WELSH JOINT EDUCATION COMMITTEE

General Certificate of Secondary Education

CYD-BWYLLGOR ADDYSG CYMRU

Tystysgrif Gyffredinol Addysg Uwchradd

MATHEMATICS

INTERMEDIATE TIER PAPER 1

A.M. TUESDAY, 9 November 1999

(2 hours)

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.

INFORMATION FOR CANDIDATES

An electronic calculator will be required.

A formula booklet is available and may be used.

You should give details of your method of solution, especially when a calculator is used.

Unless stated, diagrams are not drawn to scale.

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

In questions where it is required, take π as 3·14 or use the π button on your calculator.

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	7	
3	3	
4	2	
5	3	
6	3	
7	3	
8	3	
9	3	
10	3	
11	2	
12	2	
13	3	
14	2	
15	3	
16	2	
17	6	
18	3	
19	7	
20	3	
21	7	
22	5	
23	4	
24	4	
25	4	
26	2	
27	4	
28	4	
TOTAL		

1. *(a)* Find the value of 3^5.

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[1]

(b) Find the value of the cube of 4.

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[1]

(c) Write down the square number that is nearest to 45.

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[1]

2. *(a)* Simplify

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

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[2]

(ii) $6y - 7 - 2y - 3$.

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[1]

(b) What is the value of $5a + 3b$ when $a = 2$ and $b = -4$?

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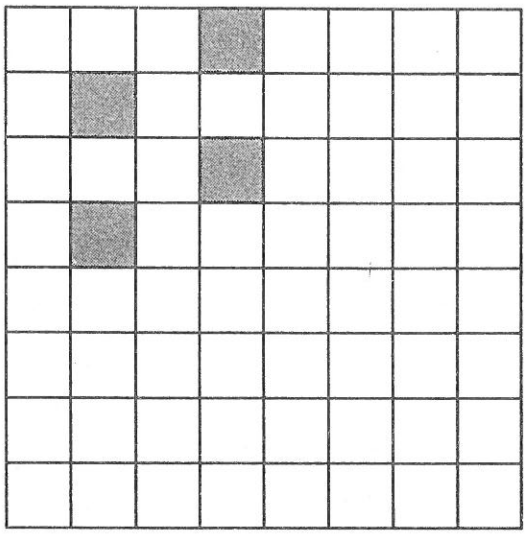
[2]

(c) Write down the next two numbers in the following sequence.

40 37 31 22 ....

[2]

3. This diagram shows a partly constructed crossword grid.
The completed grid contains 16 shaded squares and has rotational symmetry, order 4.
Complete the grid by shading the other 12 squares.



[3]

4. The diagram below shows an isosceles triangle ABC, with $AB = AC$ and $B\hat{A}C = 70°$.

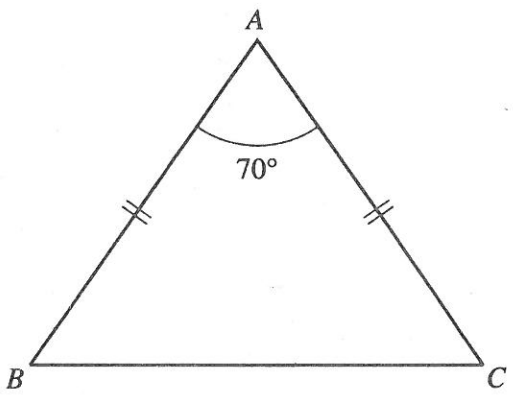


Diagram not drawn to scale.

Calculate the size of $A\hat{C}B$.

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[2]

5. Calculate the amount that £2500 will become, if it is invested for 4 years at 6% per annum **simple** interest.

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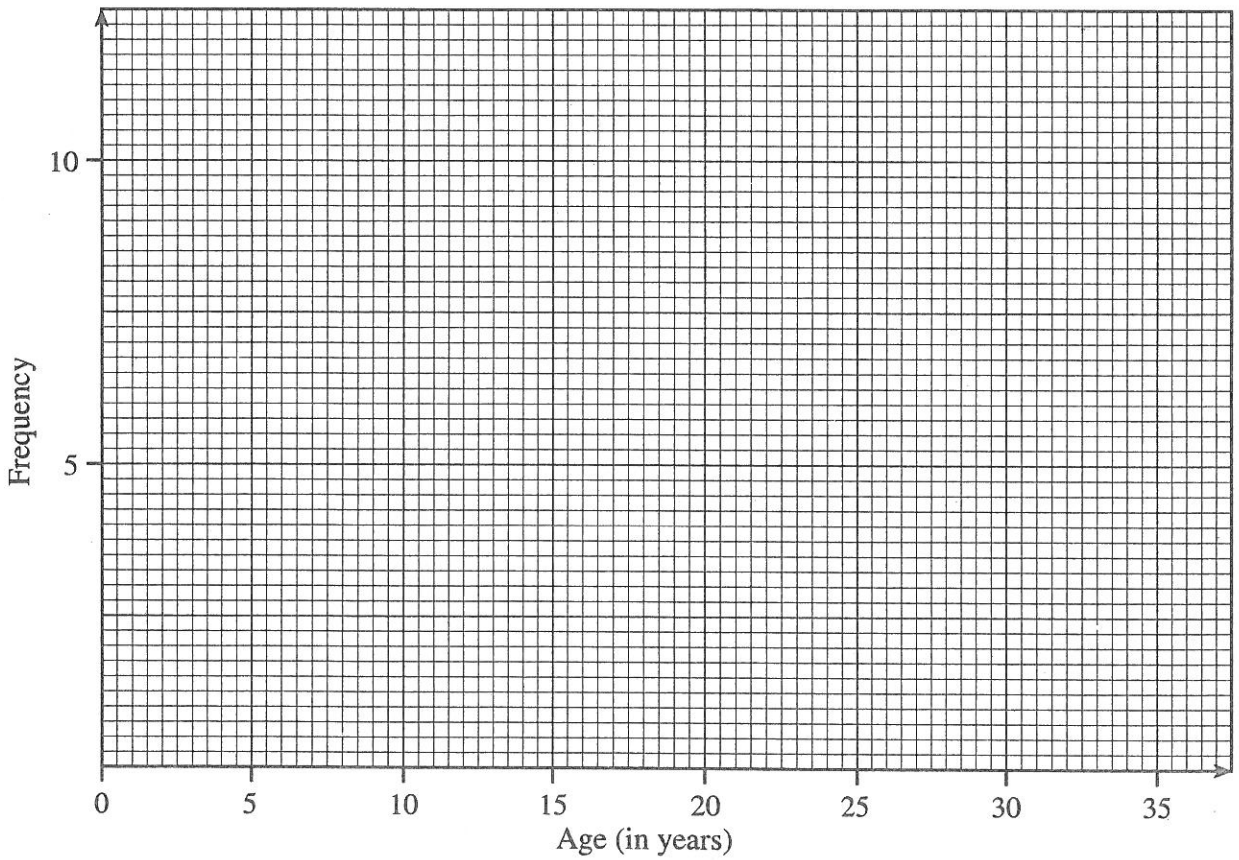
[3]

6. The table below shows a grouped frequency distribution of the ages in complete years of 25 people on a bus.

Age (Complete years)	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34
Frequency	4	9	8	1	3

(a) On the grid below, draw a grouped frequency diagram to show the distribution of the ages.



(b) What can you say about the age of the youngest person on the bus?

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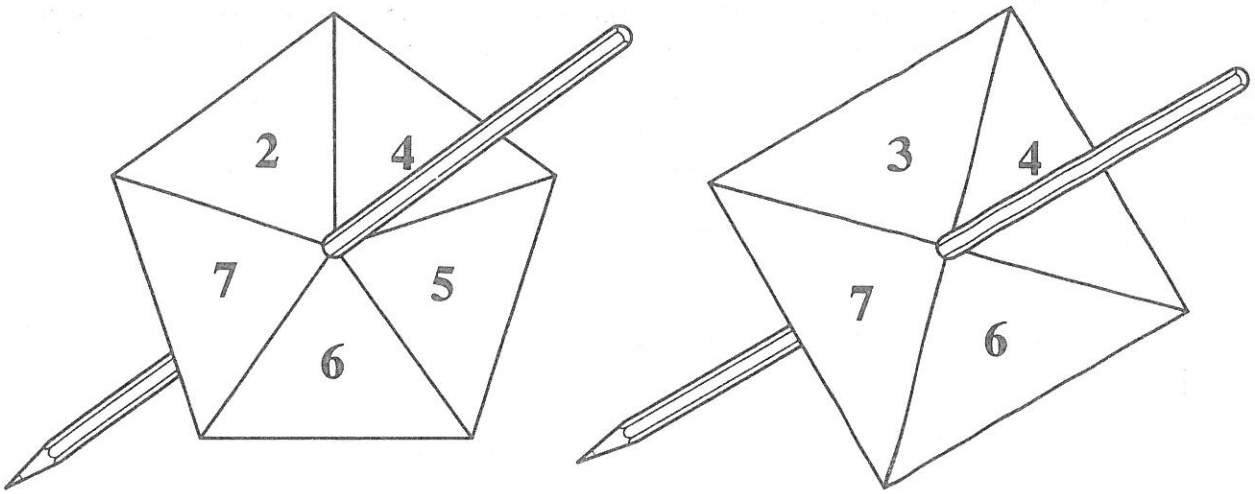
[3]

7.



Katie has two unbiased spinners. One has five sides, numbered 2, 4, 5, 6, 7 and the other has four sides numbered 3, 4, 6, 7. She spins both spinners and adds the numbers on which each lands. The table below shows some of the possible total scores she can obtain.

		1st Spinner				
		2	4	5	6	7
2nd Spinner	3	5	7	8	9	10
	4	6	8			
	6					
	7					

(a) Complete the table to show all the possible total scores Katie can obtain.

[2]

(b) What is the probability that Katie obtains a total score of 5?

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[1]

8. The diagram below is drawn to scale. It shows two airports *A* and *B*, with *B* due north of *A*. An aircraft is on a bearing of 060° (N60°E) from A and 130° (S50°E) from *B*. Clearly drawing all necessary lines, mark the position of the aircraft on your diagram.

[3]

9. The following is a list of ingredients to make 24 scones.

480g flour	80g sultanas	120g margarine
150ml milk	48g sugar	2 pinches of salt

Calculate how much salt, flour and milk would be needed to make 36 scones.

[3]

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Salt ..... pinches Flour (g) ..... Milk (ml) .....

10. Solve the following equation.

$$4(x + 2) = x + 5$$

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[3]

11. A bag contains red, blue and green beads. A bead is drawn at random from the bag. The probability that the colour of the bead drawn is red is 0·39. The probability that the colour of the bead drawn is blue is 0·26. What is the probability that the colour of the bead drawn is green?

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[2]

12. **Do not use a calculator when answering this question.**
Show all your working.
Show clearly how you would obtain an ESTIMATE for the following calculation.

$$\frac{96 \times 319}{82}$$

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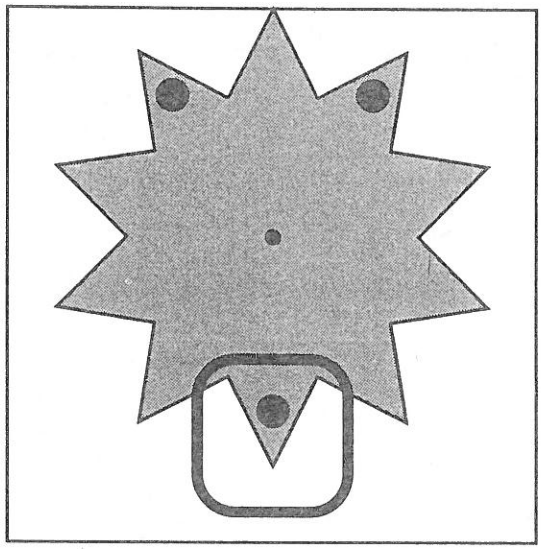
[2]

13. The diagram shows a game at a fete. When a contestant spins the star it always stops with one of its points vertically downwards. If this point has a black circle on it, the contestant wins. Otherwise the contestant loses.



(a) What is the probability of a contestant winning on one spin of the star?

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(b) At the fete 1000 contestants each have one spin of the star. How many contestants are expected to win?

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(c) Each spin costs 10p and each contestant that wins receives a prize of 30p. About how much profit is the game likely to make on 1000 contestants?

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[3]

14. Railtrack have stated that trains which now travel at average speeds of 120 m.p.h. will, in the future, be able to average 140 m.p.h. How much time would be saved on a journey of 210 miles?

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[2]

15. Jonathan measures the radius of a circular pond as 4·6m. Calculate the circumference of the pond, giving your answer to an appropriate degree of accuracy.

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[3]

16. Write down, in terms of n, the n th term of the following sequence.

8 13 18 23 .....

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[2]

17. The table below shows a grouped frequency distribution of the weights, correct to the nearest kilogram, of 25 dogs.

Weight (kg)	1 to 5	6 to 10	11 to 15	16 to 20	21 to 25
Frequency	5	8	6	4	2

(a) Calculate an estimate of the mean weight of the dogs.

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[4]

(b) In which class interval is the median weight?

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[2]

18. A village raised £6000 for charity. The organisers decided to share the money between their local hospital, OXFAM and the RSPCA in the ratio of 11:8:6. How much does each charity receive?

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[3]

19. *(a)* Complete the table which gives the values of $y = 3x^2 - 4x - 2$ for values of x ranging from –2 to 2·5.

x	–2	–1	0	0·5	1	2	2·5
$y = 3x^2 - 4x - 2$	18		–2	–3·25		2	6·75

[2]

(b) On the graph paper provided opposite draw the graph of $y = 3x^2 - 4x - 2$ for values of x ranging from –2 to 2·5.

[2]

(c) Draw the line $y = 5$ on the same 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)*.

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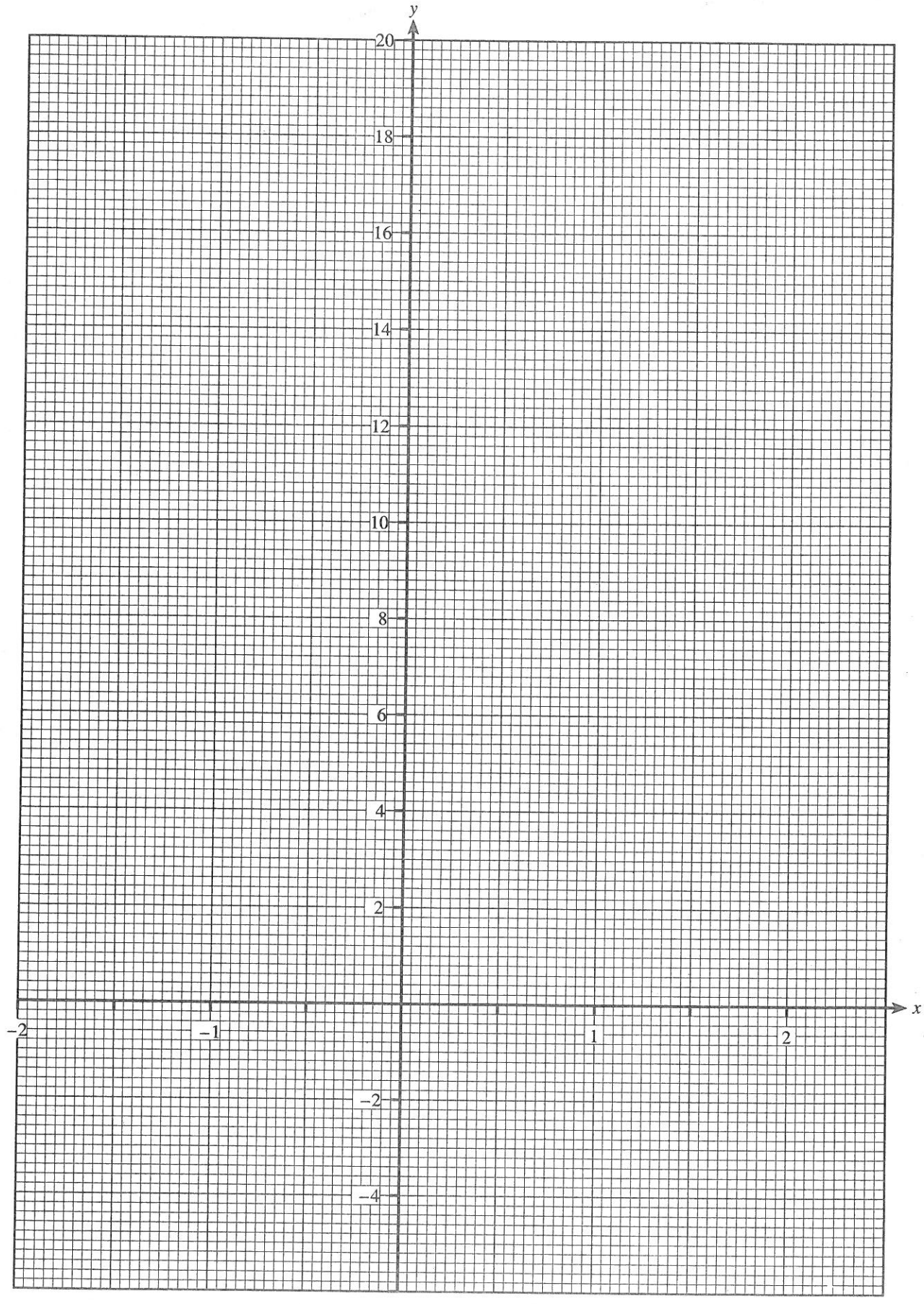
[1]

FOR USE WITH QUESTION 19

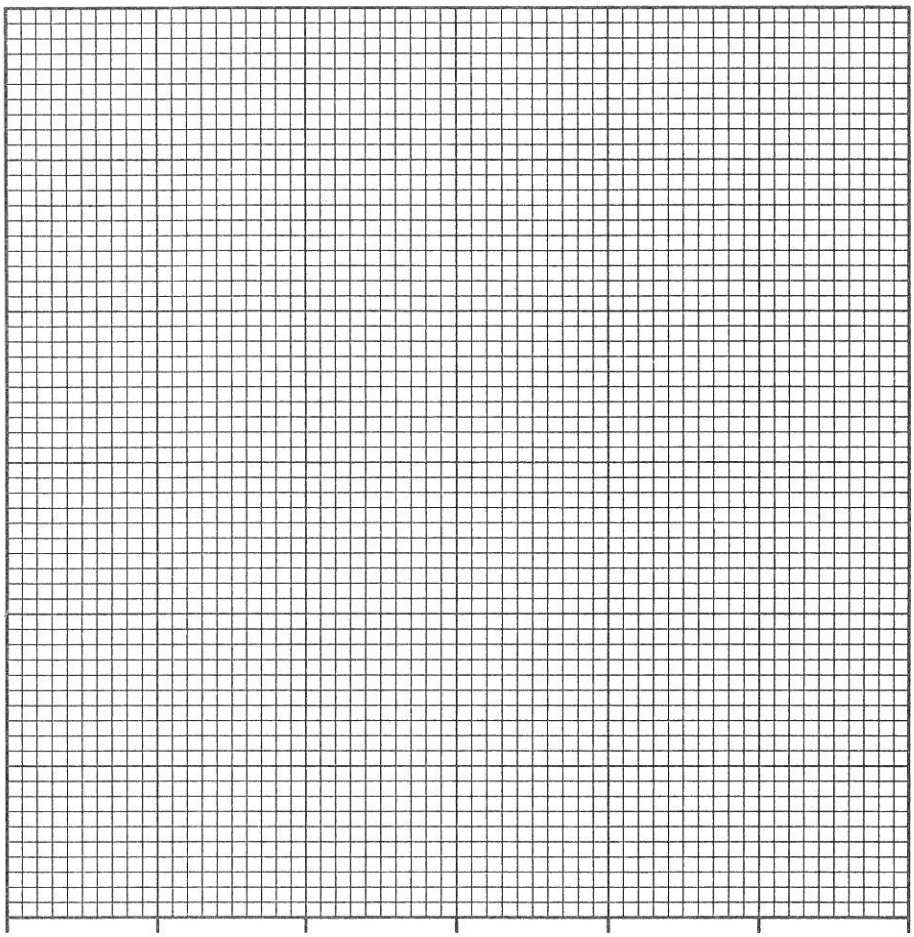


20. One afternoon, a shopkeeper kept a record of the amount of money spent by each customer in his shop. The table below shows his results.

Amount spent (to the nearest £)	1 to 10	11 to 20	21 to 30	31 to 40	41 to 50
Frequency	9	5	3	7	1

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

[3]



21. A paving block is in the shape of a symmetrical pentagonal prism. The diagram below shows the uniform cross-section of the block. It is a pentagon with a horizontal base of 14 cm, two vertical sides each 10 cm long and an overall height of 12 cm as shown in the diagram.

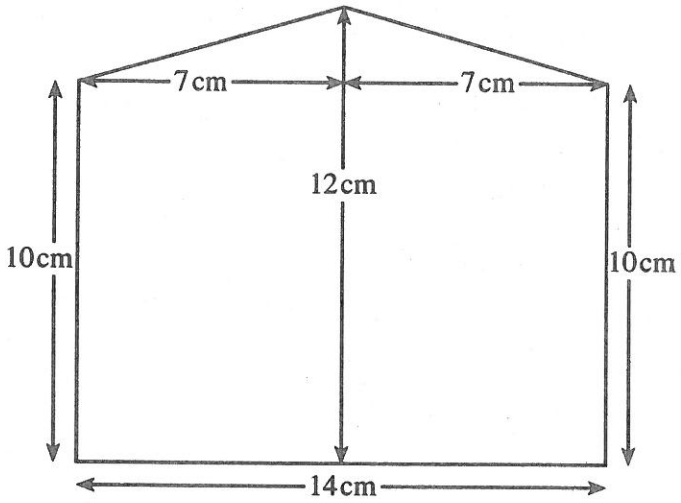


Diagram not drawn to scale.

(a) Calculate the area of the cross-section of the block.

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[3]

(b) The prism is 17 cm long and the material from which it is made has a density of 2·2 g/cm^3. Calculate the mass of the paving block in kilograms.

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[4]

22. *(a)* The cost of a holiday for an adult is £580. The same holiday only costs £377 for a child. What is the cost of the holiday for a child, as a percentage of the cost of the holiday for an adult?

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[2]

(b) A builder gives a householder a bill for £423, inclusive of V.A.T. charged at $17\frac{1}{2}\%$. How much was the V.A.T. itself?

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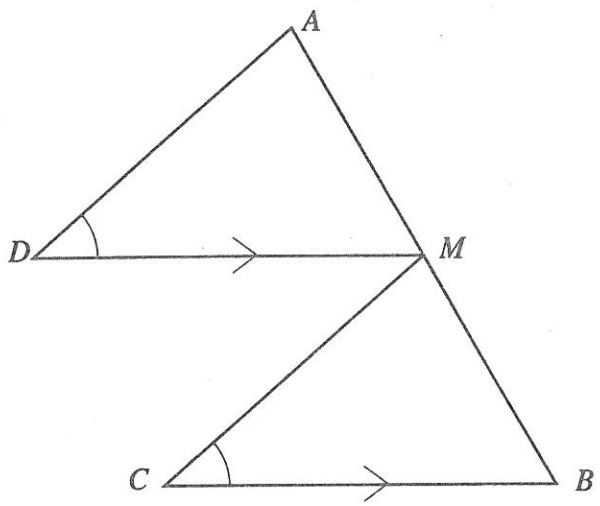
[3]

23. In the diagram below, M is the mid-point of the line AB, DM is parallel to CB and $\hat{ADM} = \hat{MCB}$.



Explain fully why triangles ADM and MCB are congruent.

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[4]

24. Solve the following simultaneous equations by an algebraic (not graphical) method. **Show all your working.**

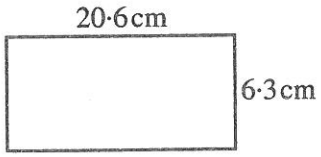
$$4x - 3y = 9$$
$$6x - 5y = 5$$

[4]

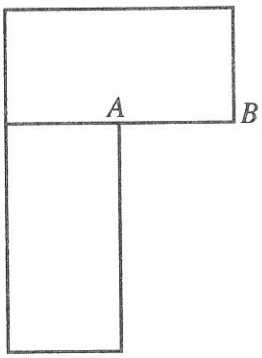
25. A cylindrical container with a circular cross-section of radius 12 cm has a volume of 1·8 litres. Calculate the height of the container, giving your answer to an appropriate degree of accuracy.

[4]

26. Rectangular sheets of metal measure 20·6cm by 6·3cm, each measurement being to the nearest mm.



Two of these sheets are placed together without overlapping as shown in the diagram below.



Find, in millimetres, the least value of the length of the side AB.

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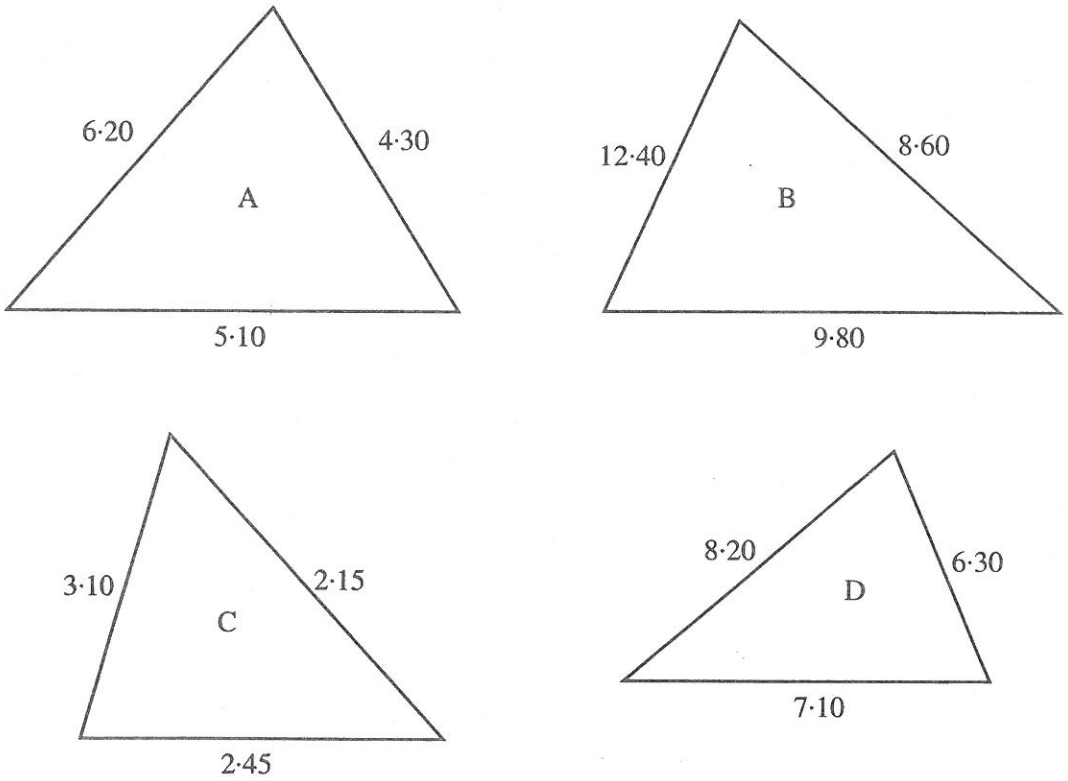
Least value for AB is ..... mm.

[2]

27. The diagrams below show four triangles, labelled A, B, C and D, with the lengths of their sides, in cm, marked on them.



Diagrams not drawn to scale.

Two of the triangles are similar to each other.
Explain which two triangles are similar, giving full reasons to justify your answer.

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[4]

28. Solve the following equation.

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

[4]