WELSH JOINT EDUCATION COMMITTEE

General Certificate of Secondary Education

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184/05

MATHEMATICS

INTERMEDIATE TIER PAPER 1

A.M. TUESDAY, 14 November 2000

(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

A formula booklet is available and may be used.

You should give details of your method of solution.

Unless stated, diagrams are not drawn to scale.

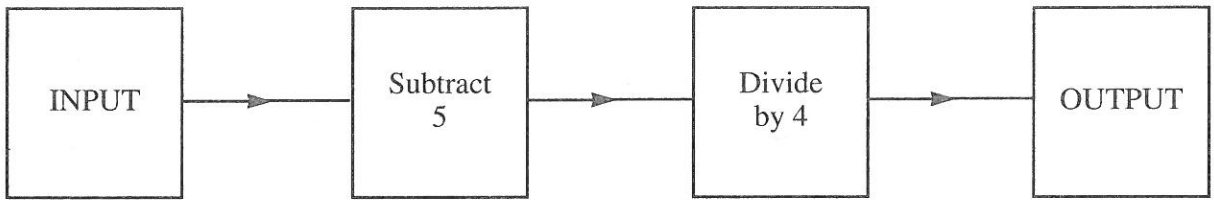
Scale drawing solutions will not be acceptable where you are asked to calculate.

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

1. The diagram below represents a number machine.



(a) When the input is –7, what is the output?

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[1]

(b) If the input is x, write down the output in terms of x.

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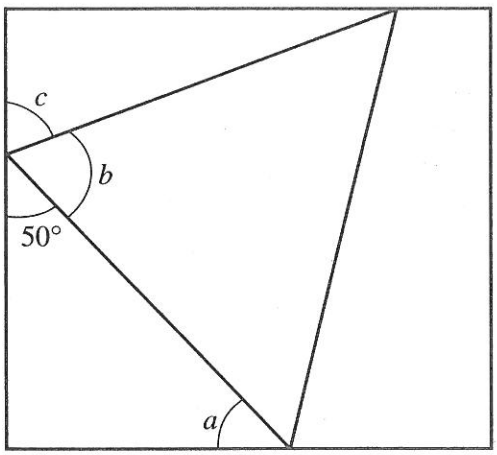
[2]

2. The diagram shows an equilateral triangle with its vertices on three sides of a square. Find the angles marked a, b and c.



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a = ... ° b = ... ° c = ... °

[3]

3. *(a)* Simplify $7a - 6 + 4a - 2$.

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[2]

(b) Find the value of $3x + 5y$ when $x = 4$ and $y = -6$.

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[2]

4. *(a)* Tim went on a holiday to America. He changed £900 into dollars, when the exchange rate was £1 = $1.55. How many dollars did Tim get?

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[2]

(b) At the end of his holiday Tim had $32 left. He changed them into pounds, when the exchange rate was £1 = $1.60. How many pounds did Tim get?

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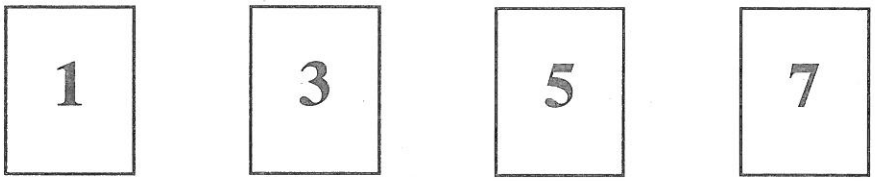
[2]

5. There are two packs of cards, one pack is coloured green and the other pack is coloured yellow. The green pack has five cards numbered:

The yellow pack has four cards numbered:



In a game a player chooses one card from the green pack and one card from the yellow pack. The player's score is the difference between the two numbers.

For example, if the number on the green card is 4 and the number on the yellow card is 7, the player works out $7 - 4 = 3$ and the player scores 3.

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

Green pack \ Yellow pack	1	3	5	7
7	6	---------	---------	---------
6	5	---------	---------	---------
5	4	---------	---------	---------
4	3	1	1	3
3	2	0	2	4

[2]

(b) (i) What is the probability that a player scores 2?

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[1]

(ii) What is the probability that a player does not get a score of 2?

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[1]

A player wins a prize by getting a score of 0 or 1.

(c) Vanessa plays the game once.

(i) What is the probability that she wins a prize?

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[2]

(ii) 300 people each play the game once.
Approximately how many would you expect to win a prize?

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[2]

(iii) It costs 50p to play the game once. The prize for getting a score of 0 or 1 is £1. If the 300 people each play the game once, approximately how much profit do you expect the game to make?

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[2]

6. *(a)* Write down 839·7 correct to 3 significant figures.

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[1]

(b) Write down 0·03426 correct to 2 significant figures.

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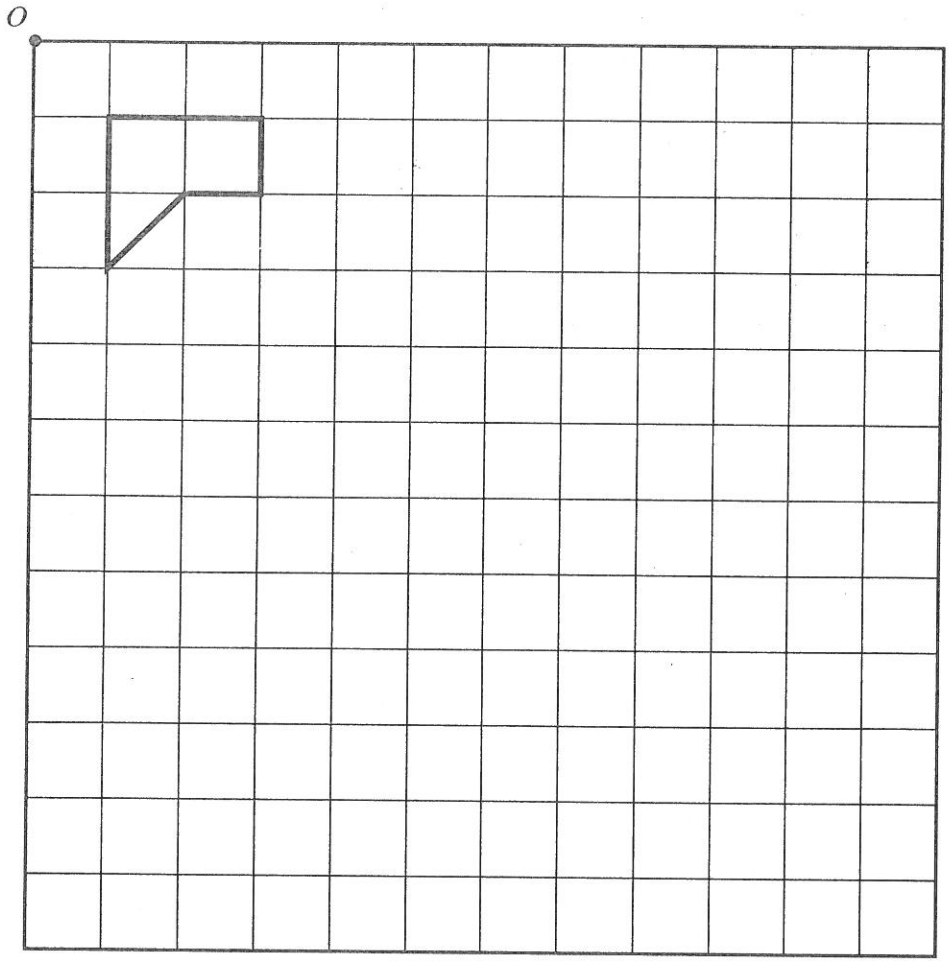
[1]

7. Draw on the grid below, an enlargement of the given shape, using a scale factor of 4 and centre O.



[3]

8. The points A and B are marked in the space below.

(a) C is the point that is 85 miles from A on a bearing of 310°.
Using the scale of 1 cm to represent 10 miles, draw the line from A to the point C. [2]

(b) Find the bearing of the point B from the point A.

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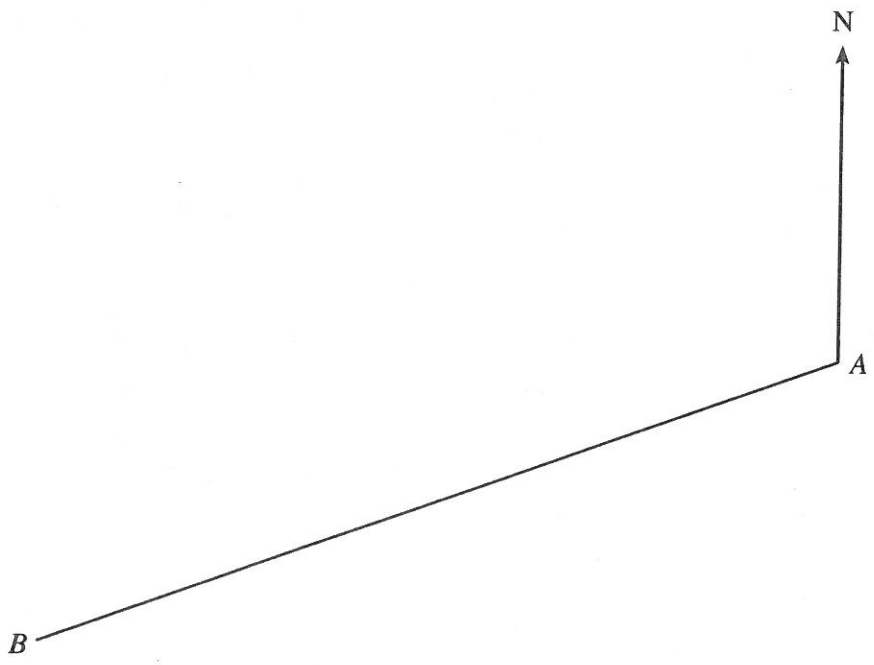
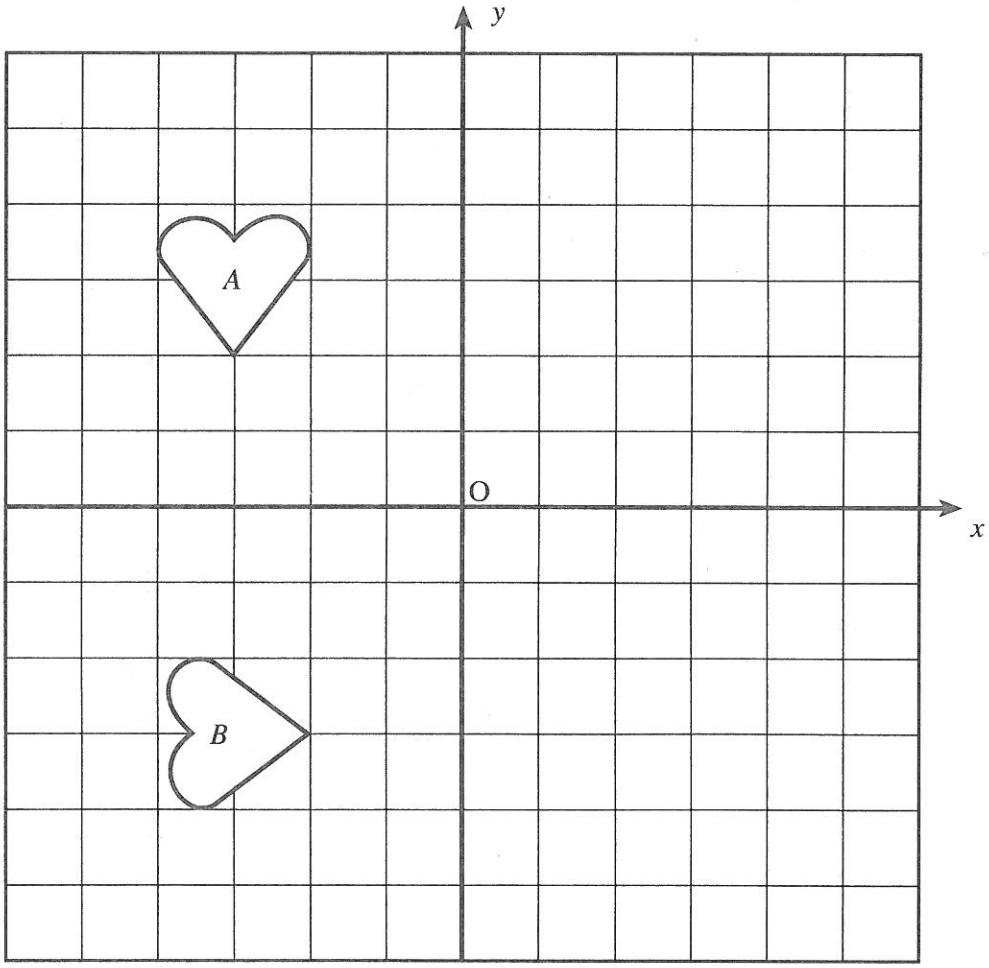
[1]



9. Describe the single transformation that takes the shape marked *A* onto the shape marked *B*.



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[3]

10. ESTIMATE the value of

$$\frac{58 \times 92}{487}.$$

Show clearly how you obtain your answer.

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[2]

11. John makes a bird table at a cost of £35. He sells the table and makes a profit of 40%. Calculate the selling price of the bird table.

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[3]

12. A motorist travels 96 miles in $1\frac{1}{2}$ hours. What is the average speed, in m.p.h., of the motorist?

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[2]

13. Solve the equation $8x - 2 = 2x + 7$.

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[2]

14. Louise buys milk in 2 litre cartons. She uses $1\frac{2}{3}$ litres of milk every day. What is the least number of cartons of milk she would need to buy in ten days?

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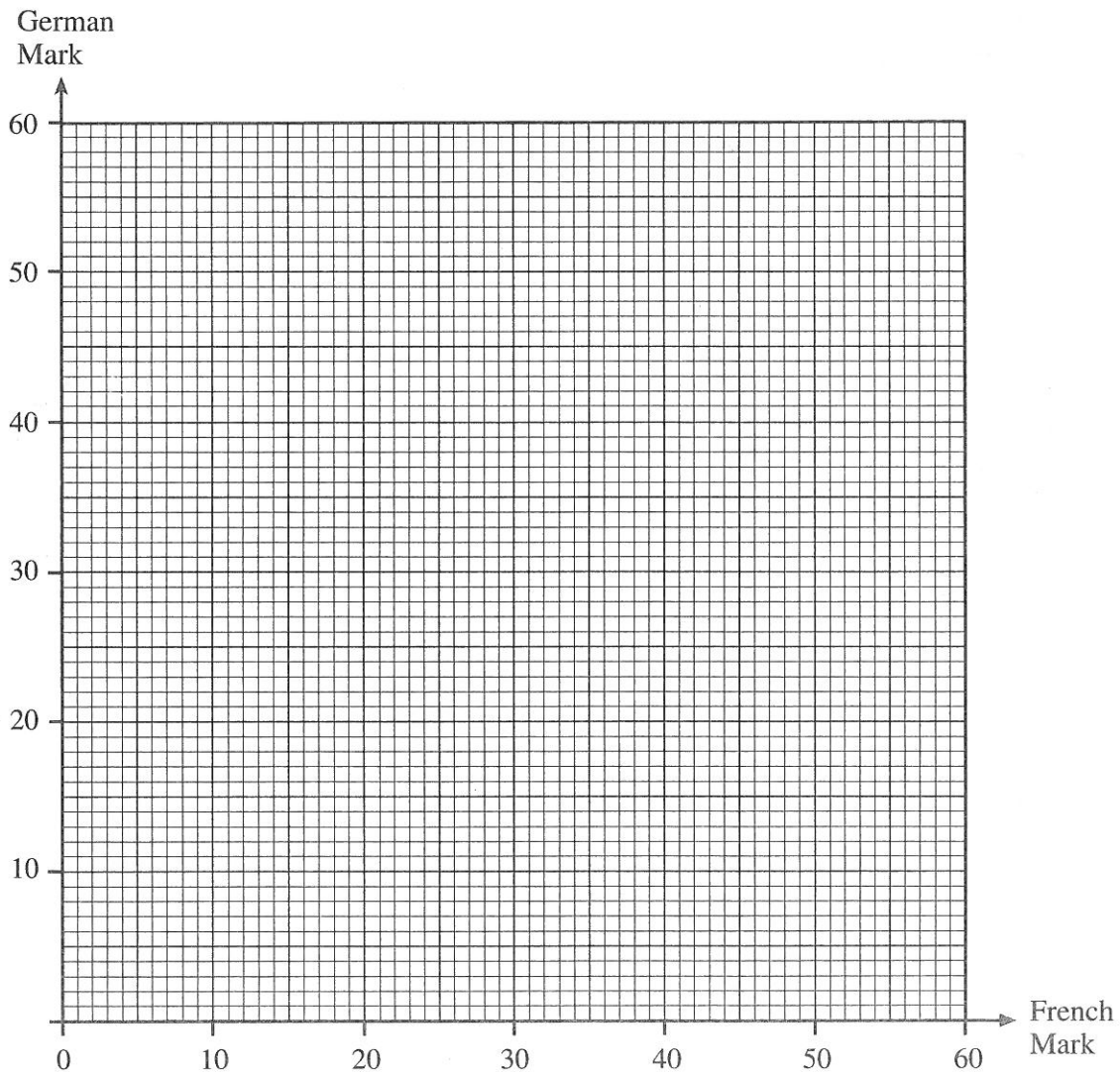
[3]

15. The table gives the marks obtained by ten students in their French and German tests.

French	15	33	42	50	55	53	42	21	60	29
German	10	31	43	34	40	47	30	23	50	22

(a) On the graph paper below, draw a scatter diagram of these results. [2]



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

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[1]

(c) The mean marks for the French and German tests are 40 and 33 respectively. Draw the line of best fit on your scatter diagram.

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[2]

(d) Jill scored 45 on her French test, but was absent for the German test. Use your line to estimate the mark she would have obtained in the German test.

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[1]

16. Adrian, Neville and Bobby invest £1800, £3700 and £2500 respectively in a business venture which makes them a profit of £1600. They share the profit in proportion to how much they each invested. Calculate how much each of them gets.

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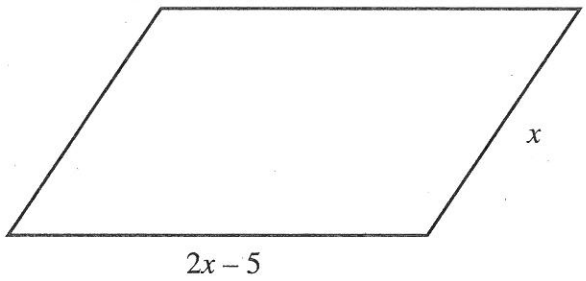
[3]

17.



The lengths, in centimetres, of two sides of a parallelogram are x and $2x - 5$, as shown in the diagram. The perimeter of the parallelogram is 68 cm.

(a) Write down an equation that is satisfied by x.

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[1]

(b) Solve your equation to find x and write down the lengths of the sides of the parallelogram.

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[3]

18. A random sample of the people in a certain county revealed the following information regarding their age and gender.

	Under 20	20 to 40	Over 40
Male	270	395	350
Female	280	375	330

The county has a population of 60 000. Use this information to estimate how many females over 40 years of age are in the county.

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[3]

19.

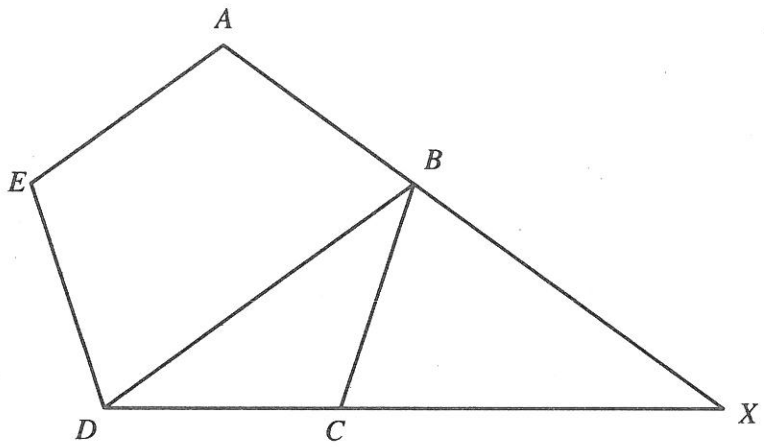

Diagram not drawn to scale.

ABCDE is a regular pentagon.
Its sides *AB* and *DC* have been extended to meet at the point *X*.

(a) Calculate the value of

(i) $C\hat{B}X$,

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[2]

(ii) $B\hat{C}D$,

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[1]

(iii) $C\hat{B}D$.

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[1]

(b) Explain clearly why triangle *BXC* is isosceles.

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[1]

20. Meg has a fair six-sided dice, with faces numbered from 1 to 6. She throws it twice.

(a) Find the probability that she throws a 5 both times.

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[2]

(b) Find the probability that she throws the same number both times.

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[1]

21. The table shows some of the values of $y = 10 + \frac{60}{x}$ for values of x from 2 to 30.

(a) Complete the table by finding the values of y for $x = 3$ and $x = 20$.

x	2	3	4	5	6	10	20	30
$y = 10 + \frac{60}{x}$	40		25	22	20	16		12

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[1]

(b) On the graph paper opposite, draw the graph of $y = 10 + \frac{60}{x}$ for values of x from 2 to 30. [2]

(c) Draw the line $y = 18$ on your graph paper and write down the x-value of the point of intersection of your line with $y = 10 + \frac{60}{x}$.

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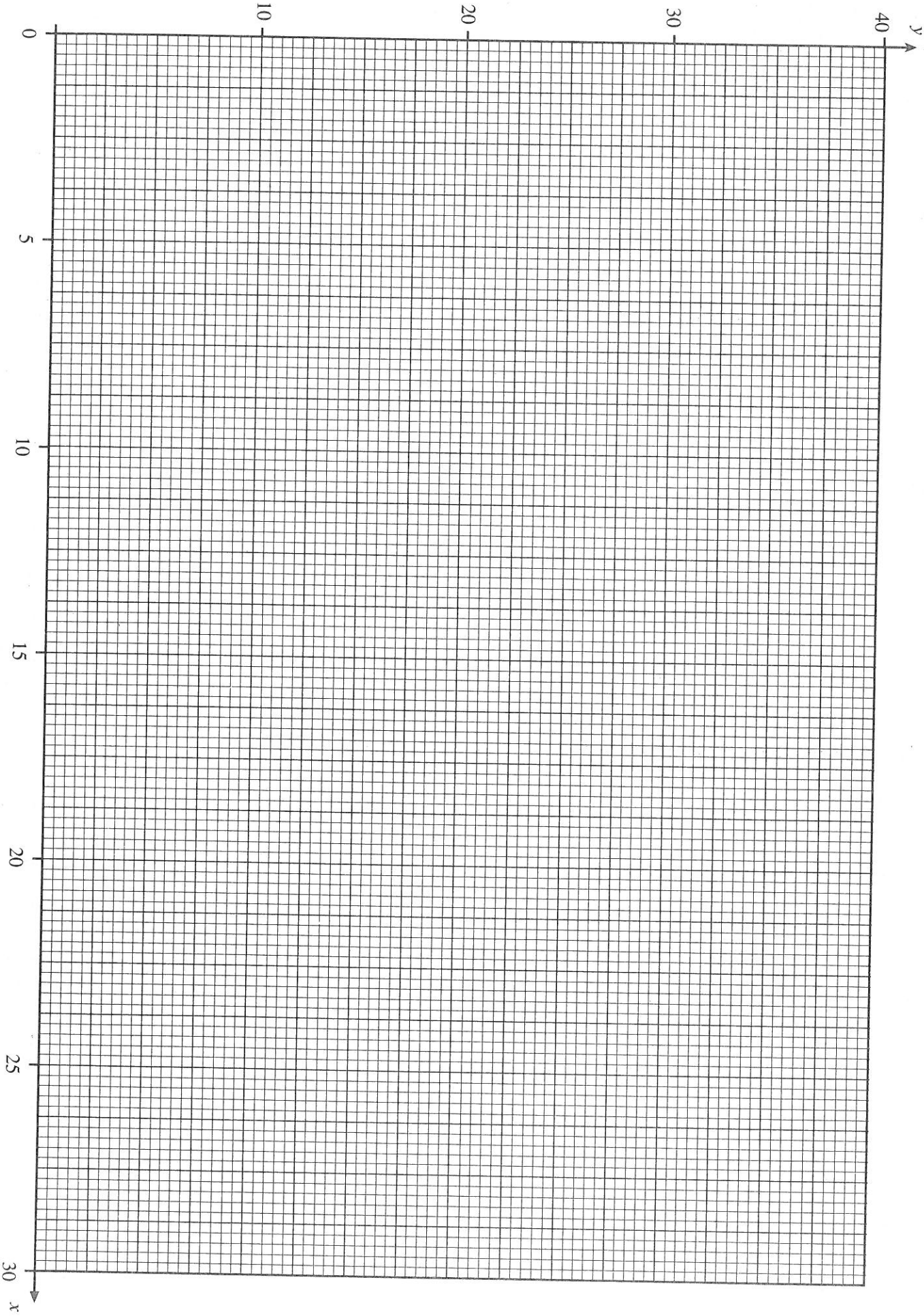
[2]

For use with question 21.



22. *(a)* Write **each** of the following numbers in standard form.

(i) 0·000443

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[1]

(ii) 673 442 814

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[1]

(b) Find, in standard form, the value of

(i) $\left(7 \times 10^{12}\right) \times \left(3{\cdot}1 \times 10^{-2}\right)$,

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[1]

(ii) $\dfrac{2 \times 10^{-7}}{5 \times 10^{6}}$.

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[2]

23. Solve the simultaneous equations by an algebraic (not graphical) method.

$$\begin{aligned} 4x + 3y &= -4 \\ 6x - 2y &= 7 \end{aligned}$$

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[4]

24. *(a)* Simplify $(4x^2)^3$.

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[2]

(b) Expand $(x - 3)^2$.

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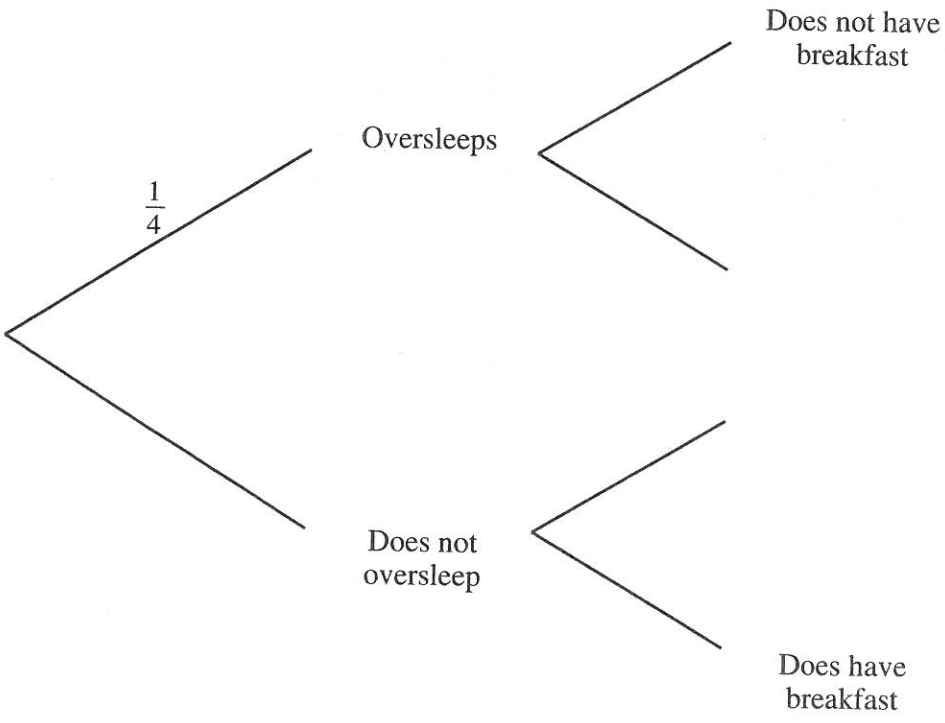
[2]

25. The probability of David oversleeping is $\frac{1}{4}$. When he oversleeps, the probability that he does NOT have breakfast is $\frac{5}{6}$. When he does not oversleep, the probability that he does have breakfast is $\frac{11}{12}$.

(a) Complete the following tree diagram.



[2]

(b) Calculate the probability that David has breakfast.

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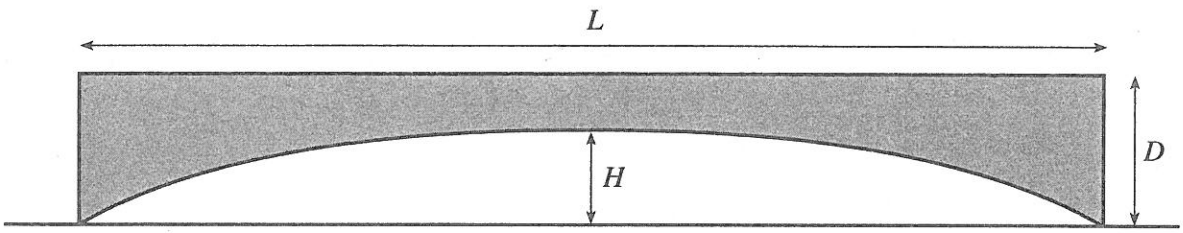
[2]

26.



The diagram shows the cross-section of an archway. The length across is L metres and the overall outer height is D metres. The height of the inside of the arch is H metres as shown in the diagram. The shaded area is denoted by A square metres.

(a) Explain why the formula $A = \dfrac{4L + 3D + 7H}{14}$ cannot be the correct formula for the area of the shaded part.

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[1]

(b) Consider the following formulae.

$$A = \frac{7LDH}{5}, \qquad A = \frac{L(4D - 3H)}{4}, \qquad A = \frac{3LD - 4H}{10}$$

Which **one** of the formulae could be the correct one for the area of the shaded part? Give a reason for your answer.

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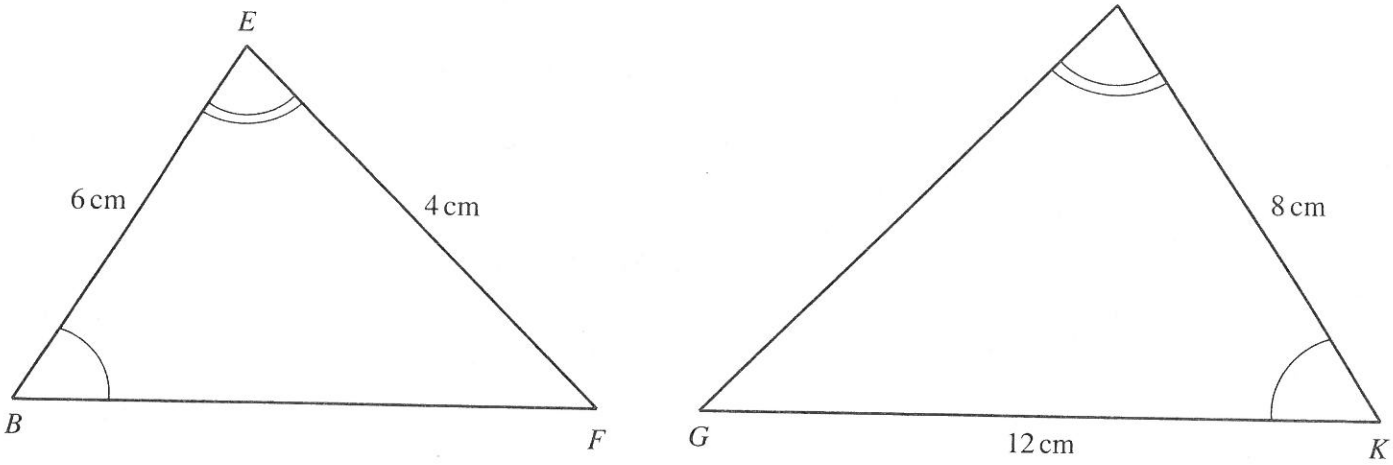
[2]

27.



Triangles *BEF* and *KHG* are similar.
BE = 6 cm, *EF* = 4 cm, *GK* = 12 cm and *HK* = 8 cm.

Find the length of

(a) *BF*,

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[2]

(b) *GH*.

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[2]