184/06

MATHEMATICS

INTERMEDIATE TIER PAPER 2

A.M. FRIDAY, 14 November 2003

(2 Hours)

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	5	
2	2	
3	4	
4	7	
5	3	
6	4	
7	6	
8	5	
9	3	
10	5	
11	3	
12	4	
13	3	
14	7	
15	7	
16	3	
17	4	
18	4	
19	4	
20	7	
21	4	
22	6	
TOTAL		

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

A calculator will be required for this paper.

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

Unless stated, diagrams are not drawn to scale.

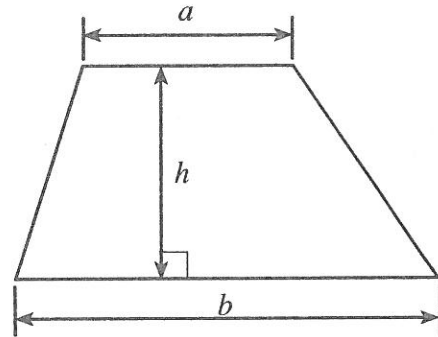Scale drawing solutions will not be acceptable where you are asked to calculate.

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.

RD*(A184/2)

Formula List

Area of trapezium = $\frac{1}{2}(a+b)h$

Volume of prism = area of cross-section × length
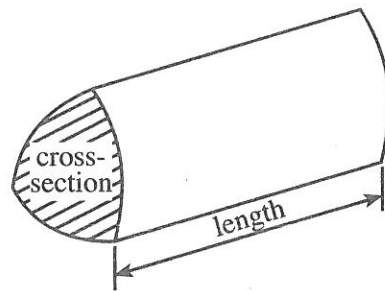
1. *(a)* Emyr hires a car for a number of days. The hire charges are:
        £45.20 for the first day;
        £31.50 for each additional day.
        His total bill was £328.70.
        For how many days did he hire the car?

        [3]

    (b) Calculate 37% of 82.

        [2]

Turn over.

2. Draw, on the grid below, an enlargement of the given shape, using a scale factor of 4.

[2]
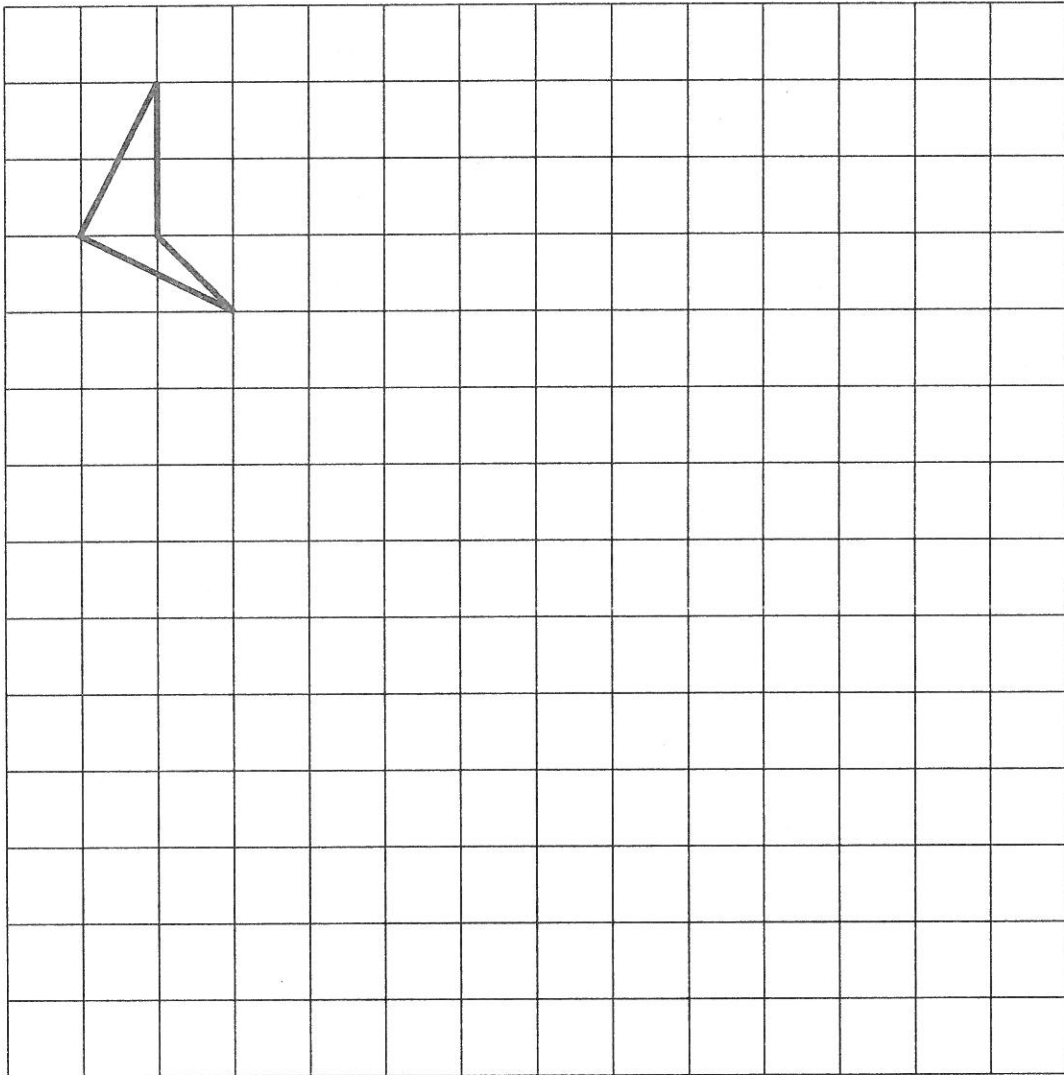
3. Calculate the sizes of the angles marked x, y and z.

....

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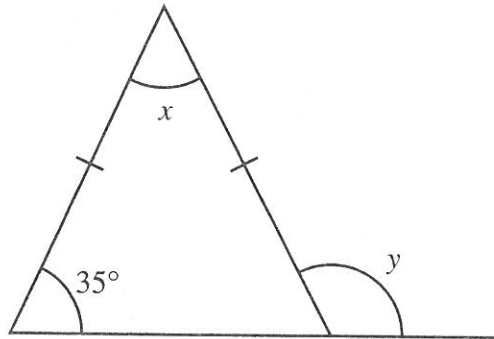
$x =$ .... $^\circ$ $y =$ .... $^\circ$ [2]

....

....

....
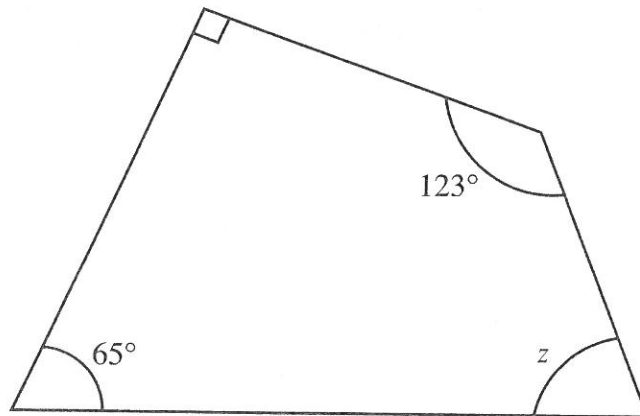
$z =$ .... $^\circ$ [2]

4.   *(a)*   Write down the next two numbers in the sequence:

32,   29,   23,   14, ..., ...

[2]

(b)   Expand $7(a - 2)$.

....

....

[1]

(c)   Simplify $6x - 5y + 3x + 4y$.

....

....

[2]

(d)   Find the value of $6d - 5e$ when $d = -4$ and $e = 3$.

....

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....

....

[2]

5. Year 11 pupils in a comprehensive school were asked to choose one colour from red, blue and green.

The two pie charts below were drawn by John to illustrate the results for the boys and girls separately.
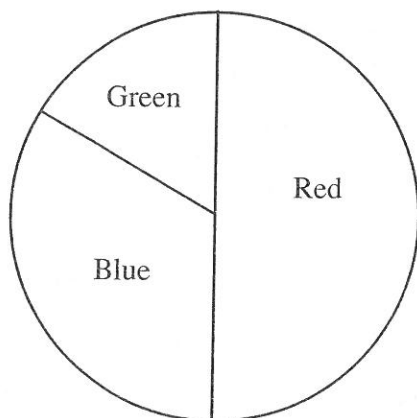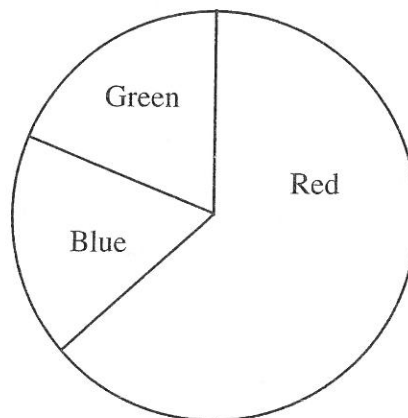
Boys   Girls

(a) Estimate the percentage of the boys who chose blue.

.... %   [1]

(b) Can you tell from the pie charts whether more girls than boys chose red?

                        Yes/No

Give a reason for your answer.

....

....

....

....

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                                                                                              [2]

6. (a) Marcus changed £900 into US dollars ($), when the rate of exchange was £1 = $1.55. How many dollars did he get?

....

....

....

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[2]

(b) After his holiday Marcus had $132 left. He exchanged these dollars into pounds when the rate of exchange was £1 = $1.65. How many pounds did he get?

....

....

....

....

[2]

7. (a) Write down, in terms of n, the nth term of **each** of the following sequences.

(i) 2×4 3×8 4×12 5×16 ....

....

....

[2]

(ii)   4   10   16   22   28   ....

....

....

[2]

(b) Write down the 2nd and 3rd terms of the sequence whose nth term is $n^2 - 4$.

2nd term = ...

3rd term = ...

[2]

8. Mr. and Mrs. Franks received their electricity bill. The details were as follows.

Present meter reading   47982
Previous meter reading   46329

Charge per unit   7.3 pence per unit
Service Charge   £11.25

VAT   5%

Showing all your working, find the total cost of the electricity including VAT.

[5]

9. An art dealer buys a painting for £350 and sells it at a profit of 45%. What is the selling price?

[3]

Turn over.

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

A circular disc has a radius of 7·5 cm.

(a) Calculate the area of one surface of the disc.

....

....

....

....

[2]

(b) Calculate the perimeter of the disc.

....

....

....

....

[3]

11. A trapezium *ABCD* is such that *AB* is parallel to *DC*, *AB* = 23 cm, *DC* = 17·5 cm and the perpendicular distance between the parallel sides is 6 cm. Calculate the area of the trapezium, stating clearly the units of your answer.
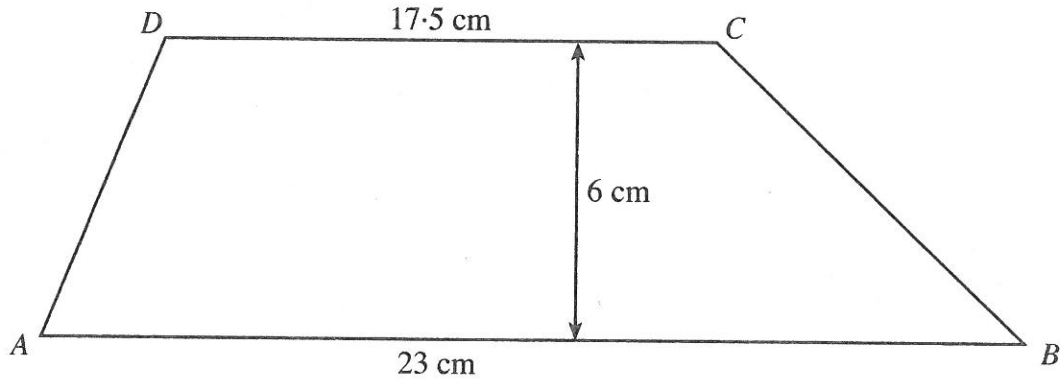
Diagram not drawn to scale.

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[3]

Turn over.

12. A business declares that its office equipment depreciates at the rate of 15% of its value at the beginning of each year. Find, to the nearest £100, the value of its office equipment at the end of 3 years of depreciation, if its value at the beginning of the period was £20 000.

[4]

13. Solve the following equation.

$$2(8 - x) = 33 - 6x$$

[3]

14. The diagram shows the uniform cross-section *ABCDEF* of a solid block of material, in which *ABDE* is a rectangle with *AB* = 8·3 cm, *BD* = 5·7 cm. The two isosceles triangles *AFE* and *BCD* are congruent. The distance *FC* is 12·7 cm.

5·7 cm

8·3 cm

12·7 cm
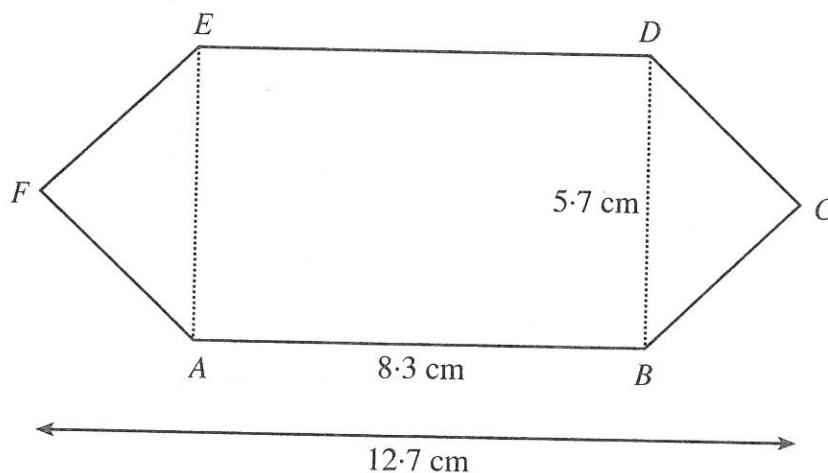
Diagram not drawn to scale.

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

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....
....
....
....

[3]

(b) The block has this uniform cross-section along its length of 15·2 cm and is made from material that has a density of 4·32 g/cm^3. Calculate the mass, in kg, of the block.

....
....
....
....
....
....

[4]

Turn over.

15. The heights of 120 shrubs were measured. The table shows a grouped frequency distribution of the results.

Height (x cm)	Number of shrubs
$50 \leqslant x < 60$	3
$60 \leqslant x < 70$	14
$70 \leqslant x < 80$	50
$80 \leqslant x < 90$	31
$90 \leqslant x < 100$	22

(a) On the graph paper below, draw a grouped frequency diagram for the data. [3]
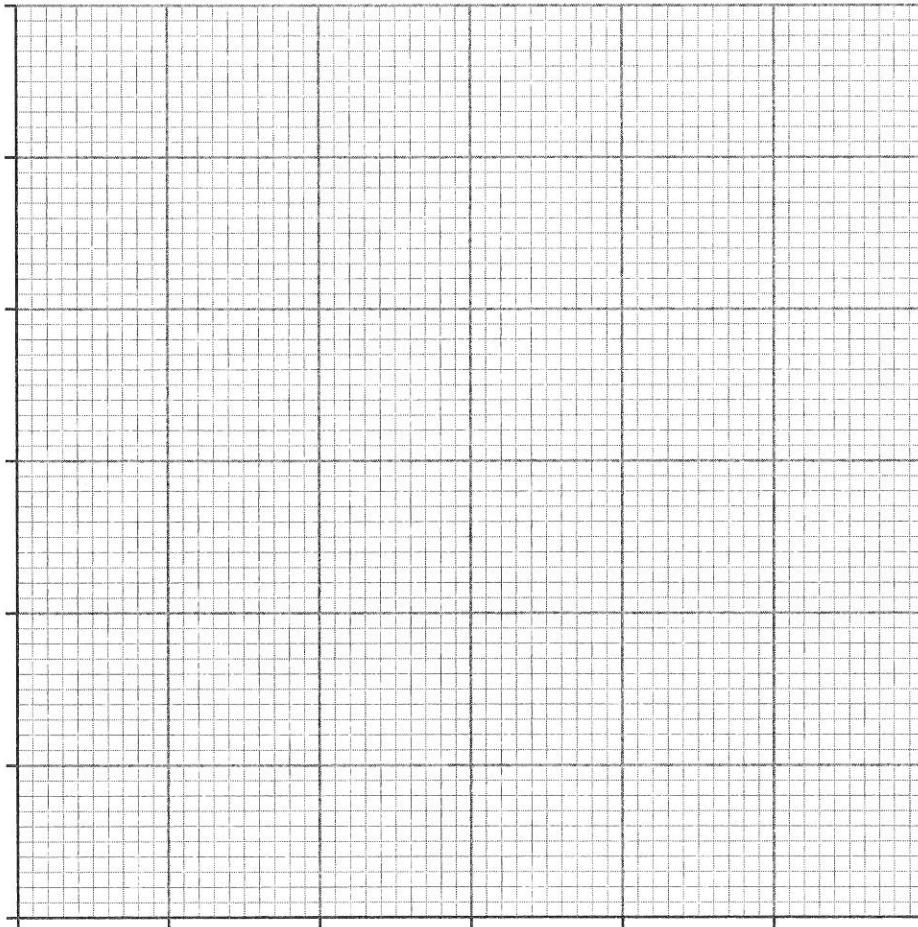
(b) Find an estimate for the mean height of the shrubs.

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[4]

16. One end of a piece of rope 8·4 m long is tied to the top of a vertical pole *XY* and the other end is tied to the ground at the point *Z* which is at a horizontal distance of 6·6 m from the foot of the pole. Calculate the height of the pole.

....

....

....

....

....

[3]

Turn over.
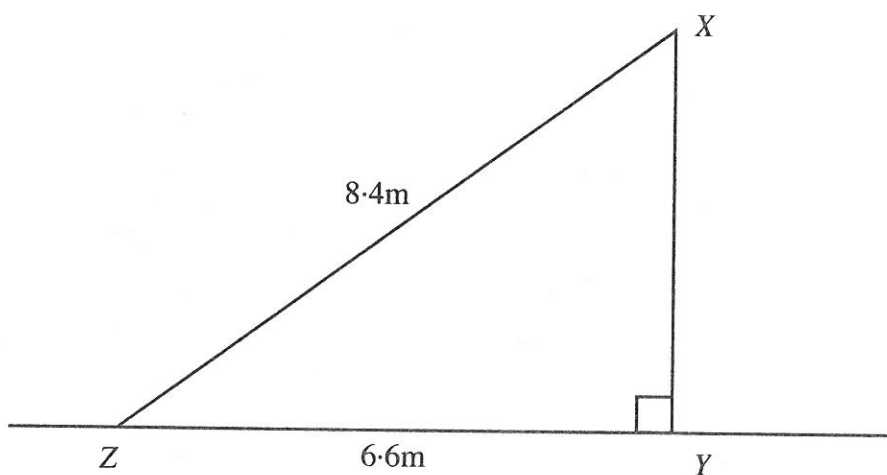
17. A solution to the equation

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

lies between 2·6 and 2·7.

Use the method of trial and improvement to find this solution correct to 2 decimal places.

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[4]

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

$$2x + 3y = 4$$
$$3x + 4y = 8$$

....

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[4]

19. Find, in standard form, the value of

(a) $(5 \cdot 2 \times 10^{-4}) \times (4 \cdot 1 \times 10^{-7})$,

....

....

[2]

(b) $(8 \cdot 4 \times 10^{-7}) \div (9 \cdot 6 \times 10^{6})$.

....

....

[2]

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

$$(x + 5)(x - 6)$$

....

....

....

....

....

[2]

(b) Make r the subject of the formula

$$7 - 6f = 4(5 - 2r).$$

....

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[3]

(c) Factorise $x^2 - 7x + 12$.

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[2]

21. The masses of 300 pupils were measured in kilograms. Below is a cumulative frequency polygon of the results.
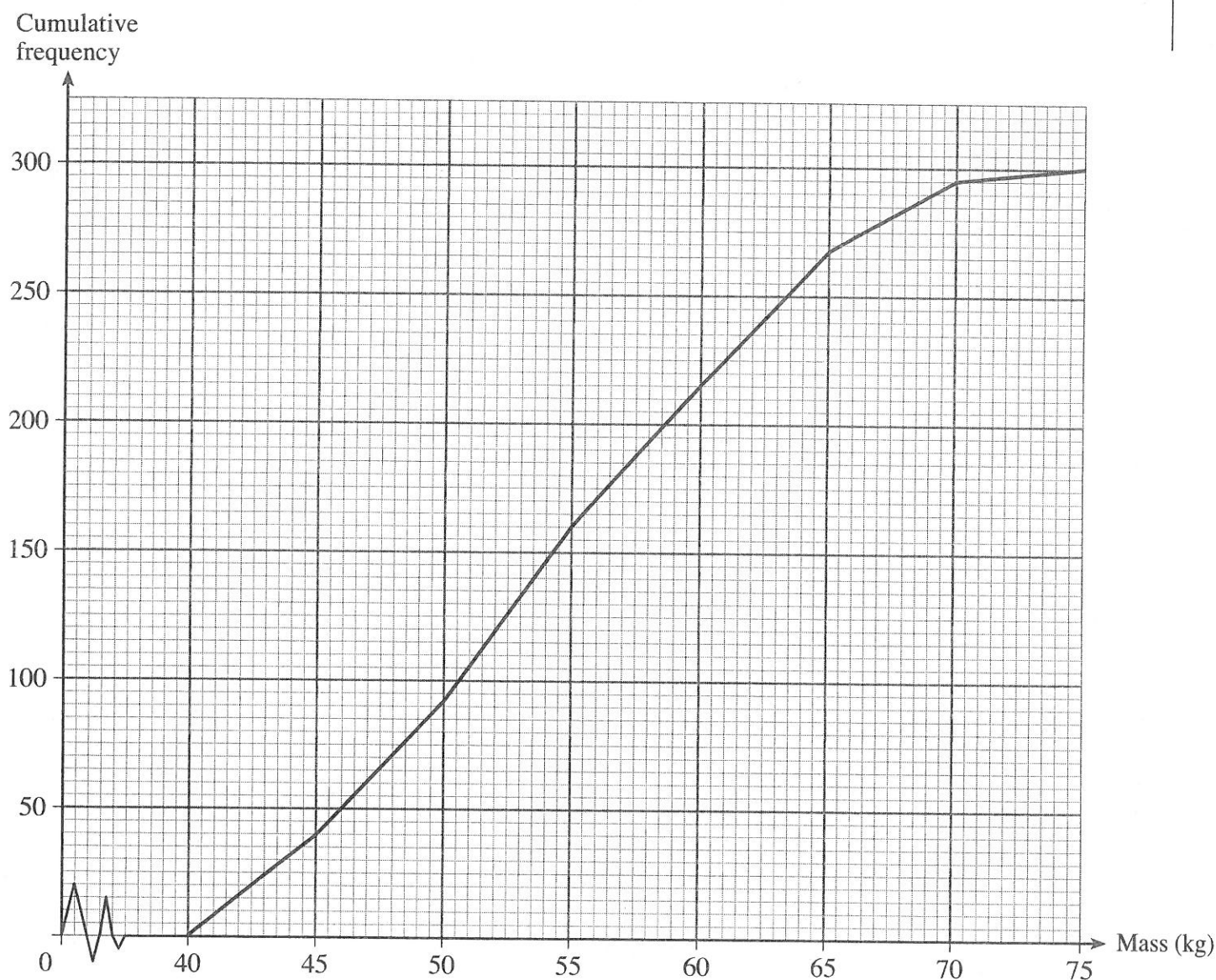
Use the cumulative frequency polygon to find

(a) the inter-quartile range,

....

....

[2]

(b) how many pupils had a mass greater than 58 kg.

....

....

[2]

Turn over.

22. In the diagram below, *ABCD* is a quadrilateral in which *AB* = 18 cm, *CD* = 6 cm and $B\widehat{A}E$ = 43°.
The point *E* is on *AD* such that *ED* = 13 cm and *BE* is perpendicular to *AD*.
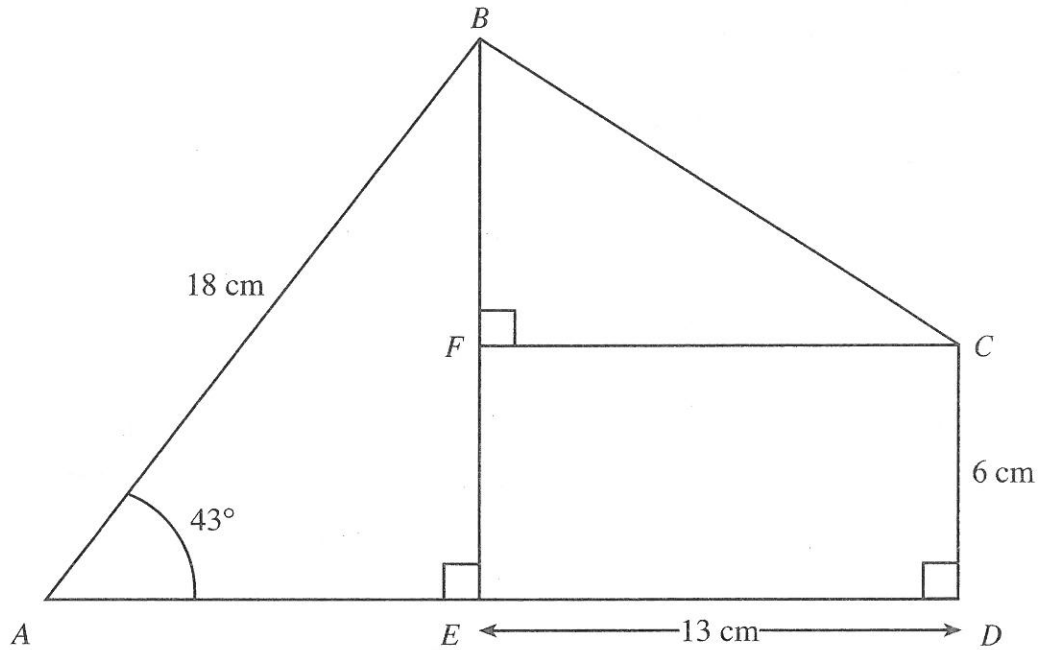The point *F* is the foot of the perpendicular from *C* to *BE*.

Diagram not drawn to scale.

(a)   Find the length of *BE*.

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[3]

(b)   Calculate the size of $C\widehat{B}F$.

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[3]