WELSH JOINT EDUCATION COMMITTEE

General Certificate of Secondary Education

CYD-BWYLLGOR ADDYSG CYMRU

Tystysgrif Gyffredinol Addysg Uwchradd

MATHEMATICS

INTERMEDIATE TIER PAPER 1

P.M. WEDNESDAY, 9 June 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.

Take π as 3·14 or use the π button on your calculator.

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.

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	4	
3	6	
4	6	
5	7	
6	6	
7	3	
8	7	
9	3	
10	6	
11	3	
12	6	
13	4	
14	3	
15	4	
16	7	
17	6	
18	6	
19	6	
20	4	
TOTAL		

1. Find which of $\frac{3}{7}$, 39% and 0·4 is the least and which is the greatest.

You must show all your working.

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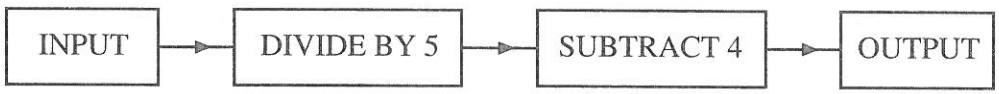
Least ..... Greatest .....

[3]

2. The diagram below represents a number machine.



(a) What is the OUTPUT when the INPUT is –15?

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[1]

(b) What is the INPUT when the OUTPUT is 0 (zero)?

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[1]

(c) Let the number input be n. Write down the output in terms of n.

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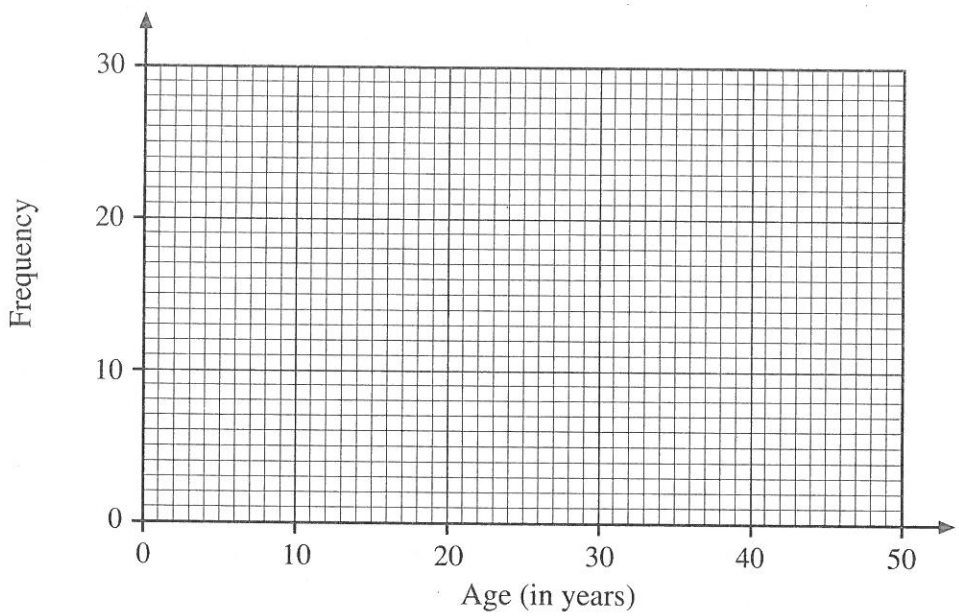
[2]

3. The table below shows the distribution of the ages, in complete years, of the people in an amusement arcade on a Tuesday afternoon in August.

Age (in years)	0 to 9	10 to 19	20 to 29	30 to 39	40 to 49
Frequency	15	26	7	3	1

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



[2]

(b) Which is the modal class?

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[1]

(c) A person is chosen at random. What is the probability that the chosen person is aged between 20 to 29?

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[2]

(d) The probability that a person chosen at random has blue eyes is $\frac{1}{4}$. What is the probability that a person chosen at random does not have blue eyes?

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[1]

4. Each interior angle of a regular octagon is 135°.
In the diagram below *A, B, C, D* and *H* are points on a regular octagon. *ABM* is a straight line.

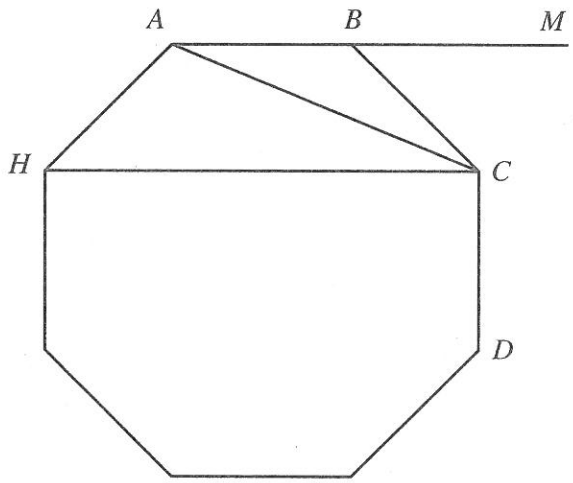

Diagram not drawn to scale.

(a) Calculate the size of $M\hat{B}C$.

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[2]

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

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[2]

(c) *HC* is parallel to *ABM*. Explain why $H\hat{C}D$ is a right-angle.

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[2]

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5. Aber, Tipton and Monkton are three towns on a bus route. Tipton is 20 miles from Aber and Monkton is a further 40 miles from Tipton.

Gareth catches a bus from Aber to go to Tipton. The distance-time graph drawn opposite represents the journey of Gareth's bus.

(a) At what time did Gareth's bus leave Aber?

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[1]

(b) At what speed, in m.p.h., did the bus travel from Aber to Tipton?

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[2]

(c) Explain fully what the part *BC* represents.

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[1]

(d) Gareth's friend Roy lives in Monkton. Roy starts out at 11.00 to meet Gareth's bus at Tipton. He travels at a speed of 30 m.p.h. On the same graph paper, draw a distance-time graph of Roy's journey. [1]

(e) Explain whether or not Roy gets to Tipton in time to meet Gareth.

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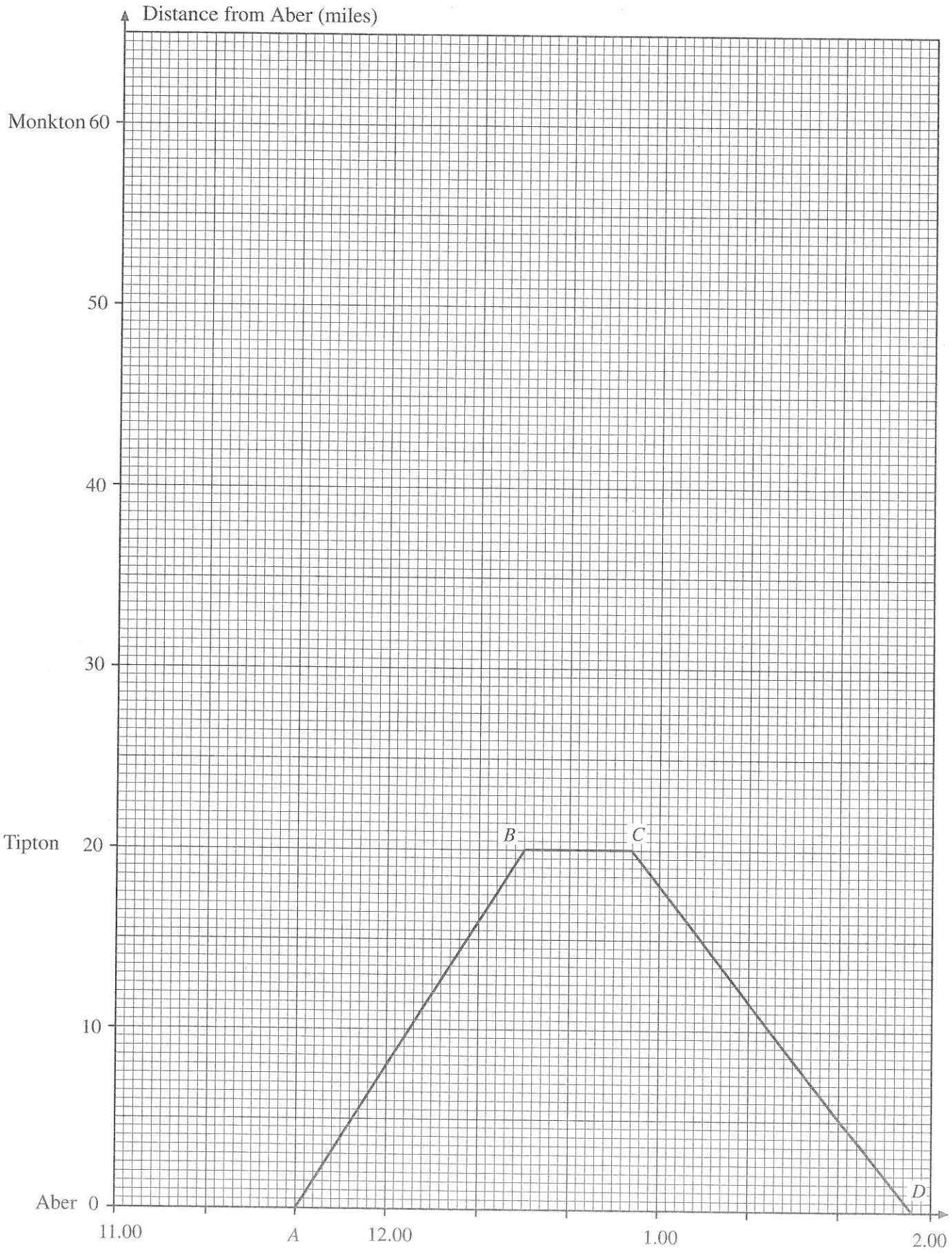
[1]

(f) Roy stays in Tipton until 1.00 then returns home by 2.00. Draw the distance-time graph of these parts of his journey. [1]

For use with question 5.



6. *(a)* Susan changed £500 into South African Rand, when the rate of exchange was £1 = 9.90 Rand. How many Rand did she get?

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[3]

(b) During her holiday Susan spent 4005 Rand.

(i) How many Rand did she have left?

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[1]

(ii) She changed her remaining Rand into pounds, when the exchange rate was £1 = 10.50 Rand.
How many pounds did she get?

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[2]

7. **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.

$$\frac{597 \times \sqrt{35{\cdot}7}}{9{\cdot}2}$$

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[3]

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8. In a survey a researcher asks 72 people to name their favourite types of television programmes. The results are shown in the table below.

Type of programme	Soaps	Drama	Comedy	Sport
Frequency	40	4	10	18

(a) In the circle below, draw a pie chart to show the distribution of the results. **You must show how you calculate the angles of your pie chart.**

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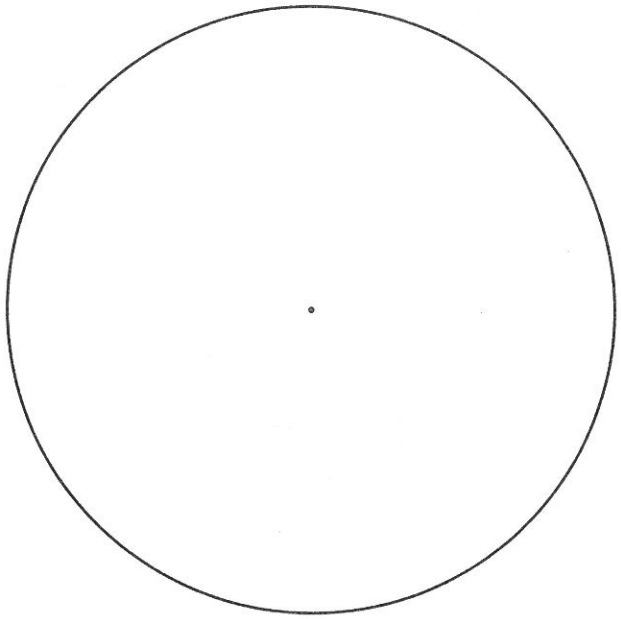
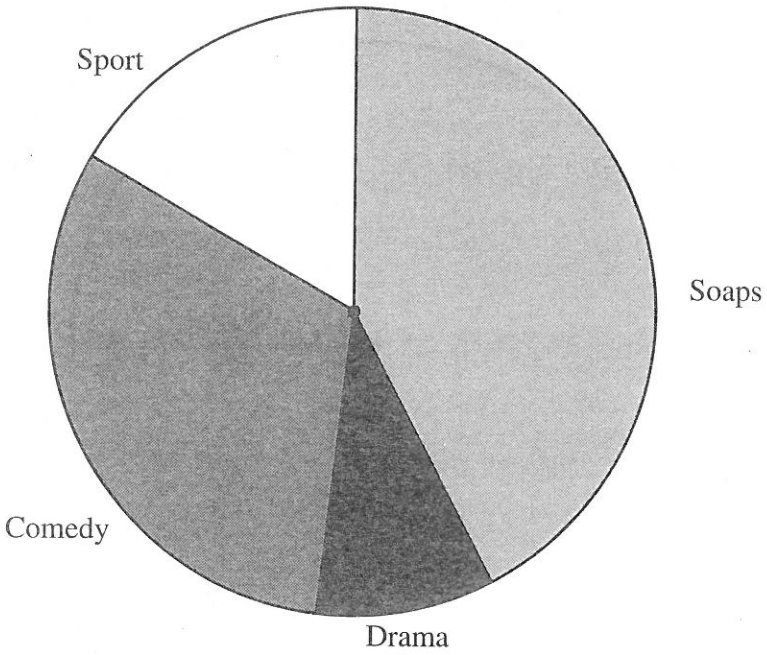


[4]

(b) The pie chart below shows the results of a similar survey of 192 people.

Favourite type of TV programme



Which survey, the first or the second, had the greater number of people whose favourite type of television programme was sport? Show your working below.

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[3]

9. *(a)* Find the value of 5^5.

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[1]

(b) Find the cube root of 64.

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[1]

(c) Write down the value of 7^0.

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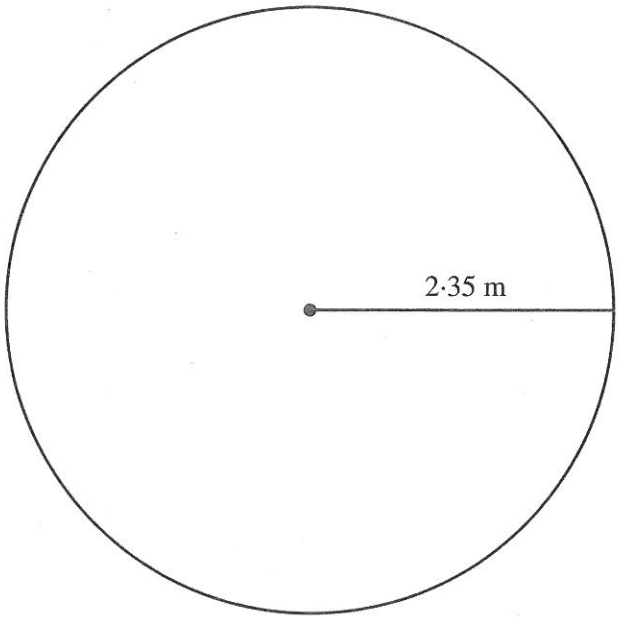
[1]

10. A circular table has a radius of 2·35 m. The top of the table is painted with varnish. One litre of varnish covers $4\,m^2$.



(a) How many litre tins of varnish must be bought to paint the top of the table?

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[4]

(b) What is the circumference of the top of the table?

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[2]

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

Show all your working.

$$3x + 4y = 1$$
$$5x - 4y = 23$$

[3]

12. Robert throws a heavy ball 50 times. The table below shows the distribution of the distances thrown, measured in feet correct to the nearest foot.

Distance (feet)	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45
Frequency	12	14	10	8	5	1

(a) Calculate an estimate of the mean distance Robert has thrown the ball.

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[4]

(b) The range of the distances Robert has thrown the ball is 25 feet.
Elinor also throws the ball. The distances she has thrown the ball have a mean of 27 feet and a range of 18 feet. Which of the two children, Robert or Elinor, is the most consistent thrower? **You must give a reason for your answer.**

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[2]

13. Fiona borrows £650 on 2nd July 1999. Interest is charged at the rate of 2·5% per month on the amount owing on the 1st of each month. She makes regular payments of £50 on the 28th of each month. What will be the balance on the account on 2nd September 1999?

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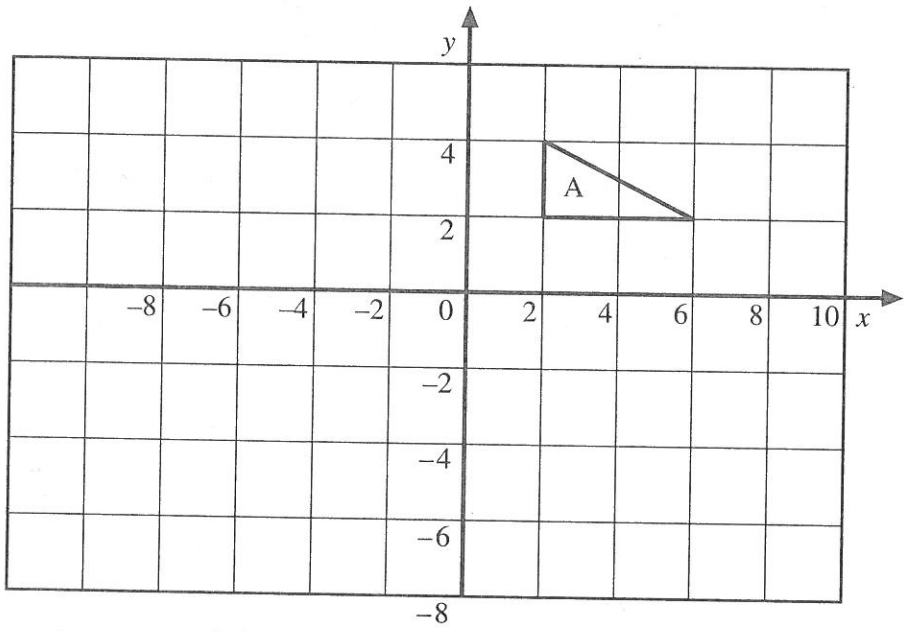
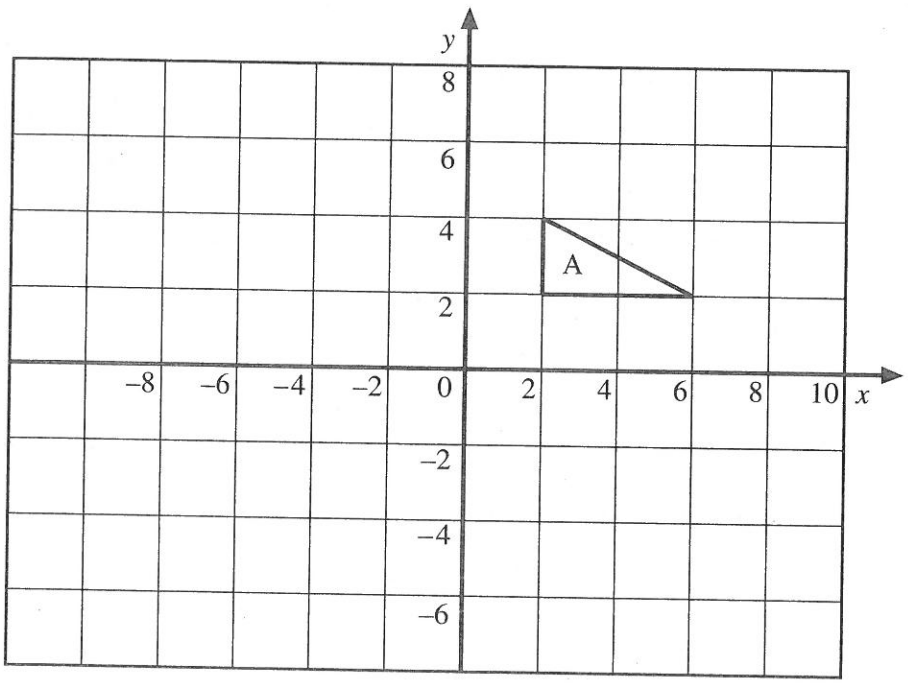
[4]

14.



(a) Rotate the shape A through 90° clockwise with centre (–2,0). Label the image B. [2]



(b) Reflect the shape A in the line $y = x$. Label the image C. [1]

15.

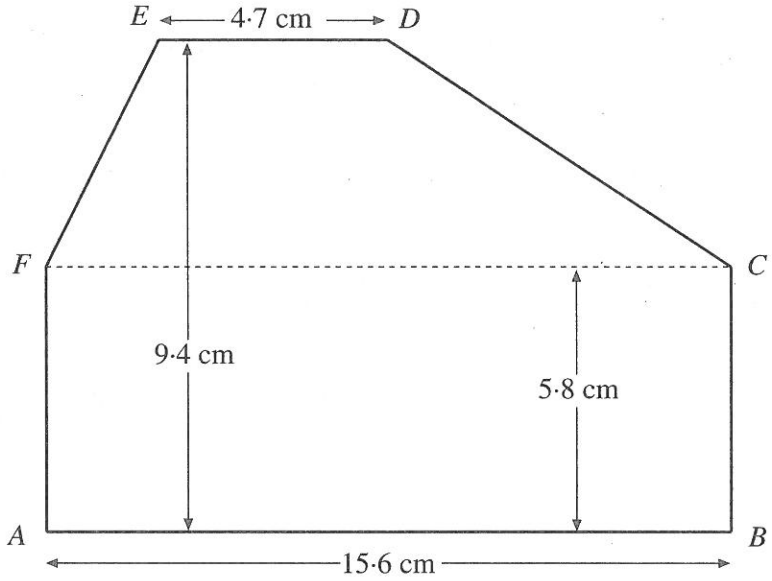


Diagram not drawn to scale.

In the diagram, $AB = 15{\cdot}6$ cm and $ED = 4{\cdot}7$ cm. The lines *ED*, *FC*, and *AB* are parallel. *AB* and *ED* are 9·4 cm apart and *AB* and *FC* are 5·8 cm apart. The angles at *A* and *B* are right-angles.

A metal bar, 25 cm long, has a uniform cross-section which is represented by the figure *ABCDEF*. The density of the metal is $4{\cdot}7\,\text{g}\,\text{cm}^{-3}$.

Calculate the mass, in kilograms, of the bar.

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[4]

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

$$4(x - 2) + 3(2x + 5)$$

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[2]

(b) Simplify $\dfrac{a^5 \times a^3}{a^2}$.

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[1]

(c) Factorise

(i) $3x^2 - 6xy$,

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[2]

(ii) $x^2 - 7x + 12$.

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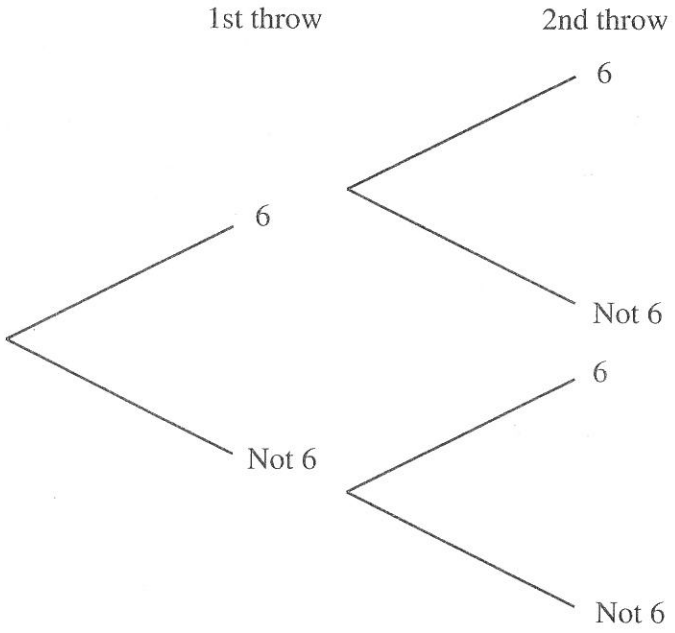
[2]

17. Siok has a biased dice. The probability of throwing a six with the dice is 0·3. Siok throws the dice twice.

(a) Complete the following probability tree diagram.



[2]

(b) What is the probability that Siok does not throw a six in her two throws?

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[2]

(c) What is the probability that Siok throws exactly one six in her two throws?

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[2]

18. *(a)* The population of the United Kingdom is 59 000 000, correct to the nearest million. Write down the least and greatest values that the population could be.

Least ..... Greatest .....

[2]

(b) A lump of plasticine has a mass of 500 g, correct to the nearest 10 g. A piece of the plasticine is removed and found to have a mass of 310 g, correct to the nearest 10 g. Find the greatest possible value of the mass of the remaining lump of plasticine.

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Greatest mass ..... g

[2]

(c) A rectangle's measurements are given as 30 cm by 20 cm, correct to the nearest centimetre.

Find the least possible length of the perimeter of the rectangle.

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Least perimeter ..... cm

[2]

19. A boat *B* is moored 40 m from the foot of a vertical cliff. The angle of depression of the boat from the top of the cliff is 42°.

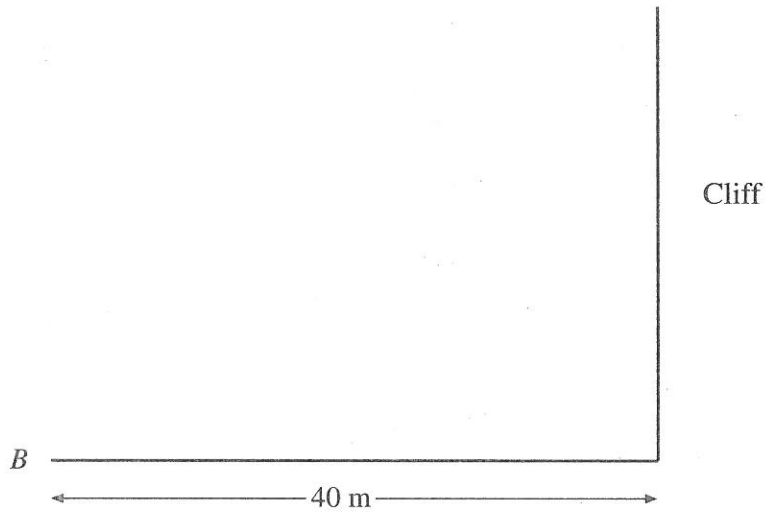

Diagram not drawn to scale.

(a) Calculate the height of the cliff.

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[3]

(b) The boat is released from its mooring and it drifts 250 m directly away from the cliff. Calculate the angle of elevation of the top of the cliff from the boat.

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[3]

20. The diagram shows a square $ABCD$ with a triangle DCE, right-angled at D, placed so that the side DC is common.
The length of the side of the square is x cm and $DE = 4$ cm. The area of the whole figure $ABCE$ is $48\,\text{cm}^2$.

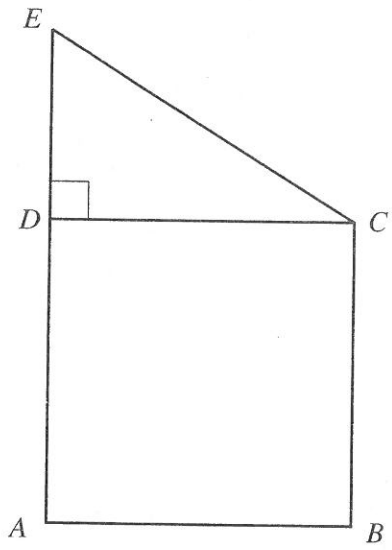

Diagram not drawn to scale.

(a) Show clearly that x satisfies the equation.

$$x^2 + 2x = 48.$$

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[1]

(b) Solve the equation and write down the length of the side of the square.

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[3]