WELSH JOINT EDUCATION COMMITTEE

General Certificate of Secondary Education

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184/05

MATHEMATICS

INTERMEDIATE TIER PAPER 1

A.M. TUESDAY, 11 November 2003

(2 Hours)

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

Centre Number .....

Candidate's Name (in full) .....

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Candidate's Examination Number .....

INSTRUCTIONS TO CANDIDATES

Write your centre number, name and candidate number in the spaces provided above.

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

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

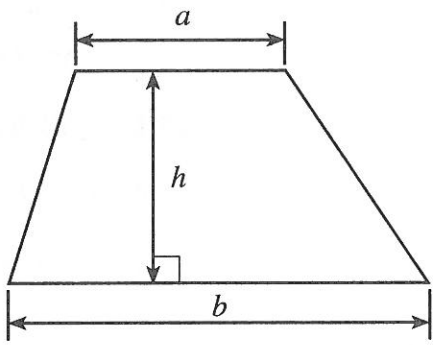
The number of marks is given in brackets at the end of each question or part-question.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

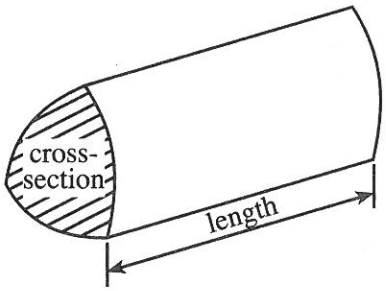
For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	3	
2	6	
3	4	
4	4	
5	3	
6	6	
7	5	
8	2	
9	4	
10	4	
11	5	
12	5	
13	6	
14	4	
15	4	
16	3	
17	4	
18	7	
19	4	
20	3	
21	2	
22	4	
23	4	
24	4	
TOTAL		

Formula List

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



Volume of prism = area of cross-section × length



1. Use the fact that $5{\cdot}3 \times 8{\cdot}6 = 45{\cdot}58$ to write down the answers to the following.

(a) $53 \times 86 =$

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[1]

(b) $530 \times 43 =$

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[1]

(c) $455{\cdot}8 \div 0{\cdot}86 =$

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[1]

2. Find the value of

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

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[2]

(b) $34{\cdot}2 - 27{\cdot}46$.

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[1]

(c) Find the value of $\frac{5}{6} - \frac{1}{3}$.

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[2]

(d) Write down the cube root of 27.

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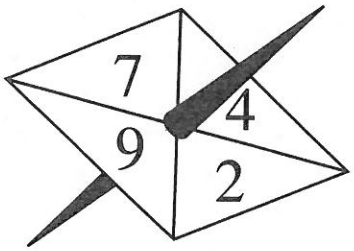
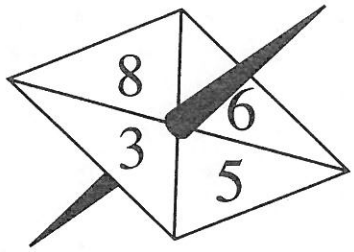
[1]

3. Spinner A has four equal sections numbered 2, 4, 7, and 9. Spinner B has four equal sections numbered 3, 5, 6 and 8. Both spinners are spun and the two numbers obtained are added together to give the score.



Spinner A



Spinner B

(a) Complete the following table to show all the possible scores. [2]

Spinner B \ Spinner A	2	4	7	9
8	10	.....	.....	.....
6	8	.....	.....	.....
5	7	9	12	14
3	5	7	10	12

(b) Find the probability that the total score on the two spinners is less than 10.

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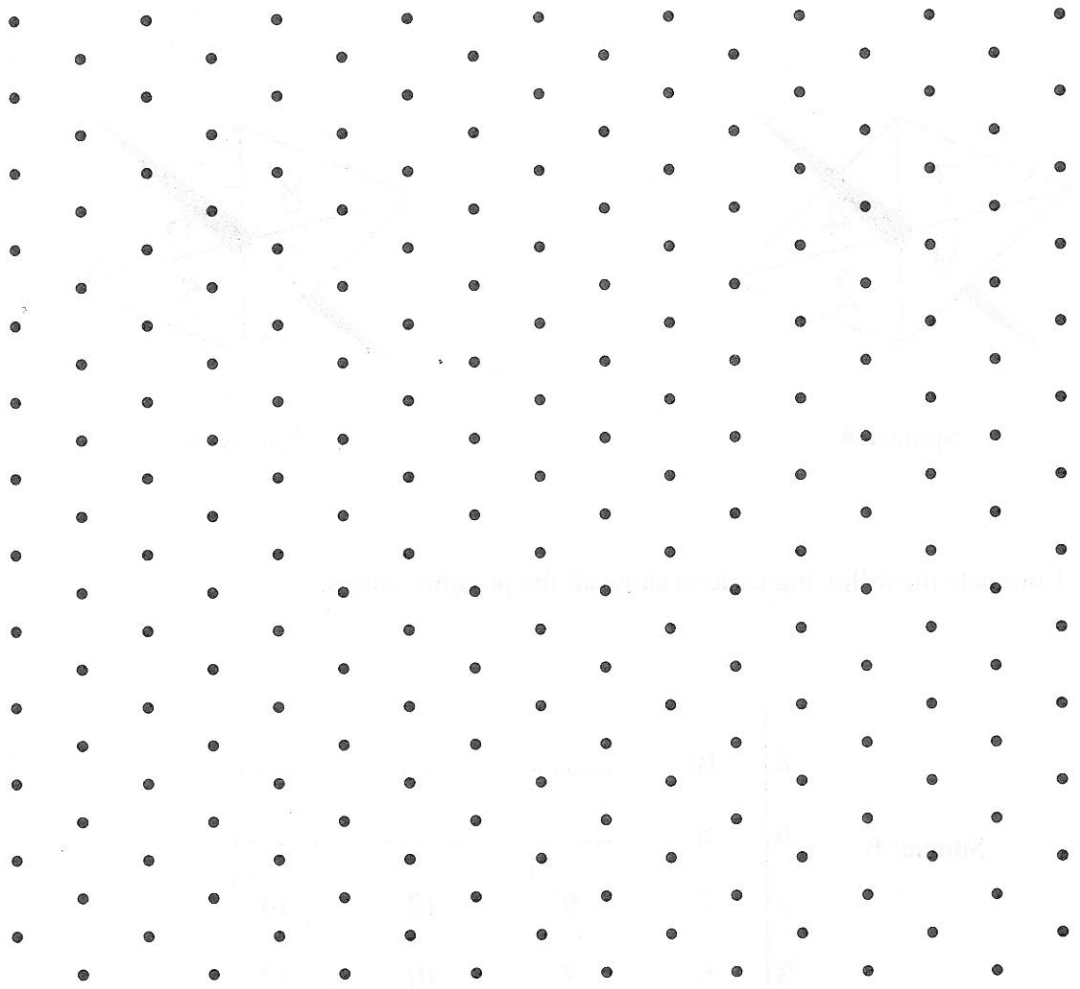
[2]

4. *(a)* On the isometric grid below, draw a cuboid of dimensions 4 cm by 3 cm by 2 cm. [2]



(b) A water tank has the shape of a cuboid with a base of length 30 cm and width 20 cm. Find the depth of water when 9000 cm^3 of water is poured into the tank.

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[2]

5. The triangle ABC is such that $AB = 400$ cm, $BC = 550$ cm and $AC = 450$ cm. Using the scale of 1 cm to represent 50 cm, draw a scale drawing of triangle ABC.

[3]

6. Heidi has x videos worth £7 each.

(a) Write down, in terms of x, the total value of Heidi's videos.

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[1]

(b) She has 9 less DVDs than videos.
Write down, in terms of x, the number of DVDs she has.

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[1]

(c) Each of Heidi's DVDs is worth £10. Write down, in terms of x, the total value of her DVDs.

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[1]

(d) Write down, in terms of x, the total value of all her videos and DVDs. You must simplify your answer as far as possible.

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[3]

7. Solve

(a) $5x = 24 + 2x$,

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[2]

(b) $5(x - 6) = 15$.

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[3]

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

$$\frac{154 \times 4023}{590}.$$

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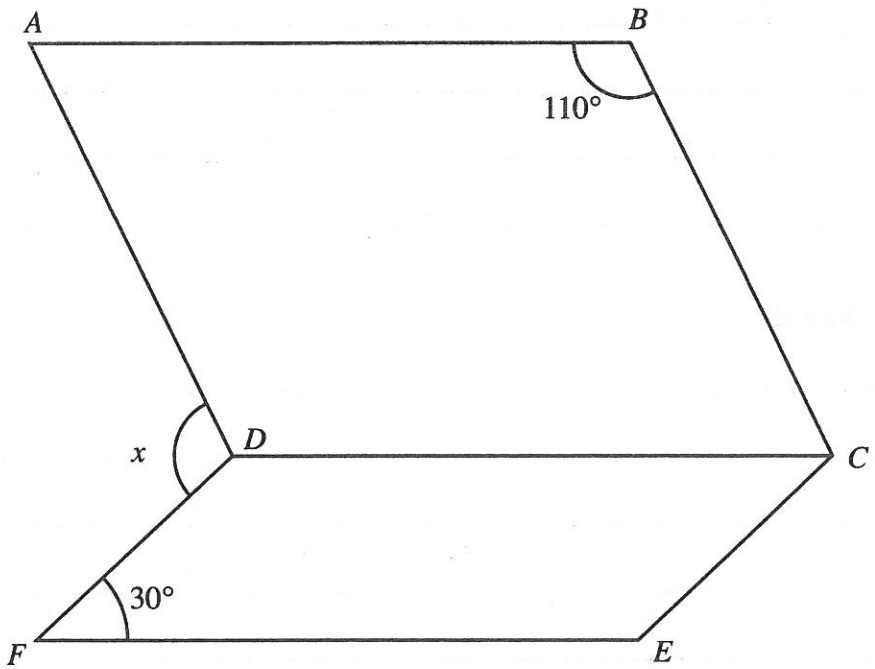
[2]

9. The diagram shows two parallelograms *ABCD* and *DCEF* with $\widehat{ABC} = 110°$ and $\widehat{DFE} = 30°$. Find the size of the angle marked x.



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[4]

10. *(a)* The points P and Q on the grid represent two towns. Find the bearing of P from Q.

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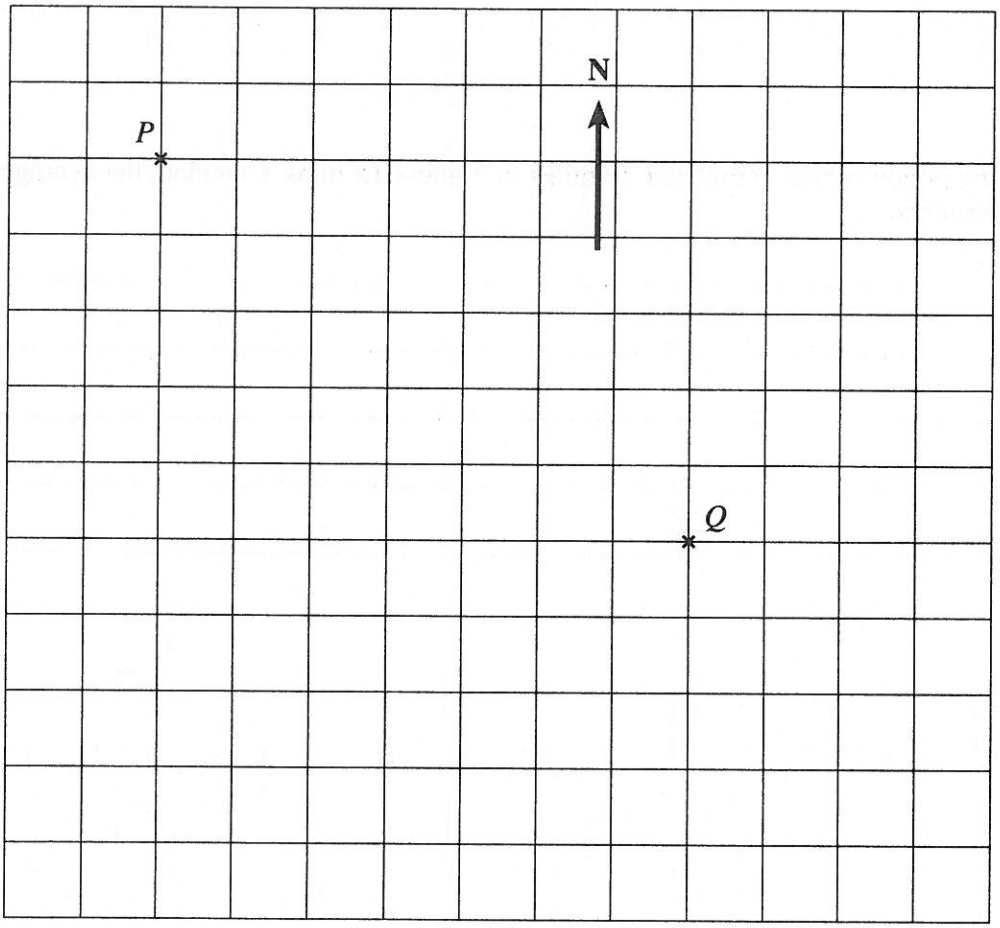
[1]



(b) Another town, R, is on a bearing of 175° from P and on a bearing of 260° from Q. Plot, as accurately as you can, the position of this town. [3]

11. *(a)* In an examination Megan scores 110 marks out of a total of 200 marks. What is her score as a percentage of the total?

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[2]

(b) A marathon runner completed 26 miles in 3 hours 15 mins. Calculate the average speed of the runner.

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[3]

12. A small jug holds x ml of water when full. A large jug holds 100 ml more than the smaller jug. Lesley finds that she needs exactly 6 large jugs full of water to fill a tank. When she uses the small jug to fill the same tank, she needs 8 small jugs full of water, but she has 50 ml left over.

(a) Use this information to set up an equation that x satisfies.

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[2]

(b) Solve the equation and write down the capacities of the two jugs.

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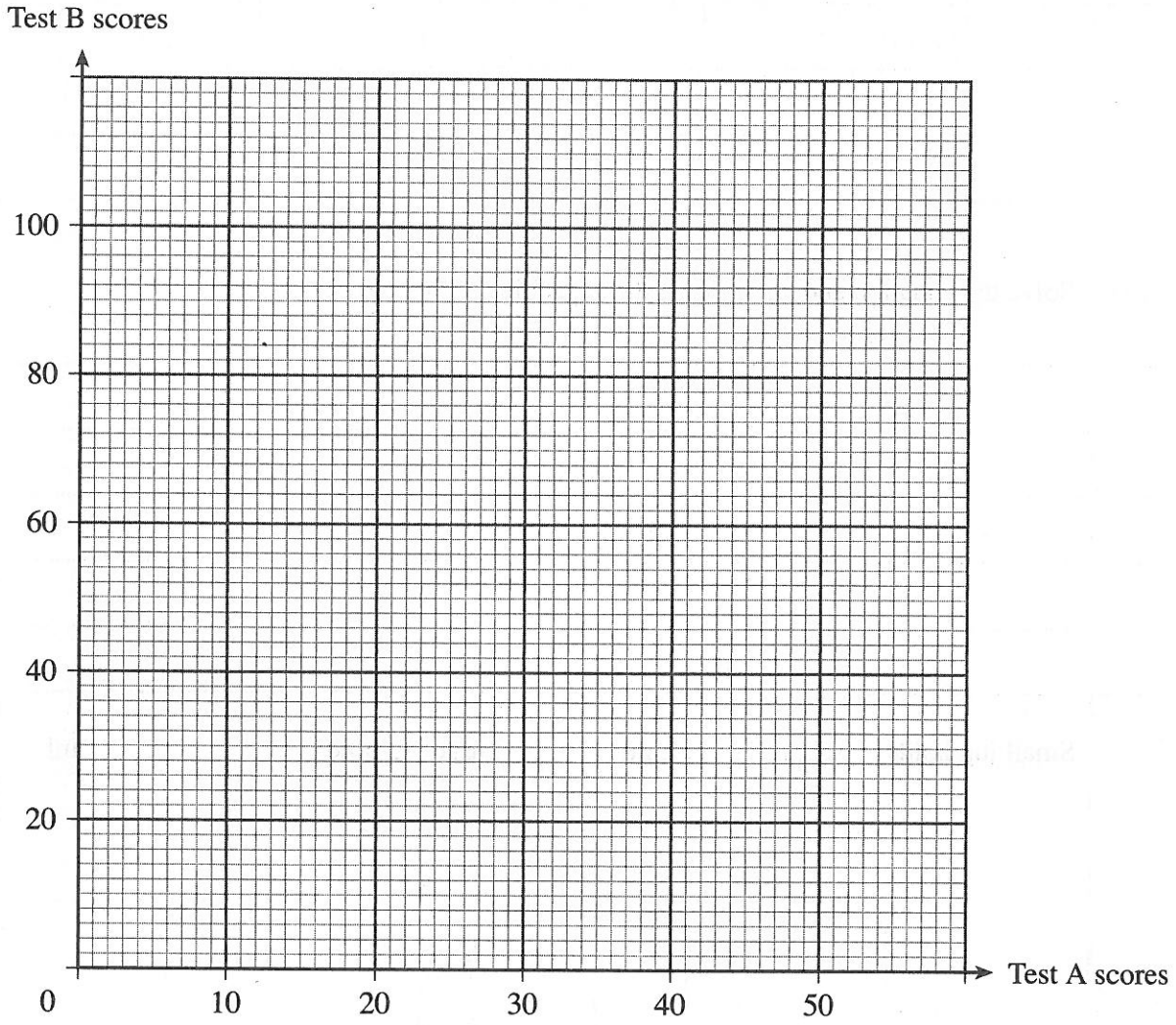
Small jug holds ..... ml Large jug holds ..... ml.

[3]

13. The table shows the pairs of scores obtained by 8 pupils on two types of tests.

Test A	21	6	43	48	8	31	29	14
Test B	58	94	28	18	84	41	54	71

(a) On the graph paper provided draw a scatter diagram for these results. [2]



(b) Describe the correlation between the two sets of scores.

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[1]

(c) The mean score for the pupils on Test A is 25 and the mean score on Test B is 56. Draw a line of best fit on your scatter diagram. [2]

(d) Another pupil sat Test A and was given a score of 18, but was absent for Test B. Use your line of best fit to estimate the score on Test B for this pupil.

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[1]

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14. *(a)* Express 2646 as a product of prime numbers in index form.

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[3]

(b) Write down the least whole number by which 2646 should be multiplied to make the result a perfect square.

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[1]

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

x	–2	–1	0	1	2	3	4
$y = 3x^2 - 2x - 5$	11	0	–5	– 4	3	16	35

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

[2]

(b) Draw the line $y = 5$ on your graph paper and write down the x-values of the points where your two graphs intersect.

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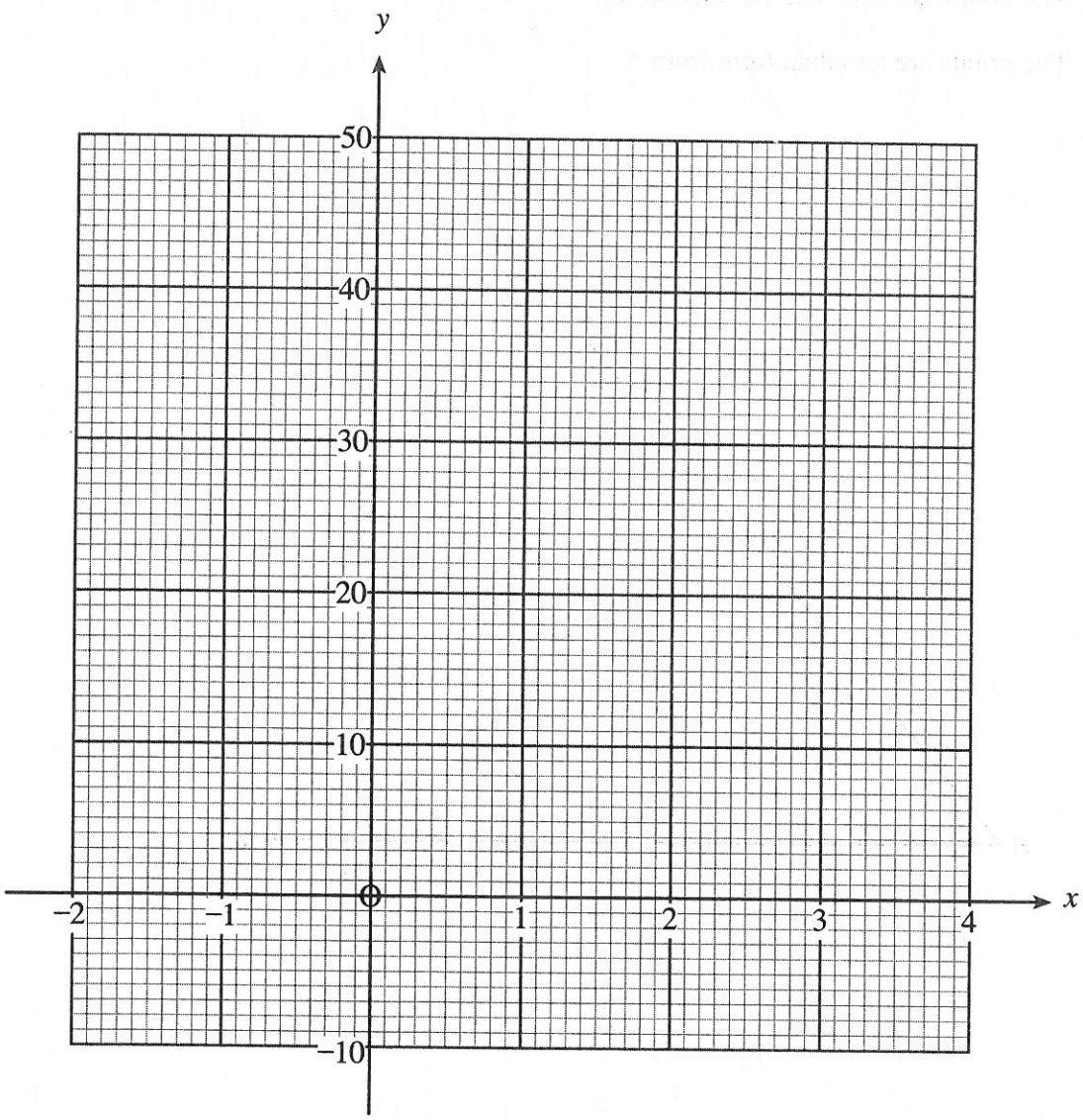
[2]

For use with Question 15

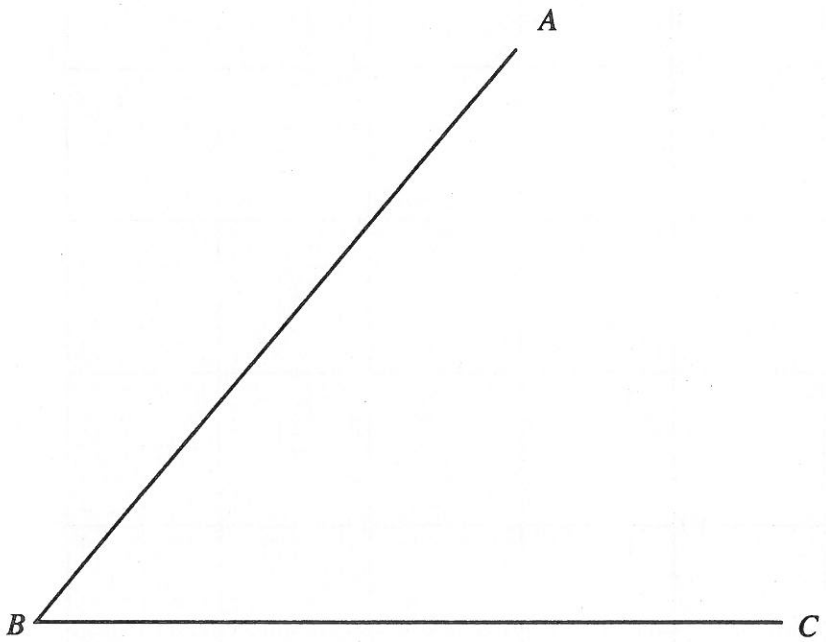


16. Find and shade the region of points that satisfy both of the following conditions.

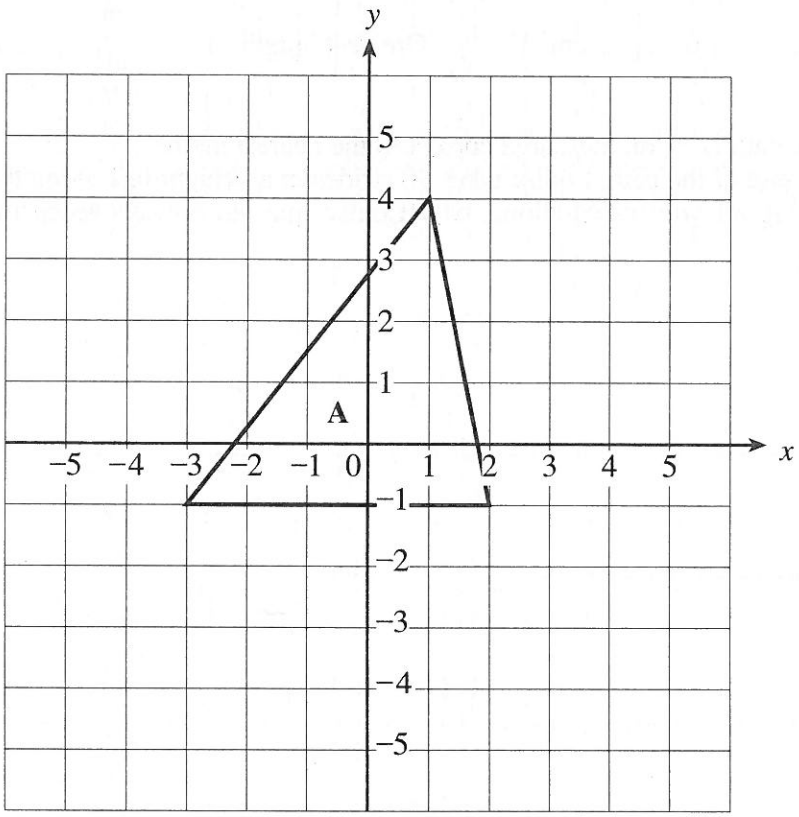
(i) The points are nearer to BC than to AB.

(ii) The points are less than 6 cm from A.

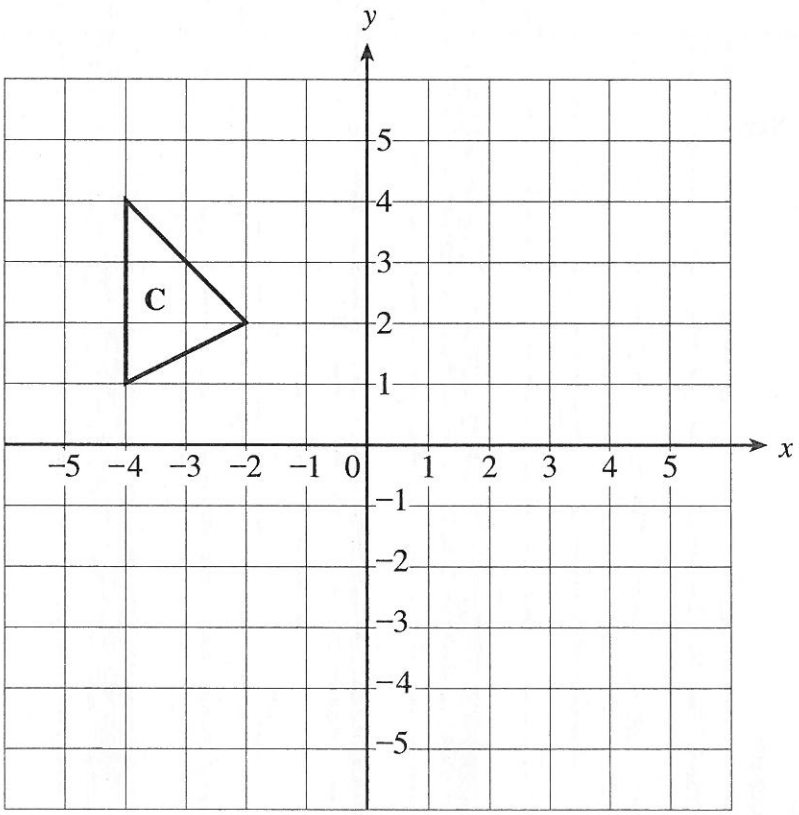
[3]



17. *(a)* Draw the image of the triangle **A** after a reflection in the line $y = x$.
Label the image **B**. [2]



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



18. The length of Louise's stride is 90 cm, measured to the nearest centimetre.

(a) Write down the least and greatest possible length of Louise's stride.

Least length ..... cm Greatest length ..... cm.

[2]

(b) The length of a path is 27 m, measured correct to the nearest metre.
Starting at one end of the path, Louise takes 30 strides in a straight line along the path.
Explain, showing all your calculations, why Louise may not always reach the end of the path.

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[5]

19. *(a)* Simplify $4c^7d^3 \times 3c^4d$.

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[2]

(b) Factorise $2x^2 - 8xy$.

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[2]

20. Solve the inequality

$$5x + 7 \geqslant 2x - 11.$$

[3]

21. Each of the following quantities has a particular number of dimensions. Give the number of dimensions of each quantity. The first one has been done for you.

Quantity	**Number of dimensions**
The capacity of a jug	3
The distance between Bangor and Swansea	
The volume of a cube	
The area of a circle	
The perimeter of a rectangle	

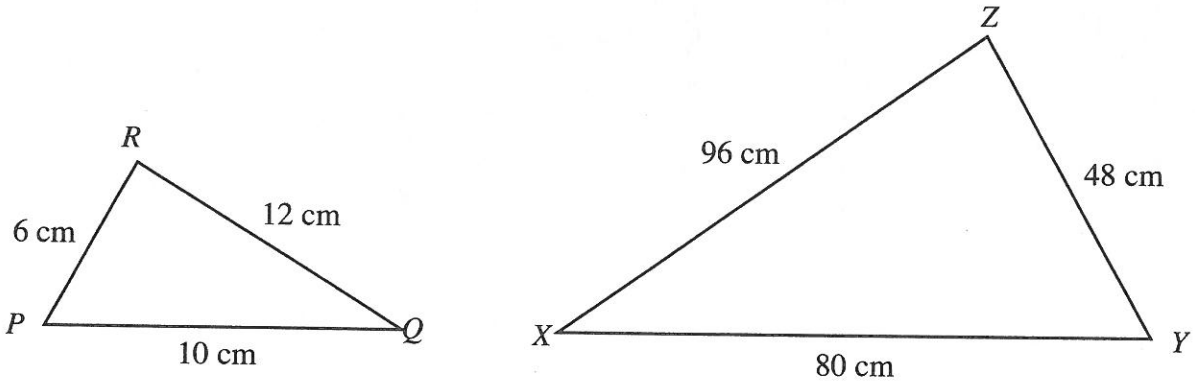
[2]

22. Solve the following equation.

$$\frac{3x+1}{3} - \frac{2x-7}{6} = \frac{5}{2}$$

[4]

23. *(a)* Explain clearly why the two triangles drawn below are similar.



Diagrams not drawn to scale.

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[2]

(b) The triangle given below, in which $AB = 7{\cdot}5$ cm and $AC = 4{\cdot}5$ cm, is similar to both triangles given in part *(a)*. Calculate the length of BC.

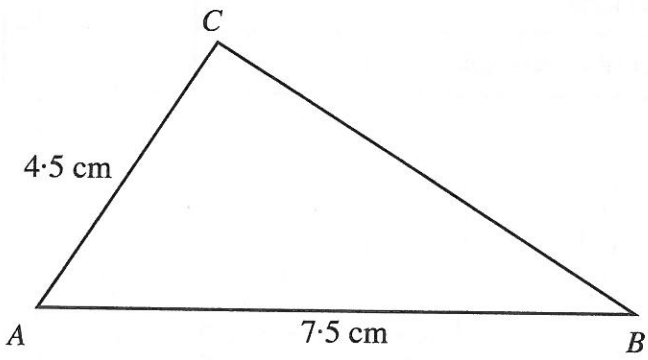

Diagram not drawn to scale.

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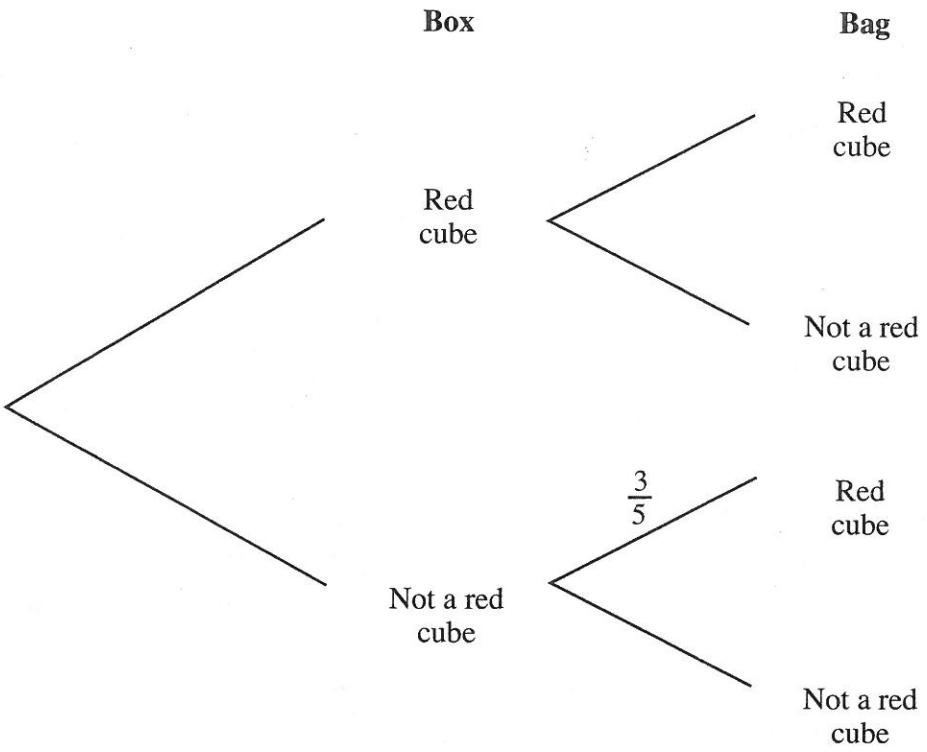
[2]

24. A box contains coloured cubes identical except for their colour. The probability of choosing a red cube at random from the box is $\frac{5}{7}$. A bag also contains similar coloured cubes. The probability of choosing a red cube at random from the bag is $\frac{3}{5}$.

Chris takes a cube at random from the box and a cube at random from the bag.

(a) Complete the following tree diagram.



[2]

(b) Calculate the probability that neither of the chosen cubes is red.

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[2]