

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

For Examiner's Use
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General Certificate of Secondary Education  
November 2006



**MATHEMATICS (SPECIFICATION A)**  
**Intermediate Tier**  
**Paper 2 Calculator**

**3301/2I**

Friday 10 November 2006 9.00 am to 11.00 am

<p><b>For this paper you must have:</b></p> <ul style="list-style-type: none"> <li>• a calculator</li> <li>• mathematical instruments.</li> </ul>	
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For Examiner's Use	
Pages	Mark
3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22	
TOTAL	
Examiner's Initials	

Time allowed: 2 hours

**Instructions**

- Use blue or black ink or ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Use a calculator where appropriate.
- Do all rough work in this book.
- If your calculator does not have a  $\pi$  button, take the value of  $\pi$  to be 3.14 unless another value is given in the question.

**Information**

- The maximum mark for this paper is 100.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. They must be tagged securely to this answer booklet.

**Advice**

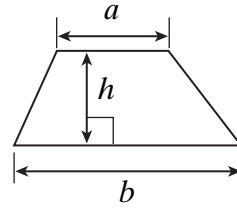
- In all calculations, show clearly how you work out your answer.

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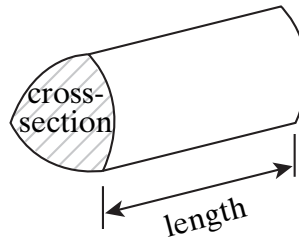
**Formulae Sheet: Intermediate Tier**

You may need to use the following formulae:

**Area of trapezium** =  $\frac{1}{2}(a+b)h$



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



Answer **all** questions in the spaces provided.

1 (a) Work out  $5^3$

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Answer ..... (1 mark)

(b) Work out  $2.4 \div 1.8^2$

(i) Write down the full calculator display.

Answer ..... (1 mark)

(ii) Give your answer to the nearest whole number.

Answer ..... (1 mark)

2 The table shows the conversion between gallons and litres.

1 gallon = 4.55 litres
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(a) Convert 8 gallons to litres.

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Answer ..... litres (2 marks)

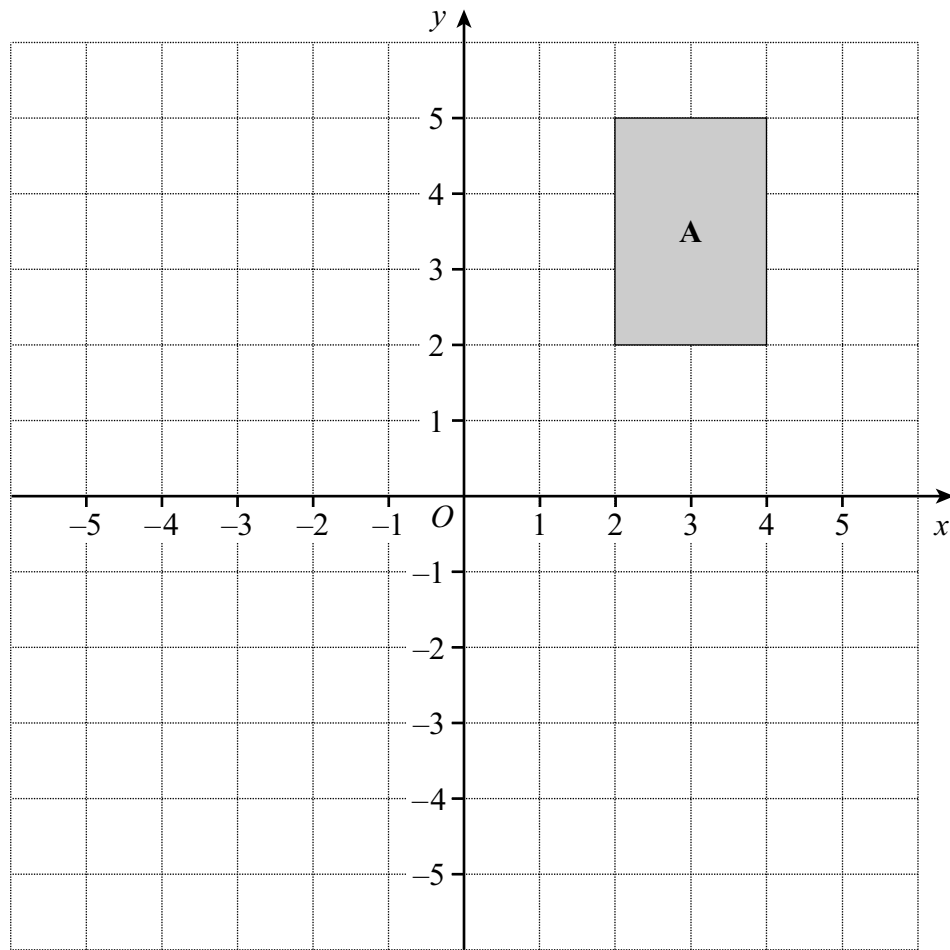
(b) Convert 40 litres to gallons.

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Answer ..... gallons (2 marks)

- 3 The diagram shows rectangle **A** which measures 2 cm by 3 cm.



- (a) Rectangle **A** is enlarged by scale factor 4.  
Write down the length and width of the new rectangle.

Answer Length ..... cm Width ..... cm (2 marks)

- (b) Draw the position of rectangle **A** after a rotation of  $90^\circ$  anticlockwise about the origin.  
(3 marks)

- 4 Matthew is investigating the costs of using a mobile phone.  
He finds that there are two methods of paying for his phone calls.

<b>Contract</b>
£14 a month fixed charge
30 minutes of free calls then 10p per minute

<b>Pay as you go</b>
No fixed charge
No free minutes 40p per minute

Matthew expects to spend 150 minutes using a mobile phone each month.

Which method is cheaper, 'Contract' or 'Pay as you go'?

You **must** show your working.

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Answer ..... (4 marks)

- 5 (a) Find the value of  $7x + 2y$  when  $x = 3$  and  $y = -5$

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Answer ..... (2 marks)

- (b) Find the value of  $4x^2 - 5$  when  $x = 3$

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Answer ..... (2 marks)

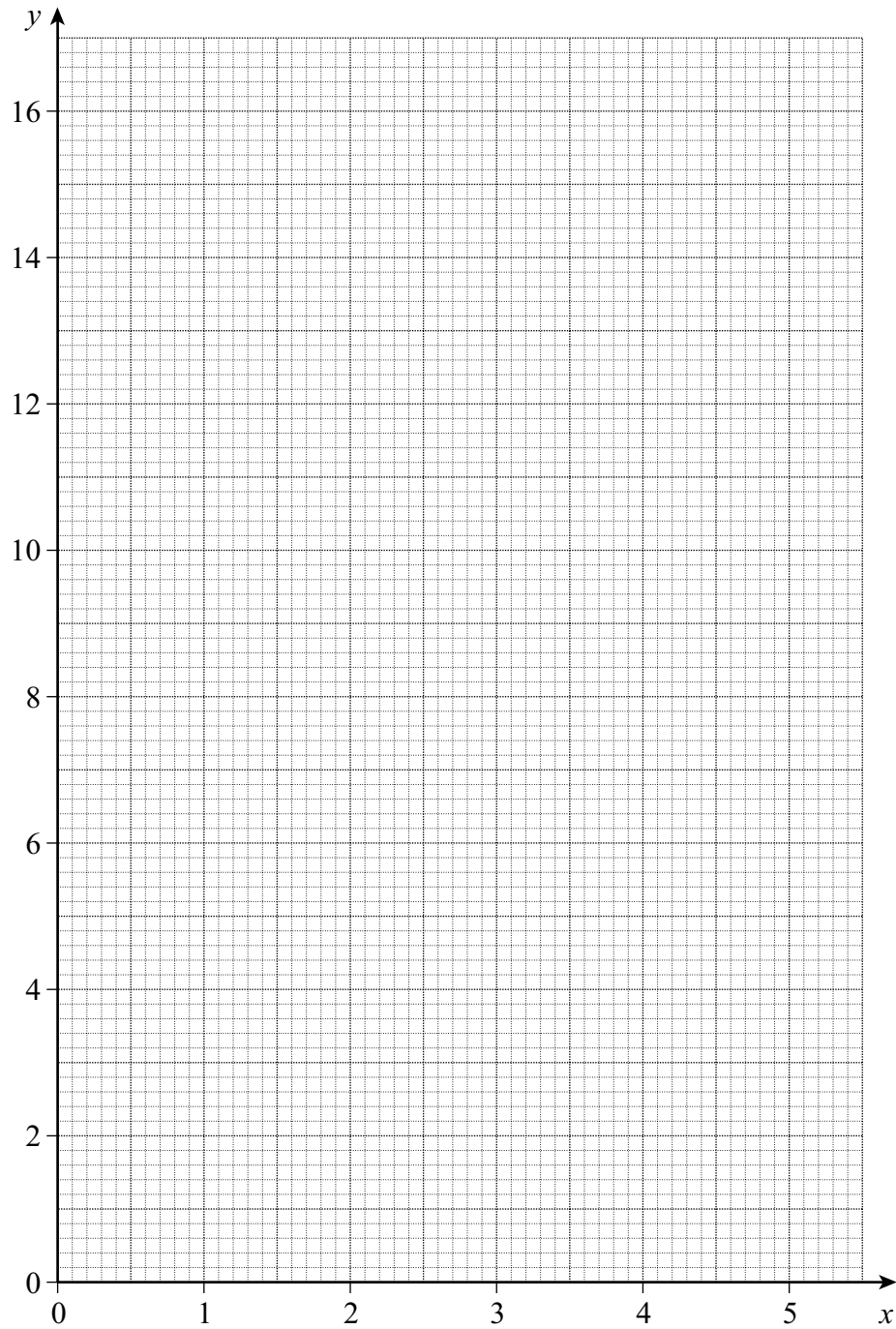
6 On the grid draw the line  $y = 2x + 5$  for values of  $x$  from 0 to 5.

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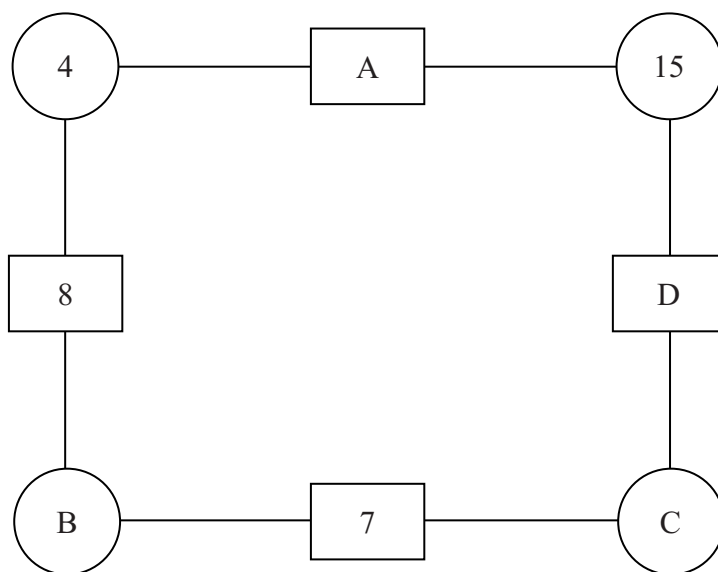
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(3 marks)

- 7 The letters A, B, C and D represent four different numbers.  
The number in each rectangle is the sum of the two numbers in the circles that are joined to it.



Find A, B, C and D.

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Answer    A = .....

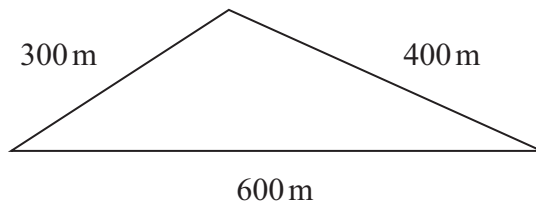
              B = .....

              C = .....

              D = .....

(4 marks)

- 8 A plot of land is in the shape of a triangle with sides 300 m, 400 m and 600 m. The sketch shows the plot of land.



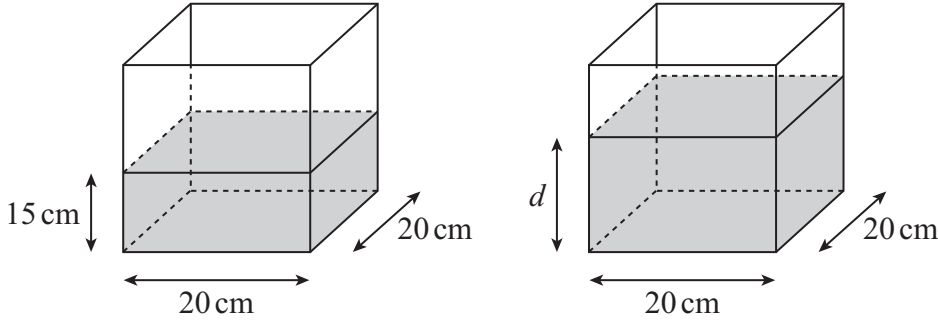
Not drawn accurately

Draw the triangle accurately, using a scale of 1 cm to 50 m.

(3 marks)



- 9 A water container is in the shape of a cuboid. Its base is 20 cm by 20 cm and the depth of the water in the container is 15 cm. Tony adds  $1000\text{ cm}^3$  of water to the container.



Calculate the new depth,  $d$ , of the water, in centimetres.

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Answer ..... cm (4 marks)

**Turn over for the next question**

10 The two-way table shows the gender and eye colour of 28 children.

		Eye colour		
		Blue	Brown	Green
Gender	Boy	5	4	4
	Girl	7	5	3

(a) A child is chosen at random from the class.  
Find the probability that the child

(i) is a boy

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Answer ..... (1 mark)

(ii) has green eyes

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Answer ..... (1 mark)

(iii) is a boy **or** has green eyes

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Answer ..... (1 mark)

(b) John writes the following in his Maths book.

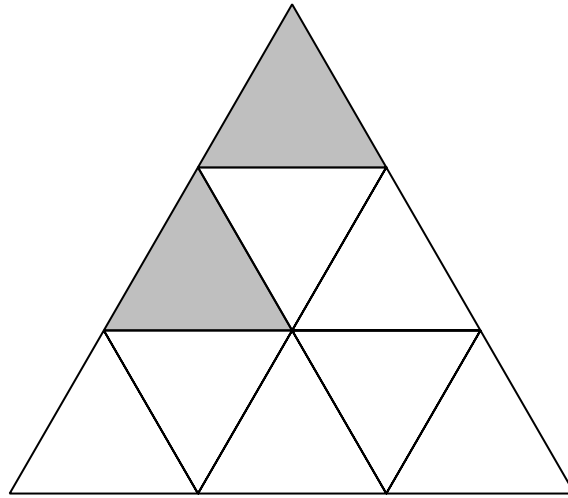
There are 12 children with blue eyes.  
 There are 15 girls.  
 $12 + 15 = 27$   
 So, the probability of a child being a girl **or** having blue eyes is  $\frac{27}{28}$

Explain what is wrong with John's work.

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(1 mark)

- 11 The diagram shows an equilateral triangle made up of smaller equilateral triangles. Two of the smaller triangles are shaded.



Shade **four more** smaller triangles so that the final shape has rotational symmetry of order 3. (2 marks)

- 12 Solve the equations

(a)  $4x + 7 = 21$

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Answer  $x =$  ..... (2 marks)

(b)  $6y + 7 = 14y$

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Answer  $y =$  ..... (2 marks)

13 Here are the  $n$ th terms of 3 sequences.

Sequence 1	$n$ th term	$4n + 1$
Sequence 2	$n$ th term	$3n + 3$
Sequence 3	$n$ th term	$3n - 1$

For each sequence state whether the numbers in the sequence are

- A Always multiples of 3
- S Sometimes multiples of 3
- N Never multiples of 3

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Answer    Sequence 1 .....

                  Sequence 2 .....

                  Sequence 3 .....

*(3 marks)*

- 14 Last year the Tate Modern Art Gallery in London had 5.2 million visitors. The gallery was open every day of the year except for 24th, 25th and 26th of December. The advertising department produces a poster.

**Tate Modern**  
**One of London's top attractions**

Each day in 2005  
there were, on  
average, over

visitors.  
**Why not join them ?**

Calculate an appropriate number to write in the box to show the average number of visitors each day.

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*(2 marks)*

**Turn over for the next question**

15 The number of eggs in 90 nests is shown in the table.

Number of eggs per nest	Frequency
0	10
1	16
2	35
3	15
4	14

Calculate the mean number of eggs per nest.

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Answer ..... (3 marks)

16 A car produces 2.78 kg of carbon dioxide per hour when driven in a city.  
The car travels 30 miles in a city at an average speed of 20 mph.  
How much carbon dioxide does the car produce during its journey?

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Answer ..... kg (3 marks)

- 17 A survey was taken of the amount of money spent at a supermarket by 100 shoppers on a Monday. The table shows the results.

Amount spent, $m$ , (£)	Frequency
$0 < m \leq 40$	18
$40 < m \leq 80$	34
$80 < m \leq 120$	40
$120 < m \leq 160$	8

Which class interval contains the median?  
You **must** show your working.

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Answer .....  $< m \leq$  ..... (2 marks)

**Turn over for the next question**

18 (a) Solve the inequality  $3(x - 2) \leq 9$

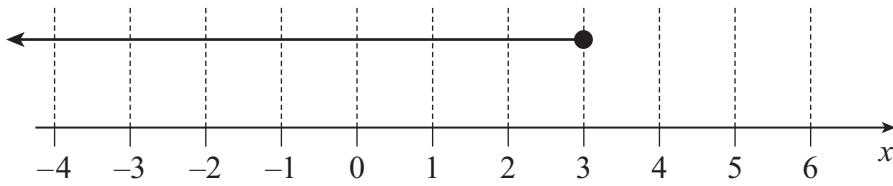
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Answer ..... (3 marks)

(b) The inequality  $x \leq 3$  is shown on the number line below.



Draw another inequality on the number line so that only the following integers satisfy both inequalities

$\{-2, -1, 0, 1, 2, 3\}$

(1 mark)



19 The table shows the consumption of water per person on average each day during various years.

Year	1960	1976	2004	2021
Consumption (litres)		110	150	

(a) A 26% increase in consumption is predicted from 2004 to 2021.  
Calculate the predicted consumption in 2021.

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Answer ..... litres (3 marks)

(b) Calculate the percentage increase in consumption from 1976 to 2004.

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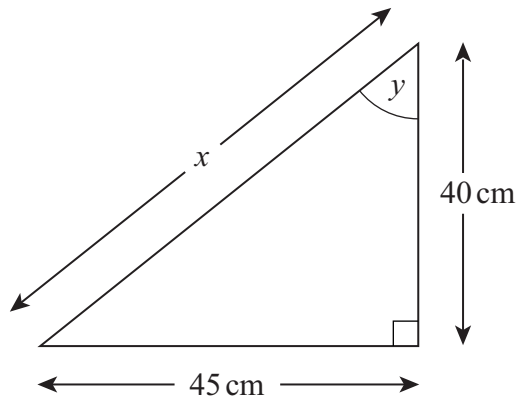
Answer ..... % (3 marks)

(c) The consumption in 1976 was 20% more than the consumption in 1960.  
Calculate the consumption in 1960.

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Answer ..... litres (3 marks)

20 A right-angled triangle has the dimensions shown.



Not drawn accurately

- (a) Calculate the length  $x$ .  
Give your answer to a suitable degree of accuracy.

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Answer ..... cm (4 marks)

- (b) Calculate the size of angle  $y$ .  
Show your working.

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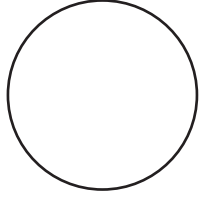
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Answer ..... degrees (3 marks)

- 21 A child's toy has circular pegs and square holes.  
The area of each circle is  $8 \text{ cm}^2$ .  
The area of each square is  $9 \text{ cm}^2$ .



Not drawn accurately

Will the circular peg fit into the square hole?  
You **must** show your working.

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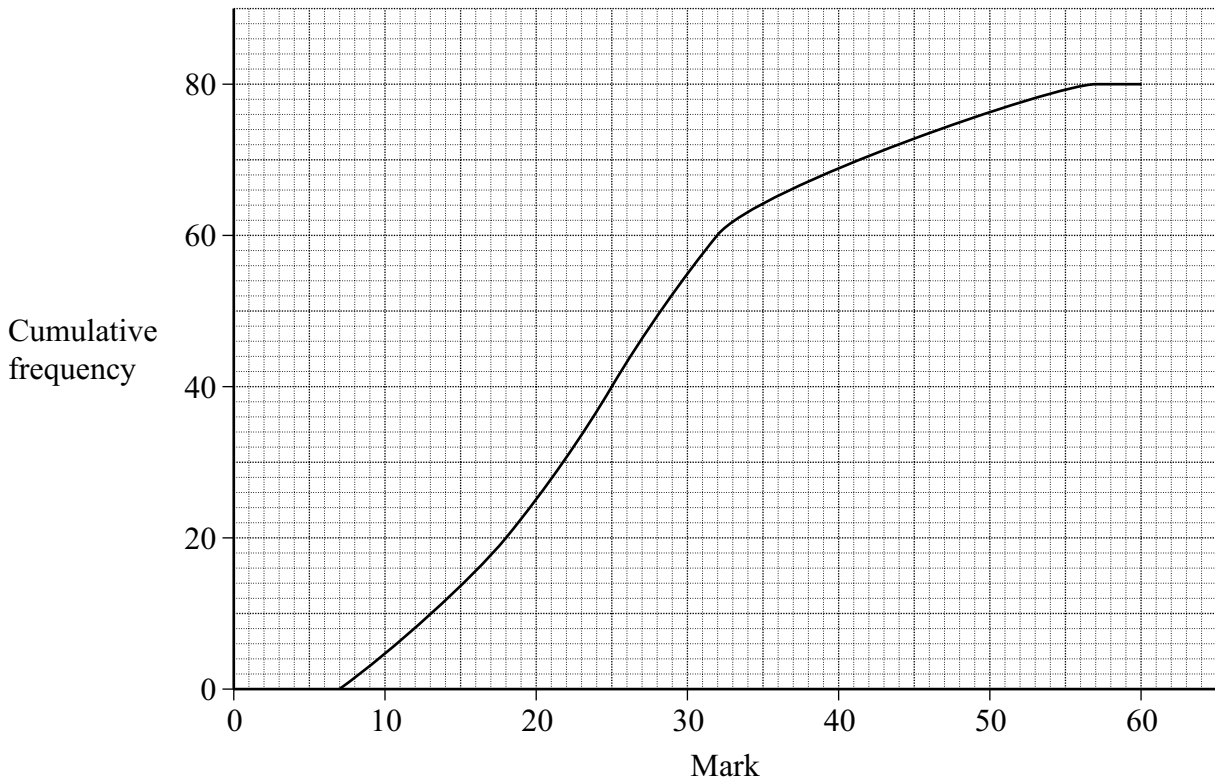
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(4 marks)

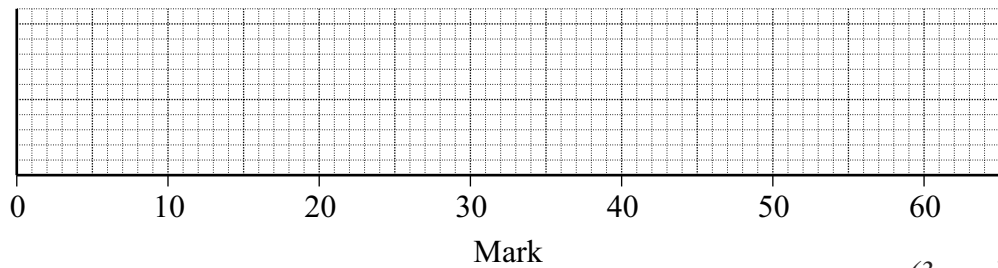
**Turn over for the next question**

Turn over 

22 The cumulative frequency diagram shows the distribution of marks for 80 students in a Geography examination.



- (a) The lowest mark is 8.  
The highest mark is 57.  
Draw a box plot for this data.



(3 marks)

- (b) What percentage of students scored less than the lower quartile mark?

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Answer ..... % (1 mark)



- 24 (a) Calculate the value of  $(5.24 \times 10^7) \times (8.26 \times 10^6)$   
Give your answer in standard form.

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Answer ..... (2 marks)

- (b) Calculate the value of  $(6.04 \times 10^{11}) \div (2.17 \times 10^{-5})$   
Give your answer in standard form.

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Answer ..... (2 marks)

- 25 A prism has the following properties.

Area of cross-section	$0.6 \text{ m}^2$
Mass	15 kg
Density	$20 \text{ kg per m}^3$

Calculate the length of the prism.

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Answer ..... m (4 marks)

**END OF QUESTIONS**

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