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Centre Number						Candidate Number					
Candidate Signature											

For Examiner's Use
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General Certificate of Secondary Education  
November 2007



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

**3301/2I**

Friday 9 November 2007 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 book.

**Advice**

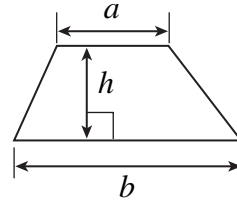
- In all calculations, show clearly how you work out your answer.

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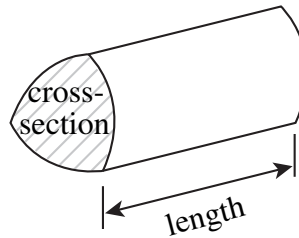
**Formulae Sheet: Intermediate Tier**

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 Two pounds of powder are mixed with one gallon of water to make paint.

16 ounces = 1 pound.

- (a) How many ounces of powder are mixed with one gallon of water?

.....

Answer ..... ounces (1 mark)

- (b) 8 pints = 1 gallon.

How many ounces of powder are mixed with one pint of water?

.....

.....

Answer ..... ounces (2 marks)

- 2 (a) Calculate the cube of 47.

.....

Answer ..... (1 mark)

- (b) Calculate  $3.1^5$

.....

Answer ..... (1 mark)

Turn over ►

- 3 (a) Complete the table to describe these quadrilaterals.

	Square	Trapezium	Rhombus
Number of equal sides	4	0	
Diagonals always equal in length	Yes		No
Number of pairs of parallel sides	2		

(3 marks)

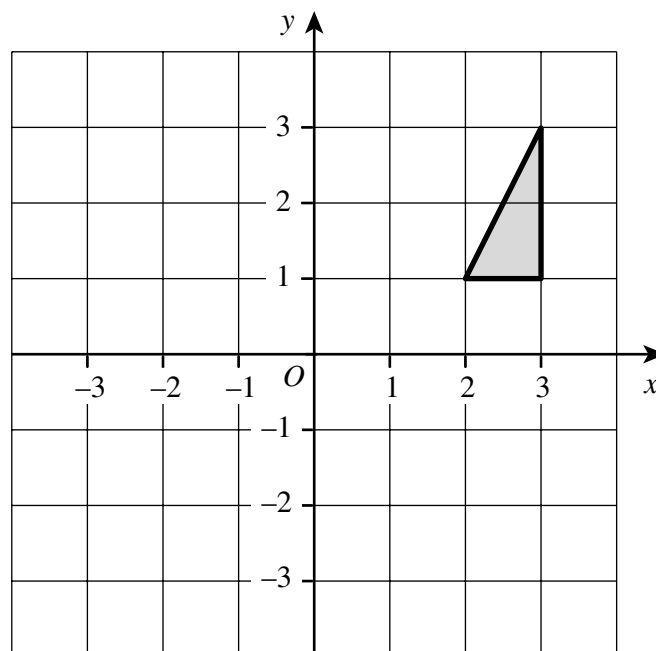
- (b) Two **different** isosceles triangles have bases of the same length. The bases are joined to form a quadrilateral.

What is the name of this type of quadrilateral?

Answer .....

(1 mark)

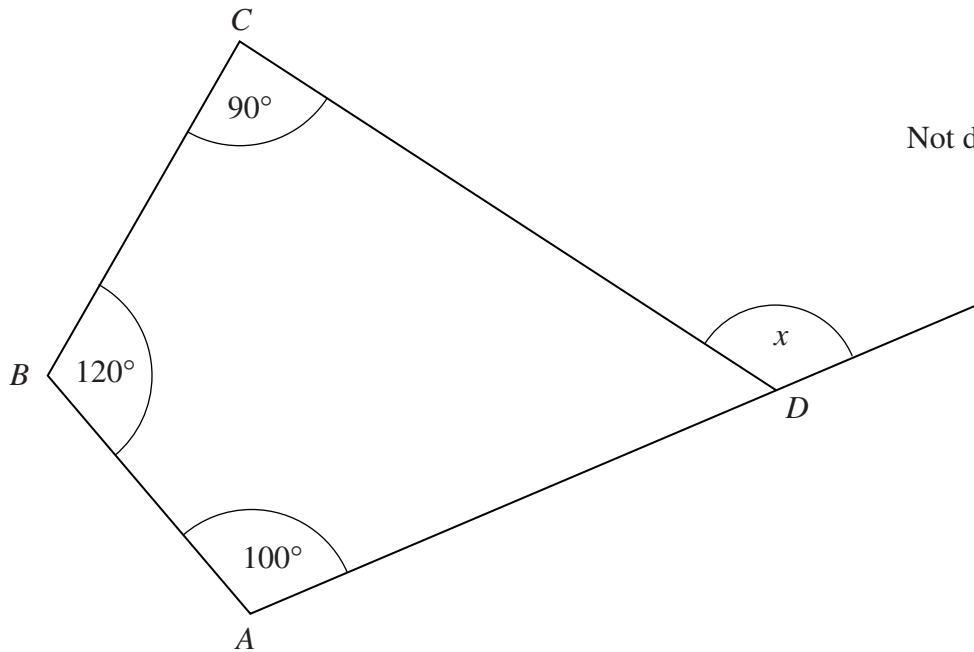
4



Rotate the triangle  $90^\circ$  clockwise about the origin.

(2 marks)

- 5  $ABCD$  is a quadrilateral.  
The side  $AD$  is extended.



Work out the size of angle  $x$ .

.....

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.....

Answer ..... degrees (3 marks)

**Turn over for the next question**

Turn over ►

- 6 (a) A circular lawn has a radius of 2.7 m.

Calculate the area of the lawn.

.....

.....

Answer ..... m<sup>2</sup> (2 marks)

- (b) (i) Convert 80 cm to metres.

Answer ..... m (1 mark)

- (ii) A rectangle measures 80 cm by 60 cm.

Find the area of the rectangle.

Give your answer in m<sup>2</sup>.

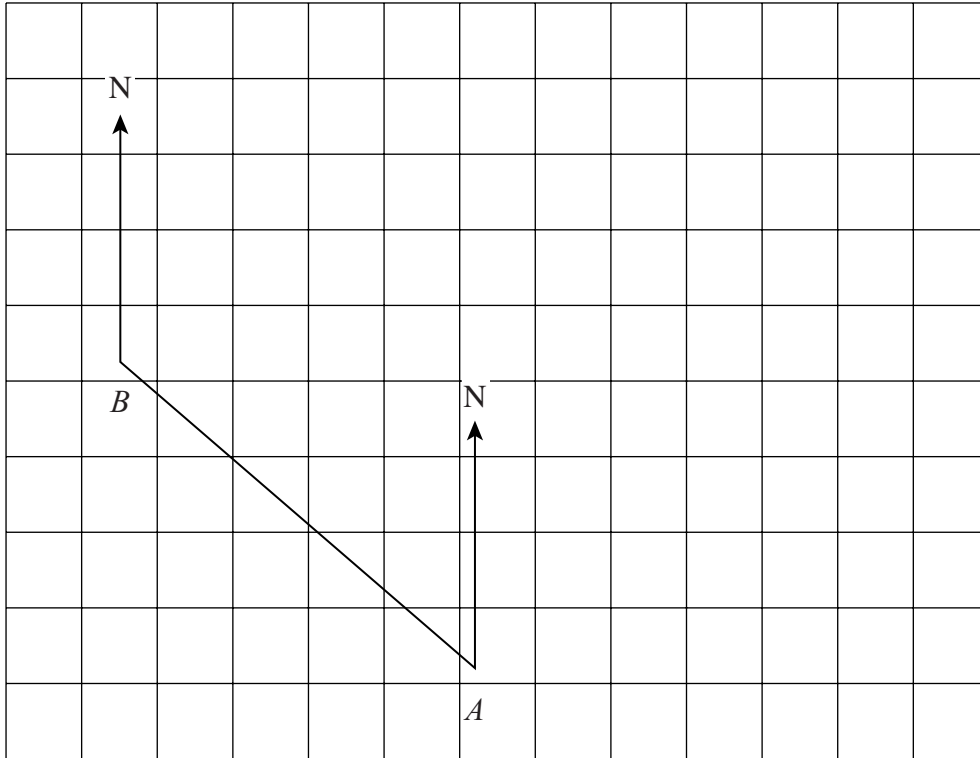
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Answer ..... m<sup>2</sup> (2 marks)

7 The diagram shows two points *A* and *B*.



(a) Measure the bearing of *A* from *B*.

Answer ..... degrees (1 mark)

(b) Point *C* is on a bearing of  $065^\circ$  from *A*.  
Point *C* is also on a bearing of  $105^\circ$  from *B*.

Mark the position of point *C* on the diagram.

(2 marks)

- 8 A road has 30 houses.  
The number of letters delivered to each house on one day is given in the frequency table.

Number of letters	Frequency
0	4
1	6
2	4
3	3
4	7
5	6

- (a) Calculate the mean number of letters delivered to each house.

.....  
 .....  
 .....  
 .....

Answer ..... (3 marks)

- (b) A house is chosen at random.

What is the probability that it has more than 3 letters delivered?

.....  
 .....

Answer ..... (2 marks)

- 9 An apple costs  $a$  pence.  
A banana costs  $b$  pence.

Draw lines to match each statement with the amount in pence.

Statement

Amount in pence

Cost of 7 apples

$$a + 7$$

$$7a$$

$$8a + b$$

Cost of 8 apples and 8 bananas

$$8a + 8b$$

$$2 - 6b$$

Change in pence when you use a  
£2 coin to pay for 6 bananas

$$200 - 6b$$

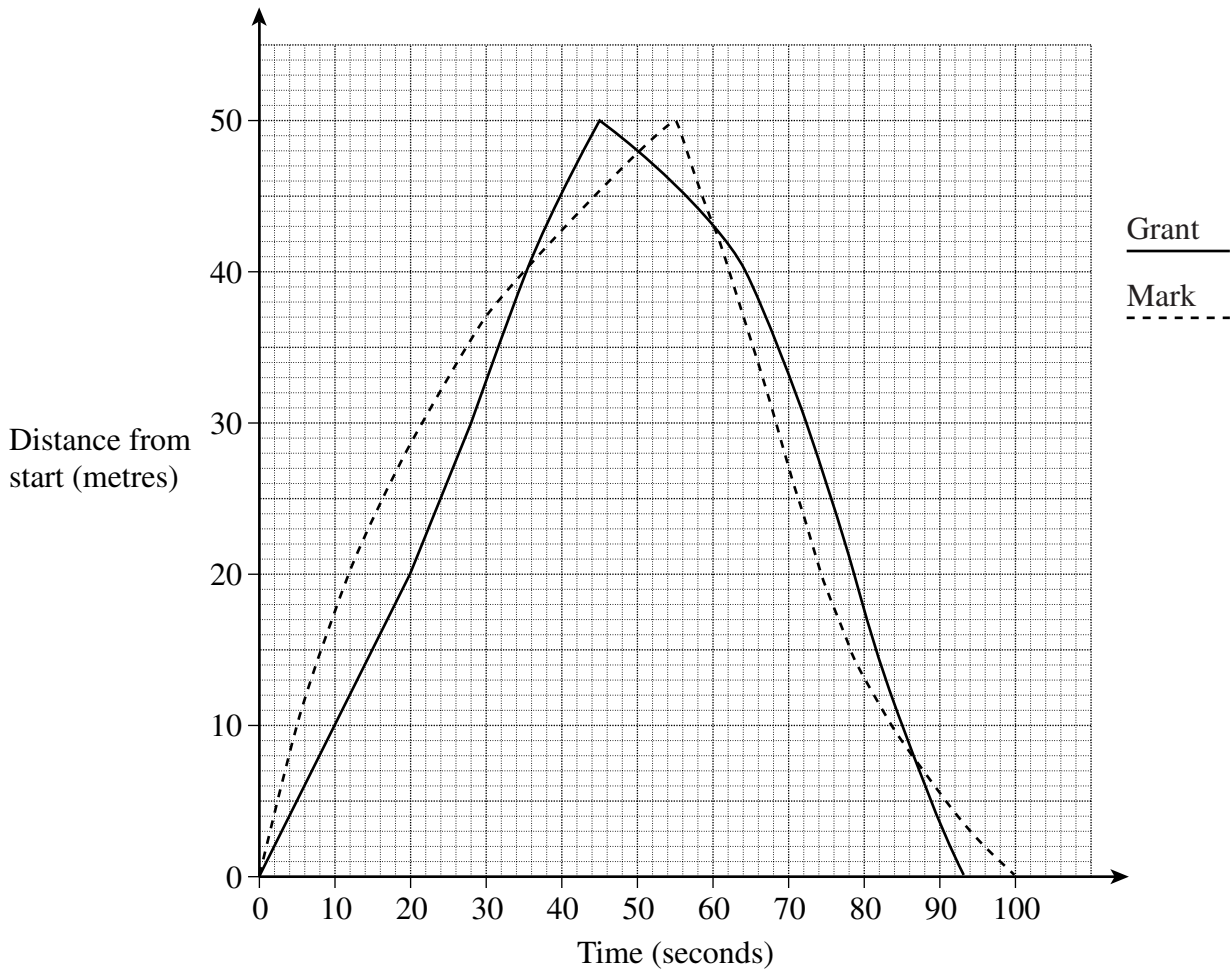
$$6b - 2$$

(3 marks)

**Turn over for the next question**

Turn over ►

10 Grant and Mark race each other over two lengths of a 50 metre swimming pool.



(a) Who won the race?

Answer ..... (1 mark)

(b) What was the winning time?

Answer ..... seconds (1 mark)

(c) What was Grant's average speed during the first 30 seconds of the race?

.....  
.....

Answer ..... m/s (2 marks)

(d) (i) Who was swimming faster at 60 seconds?

Answer ..... (1 mark)

(ii) How can you tell from the graph?

.....

.....

(1 mark)

**Turn over for the next question**

Turn over ►

**11** Jane, Paul and Fred share £900 between them.

Paul gets  $\frac{1}{3}$  of £900.

Fred gets  $\frac{2}{5}$  of £900.

What fraction of £900 does Jane get?  
Give your fraction in its simplest form.

.....  
 .....  
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Answer ..... (4 marks)

**12** Amir uses his mobile phone for 'Talk' and 'Text'.  
 'Talk' costs 2p per minute.  
 Each 'Text' costs 1p.

(a) In January Amir paid £18  
 He used 700 minutes of 'Talk'.

How many 'Texts' did he send?

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 .....

Answer ..... (2 marks)

(b) In February Amir paid £24.60  
 He sent 1200 'Texts'.

How many minutes of 'Talk' did he use?

.....  
 .....

Answer ..... minutes (2 marks)

13 (a) Simplify  $8c + 5d - c - 3d$ .

.....  
 .....

Answer ..... (2 marks)

(b) Use the formula  $R = 6T + 2W$  to find  $W$  when  $R = 46$  and  $T = 4$

.....  
 .....

Answer  $W =$  ..... (3 marks)

(c) Solve the equations

(i)  $5w - 4 = 41$

.....  
 .....

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

(ii)  $4(2x - 7) = 12$

.....  
 .....

Answer  $x =$  ..... (3 marks)

(iii)  $\frac{y}{7} - 9 = 2$

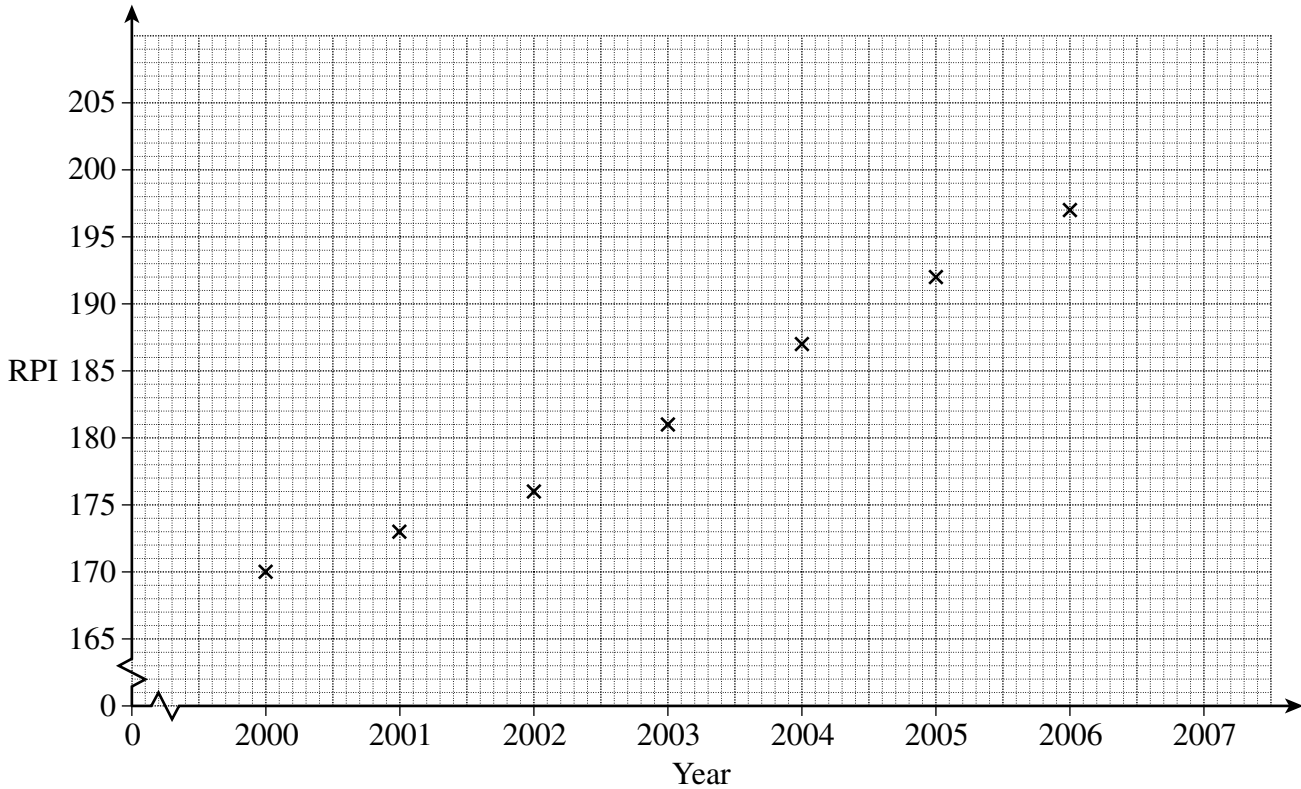
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Answer  $y =$  ..... (2 marks)

Turn over ►

14 The values of the Retail Price Index (RPI) for various years are shown in the table and on the graph.

Year	2000	2001	2002	2003	2004	2005	2006
RPI	170	173	176	181	187	192	197



(a) Use the graph to estimate the RPI for 2007.

.....

Answer ..... (1 mark)

(b) The RPI for 1987 was 100

State the percentage increase in the RPI from 1987 to 2005.

.....

Answer ..... % (1 mark)

(c) Calculate the percentage increase in the RPI from 2000 to 2006.

.....

.....

.....

Answer ..... % (3 marks)

15 Use trial and improvement to find a solution to the equation

$$x^3 + 2x = 60$$

Give your answer to 1 decimal place.  
You **must** show your working.

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Answer  $x =$  ..... (4 marks)

16 (a) Calculate the reciprocal of 0.8

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Answer ..... (1 mark)

(b) Calculate  $\sqrt{8.17^3 + 4.39^2}$

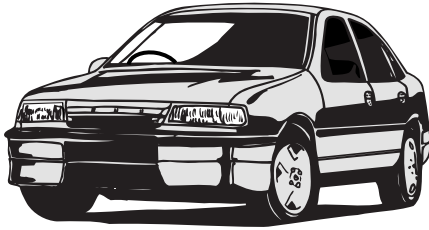
(i) Give **all** the figures on your calculator display.

Answer ..... (1 mark)

(ii) Give your answer to an appropriate degree of accuracy.

Answer ..... (1 mark)

- 17 (a) A car is in a sale.



### Sale

15% off normal price

Normal price £8 400

What is the sale price of the car?

.....

.....

.....

Answer £ ..... (3 marks)

- (b) Another car is in a sale.



### Sale

15% off normal price

Sale price £12 512

What is the normal price of the car?

.....

.....

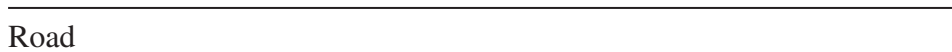
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Answer £ ..... (3 marks)

18 The diagram shows a scale drawing of a straight road.  
A walker is at point P.

Scale:  
1 cm represents 0.5 km

P  
×



(a) Use a ruler and compasses to construct the perpendicular from the point P to the road.  
You **must** show all your construction lines and arcs.

(3 marks)

(b) Find the shortest real distance from the walker to the road.

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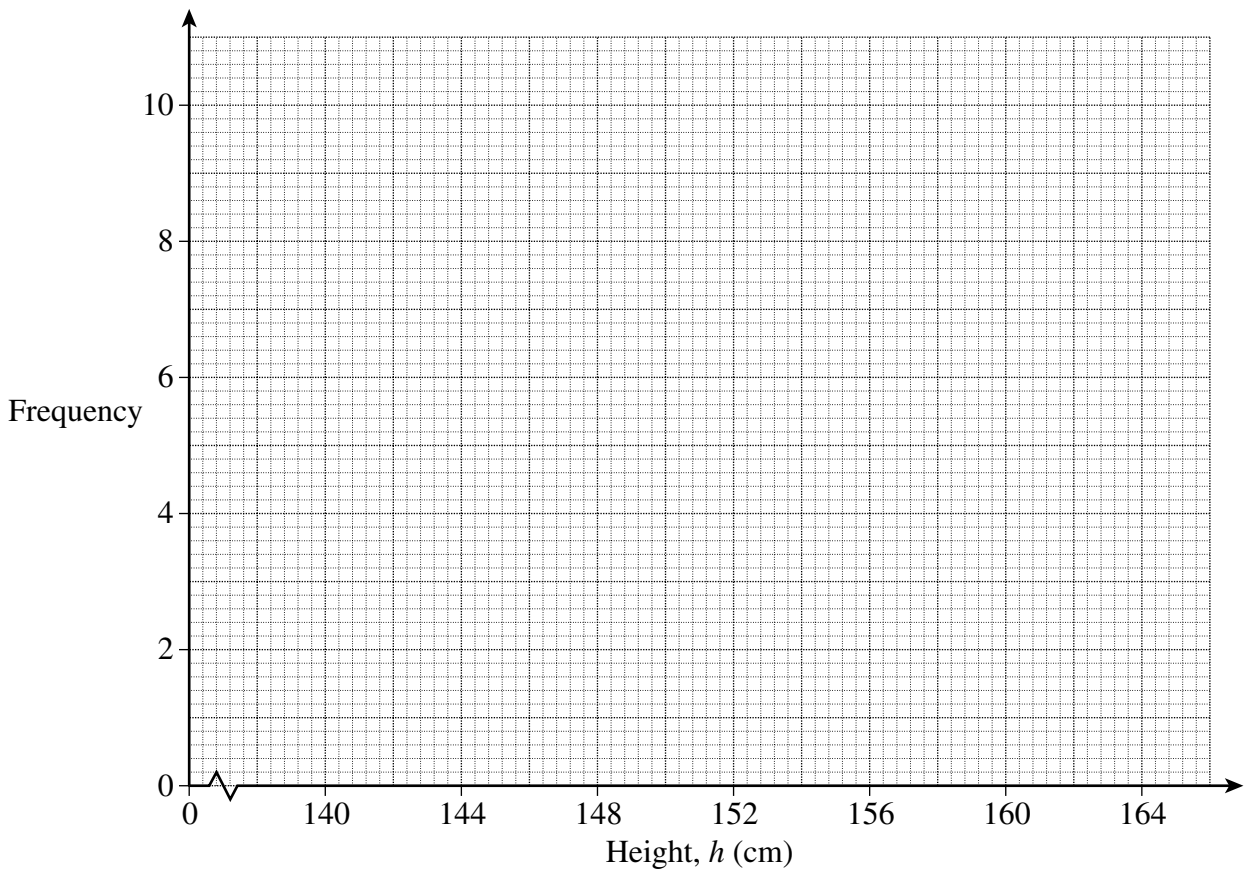
Answer ..... km (2 marks)

Turn over ►

19 The table shows the heights of 40 students.

Height, $h$ (cm)	Frequency
$140 < h \leq 144$	6
$144 < h \leq 148$	10
$148 < h \leq 152$	7
$152 < h \leq 156$	9
$156 < h \leq 160$	6
$160 < h \leq 164$	2

(a) Draw a frequency polygon for the data.



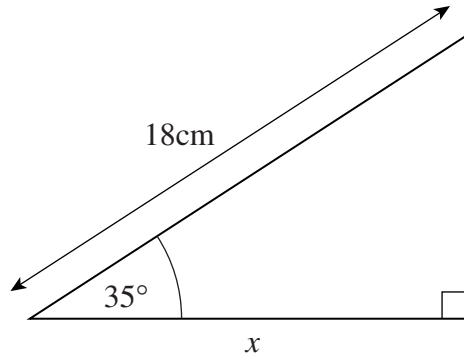
(2 marks)

(b) In which class interval is the median?

.....

Answer .....  $< h \leq$  ..... (1 mark)

20



Not drawn accurately

Calculate the length  $x$ .

.....

.....

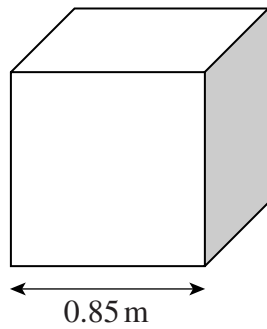
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Answer ..... cm (3 marks)

21 A bag filled with sand is a cube 0.85 m along each side.



Not drawn accurately

The bag holds 1 tonne of sand.

Find the density of the sand.

Give your answer in kilograms per cubic metre.

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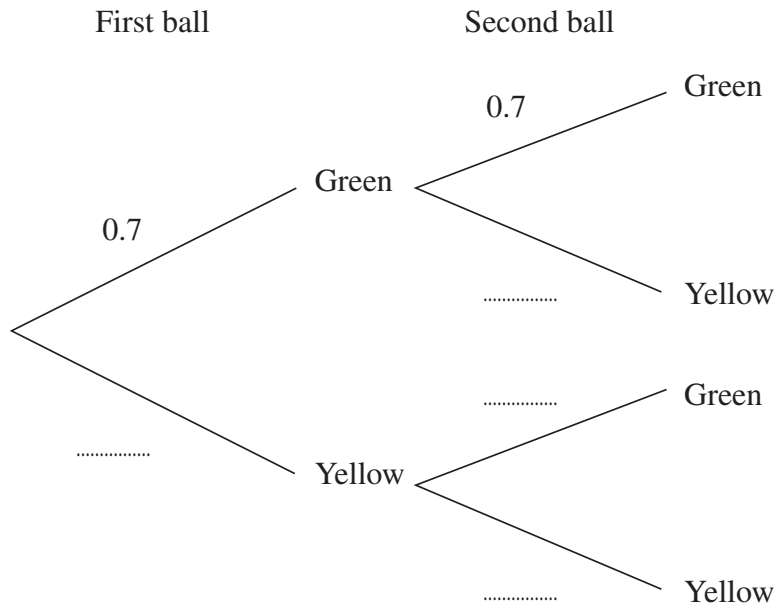
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Answer ..... kg/m<sup>3</sup> (3 marks)

Turn over ►

**22** A bag contains 7 green and 3 yellow balls.  
 A ball is taken from the bag at random and replaced.  
 Another ball is then taken from the bag at random.

(a) Complete the tree diagram.



(1 mark)

(b) What is the probability that both balls are different colours?

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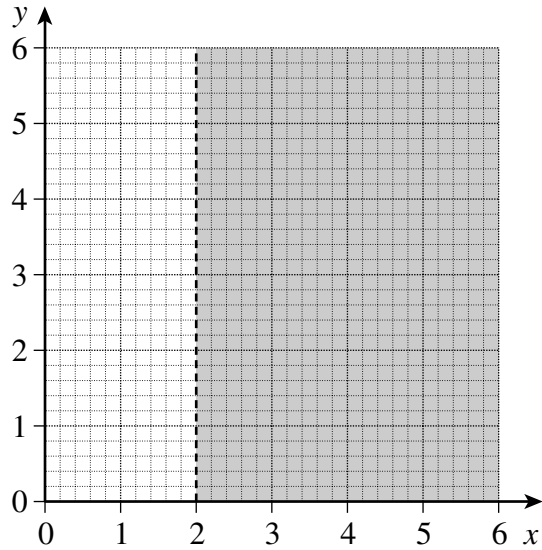
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Answer ..... (3 marks)

23 (a)



Which inequality is shown shaded on the grid?  
Circle the correct answer.

$y > 2$

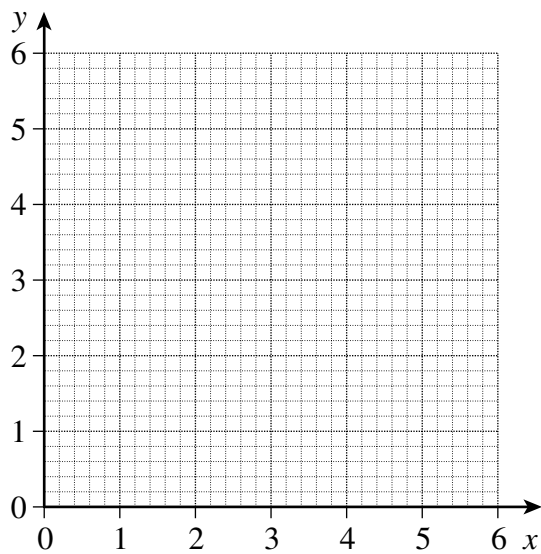
$y \geq 2$

$x > 2$

$x \geq 2$

(1 mark)

(b)



On the grid draw lines to find the region satisfied by the three inequalities

$$\begin{aligned} y &> 2 \\ y &< x + 1 \\ x + y &< 5 \end{aligned}$$

Label the region with the letter R.

.....

.....

.....

(3 marks)

Turn over ►

- 24 The mass of one atom of Hydrogen is  $1.67 \times 10^{-24}$  grams.  
The mass of one atom of Oxygen is  $2.66 \times 10^{-23}$  grams.

- (a) One molecule of water has two atoms of hydrogen and one atom of oxygen.  
The total mass of one molecule of water is given by

$$2 \times 1.67 \times 10^{-24} + 2.66 \times 10^{-23}$$

Work out the total mass.  
Give your answer in standard form.

.....  
.....

Answer ..... grams (2 marks)

- (b) Calculate the number of molecules in one gram of water.  
Give your answer in standard form.

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Answer ..... (2 marks)

**END OF QUESTIONS**

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