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| Centre Number       |  |  |  |  |  |  | Candidate Number |  |  |  |             |  |  |  |  |  |  |  |  |  |  |
| Candidate Signature |  |  |  |  |  |  |                  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |

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General Certificate of Secondary Education  
November 2005



**MATHEMATICS (SPECIFICATION A) 3301/11**  
**Intermediate Tier**  
**Paper 1 Non-Calculator**

Tuesday 8 November 2005 9.00 am to 11.00 am

|   |  |
|---|--|
| <p><b>In addition to this paper you will require:</b><br/>mathematical instruments.<br/>You must <b>not</b> use a calculator.</p> |  |
|---|--|

| For Examiner's Use  |      |
|---------------------|------|
| Pages               | Mark |
| 3                   |      |
| 4 – 5               |      |
| 6 – 7               |      |
| 8 – 9               |      |
| 10 – 11             |      |
| 12 – 13             |      |
| 14 – 15             |      |
| 16 – 17             |      |
| 18 – 19             |      |
| 20                  |      |
| 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 in the spaces provided.
- Do all rough work in this booklet.

**Information**

- The maximum mark for this paper is 100.
- Mark allocations are shown in brackets.
- Additional answer paper, graph paper and tracing paper will be issued on request and must be tagged securely to this answer booklet.
- The use of a calculator is **not** permitted.

**Advice**

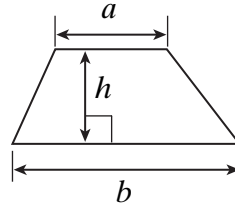
- In all calculations, show clearly how you work out your answer.

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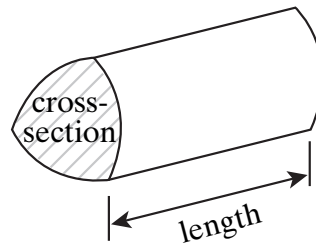
**Formulae Sheet: Intermediate Tier**

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 school shop buys 400 pens for £36.  
The shop sells the pens for 10p each.  
How much profit does the shop make when it sells all the pens?

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Answer £ ..... (3 marks)

- 2** (a) Simplify  $3p + 5q - p + 3q$

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Answer ..... (2 marks)

- (b) (i) Use the formula  $y = 5x + 2$  to work out the value of  $y$  when  $x = -3$

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

- (ii) Use the formula  $y = 5x + 2$  to work out the value of  $x$  when  $y = 32$

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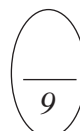
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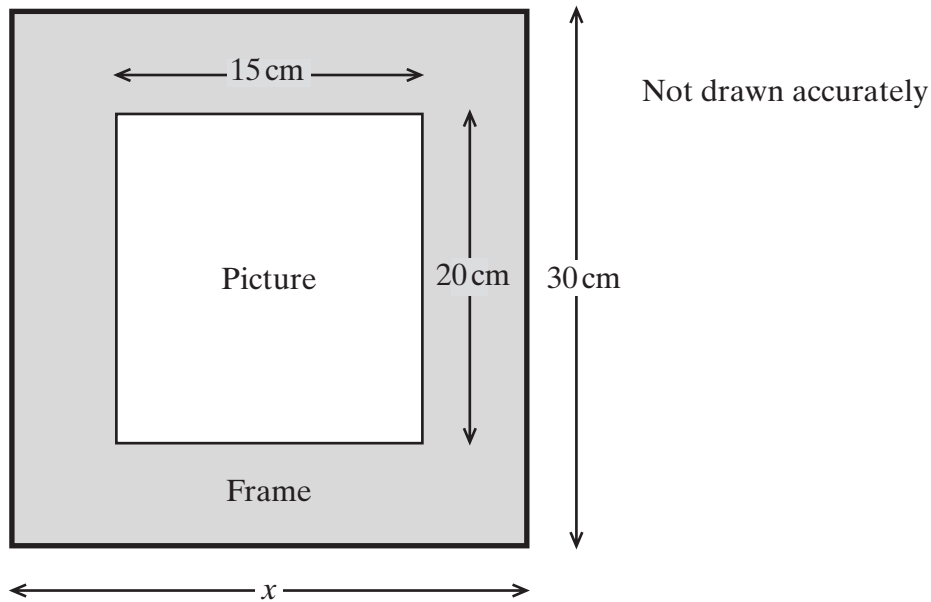
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Answer  $x =$  ..... (2 marks)

Turn over ►



- 3 The diagram shows a rectangular picture with a frame around it.  
The frame is the same width all the way round.  
The picture is 15 cm wide and 20 cm high.  
The total height of the picture **and** frame is 30 cm.



- (a) Work out the width  $x$ , shown on the diagram.

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Answer ..... cm (3 marks)

- (b) Work out the area of the frame.  
State the units of your answer.

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Answer ..... (4 marks)

- 4 (a) The first term of a sequence is  $-2$ .  
The rule for continuing the sequence is

Add 7

then

Multiply by 4

What is the second term of the sequence?

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Answer ..... (1 mark)

- (b) This rule is used to continue a different sequence.

Multiply by 2

then

Add 5

The second term of this sequence is 3.  
What is the first term?

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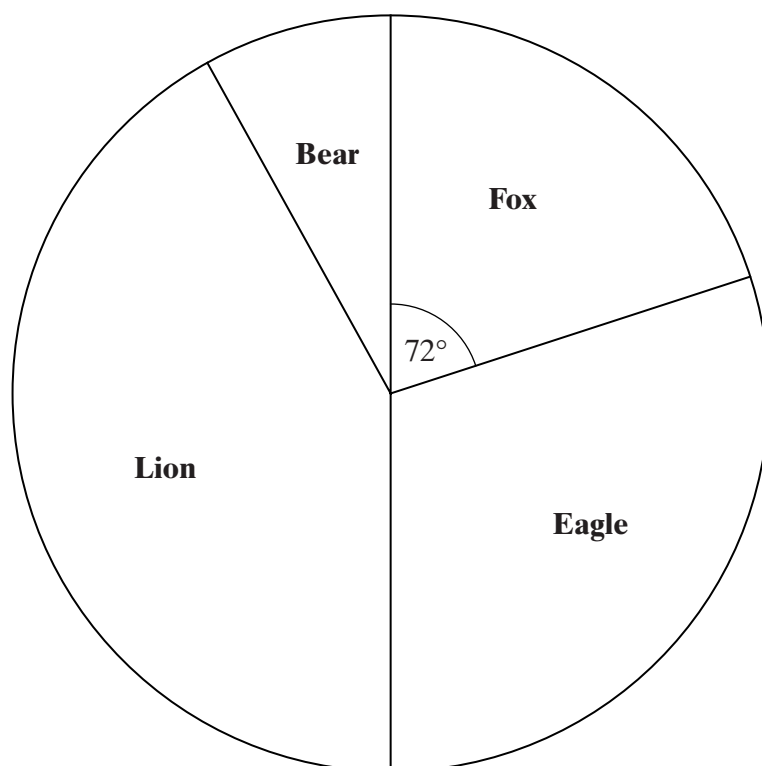
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Answer ..... (3 marks)

Turn over ►

- 5 A football club is choosing a new mascot.

The club asks 400 supporters to help choose the mascot.  
The pie chart shows their choices.



- (a) How many of the 400 supporters choose the fox?

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Answer ..... (3 marks)

- (b) The number of supporters who choose the lion is 168.  
What percentage of the 400 supporters is this?

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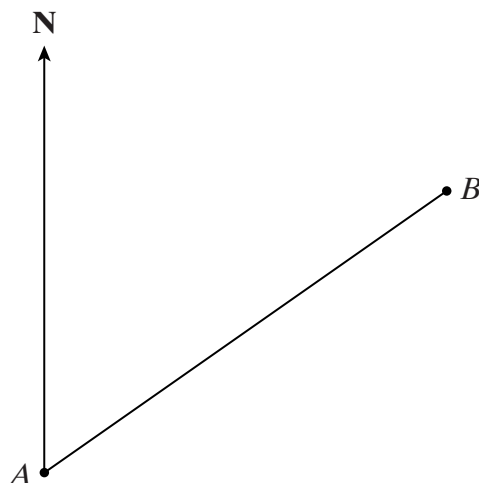
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Answer ..... % (2 marks)

- 6 The diagram shows a scale drawing of two points,  $A$  and  $B$ , on an orienteering course.

Scale: 1 cm represents 50 m



- (a) Use the diagram to work out the actual distance from  $A$  to  $B$ .

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Answer ..... metres (2 marks)

- (b) Measure and write down the three-figure bearing of  $B$  from  $A$ .

Answer ..... degrees (1 mark)

- (c) The bearing of point  $C$  from  $A$  is  $300^\circ$ .  
 What is the three-figure bearing of  $A$  from  $C$ ?

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Answer ..... degrees (2 marks)

Turn over ►

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

|     |    |    |    |    |    |   |   |
|-----|----|----|----|----|----|---|---|
| $x$ | -3 | -2 | -1 | 0  | 1  | 2 | 3 |
| $y$ |    | 1  | -2 | -3 | -2 |   | 6 |

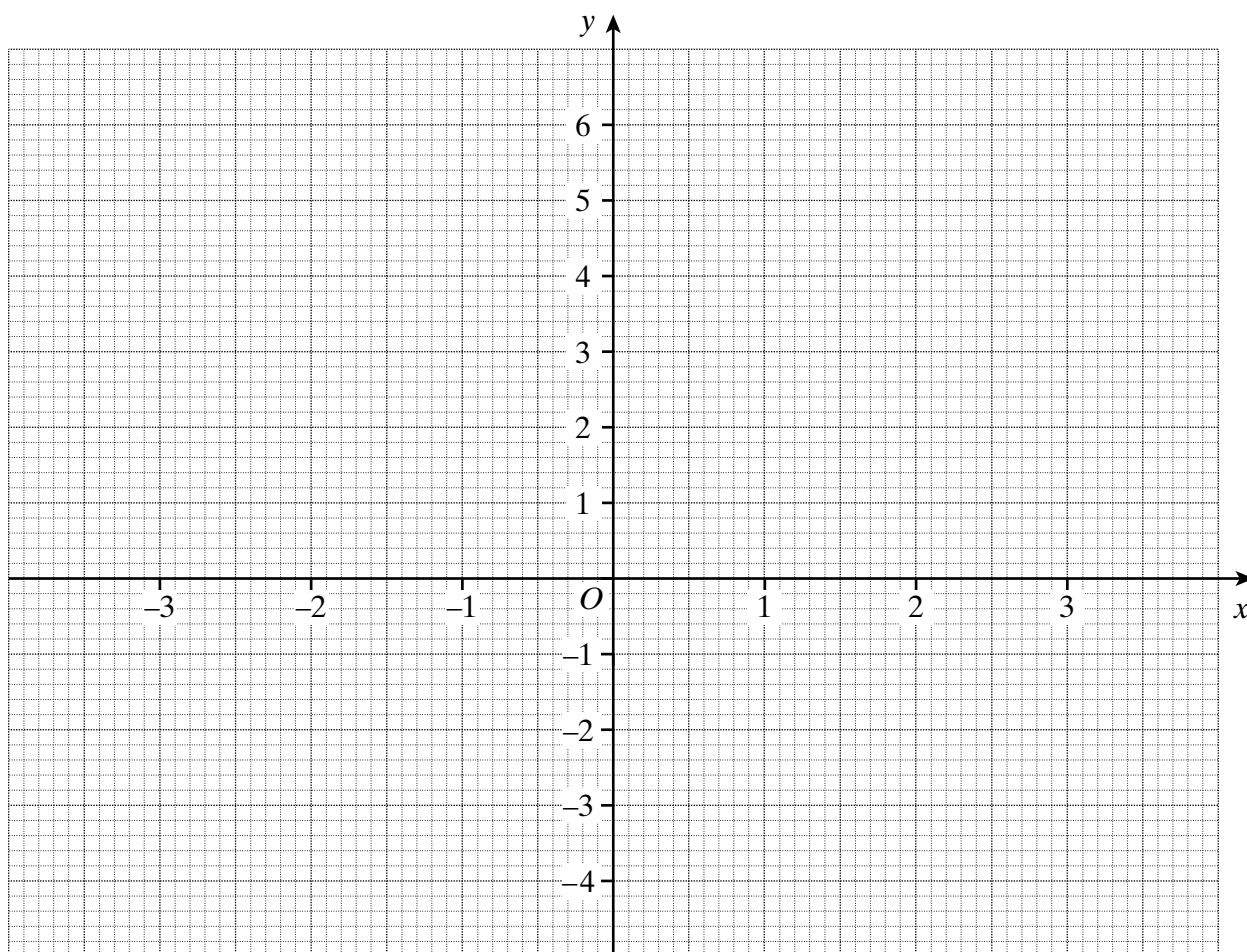
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(1 mark)

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



(2 marks)

- (c) Use the graph to solve the equation  $x^2 - 3 = 0$

Answer ..... (2 marks)



- 8 Work out  $300 \times (0.58 - 0.08)$

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Answer ..... (2 marks)

- 9 Write down all the common factors of 10 and 15.

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Answer ..... (2 marks)

- 10 The weight of a 2p coin is 7 g.  
Find the weight of £10 worth of 2p coins.  
Give your answer in kilograms.

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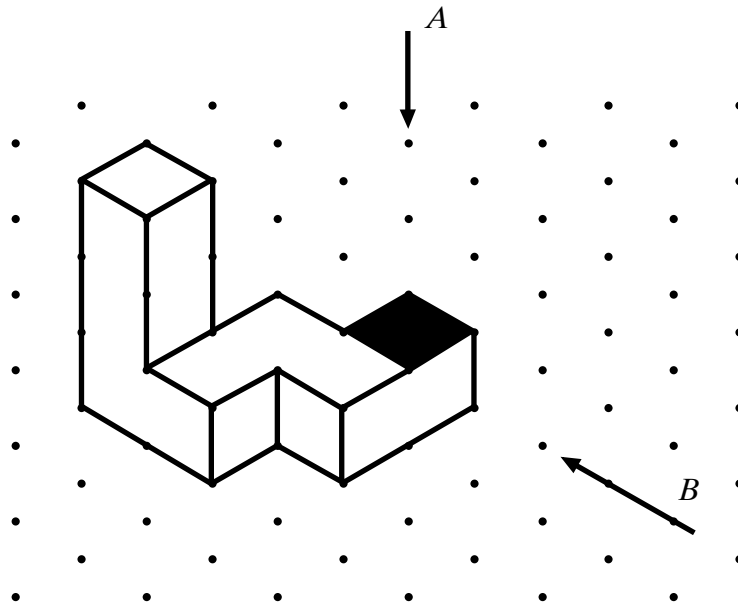
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Answer ..... kilograms (4 marks)

Turn over ►

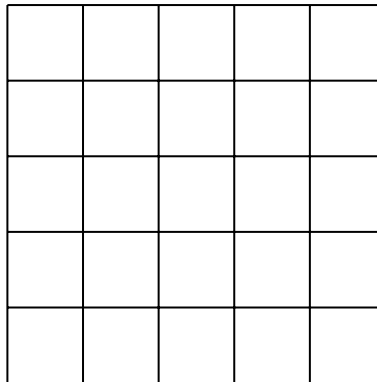
- 11** This 3-D shape is made from seven cubes.  
It is drawn on an isometric grid.



- (a) Tim looks down on the shape from *A*.  
One of the faces of a cube that he sees is shaded.  
Shade all the other faces that he sees.

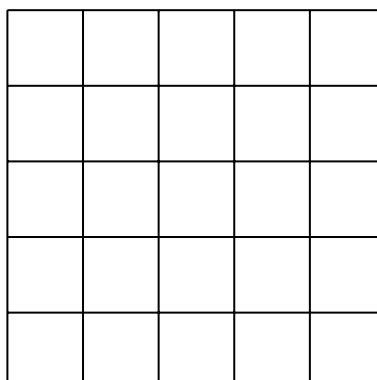
(1 mark)

- (b) On this grid draw the plan from *A*.



(1 mark)

- (c) On this grid draw the front elevation from *B*.



(1 mark)

- 12** Bag *A* contains  $x$  counters.  
Bag *B* contains 6 more counters than Bag *A*.  
Bag *C* contains 4 times as many counters as Bag *B*.  
Show that the total number of counters in Bags *A*, *B* and *C* is  $6(x + 5)$ .

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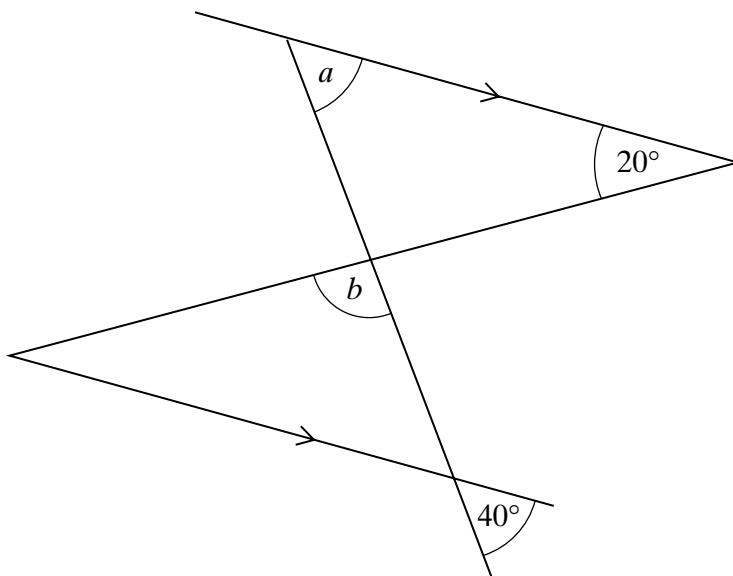
(4 marks)

- 13** The Kitti's hog-nosed bat from Thailand is the smallest known mammal.  
One of these bats is 33 mm long to the nearest millimetre.  
What is its smallest possible length?

Answer ..... mm (1 mark)

Turn over ►

- 14 (a) Work out the size of angles  $a$  and  $b$ .



Not drawn accurately

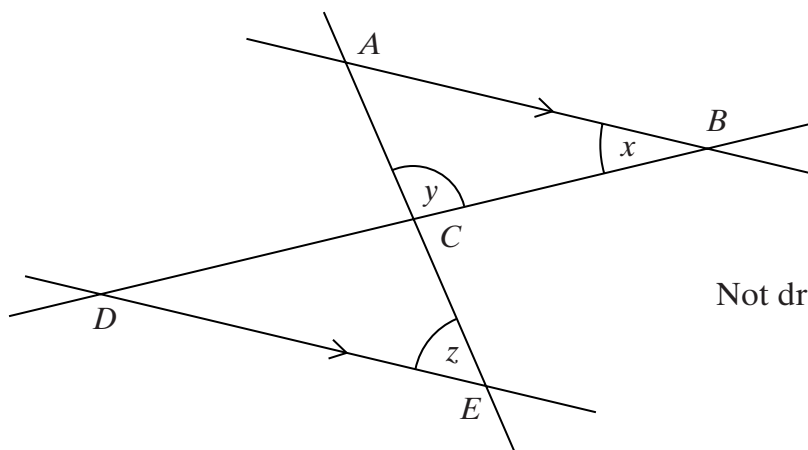
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Answer  $a =$  ..... degrees,  $b =$  ..... degrees (3 marks)

- (b) Show that  $x + y + z = 180$



Not drawn accurately

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(2 marks)

**15** Use approximations to show which of the following calculations gives the bigger answer.

(a)  $59.4 \div 0.307$

(b)  $80.16 \div 0.481$

You **must** show your working.

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Answer ..... (3 marks)

**16** Lucy makes some curtains for her living room and her bedroom.

In the living room she uses  $3\frac{2}{3}$  metres of material.

In the bedroom she uses  $2\frac{4}{5}$  metres of material.

How many metres of material does she use altogether?

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Answer ..... m (3 marks)

Turn over ►

- 17** A cuboid is made from centimetre cubes.  
The area of the base of the cuboid is  $5\text{ cm}^2$ .  
The volume of the cuboid is  $10\text{ cm}^3$ .  
Work out the surface area of the cuboid.

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Answer .....  $\text{cm}^2$  (3 marks)

- 18** Mr Jones buys a new car for £50 000.  
The car decreases in value at the rate of 30% each year.  
Find the value of the car after two years.

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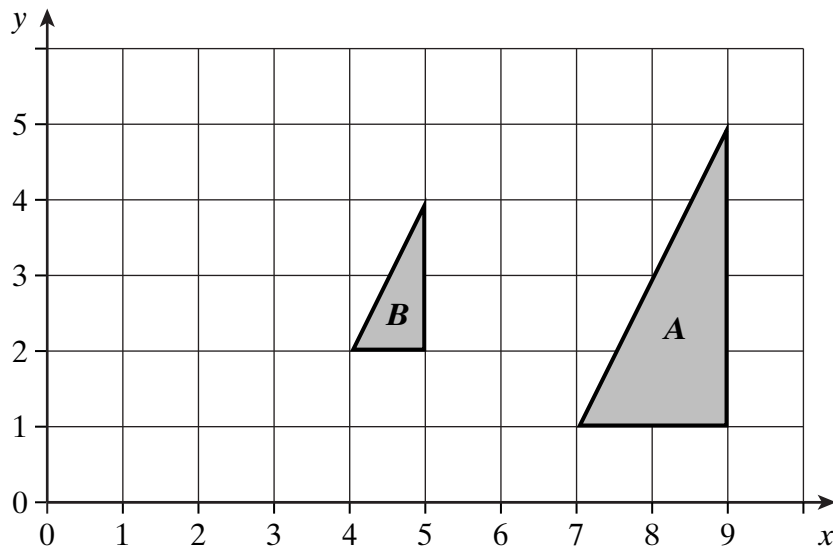
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Answer £ ..... (3 marks)

**19** The diagram shows two triangles **A** and **B**.



Describe fully the single transformation that maps triangle **A** onto triangle **B**.

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 .....  
 ..... (3 marks)

**20** (a) Write these numbers in standard form

(i) 9 170 000

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 Answer ..... (1 mark)

(ii) 0.000 048

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 Answer ..... (1 mark)

(b) Find the value of  $(1.8 \times 10^{12}) \div (2 \times 10^8)$

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 Answer ..... (2 marks)

Turn over ►

**21** Penny, Sam and Robert do this experiment on the **same** bag of **10** counters.

1. Take a counter from the bag at random.
  2. Record its colour.
  3. Put the counter back in the bag.
- Repeat this trial a number of times.

Their results are shown in this table.

| Name of pupil | Number of trials | Colour of counter |       |       |
|---------------|------------------|-------------------|-------|-------|
|               |                  | Black             | White | Green |
| Penny         | 10               | 0                 | 6     | 4     |
| Sam           | 40               | 3                 | 16    | 21    |
| Robert        | 200              | 22                | 76    | 102   |

Estimate the number of each different coloured counter in the bag.  
Clearly state the set of results that you use to make the estimate.  
Give a reason for your choice.

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Set of results used .....

Reason .....

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Answer Black ....., White ....., Green ..... (4 marks)



**22** (a) Simplify

(i)  $y^7 \times y^2$

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Answer ..... (1 mark)

(ii)  $y^7 \div y^2$

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Answer ..... (1 mark)

(iii)  $(y^7)^2$

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Answer ..... (1 mark)

(b) Expand and simplify  $(x - 3)(x + 8)$

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Answer ..... (2 marks)

(c) Factorise  $h^2 - 25$

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Answer ..... (1 mark)

(d) Make  $t$  the subject of the formula  $w = \sqrt{t} - v$

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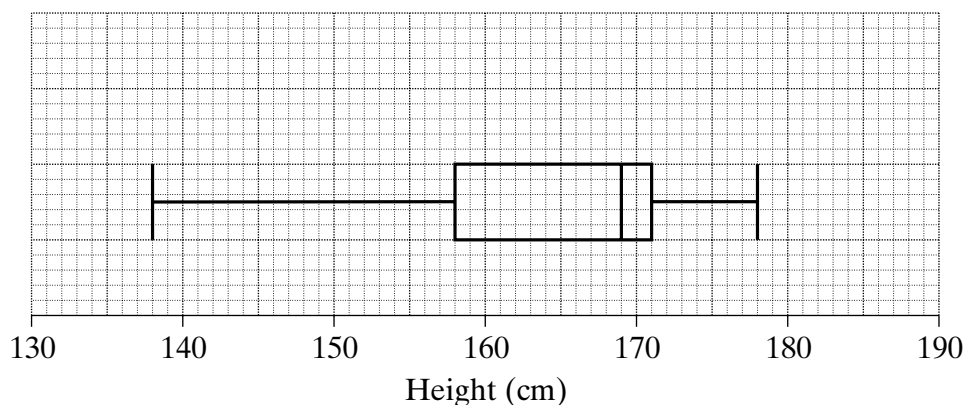
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Answer  $t =$  ..... (2 marks)

Turn over ►

- 23** (a) The box plot shows the heights of a group of boys in a school.



- (i) Write down the median height of these boys.

Answer ..... cm (1 mark)

- (ii) Find the interquartile range of the heights of these boys.

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Answer ..... cm (2 marks)

- (b) 15 girls in the school are chosen at random.  
Their heights, in centimetres, are shown below.

142, 147, 152, 156, 156, 159, 164, 166, 166, 166, 167, 170, 171, 171, 175

There are a total of 450 girls in the school.

Use this sample to estimate how many girls in the school are less than 148 cm tall.

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Answer ..... (2 marks)

**24** Match each of the sketch graphs to one of these equations.

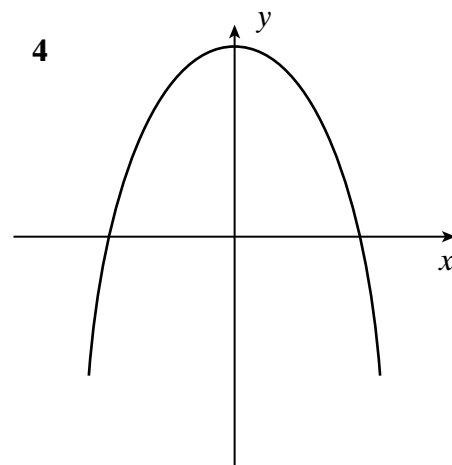
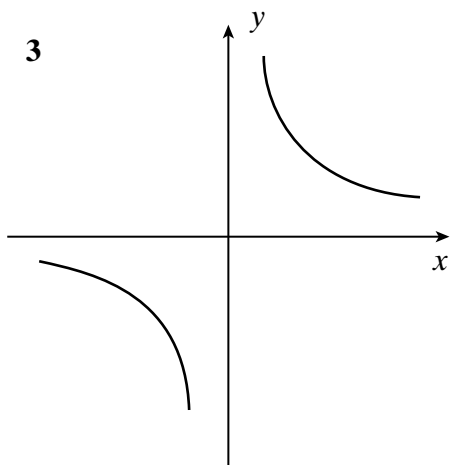
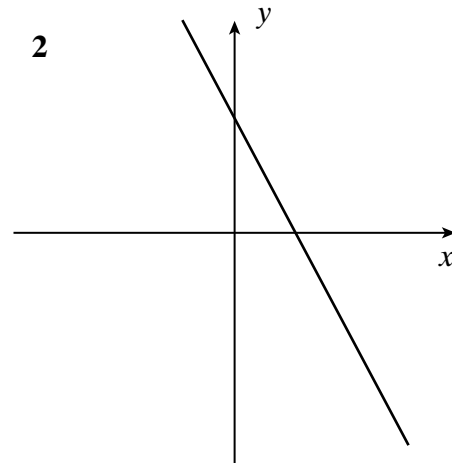
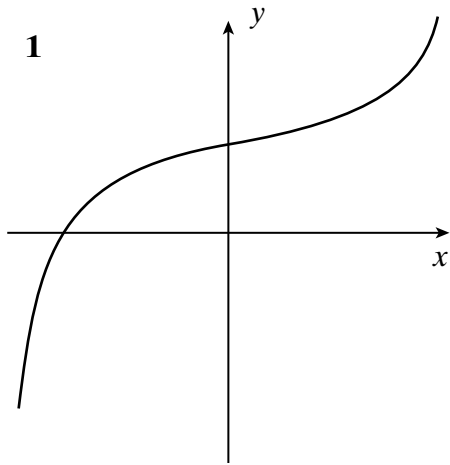
**A**  $y = 2 - 2x$

**B**  $y = 2x + 2$

**C**  $y = 3 - x^2$

**D**  $y = x^3 + 4$

**E**  $y = \frac{2}{x}$



Graph **1** represents equation .....

Graph **2** represents equation .....

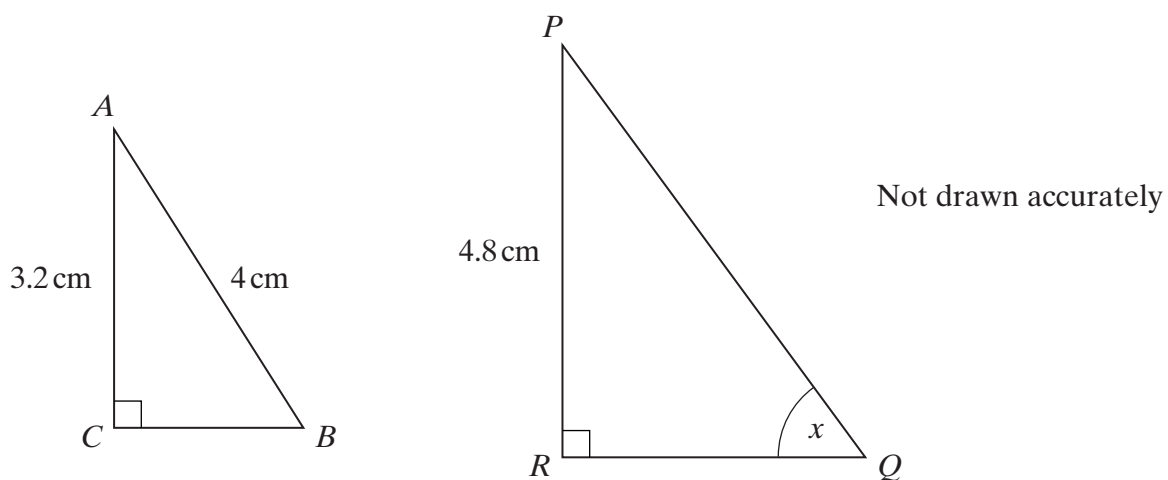
Graph **3** represents equation .....

Graph **4** represents equation .....

(4 marks)

Turn over ►

- 25** Triangles  $ABC$  and  $PQR$  are similar.  
 $AC = 3.2$  cm,  $AB = 4$  cm and  $PR = 4.8$  cm.



- (a) Explain why  $\sin x = 0.8$

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(1 mark)

- (b) Calculate the length of  $PQ$ .

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Answer ..... cm (3 marks)

**END OF QUESTIONS**