

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

Paper Reference(s)

**5525/05**

**Edexcel GCSE  
Mathematics A – 1387**

Paper 5 (Non-Calculator)

**Higher Tier**

Monday 5 June 2006 – Afternoon

Time: 2 hours



Examiner's use only

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Team Leader's use only

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**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.

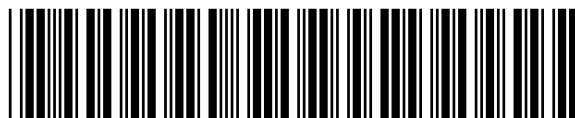
Work steadily through the paper. Do not spend too long on one question.

If you cannot answer a question, leave it and attempt the next one.

Return at the end to those you have left out.

Lots more free papers at:

<http://bland.in>



*Turn over*

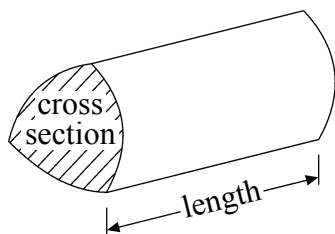
edexcel

## GCSE Mathematics 1387/8

Formulae: Higher Tier

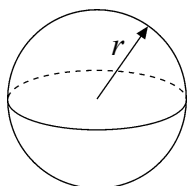
**You must not write on this formulae page.  
Anything you write on this formulae page will gain NO credit.**

**Volume of a prism** = area of cross section  $\times$  length



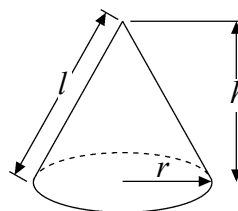
**Volume of sphere** =  $\frac{4}{3} \pi r^3$

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

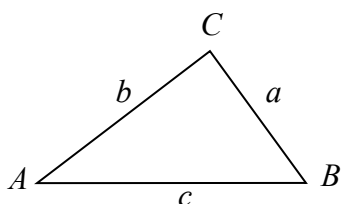


**Volume of cone** =  $\frac{1}{3} \pi r^2 h$

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



**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  $x$ .

$x = \dots\dots\dots$   
**(2)**

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

$\dots\dots\dots$   
**(3)**

**(Total 5 marks)**

**Q1**

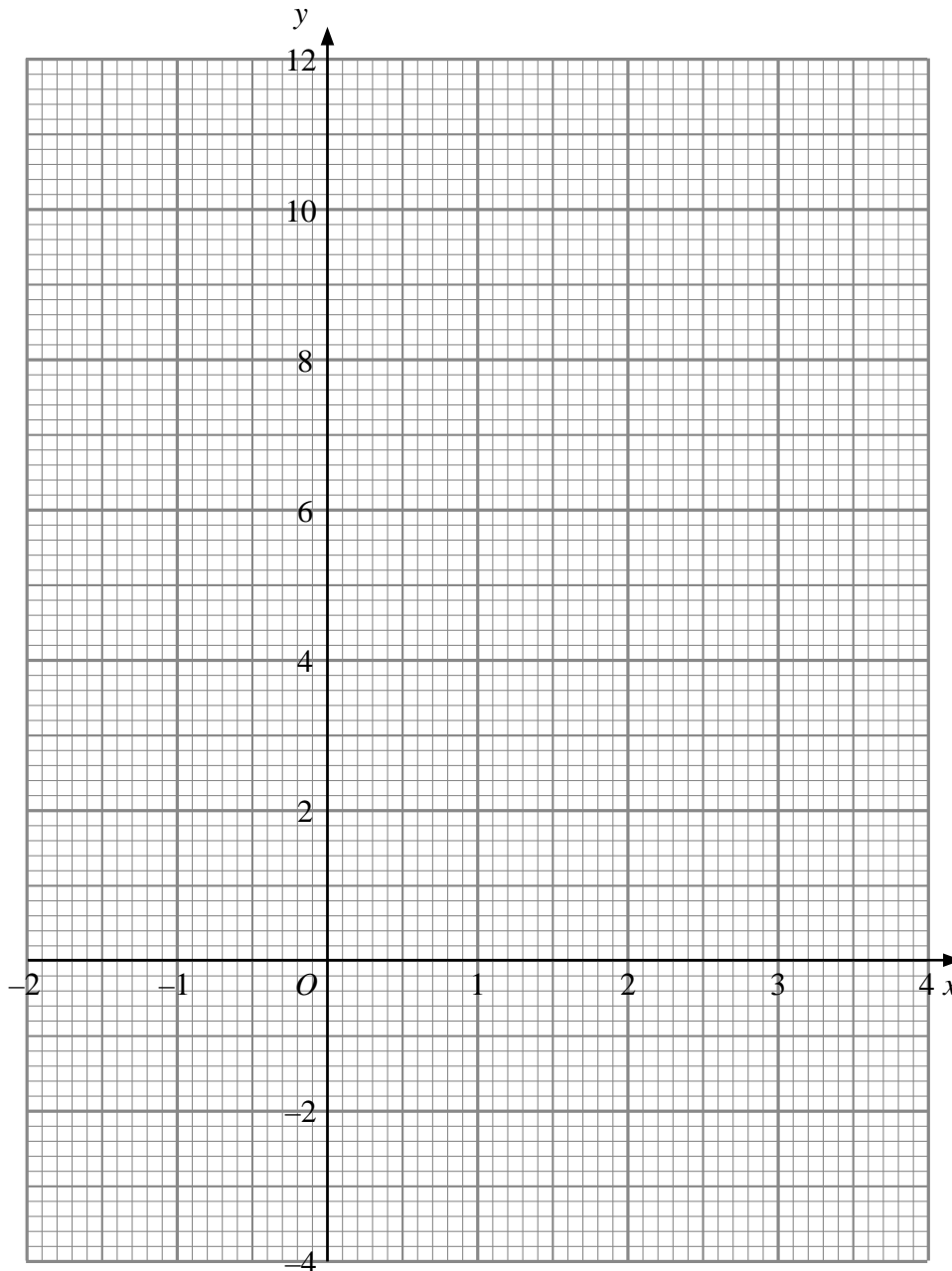


2. (a) Complete the table of values for  $y = x^2 - 3x + 1$

$x$	-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  $y = 3$

$x = \dots\dots\dots$

$x = \dots\dots\dots$

(2)

Q2

(Total 6 marks)



3. A silver chain has a volume of  $5 \text{ cm}^3$ .  
The density of silver is  $10.5 \text{ grams per cm}^3$ .

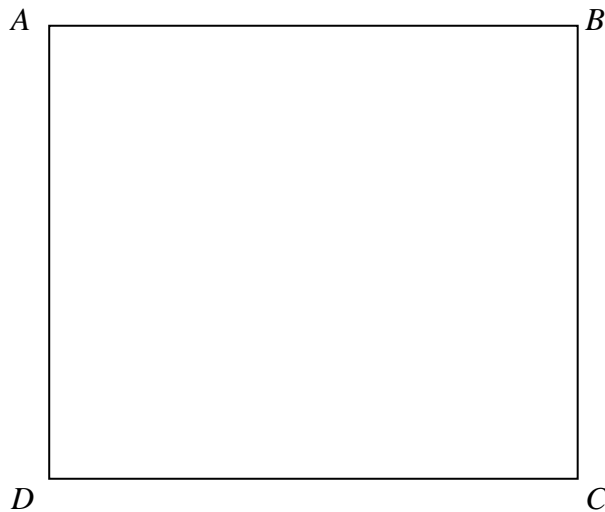
Work out the mass of the silver chain.

..... grams

(Total 2 marks)

Q3

4.



$ABCD$  is a rectangle.

Shade the set of points inside the rectangle which are **both**

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

(Total 4 marks)

Q4



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
$0 < t \leq 40$	8
$40 < t \leq 80$	12
$80 < t \leq 120$	14
$120 < t \leq 160$	16
$160 < t \leq 200$	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.

.....

**Q5**

**(Total 2 marks)**

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

.....

**Q6**

**(Total 3 marks)**



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)

(Total 2 marks)

Q7

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.

(Total 2 marks)

Q8



9. Write in standard form

(a) 456 000

.....  
(1)

(b) 0.00034

.....  
(1)

(c)  $16 \times 10^7$

.....  
(1)

(Total 3 marks)

Q9

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

.....  
(2)

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

$x =$  .....  
or  $x =$  .....  
(1)

(Total 3 marks)

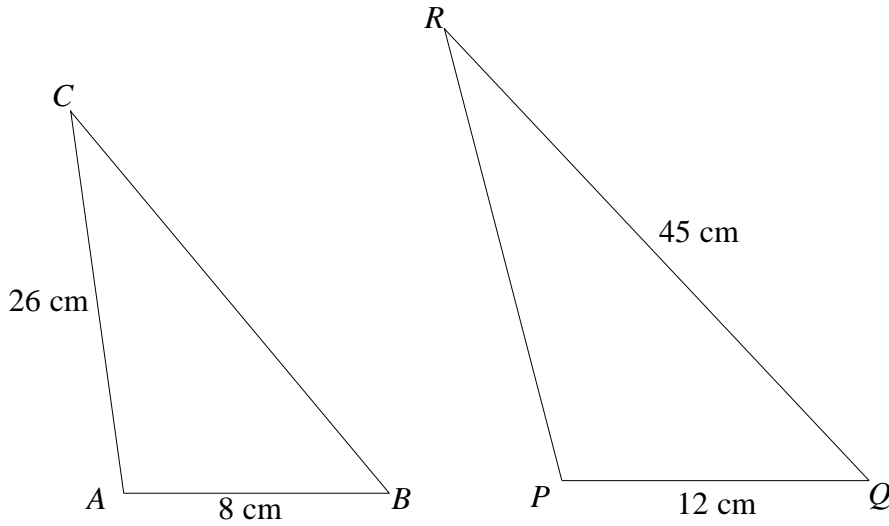
Q10





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  $BC$ .

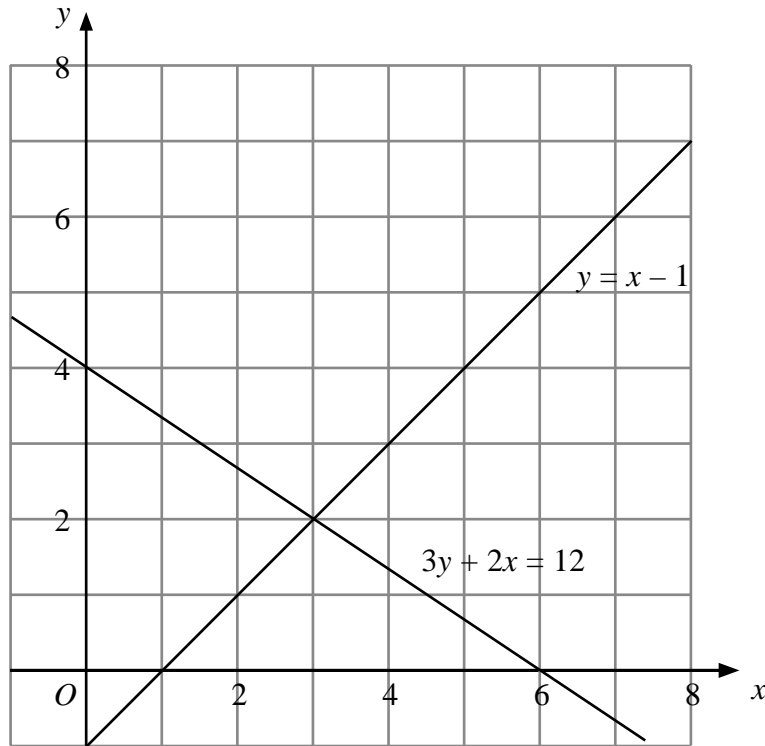
..... cm  
(2)

Q11

(Total 4 marks)



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

$$\begin{aligned} 3y + 2x &= 12 \\ y &= x - 1 \end{aligned}$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(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)

Q12

(Total 4 marks)



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)

(Total 3 marks)

Q13



14. A company tested 100 batteries.

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

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

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

(1)

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

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

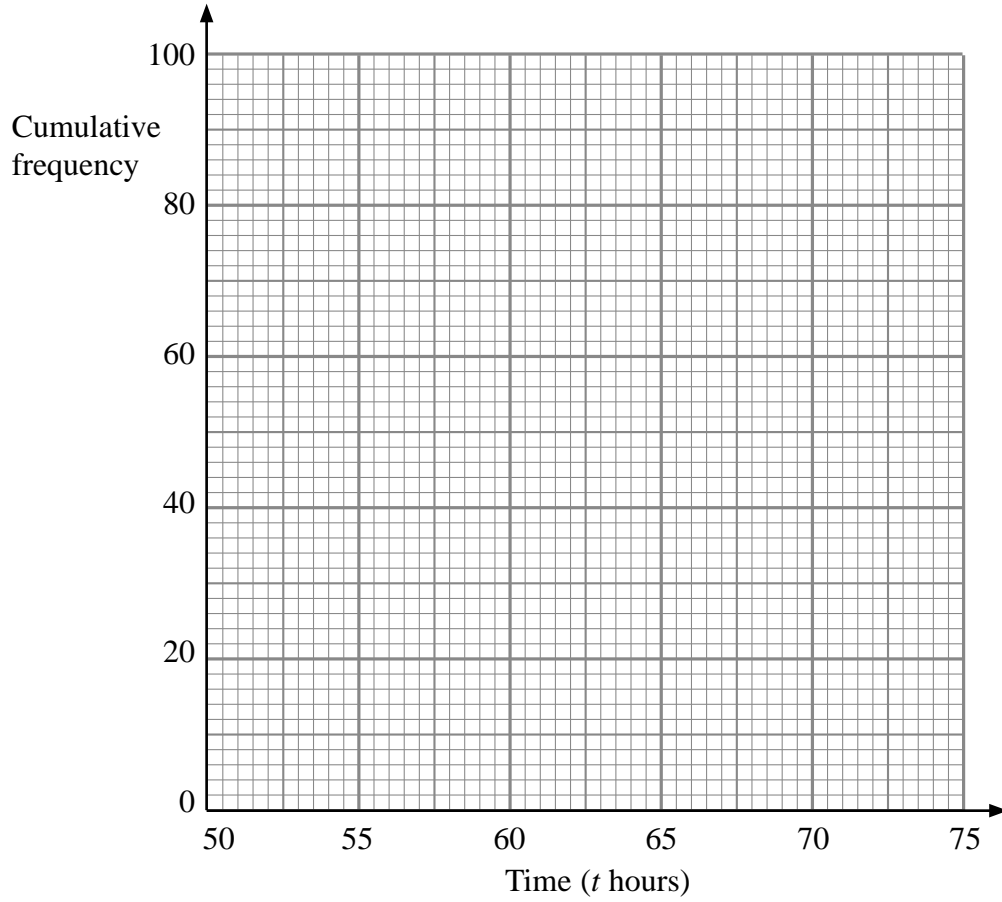
(2)

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

.....  
(2)



Leave blank



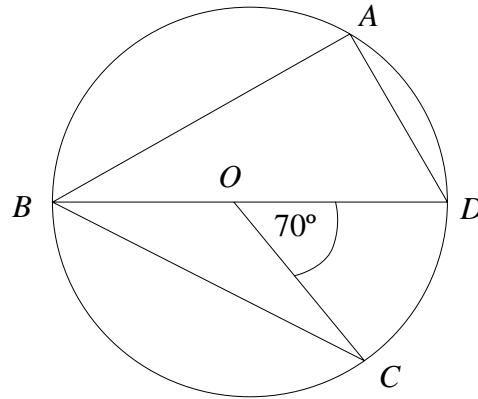
Q14

(Total 5 marks)



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  $COD = 70^\circ$

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

.....<sup>o</sup>  
 (2)

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

.....<sup>o</sup>  
 (2)

(Total 4 marks)

Q15



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  $m = 400$

$$T = \dots\dots\dots (3)$$

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  $P = 900$

$$T = \dots\dots\dots (3)$$

(Total 6 marks)

Q16



17.

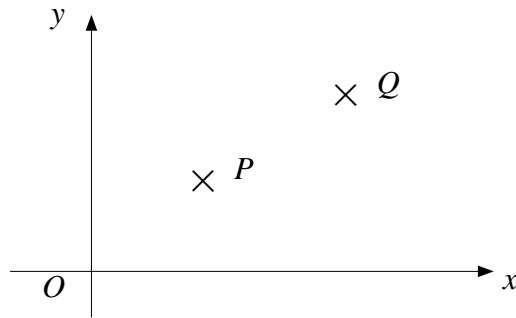


Diagram **NOT** accurately drawn

The diagram is a sketch.

$P$  is the point  $(2, 3)$

$Q$  is the point  $(6, 6)$

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

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

$\begin{pmatrix} \phantom{x} \\ \phantom{y} \end{pmatrix}$   
.....  
(2)

$PQRS$  is a parallelogram.

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

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

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

$\begin{pmatrix} \phantom{x} \\ \phantom{y} \end{pmatrix}$   
.....  
(2)

(Total 4 marks)

Q17





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

$x = \dots\dots\dots$   
(2)

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

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

$y = \dots\dots\dots$   
or  $y = \dots\dots\dots$   
(3)

(Total 5 marks)

Q18



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

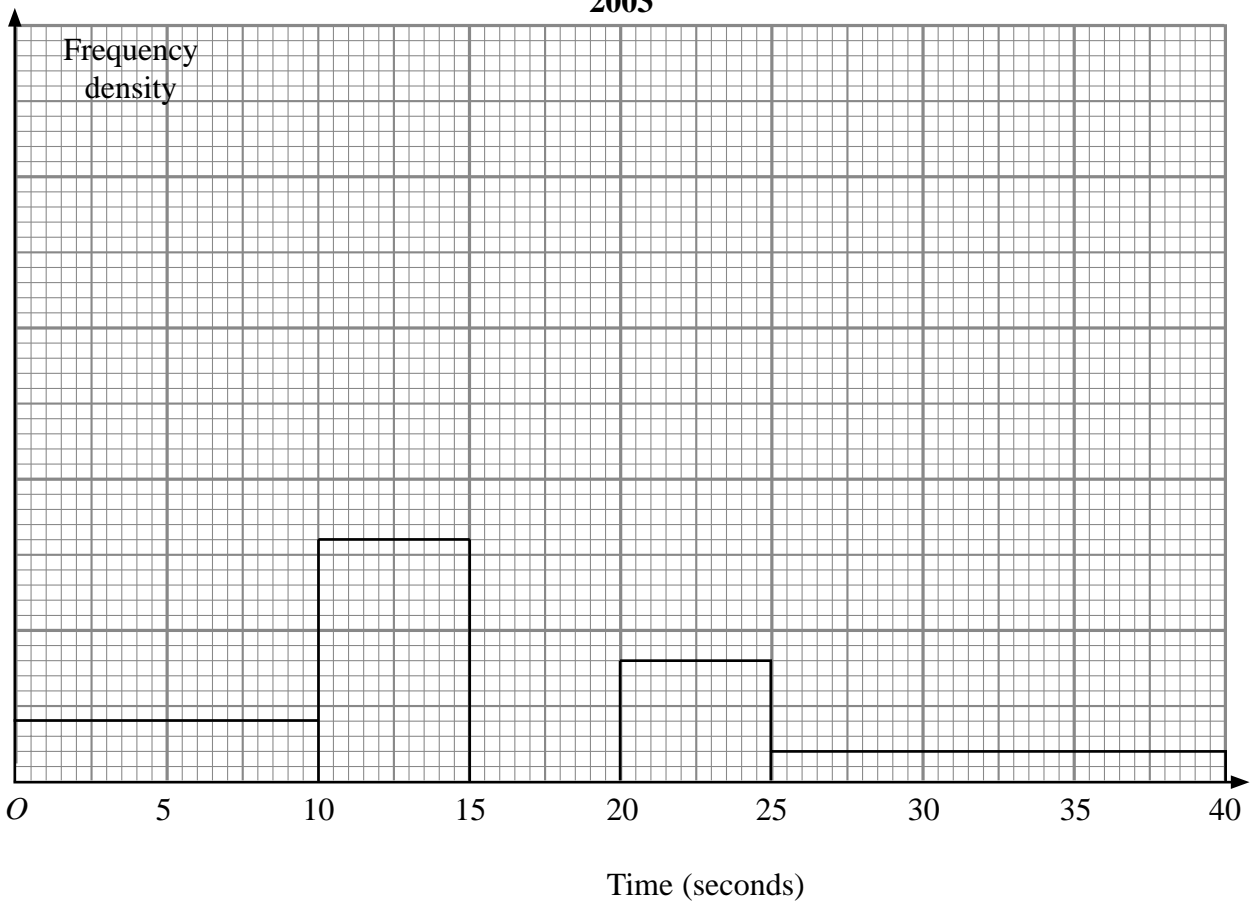
Time ( $t$ seconds)	Frequency
$0 < t \leq 10$	20
$10 < t \leq 15$	
$15 < t \leq 17.5$	30
$17.5 < t \leq 20$	40
$20 < t \leq 25$	
$25 < t < 40$	

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

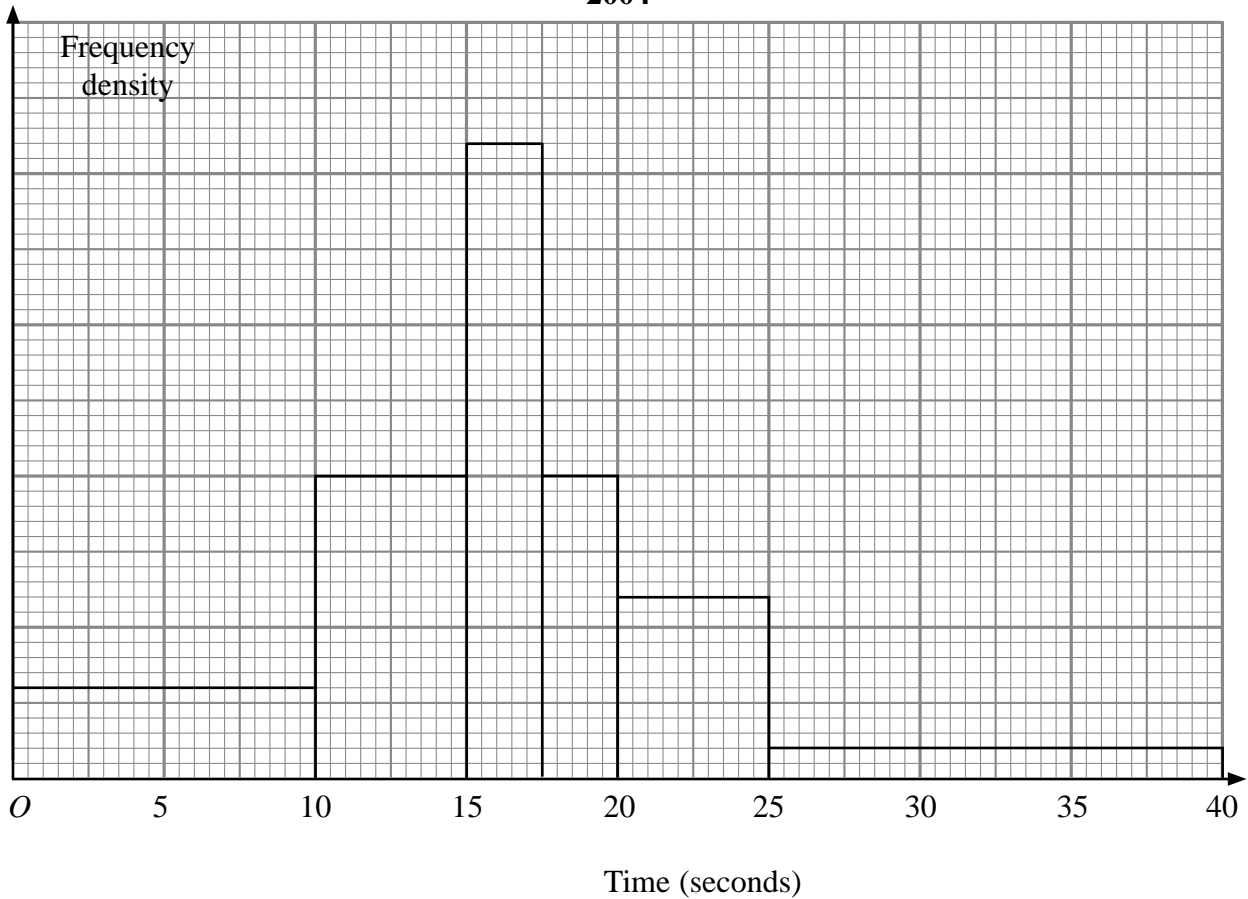
(a) Use the table to complete the histogram. (2)

(b) Use the histogram to complete the table. (2)

**2003**



2004



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)



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)

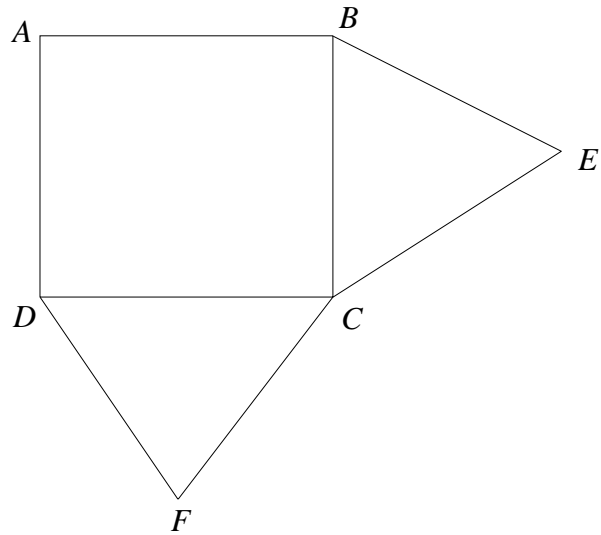
(Total 6 marks)

Q20



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)



22.

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

Rearrange the formula to make  $a$  the subject.

$a = \dots\dots\dots$

**(Total 4 marks)**

**Q22**

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

$\dots\dots\dots$   
**(2)**

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

$\dots\dots\dots$

$n$  and  $a$  are integers.

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

$\dots\dots\dots$   
 $\dots\dots\dots$   
 $\dots\dots\dots$

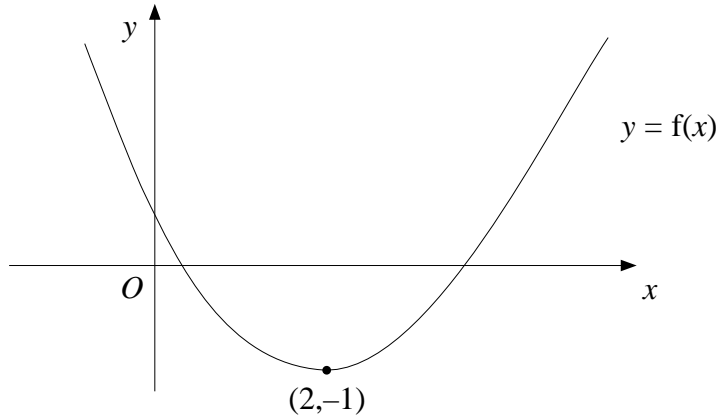
**(4)**

**(Total 6 marks)**

**Q23**



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**

**END**



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