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, 3 June 1998

(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 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	4	
2	3	
3	6	
4	3	
5	6	
6	7	
7	7	
8	5	
9	3	
10	3	
11	2	
12	4	
13	6	
14	8	
15	5	
16	8	
17	4	
18	3	
19	7	
20	6	
TOTAL		

1. *(a)* Which of the fractions $\frac{2}{3}$ and $\frac{3}{4}$ is the larger? Show your working.

.....

.....

.....

.....

.....

[1]

(b) Sam gives his dog $\frac{3}{4}$ of a tin of dog food each day. What is the least number of tins Sam needs to buy to feed his dog for 7 days?

.....

.....

.....

.....

.....

[3]

2. *(a)* Find the cube of 6.

.....

.....

[1]

(b) Find the value of 2^5.

.....

.....

.....

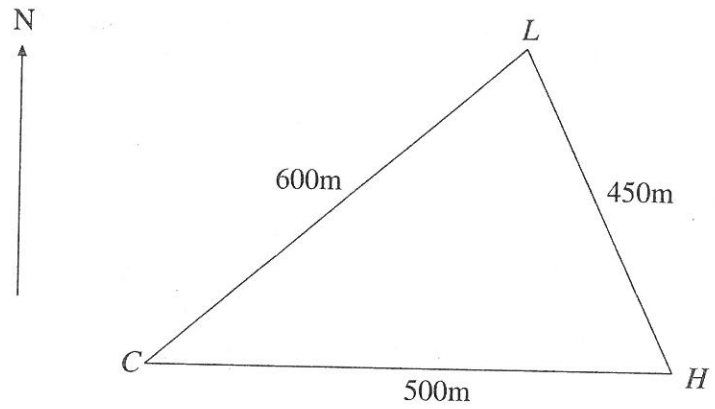
[1]

(c) Write down the value of 3^0.

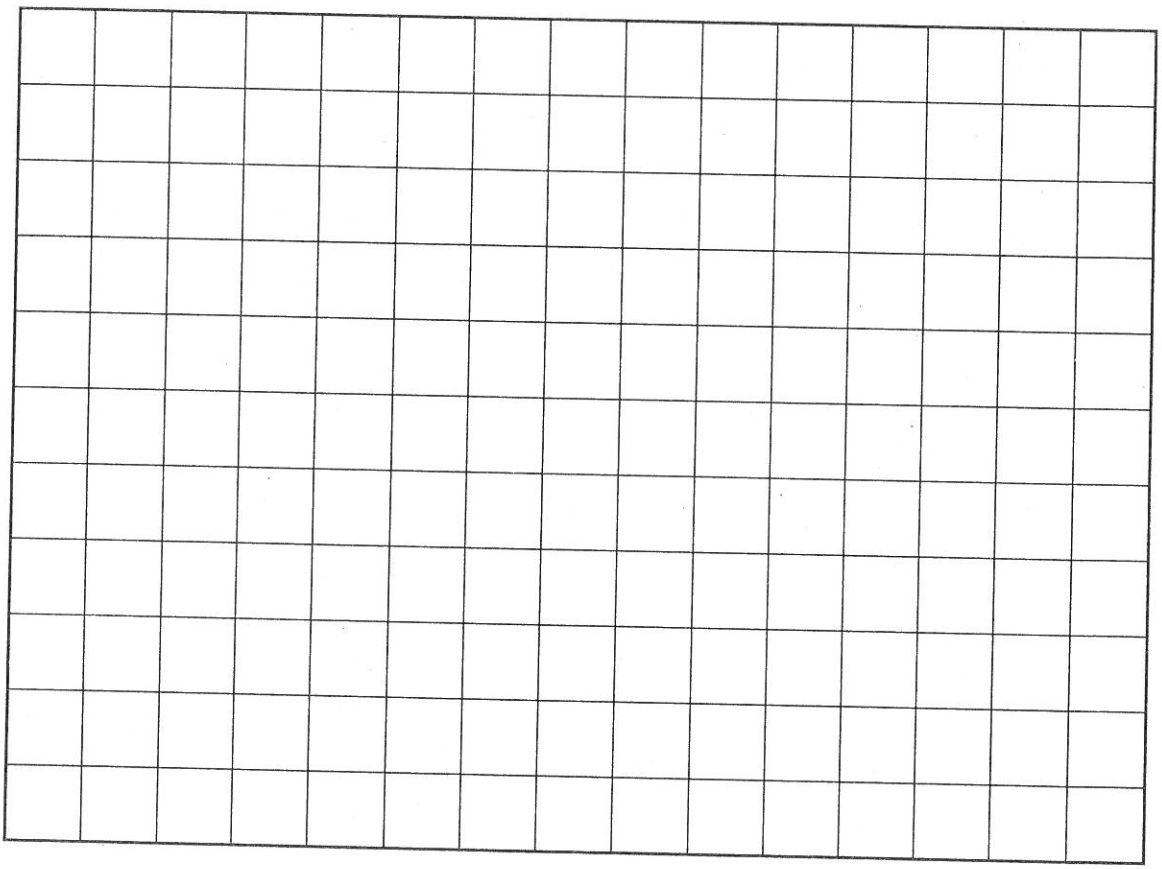
.....

[1]

3. During the survey of a town the positions of the church *(C)*, the town hall *(H)* and the library *(L)* are marked by points on a map. The distances between them are shown on the following diagram.



(a) Using the cm square grid given below, draw an accurate scale drawing of triangle *CHL*, using a scale of 1 cm to represent 50 m.



[3]

(b) The position of the police station is to be marked by the letter *P* on the map. The bearing of *P* from *C* is 042° (N42°E). The bearing of *P* from *H* is 300° (N60°W).

By drawing suitable lines, mark the position of *P* on your diagram.

[3]

4. A recipe for a bean and rice salad dish for 6 people uses the following ingredients.

110g dried beans,
1 mugful of long-grain brown rice.

Calculate the amount of each ingredient needed to make the dish for 9 people.

.....

.....

.....

.....

[3]

5. Christopher has received his gas bill for the period June to August.
The details of the bill are as follows.

Number of units of gas used is 7939.
The cost of one unit of gas is 1.52 pence.
Number of days in this period is 92.
The Standing Charge is 10.39 pence per day.

(a) Find, in pounds, the total cost of the gas, including the standing charge, for the June to August period. Show your working.

.....

.....

.....

.....

.....

.....

[4]

(b) V.A.T. at 5% is charged on gas bills.
How much is Christopher's gas bill including V.A.T.? Give your answer in pounds, correct to the nearest penny.

.....

.....

.....

[2]

6. In one turn of a game at a fête, a contestant spins two spinners. Each spinner is numbered 1 to 5 and these numbers are equally likely to occur. A contestant's score is the sum of the two numbers shown on the spinners.

(i) Complete the following table to show the possible outcomes of a contestant's score on one turn.

Second spinner					
5	----	----	----	----	----
4	----	----	----	----	----
3	4	----	----	----	----
2	3	4	5	6	7
1	2	3	4	5	6
	1	2	3	4	5
			First spinner		

(ii) What is the probability of scoring 2 on one turn?

.....

(iii) Contestants win a prize if they score 8 or more.
Jennifer has one turn at the game.
What is the probability that she wins a prize?

.....

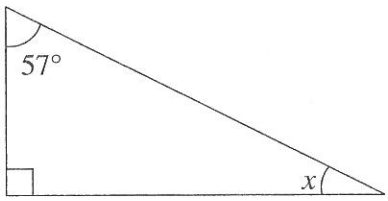
(iv) At the fête, 200 people each have one turn at the game.
Approximately how many of them will win a prize?

.....

[7]

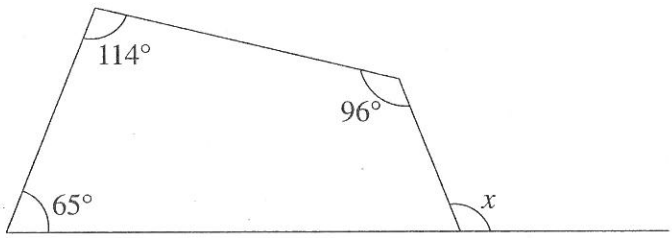
7. *(a)* Write down the size of the angle marked x in **each** of the following diagrams. [2]

(i)



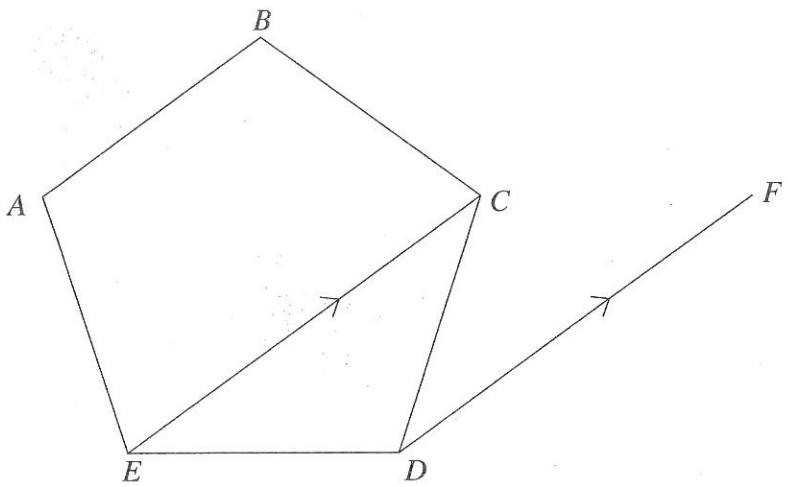
$x =$ ..... °

(ii)



$x =$ ..... °

(b)



The above diagram shows a regular pentagon $ABCDE$, a diagonal EC and a line DF which is parallel to EC.

(i) Calculate the size of $\widehat{EDC}$.

.....

.....

(ii) Calculate the size of $\widehat{ECD}$.

.....

.....

(iii) Calculate the size of $\widehat{CDF}$.

.....

[5]

8. David makes a certain type of shirt with 8 buttons on each shirt.
In one week, David makes x of these shirts.

(a) Write down, in terms of x, the total number of buttons on these x shirts.

.....

[1]

(b) David also makes blouses. Each week he makes twice as many blouses as shirts. Write down, in terms of x, the total number of blouses that he makes in a week.

.....

[1]

(c) Each blouse has 6 buttons. Write down, in terms of x, the total number of buttons on the blouses that he makes each week.

.....

[1]

(d) Write down, in terms of x, the total number of buttons on the shirts and the blouses that he makes each week. Simplify your answer as far as possible.

.....

.....

.....

.....

[2]

9. Solve the equation

$$5x + 17 = 3(x + 6).$$

.....

.....

.....

.....

.....

.....

[3]

10. In a survey, Jason uses the following questionnaire to test the hypothesis "more boys than girls like sport".

Which sex are you? Male ☐ Female ☐

Which ONE of these sports do you like best?

Football	Cricket	Netball	Basketball	Hockey	Rugby	None of these
☐	☐	☐	☐	☐	☐	☐

(a) Explain why this questionnaire is not suitable for his survey.

.....

.....

[1]

(b) One evening he gives the questionnaire to all the people in the local gymnasium. Give **two** reasons why this is unlikely to be a suitable group of people to survey.

(i) .....

.....

(ii) .....

.....

[2]

11. Share £140 in the ratio 5 : 2.

.....

.....

.....

.....

.....

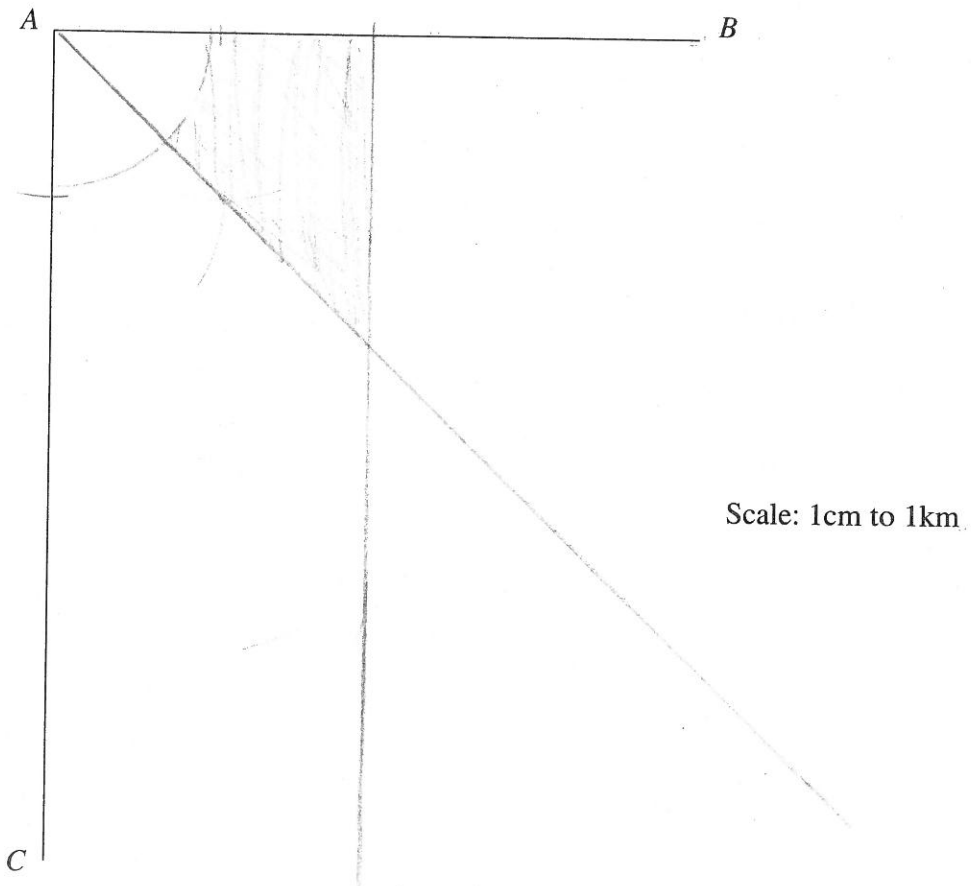
.....

[2]

12. The diagram is drawn using a scale 1 cm to 1 km. It shows two roads AB and AC. A radio mast has to be built so that it satisfies the following conditions.

It must be closer to A than to B.
It must be closer to AB than to AC.
It must NOT be nearer than 2 km to A.

On the diagram, shade the area where the radio mast can be built.



[4]

13. The diagram below shows a glass prism. The uniform cross-section of the prism is a right-angled triangle with a hypotenuse of 9·83 cm and a base of 5·87 cm. The length of the prism is 21·6 cm.

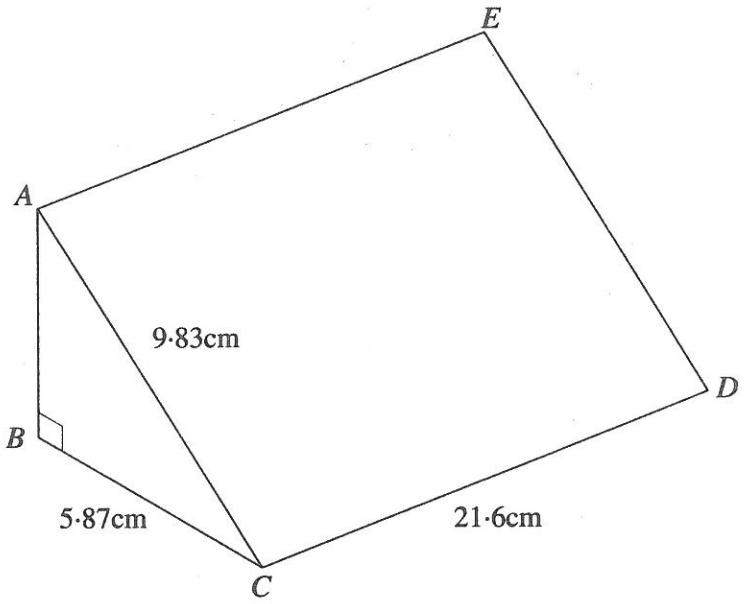


Diagram not drawn to scale

(a) Calculate the length of *AB*.

$9.83^2 + 5.87^2 = 131.0858$

$\sqrt{131.0858} = 11.45\text{ cm}$

[3]

(b) Calculate the volume of the prism, giving your answer correct to one significant figure.

$\text{Volume} = \frac{\text{Length} \times \text{Height} \times \text{Depth}}{2}$

$5.87 \times 11.45 \times 21.6 = 1451.7684$

$1451.7684 \div 2 = 725.88\text{cm}^3$

$= 700\text{cm}^3$

[3]

BLANK PAGE

14. *(a)* Complete the following table which gives the values of $y = 2x^2 - 6x + 5$ for values of x from –2 to 4.

x	–2	–1	0	1	2	3	4
$y = 2x^2 - 6x + 5$	25	13	5	1	1	5	13

[2]

(b) On the graph paper provided opposite, draw the graph of $y = 2x^2 - 6x + 5$ for values of x from –2 to 4. [3]

(c) Draw the line $y = 10$ on the same graph paper and write down the x-values of the points where your two graphs intersect.

$-0.8, 3.9$

[2]

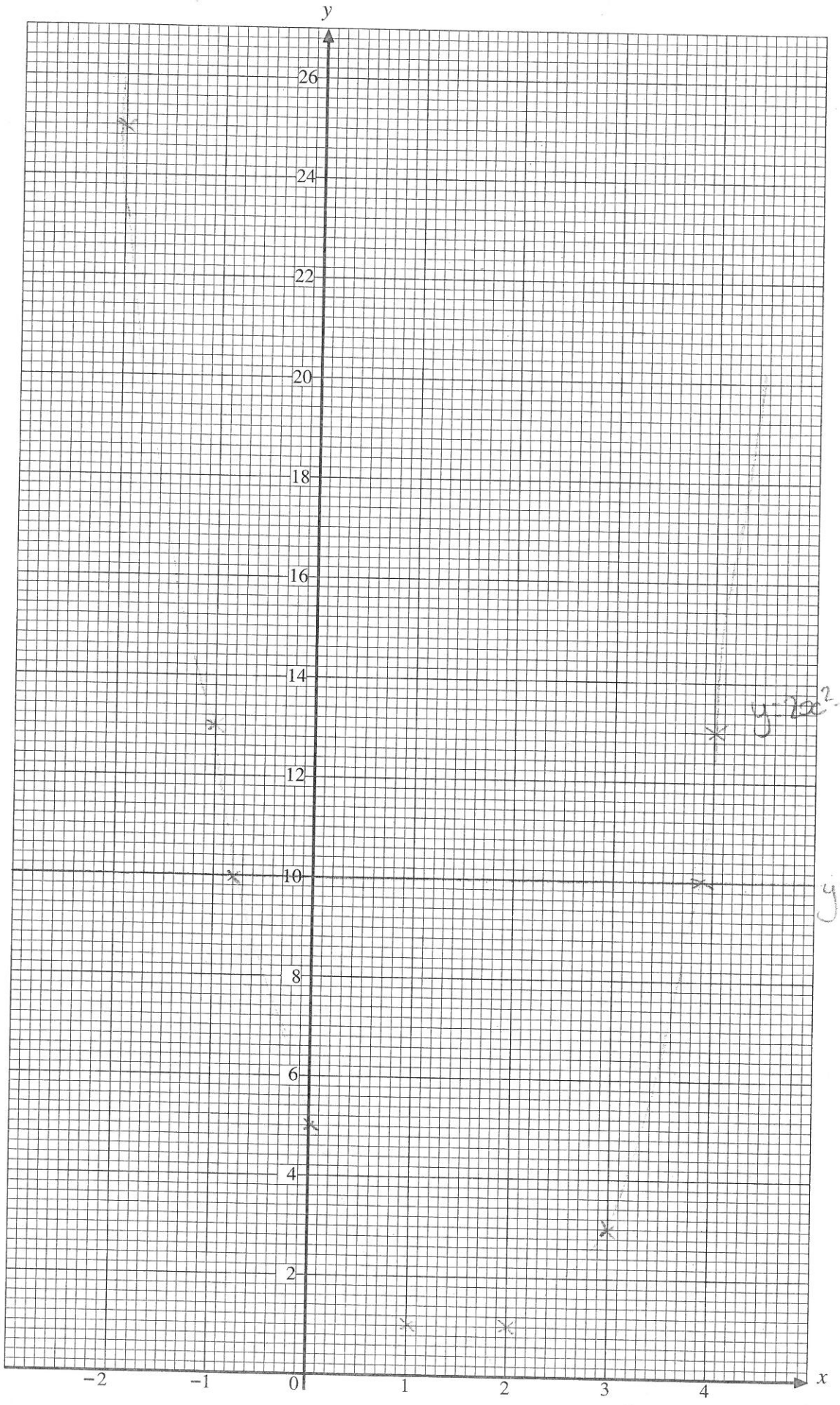
(d) Write down the equation in x whose solutions are the x-values you found in *(c)*.

$2x^2 - 6x + 5 = 10$

$2x^2 - 6x + 5 - 10 = 0$

$2x^2 - 6x - 5 = 0$

[1]


y
x
26
24
22
20
18
16
14
12
10
8
6
4
2
−2
−1
0
1
2
3
4
y=10

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

(i) 457 170 000

$4{\cdot}6 \times 10^{8}$

[1]

(ii) 0·00000000656

$6{\cdot}6 \times 10^{-9}$

[1]

(b) Find, in standard form, the value of each of the following.

(i) $(8{\cdot}17 \times 10^{-4}) \times (6{\cdot}54 \times 10^{-5})$

$5{\cdot}34318 \times 10^{-8}$

[1]

(ii) $\dfrac{3{\cdot}32 \times 10^{4}}{7{\cdot}11 \times 10^{-3}}$

4669.79·606

$4{\cdot}7 \times 10^{6}$

[2]

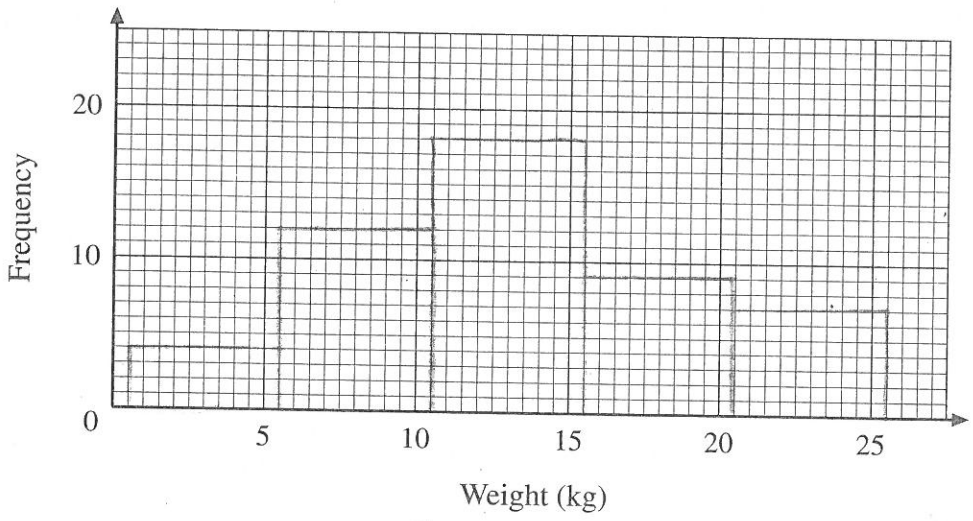
16. The table below shows a grouped frequency distribution of the weights, correct to the nearest kilogram, of 50 dogs at a dog show.

Weight (kg)	1 to 5	6 to 10	11 to 15	16 to 20	21 to 25
Frequency	4	12	18	9	7

(a) Calculate an estimate of the mean weight of this set of 50 dogs.

[4]

(b) On the grid below, draw a frequency polygon to show the distribution of the weights.



[2]

(c) The distribution of the weights of a second set of 50 dogs at the show had a modal class of 6 to 10 kg and a mean of 16 kg. Which set, the first or the second, had the greater total weight? Give a reason for your answer.

[2]

17. Solve the following equation.

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

$\frac{2x-3}{6} + \frac{2x+4}{6} = \frac{15}{6}$

$2x - 3 + 2x + 4 = 15$

$4x + 1 = 15$

$4x = 15 - 1 = 14$

$x = 14/4 \qquad x = 3.5$

[4]

18. A factory uses wire to make frames for plant covers as shown in the diagram. Each frame has width W, depth D and uprights of height H.

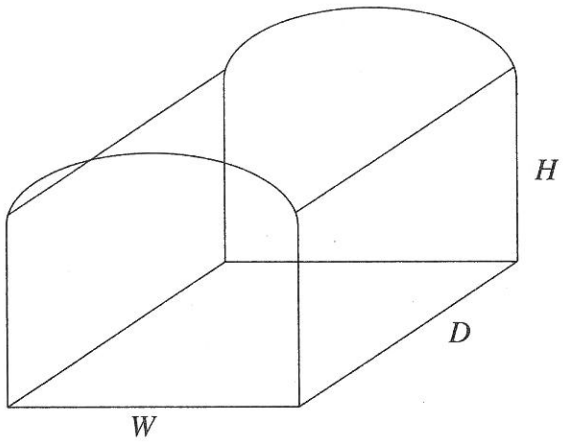


Diagram not drawn to scale

One of these formulae may be used to estimate L, the total length of wire required for each frame.

$L = 5W + 4D + 4H$
$L = 5W + 4DH$
$L = 5W(4D + 4H)$
$L = 5WDH$

(a) Explain why the formula $L = 5WDH$ cannot be used to estimate the total length of wire required.

It gives a volume dimension

[1]

(b) State, with a reason, which of the above formulae may be used to estimate the total length of wire required.

$L = 5W + 4D + 4H$ It's the only formula that gives a length dimension

[2]

19. This diagram shows a vertical pole, *AB*, standing on horizontal ground *DBC*.
The pole is held by two wires *AC* and *AD*.
The wire *AC* is 16 m long and makes an angle of 54° with the ground.

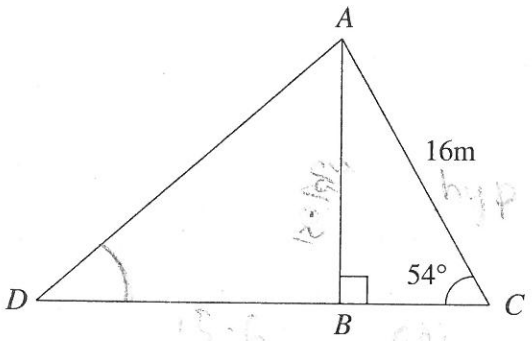


Diagram not drawn to scale

(a) Calculate the length of the pole *AB*. Give your answer to an appropriate degree of accuracy.

Sin C = opp / hyp
Sin 54 = ? / 16
16 × Sin 54 = ?
opp = 12.94 m

[3]

(b) The distance *CD* is 25 m. Calculate the angle the wire *AD* makes with the ground.

Cos C = adj / hyp
Cos 54 = ? / 16
16 × Cos 54 = 9.40 m
25 − 9.40 = 15.6 m
Tan D = opp / adj
Tan D = 12.94 / 15.6
Tan D = 0.83
D = Tan⁻¹ × 0.83
D = 39.7°

[4]

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

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

	$2x$	-3
x	$2x^2$	$-3x$
-4	$-8x$	$+12$

$2x^2 - 3x - 8x + 12$

$2x^2 - 11x + 12$

[2]

(b) Solve the following equation.

$$x^2 - 5x + 4 = 0$$

$x^2 - 5x = -4$

$5x^2 - 5x = -4/5$

x^2

[2]

(c) Make w the subject of the following formula.

$$3w + y = 5y + 7$$

$3w - 7 = 5y - y$

$3w - 7 = 4y$

$3w = 4y + 7$

$w = \frac{4y + 7}{3}$

[2]