WELSH JOINT EDUCATION COMMITTEE

General Certificate of Secondary Education

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184/06

# MATHEMATICS

## INTERMEDIATE TIER PAPER 2

A.M. FRIDAY, 15 November 2002

(2 Hours)

Centre Number .....

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

.....

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 $\pi$ as 3·14 or use the $\pi$ button on your calculator.

## INFORMATION FOR CANDIDATES

A calculator will be required for this paper.

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.

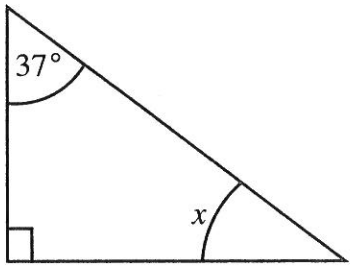
Scale drawing solutions will not be acceptable where you are asked to calculate.

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 | 5 | |
| 2 | 3 | |
| 3 | 4 | |
| 4 | 1 | |
| 5 | 2 | |
| 6 | 6 | |
| 7 | 4 | |
| 8 | 3 | |
| 9 | 2 | |
| 10 | 5 | |
| 11 | 3 | |
| 12 | 3 | |
| 13 | 3 | |
| 14 | 6 | |
| 15 | 3 | |
| 16 | 6 | |
| 17 | 3 | |
| 18 | 3 | |
| 19 | 4 | |
| 20 | 4 | |
| 21 | 4 | |
| 22 | 3 | |
| 23 | 6 | |
| 24 | 8 | |
| 25 | 6 | |
| TOTAL | | |

**1.** Find the angles marked $x$, $y$ and $z$ in the following diagrams.

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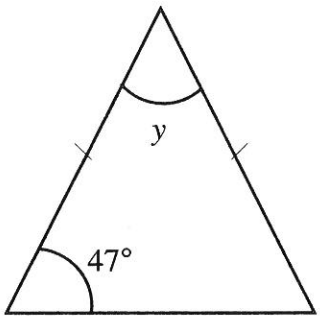
$x =$ ..... ° [1]

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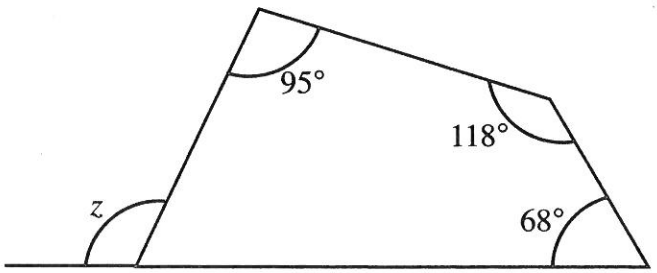
$y =$ ..... ° [2]

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$z =$ ..... ° [2]

**2.** The number of matches found in each of 50 different match boxes is shown in the following table.

| Number of matches in the box | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|
| Number of boxes | 7 | 9 | 15 | 10 | 9 |

*(a)* One of the boxes is chosen at random. What is the probability that it contains exactly 22 matches?

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[1]

*(b)* How many matches are there altogether?

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[2]

**3.** The total cost of 1·5 kg of bananas and 2 kg of apples is £4.32. The bananas cost £1.08 per kilogram. What is the cost per kilogram of the apples?

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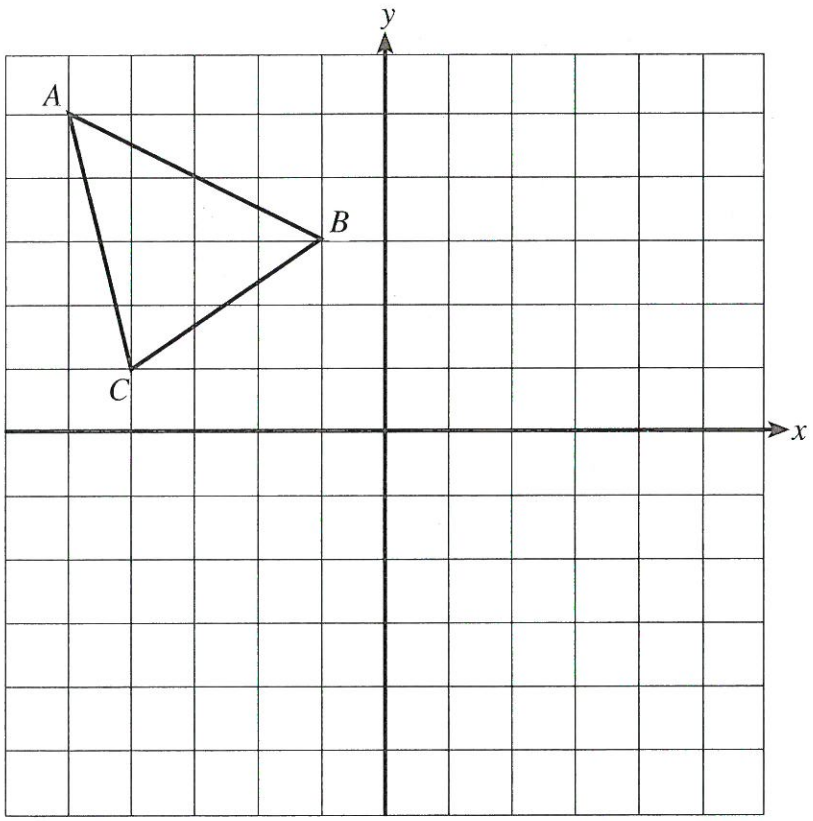
[4]

**4.** Reflect the triangle $ABC$ in the $y$-axis. [1]




**5.** *(a)* Write down the number 3742 correct to 1 significant figure.

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[1]

*(b)* Write down the number 0·06731 correct to 3 significant figures.

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[1]

**6.** Jane has some 3-hour and some 4-hour blank video tapes.

She has $x$ of the 3-hour video tapes.

*(a)* Write down, in terms of $x$, the total number of hours she can record on these 3-hour tapes.

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[1]

*(b)* Jane has 6 fewer 4-hour tapes than 3-hour tapes. Write down, in terms of $x$, the number of 4-hour tapes she has.

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[1]

*(c)* Write down, in terms of $x$, the total number of hours she can record on these 4-hour tapes.

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[1]

*(d)* Write down, in terms of $x$, the total number of hours she can record on all of her tapes. You must simplify your answer as far as possible.

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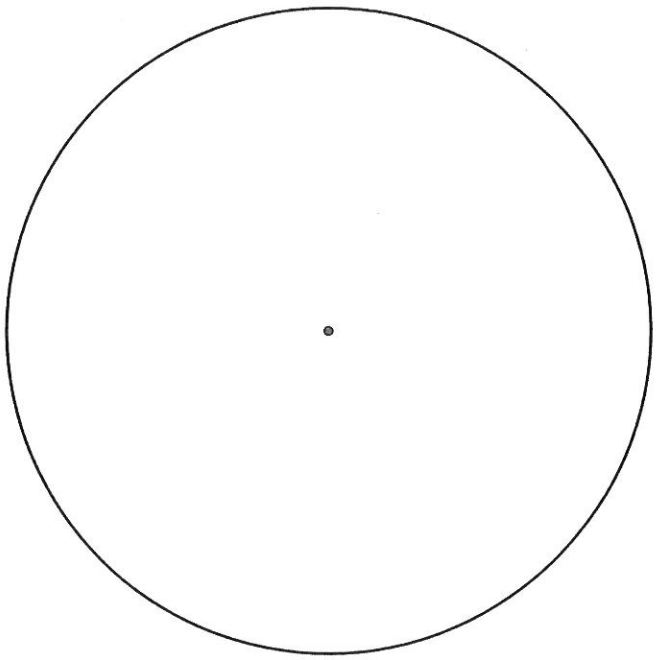
[3]

**7.** The table shows the way in which £120, collected in a lottery, was distributed.

| Category | Amount (£) |
|---|---|
| Prizes | 56 |
| Tax | 18 |
| Good causes | 36 |
| Profit | 10 |

Draw a pie chart to illustrate this data. You should show how you calculate the angles of your pie chart.



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[4]

**8.** *(a)* Marilyn wants to find out what type of book is the most popular. She asks the following question.

*Which one of the following is your favourite type of book?*

*Science fiction* ☐ *Adventure* ☐ *Comedy* ☐ *Romance* ☐

Write down **two** criticisms of this question.

(i) .....

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(ii) .....

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[2]

*(b)* She plans to conduct her survey in her town centre on a Wednesday afternoon. Give a reason why this may **not** be a suitable plan for her to conduct her survey.

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[1]

**9.** Lee scores 91 marks out of a possible 140 marks. What percentage has he scored?

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[2]

**10.** Jackie lives in Whitchurch and Brian lives in Bishopston, which is 50 miles from Whitchurch. One day they decide to meet at Baglan, which is a place somewhere between their two villages. After meeting they each return home. The graphs on the next page show part of their journeys.

*(a)* How far is Baglan from Bishopston?

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[1]

*(b)* How long has Jackie been waiting at Baglan when Brian arrives?

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[1]

*(c)* Without calculating any speeds, explain how you can tell whether or not Jackie had a higher average speed on her way to Baglan, than Brian had on his way home from Baglan.

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[1]

*(d)* Jackie leaves for home at the same time as Brian. She travels home at an average speed of 25 m.p.h. Draw this part of her journey on the graph paper.

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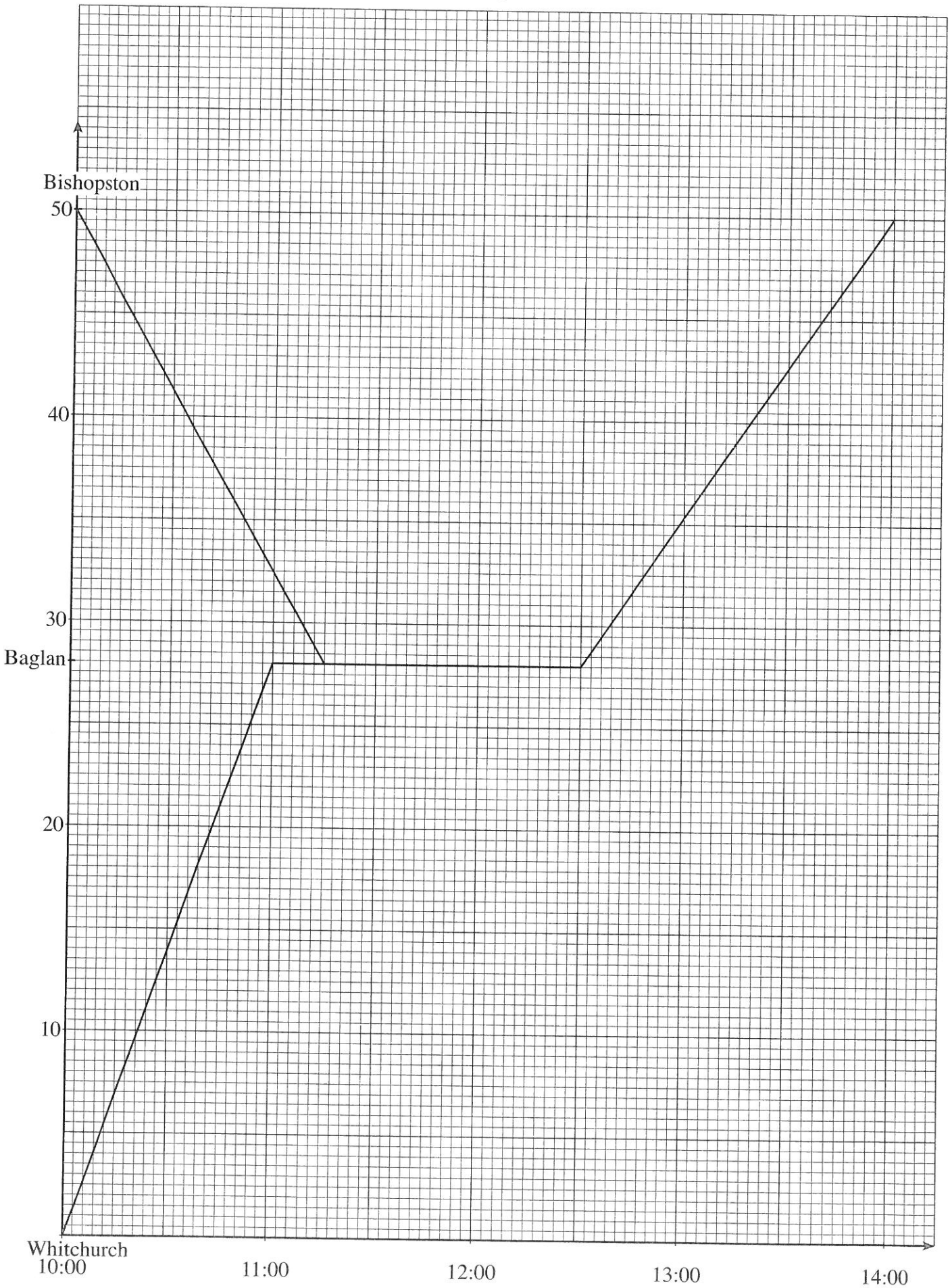
[2]

**For use with Question 10**



**11.** Calculate the average speed, in km/hour, of a racing car that covers 490 km in 1 hour 45 minutes.

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[3]

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

*(a)* 8 16 24 32 40 .....

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[1]

*(b)* 2 9 16 23 30 .....

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[2]

**13.** Solve the following equation.

$$6(x - 5) = 4x + 1$$

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[3]

**14.** In both parts *(a)* and *(b)* of this question you should state the units of your answer and give your answer to an appropriate degree of accuracy.

A circular pond has a radius of 8·2 m.

*(a)* Find the perimeter of the pond.

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[3]

*(b)* Calculate the area of the surface of the pond.

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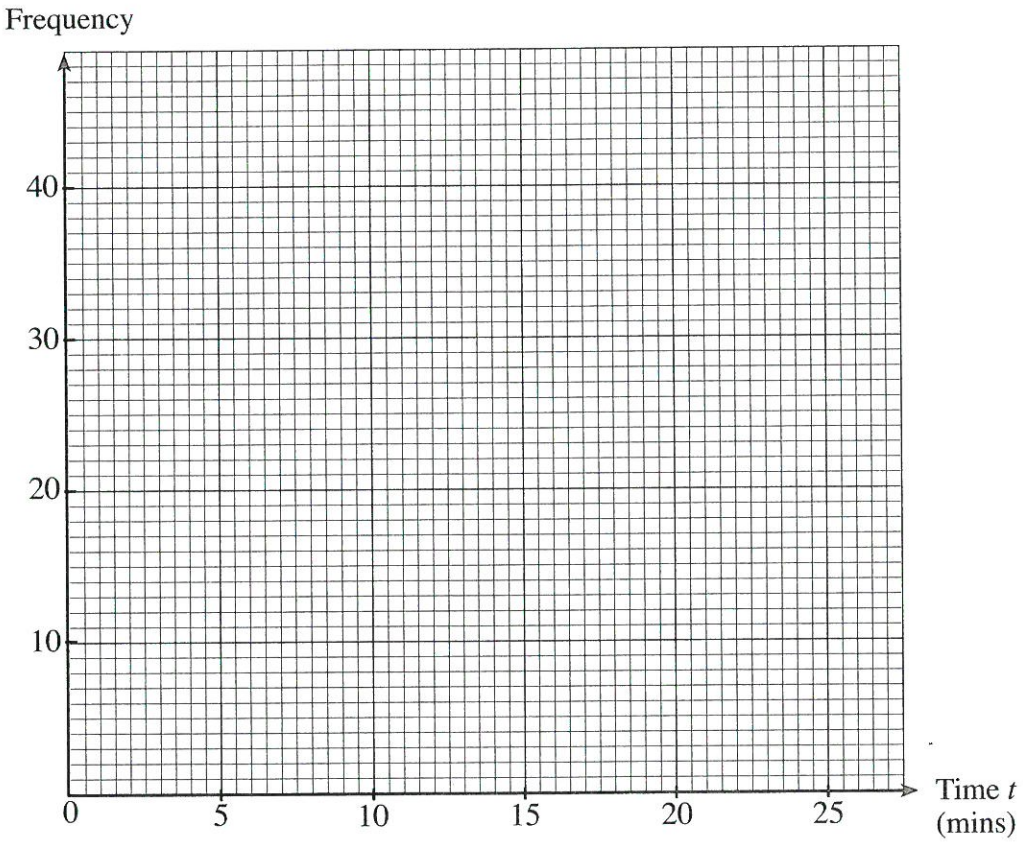
[3]

**15.** The times of telephone calls to a certain company were measured (to the nearest minute) and the results are summarised in the following table.

| Time $t$ (in minutes) | Frequency |
|---|---|
| 1 - 5 | 18 |
| 6 - 10 | 37 |
| 11 - 15 | 31 |
| 16 - 20 | 10 |
| 21 - 25 | 4 |

*(a)* On the graph paper below, draw a grouped frequency diagram for the data. [2]




*(b)* Write down the modal group.

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[1]

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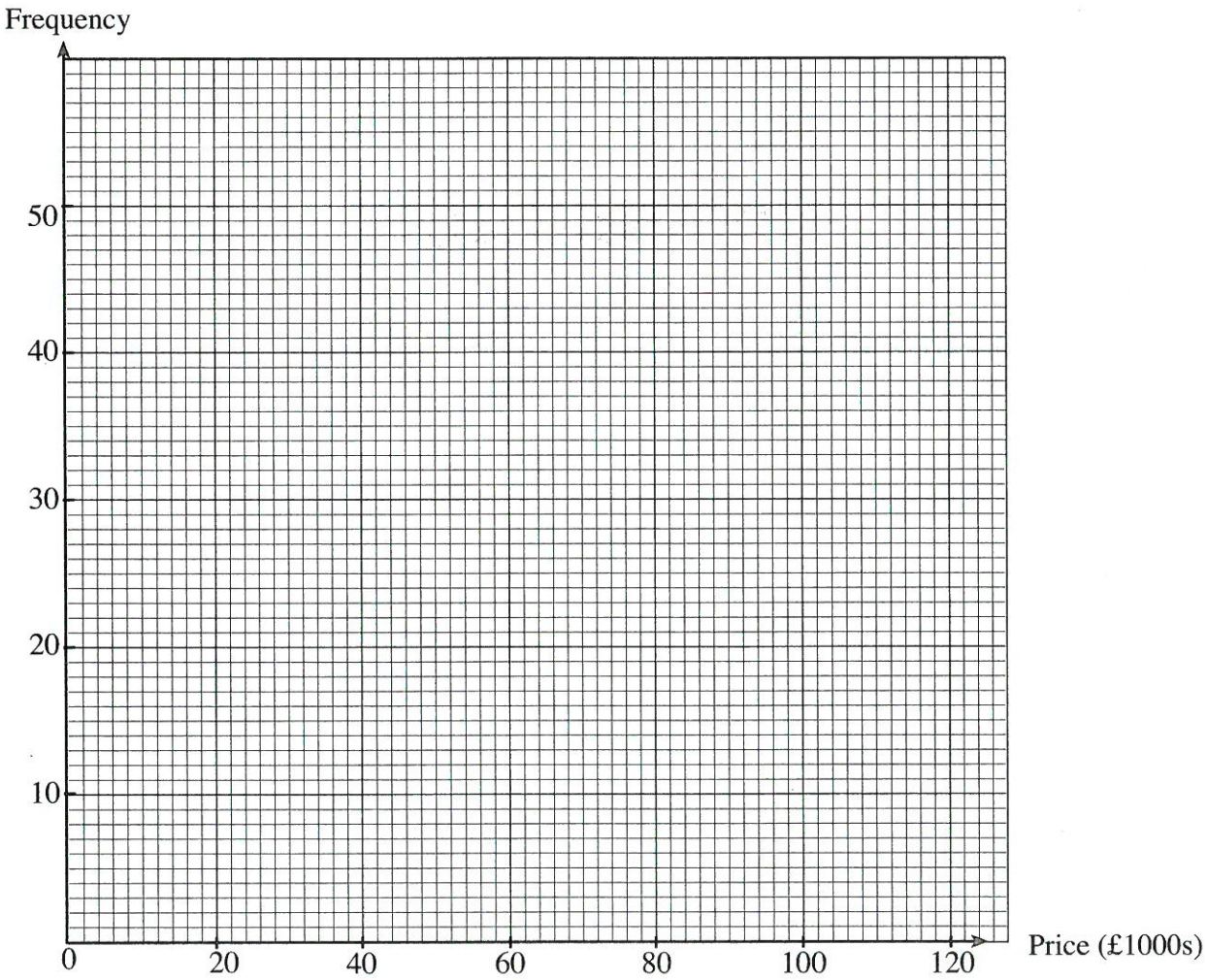
**16.** *(a)* The following table shows the value of a selection of 90 houses on an estate agency's books.

| Price $P$ (in thousands £) | Frequency |
|---|---|
| $20 \leqslant P < 40$ | 4 |
| $40 \leqslant P < 60$ | 12 |
| $60 \leqslant P < 80$ | 20 |
| $80 \leqslant P < 100$ | 36 |
| $100 \leqslant P < 120$ | 18 |

On the graph paper below, draw a frequency polygon for the data. [2]



*(b)* Find an estimate for the mean price for these houses.

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[4]

**17.** Every year, an item of furniture depreciates by 15% of its value at the start of that year. An item of furniture is bought for £3000. How much will it be worth in 3 years time?

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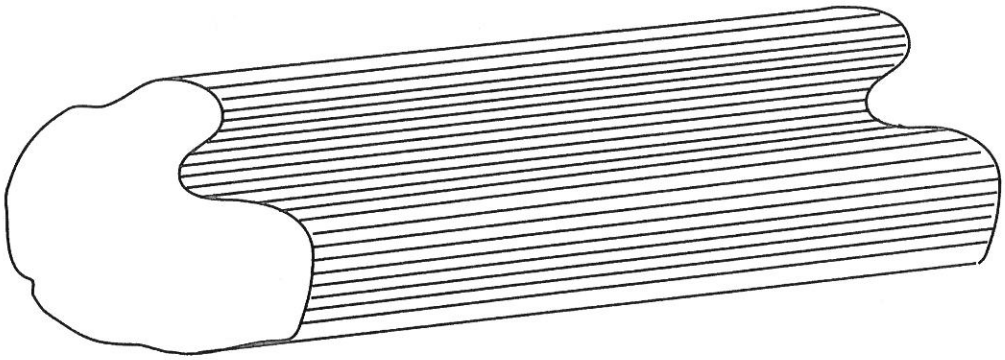
[3]

**18.**



The diagram represents a prism with an uniform cross-section of area 78 $cm^2$.
The prism is 54 cm long and has a mass of 19·6 kg.
Find the density, in $g/cm^3$, of the material from which the prism has been made.

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[3]

**19.** A rod is 18·5 cm measured to the nearest mm.

*(a)* Write down the least possible length and the greatest possible length of the rod.

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

[2]

*(b)* Keri places 30 of these rods end to end in a straight line.

Write down the least possible length and the greatest possible length of this straight line of 30 rods.

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

[2]

**20.** *AB* and *CD* represent the vertical walls of two buildings that are 8·3 m apart on level ground *AC*. The points *B* and *D* are 10·6 m and 15·2 m vertically above the ground respectively. Calculate the distance *BD*.

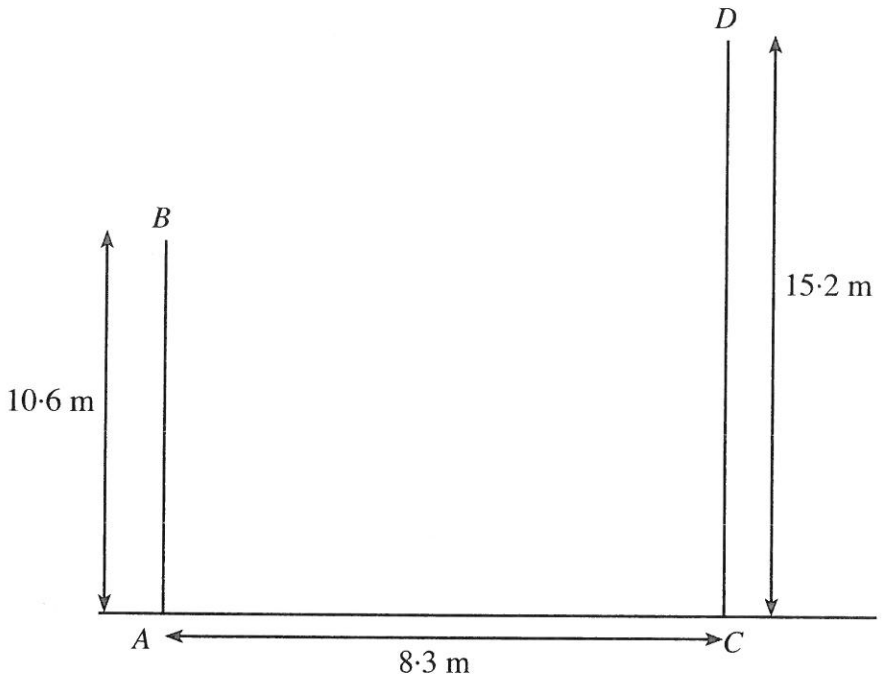


*Diagram not drawn to scale.*

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[4]

**21.** A solution to the equation

$$x^3 + 4x - 8 = 0$$

lies between 1·3 and 1·4.
Use the method of trial and improvement to find this solution correct to two decimal places.

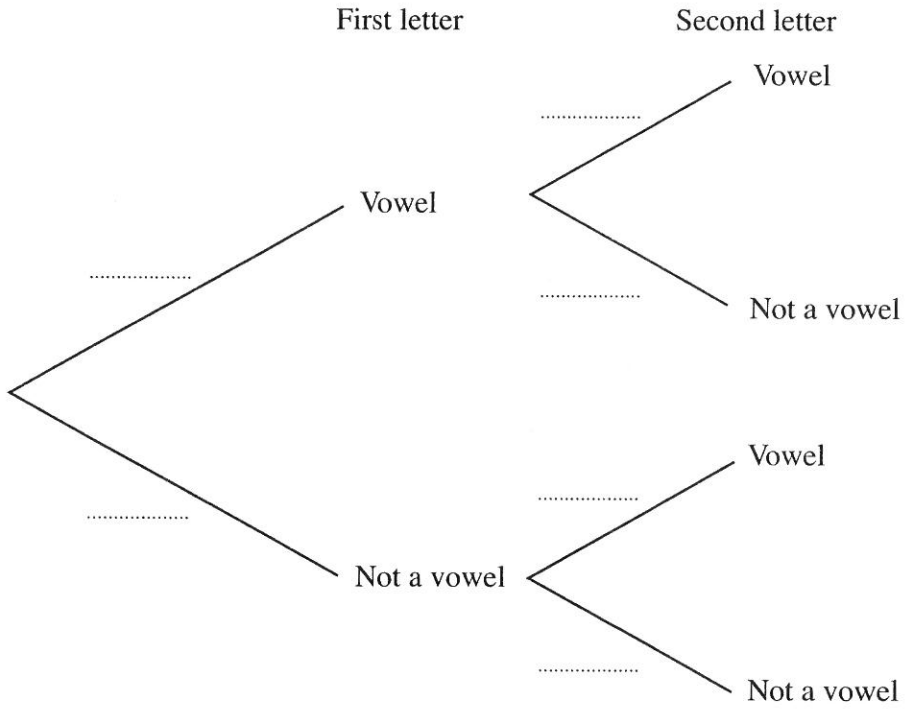
[4]

**22.** A bill comes to £89.30 inclusive of V.A.T. at 17½ %. How much was the bill before V.A.T. was added?

[3]

**23.** Paul selects a letter at random from a passage of text, he then selects a second letter at random from the text. The probability that any letter he chooses is a vowel is $\frac{2}{5}$ .

*(a)* Complete the following tree diagram by entering all the probabilities on the branches.




[2]

*(b)* Calculate the probability that both the letters chosen are vowels.

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[2]

*(c)* Calculate the probability that only one letter is a vowel.

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[2]

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

$$(x-4)(x+7)$$

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[2]

*(b)* Make $p$ the subject of the formula

$$4(t+3p) = 6 - 3t.$$

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[3]

*(c)* (i) Factorise $x^2 - 5x - 14$.

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(ii) Hence solve the equation

$$x^2 - 5x - 14 = 0.$$

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[3]

**25.** *ACD* and *BCE* are two triangles right-angled at *C*. The point *D* lies on *CE* at a distance of 23·7 cm from *C* and *B* lies on *AC* such that *AB* is 5·7 cm. The side *BE* has length 63 cm.

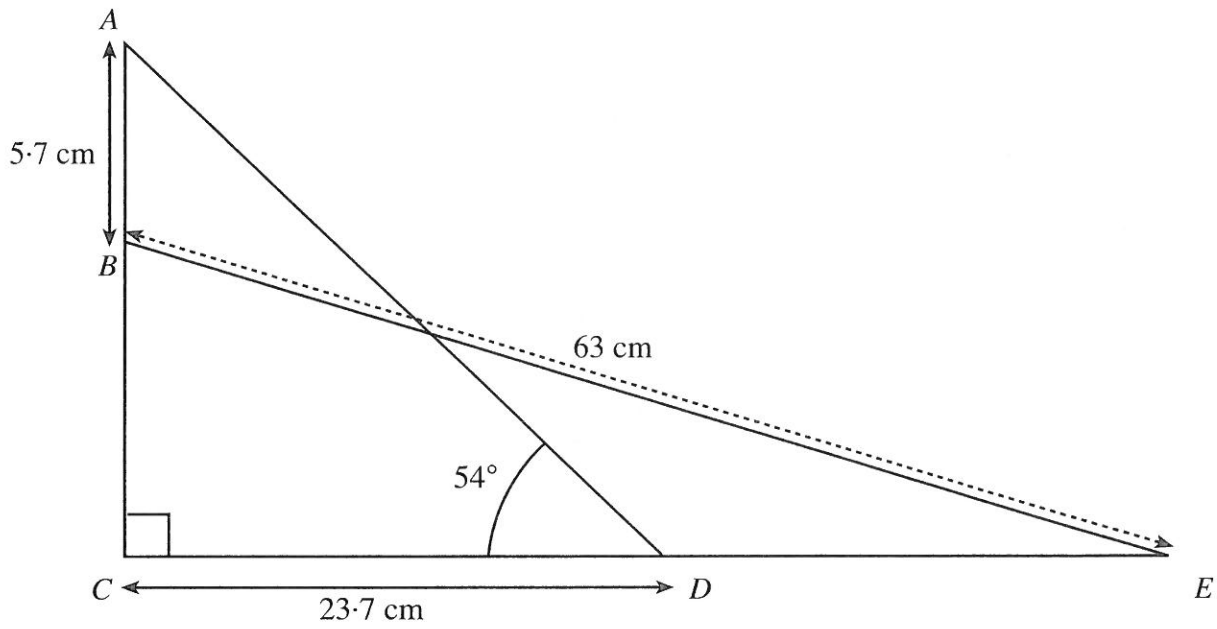


*Diagram not drawn to scale.*

Calculate the size of $\hat{BEC}$.

[6]