1. Find the value of

   (a) the cube of 4,

   ....

   ....

   ....

   [1]

   (b) 0.3×0.2,

   ....

   ....

   ....

   [1]

   (c) $3^2 \times 2^4$,

   ....

   ....

   ....

   [2]

   (d) $8.7 - 3.24$.

   ....

   ....

   ....

   [1]

2. Find the size of the angle marked x.
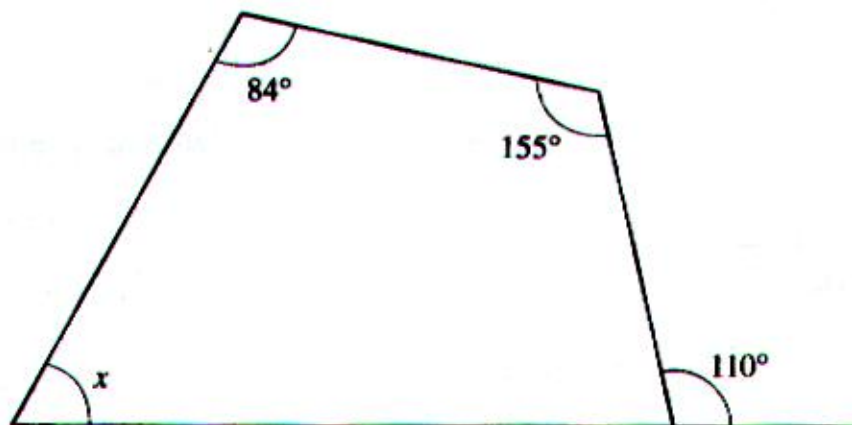
Diagram not drawn to scale.

$x = $ .... $^\circ$

[2]

3. Showing all your working, find which of the quantities 60%, 0·7 and $\frac{13}{20}$ is (i) the smallest, (ii) the largest.

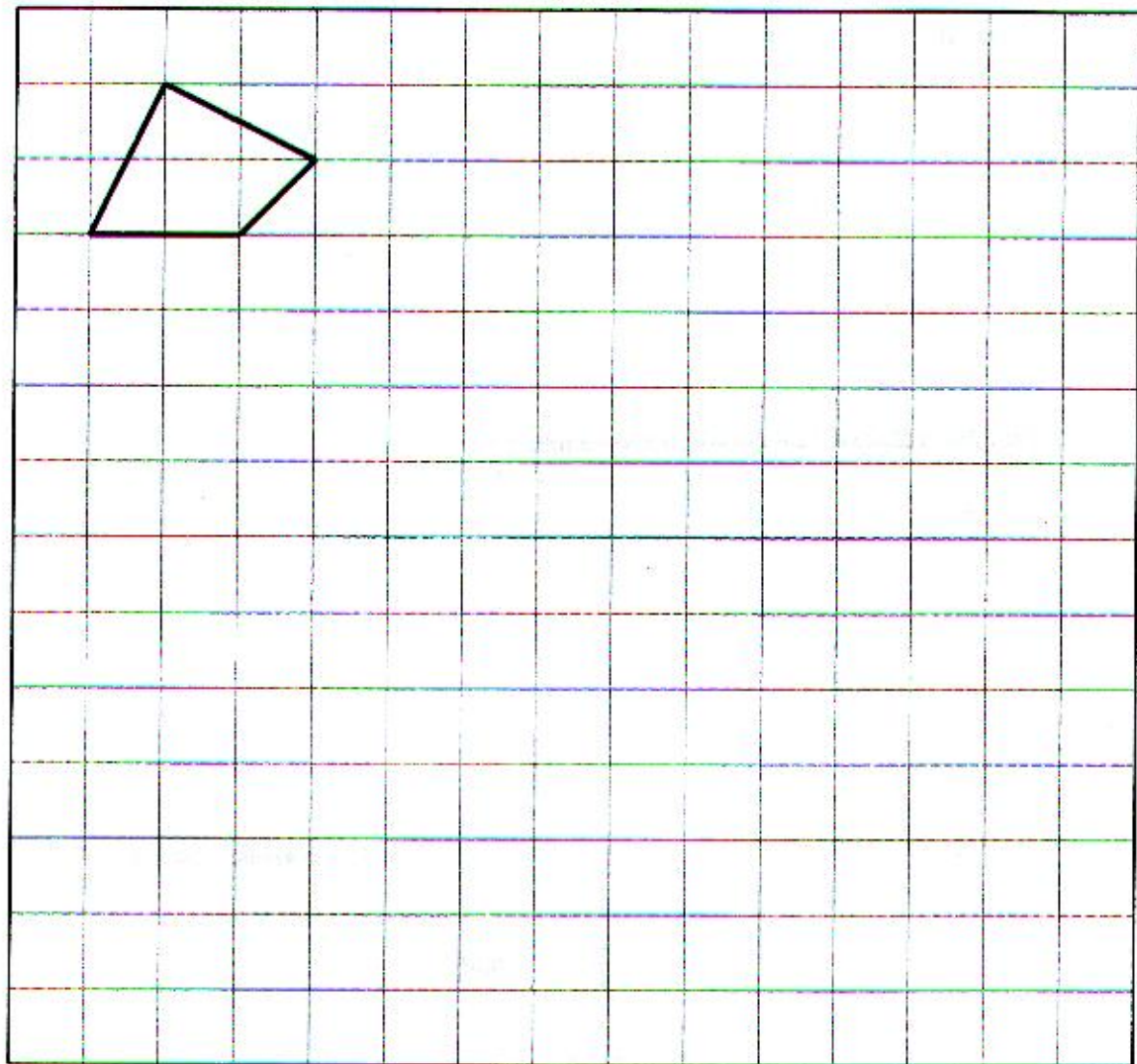(i) Smallest = ... (ii) Largest = ...

[3]

4. Draw, on the grid below, an enlargement of the given shape, using a scale factor of 3.

[2]

5. *(a)* Write down the next two numbers in the sequence:

27,   25,   21,   15, ..., ...   [2]

(b) Expand $4(x - 3)$.

....

[1]

(c) Simplify $4a - 6b - 3a + 4b$.

....

....

[2]

(d) Find the value of $5x - 6y$ when $x = -2$ and $y = 3$.

....

....

....

[2]

6. Showing clearly how you decide, find which of the following fractions is closest to $\frac{1}{3}$.

$$\frac{3}{8}, \qquad \frac{1}{4}, \qquad \text{and} \qquad \frac{1}{6}$$

....

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....

....

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....

[2]

7. There are four red cards numbered 1, 3, 5 and 7 respectively and four blue cards numbered 2, 4, 6 and 8 respectively. In a game, a player chooses a red card and a blue card at random. The score for the game is the smaller of the two numbers on the cards.

For example, if the number on the red card is 3 and the number on the blue card is 2, the player scores 2.

(a) Complete the following table to show all the possible scores. [1]

Blue card				
8	1	....	....	....
6	1	....	....	....
4	1	3	4	4
2	1	2	2	2
	1	3	5	7

Red card

A player wins a prize by getting a score of 2 or less.

(b) Jackie plays the game once. What is the probability that she wins a prize?

....

.... [2]

(c) 800 people each play the game once.
Approximately how many would you expect to win a prize?

....

....

....

.... [2]

(d) It costs 50p to play the game once. The prize for getting a score of 2 or less is £1. If the 800 people each play the game once, approximately how much profit do you expect the game to make?

....

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....

....

....

.... [2]

8. Clearly showing how you obtained your answer, ESTIMATE the value of:

$$\frac{47 \times 307}{24}$$

....

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....

....

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....

[2]

9. A cube is labelled A.
A pentagon is labelled B.
A cuboid is labelled C.
A square-based pyramid is labelled D.

Complete the following table.

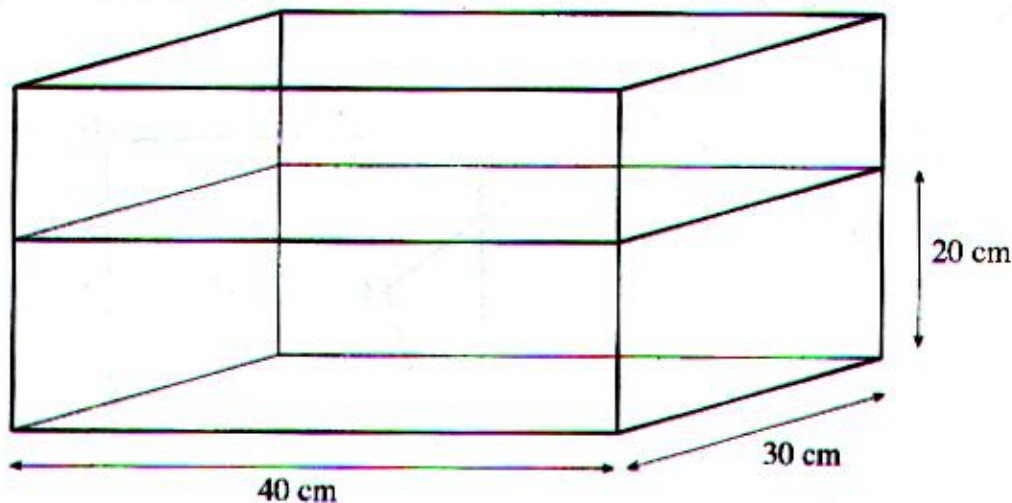| Property of the shape	Label on the shape
It has 6 congruent faces	
It has 2 square faces and 4 rectangular faces	
It is not a 3D shape	
It has 5 faces	

[3]

10.

Diagram not drawn to scale.

A glass water tank, in the shape of a cuboid, has a base measuring 40 cm by 30 cm and contains water to a height of 20 cm.

(a) Calculate the volume of water in the tank.

....

....

[2]

(b) Calculate the area of the inside of the tank that is in contact with the water.

....

....

....

....

....

....

[2]

11. *ABCDE* is a regular pentagon and *BFGH* is a rectangle. They meet at *B* so that *ABF* is a straight line.

(a) Explain clearly why each of the interior angles of a regular pentagon is $108°$.

....

....

....

....

....

....

[2]

(b) Find the value of the angle marked *x*.

....

....

....

....

....

....

[2]

12. *(a)* Write down, in terms of *n*, the *n*th term of **each** of the following sequences.

(i) 4×1 5×2 6×3 7×4 ....

....

....

[2]

(ii) 11   17   23   29   35   ....

....

....

[2]

(b) Write down the first term of the sequence whose *n*th term is $n^2 + 4$.

....

....

[1]

13.
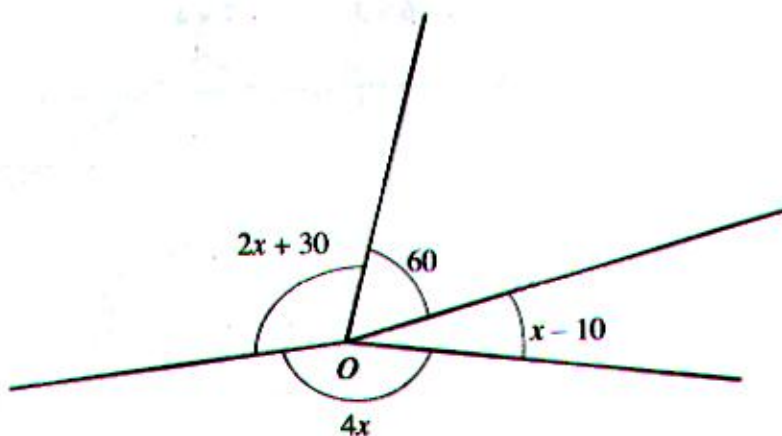
All the angles are in degrees and meet at the point O. Write down an equation that x satisfies and solve the equation to find the value of x.

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....

[4]

14. The heights of 70 pupils were measured to the nearest cm. The table below shows a grouped frequency distribution of the results.

Height, h (to the nearest cm)	$130 < h \leqslant 140$	$140 < h \leqslant 150$	$150 < h \leqslant 160$	$160 < h \leqslant 170$	$170 < h \leqslant 180$
Frequency	8	15	24	13	10

On the graph paper below, draw a frequency polygon to show this data.

[3]
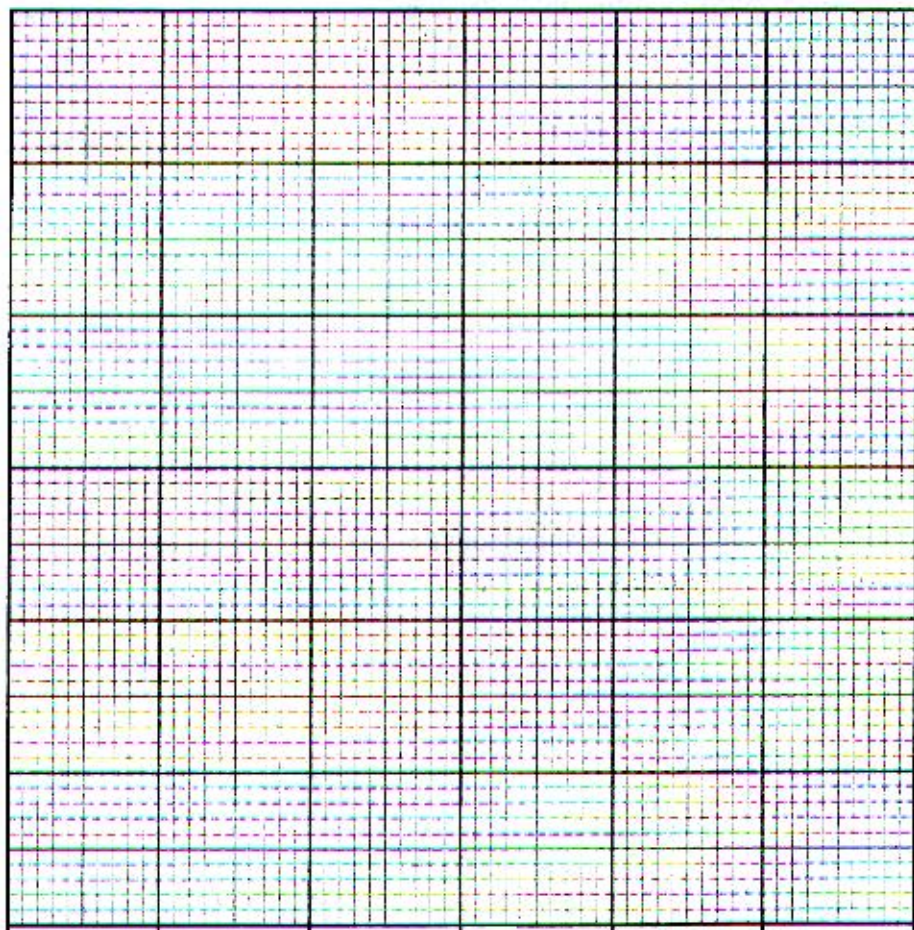
15. The table shows some of the values of $y = 2x^2 - 5x - 3$ for values of x from -2 to 4.

(a) Complete the table by finding the value of y for $x = -1$.

x	-2	-1	0	1	2	3	4
$y = 2x^2 - 5x - 3$	15		-3	-6	-5	0	9

....

....

[1]

(b) On the graph paper opposite, draw the graph of $y = 2x^2 - 5x - 3$ for values of x between -2 and 4.

[3]

(c) Draw the line $y = 3$ on the graph paper and write down the x-values of the points where your two graphs intersect.

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....

[2]

(d) Write down the equation in x whose solutions are the x-values you found in (c).

....

....

[1]
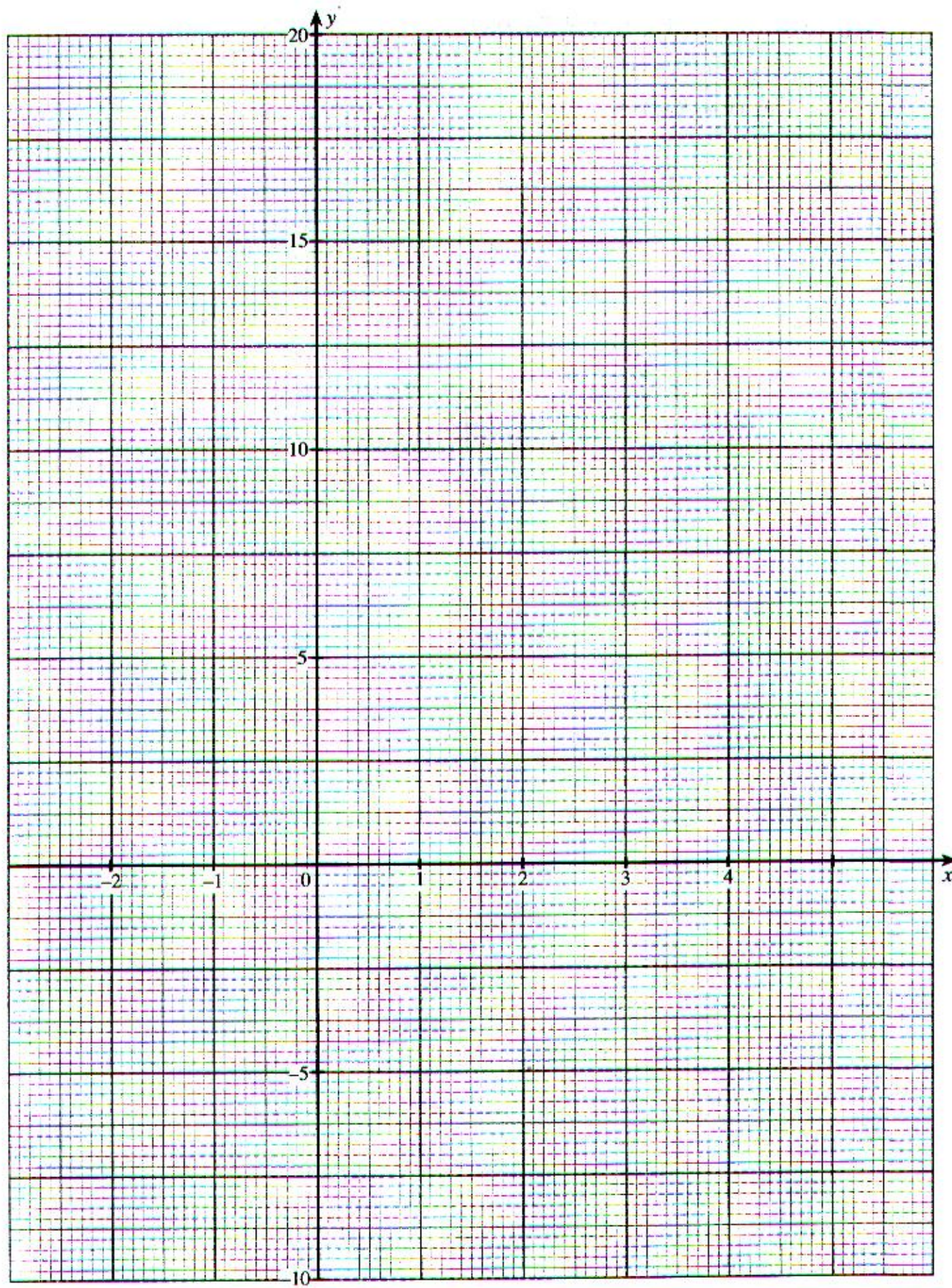
16. Find and shade the region of points that satisfy both of the following conditions.

    (i)   The points are nearer to *A* than to *B*.

    (ii)   They are not further than 7 cm from *B*.

[3]

A

B

17. *(a)* Solve the following equation.

$$5x - 6 = 3(10 - x).$$

[3]

(b) Expand and simplify: $4(2y - 3) - 3(y + 5)$

[2]

18. (a) Draw the image of the triangle A after a translation of –3 units in the x-direction and 4 in the y-direction. Label the image B.

[2]
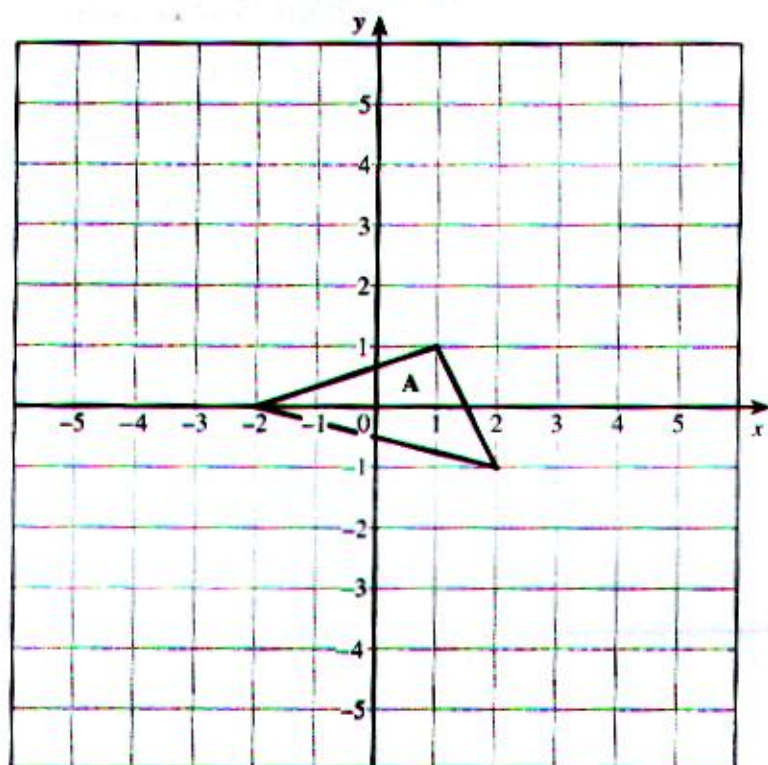
(b) Rotate the triangle C through 90° clockwise about the point (–2, 1). Label the image D.

[2]
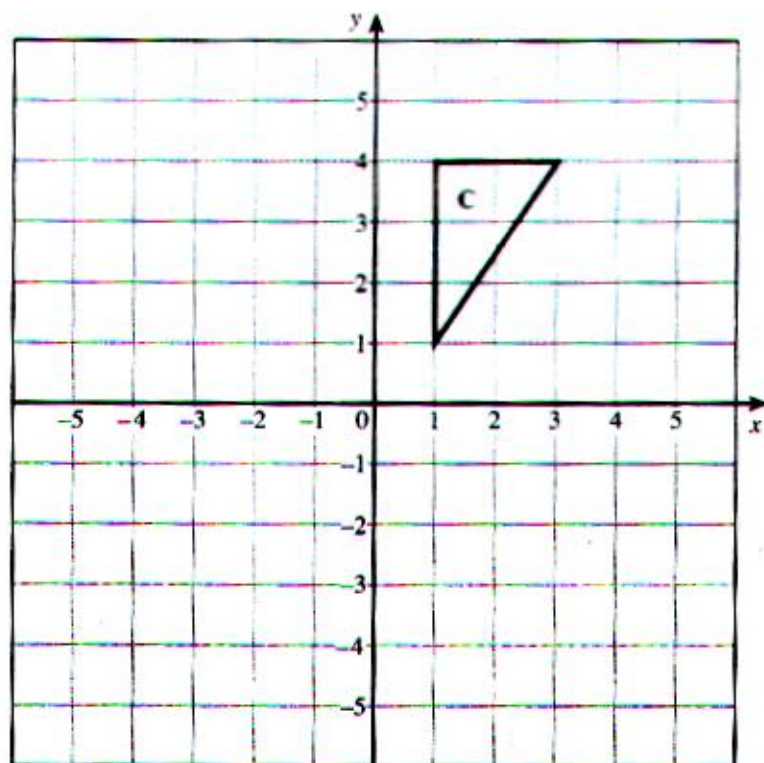
19. The capacity of a jug is 250 ml, measured to the nearest 10 ml.

(a) Write down the least and greatest value of the capacity of the jug.

Least capacity .... ml   Greatest capacity .... ml

[2]

(b) The capacity of a bucket is 5·1 litres, measured correct to the nearest $\frac{1}{10}$ of a litre.

The jug is filled with water and then the water is poured into the bucket. This is done 20 times in all. Explain, showing all your calculations, why it is not always possible for the bucket to hold all this water.

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....

[5]

20. *(a)* Expand the following expression, simplifying your answer as far as possible.

$$(x-3)(x-4)$$

[2]

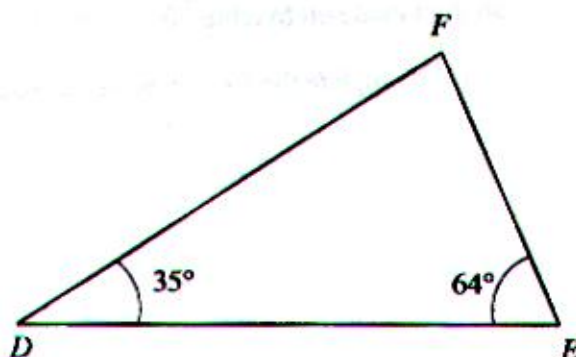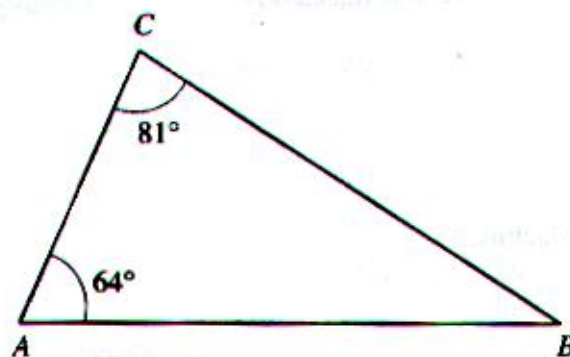*(b)* Make t the subject of the formula:

$$2n + 5 = 3(8 - 3t)$$

[3]

(c) (i) Factorise $x^2 + 7x - 18$.

(ii) Hence solve the equation

$$x^2 + 7x - 18 = 0.$$

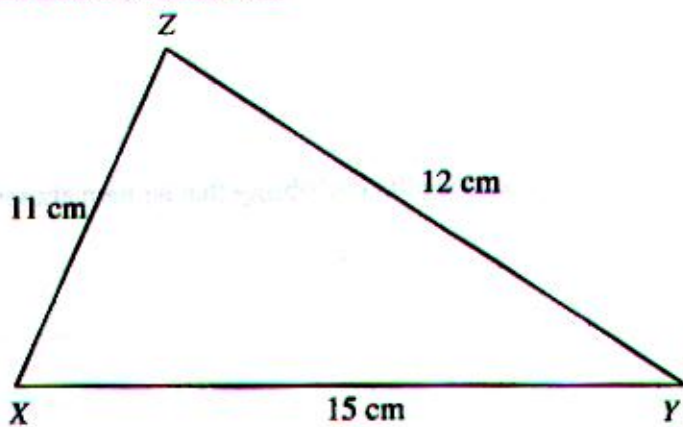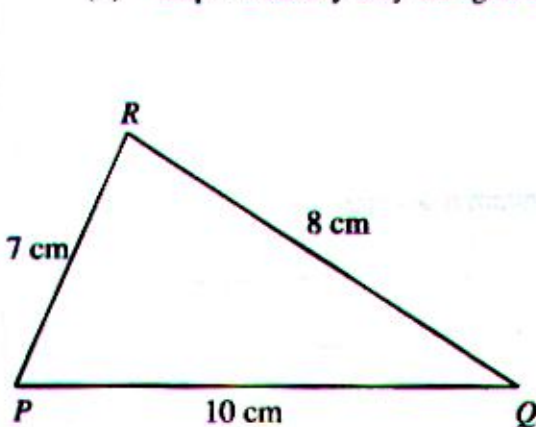[3]

21. *(a)* Explain clearly why triangles *ABC* and *DEF* are similar.

Diagrams not drawn to scale.

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....

....

[1]

(b) Explain clearly why triangles *PQR* and *XYZ* are **not** similar.

Diagrams not drawn to scale.

....

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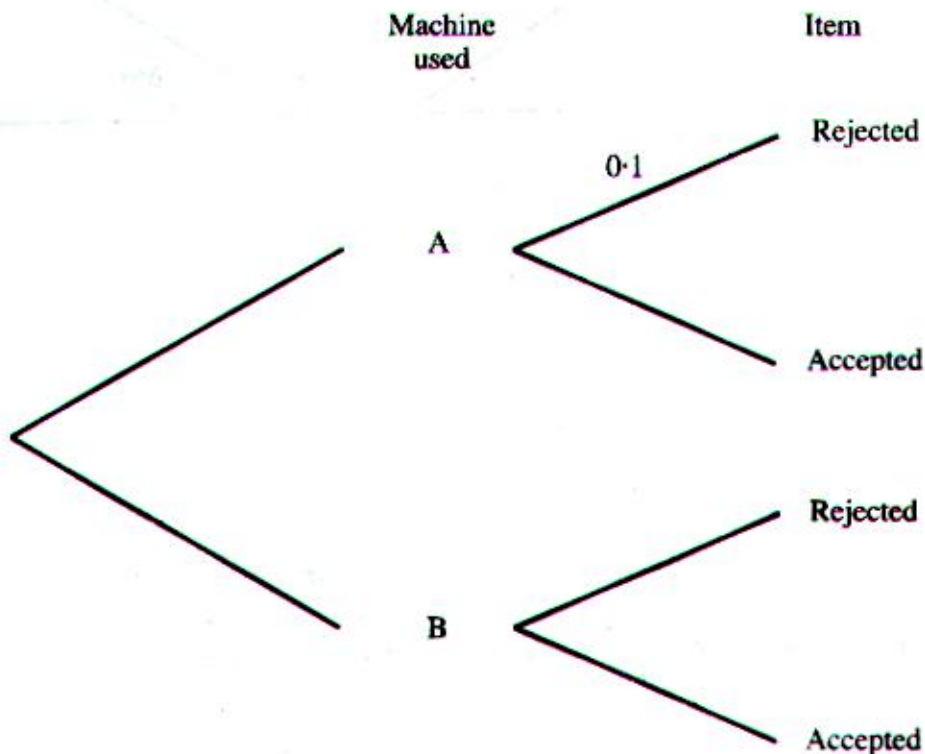...

[3]

22. A factory has two machines, A and B, which it uses to make large numbers of a certain item. Machine A is used to make 60% of the factory's total output and Machine B is used for the remainder. The probability that an item made on Machine A is rejected is 0·1. The probability that an item made on Machine B is rejected is 0·2.

(a) Complete the following tree diagram.

[2]

(b) Calculate the probability that an item chosen at random is accepted.

....

....

....

....

[2]

23. In each of the following formulae, every letter stands for the measurement of a length. By considering the dimensions implied by the formulae, write down, for each case, whether the formulae could be for a length, an area, a volume or none of these.

The first one has been done for you.

Formulae could be for:

$3d^3 - dhr$ volume

$5d - 7h + 3r$ ....

$7rdh - 6dr + d^2$ ....

$(d + 2h)r$ ....

$6r^2h + 5h^2r$ ....

[2]

24. Solve the following equation.

$$\frac{4x - 1}{4} + \frac{x + 8}{2} = \frac{3}{4}$$

....

....

....

....

....

[3]