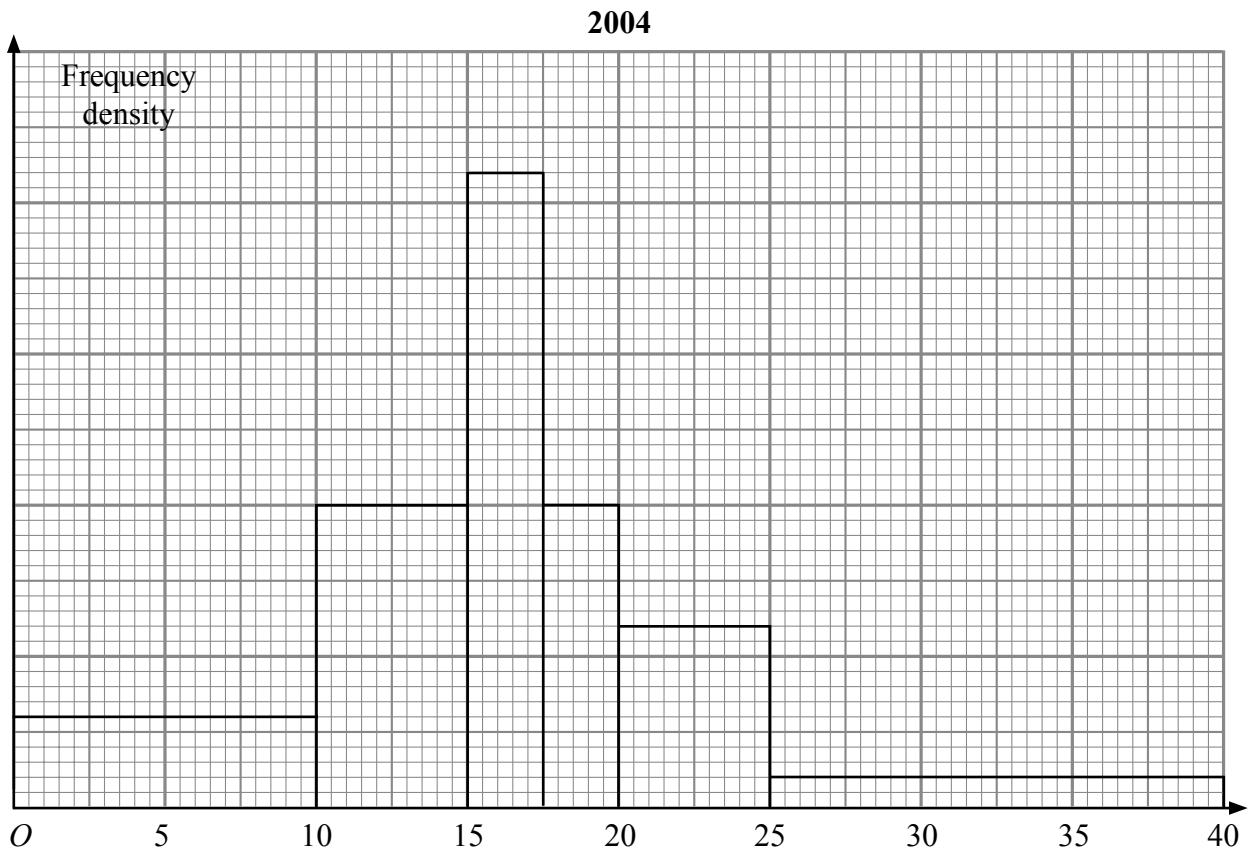


The histogram shows information about the time it took some children to connect to the internet.
None of the children took more than 40 seconds to connect to the internet.

110 children took up to 12.5 seconds to connect to the internet.

(c) Work out an estimate for the number of children who took 21 seconds or more to connect to the internet.

.....

(3) **Q19**

(Total 7 marks)

Turn over

Leave blank

20. (a) Write down the value of $8^{\frac{1}{3}}$

.....
(1)

$8\sqrt{8}$ can be written in the form 8^k

(b) Find the value of k.

$k =$ .....
(1)

$8\sqrt{8}$ can also be expressed in the form $m\sqrt{2}$ where m is a positive integer.

(c) Express $8\sqrt{8}$ in the form $m\sqrt{2}$

.....
(2)

(d) Rationalise the denominator of $\frac{1}{8\sqrt{8}}$

Give your answer in the form $\frac{\sqrt{2}}{p}$ where p is a positive integer.

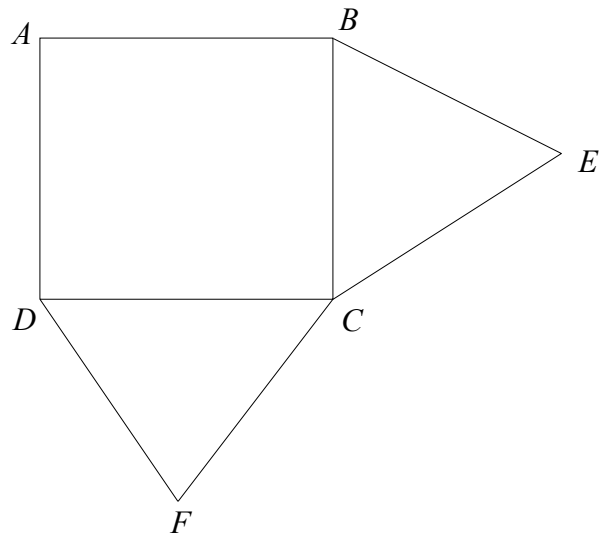
.....
(2) **Q20**

(Total 6 marks)

Leave blank

21.

Diagram **NOT** accurately drawn



ABCD is a square.
BEC and *DCF* are equilateral triangles.

(a) Prove that triangle *ECD* is congruent to triangle *BCF*.

(3)

G is the point such that *BEGF* is a parallelogram.

(b) Prove that *ED* = *EG*

(2) **Q21**

(Total 5 marks)

Turn over

Leave blank

22.

$$P = \frac{n^2 + a}{n + a}$$

Rearrange the formula to make a the subject.

$a =$ .....

Q22

(Total 4 marks)

23. (a) Factorise $2x^2 - 7x + 6$

.....

(2)

(b) (i) Factorise fully $(n^2 - a^2) - (n - a)^2$

.....

n and a are integers.

(ii) Explain why $(n^2 - a^2) - (n - a)^2$ is always an even integer.

.....

.....

.....

(4)

Q23

(Total 6 marks)

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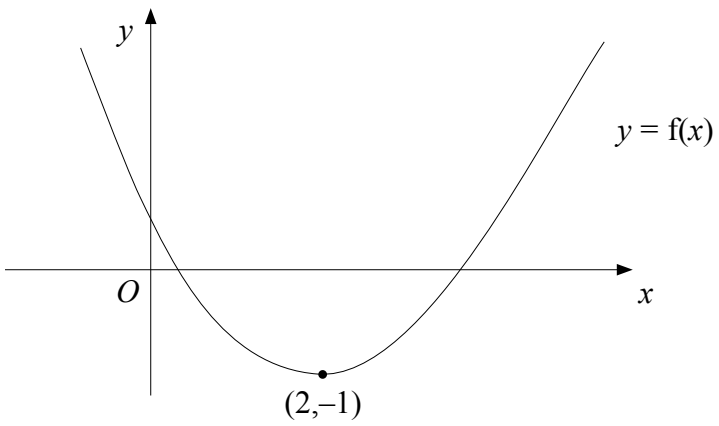
24.



The diagram shows part of the curve with equation $y = f(x)$
The minimum point of the curve is at (2,–1)

(a) Write down the coordinates of the minimum point of the curve with equation

(i) $y = f(x + 2)$

.....

(ii) $y = 3f(x)$

.....

(iii) $y = f(2x)$

.....

(3)

The curve $y = f(x)$ is reflected in the y axis.

(b) Find the equation of the curve following this transformation.

$y =$ .....

(1)

The curve with equation $y = f(x)$ has been transformed to give the curve with equation $y = f(x) + 2$

(c) Describe the transformation.

.....

(1)

Q24

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

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