WELSH JOINT EDUCATION COMMITTEE

General Certificate of Secondary Education

CYD-BWYLLGOR ADDYSG CYMRU

Tystysgrif Gyffredinol Addysg Uwchradd

MATHEMATICS

INTERMEDIATE TIER PAPER 2

A.M. FRIDAY, 13 November 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	3	
2	3	
3	3	
4	7	
5	3	
6	6	
7	3	
8	2	
9	3	
10	3	
11	4	
12	7	
13	3	
14	3	
15	4	
16	6	
17	3	
18	4	
19	9	
20	6	
21	6	
22	6	
23	3	
TOTAL		

1. *(a)* Work out 3^4.

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[1]

(b) Write down the cube of 4.

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[1]

(c) Write down the next prime number after 50.

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[1]

2. *(a)* Write down a fraction which is greater than $\frac{2}{5}$ and less than $\frac{7}{10}$.

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[1]

(b) Chris and Marcus share some money. Chris has $\frac{2}{3}$ of the money and Marcus has the remainder, which is £36.
How much money do they share?

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[2]

3. The probability that a person chosen at random is right-handed is 0·72.

(a) What is the probability that a person chosen at random is **left**-handed?

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[1]

(b) There are 500 people watching a hockey match. How many of them would you expect to be left-handed?

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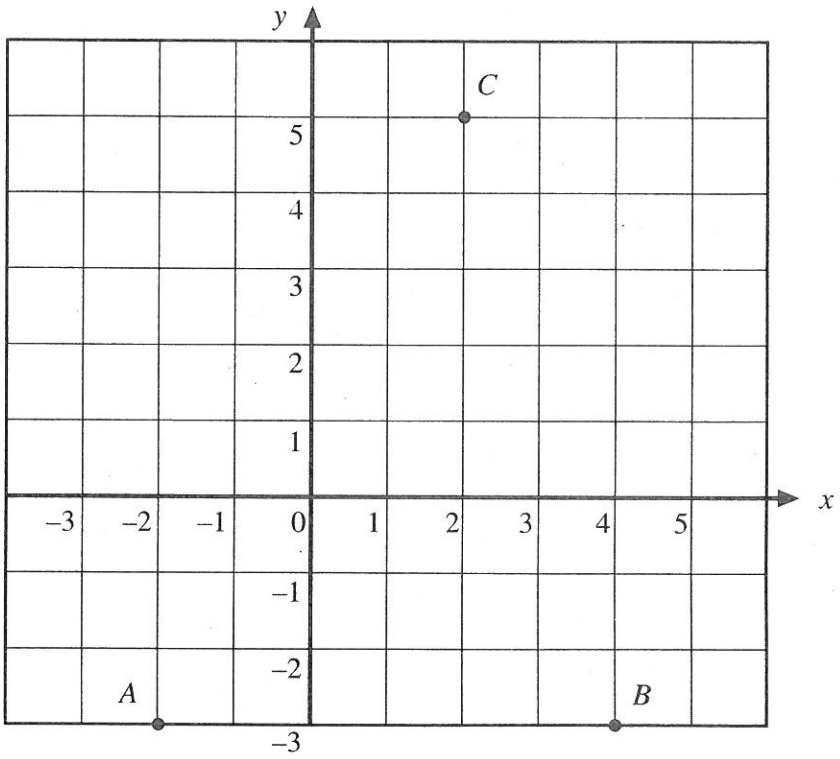
[2]

4.



(a) Calculate the area of triangle *ABC*.

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[3]

(b) *AB* is also the side of a rectangle with the same area as triangle *ABC*. Write down the coordinates of one other corner of the rectangle.

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[2]

(c) (i) Write down the coordinates of point *D* such that *ABCD* is a parallelogram.

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(ii) What is the area of the parallelogram *ABCD*?

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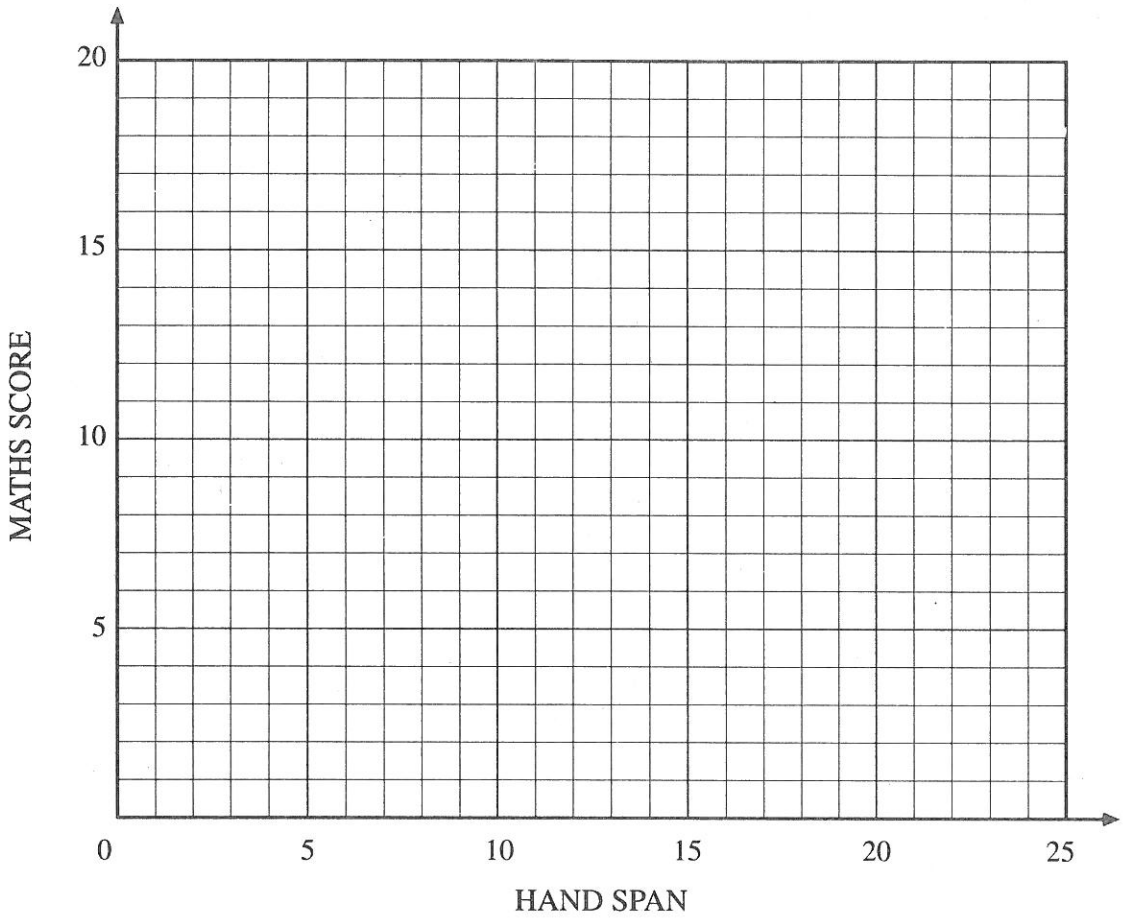
[2]

5. Jason records the hand span and the score in a maths test for each of 8 people. This table shows his results.

Hand span (cm)	25	10	15	18	22	14	20	14
Maths test mark	6	10	12	9	18	5	8	19

(a) On the grid below, draw a scatter diagram to show these results.



[2]

(b) Does your scatter diagram show positive correlation, no correlation or negative correlation?

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[1]

6. Medwin has x compact discs in his music collection. They are worth £9 each.

(a) Write down, in terms of x, the total value of Medwin's compact discs.

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[1]

(b) Medwin has 5 fewer cassette tapes than compact discs. Write down, in terms of x, the number of cassette tapes he has.

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[1]

(c) The cassette tapes are worth £6 each. Write down, in terms of x, the total value of his cassette tapes.

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[1]

(d) Write down, in terms of x, the total value of Medwin's compact discs and cassette tapes, simplifying your answer as far as possible.

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[3]

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, giving your answer as a decimal.

$$\frac{0{\cdot}0396 \times 782}{(8{\cdot}2)^2}$$

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[3]

8. The table below shows some age ranges, in complete years, and the probabilities that a person picked at random from the members of a dance school will have an age in those ranges.

Age in complete years	1 to 5	6 to 10	11 to 15	16 to 20
Probability	0·36	0·41	0·18	0·05

What is the probability that a person picked at random from the members of the dance school will be under 11 years old?

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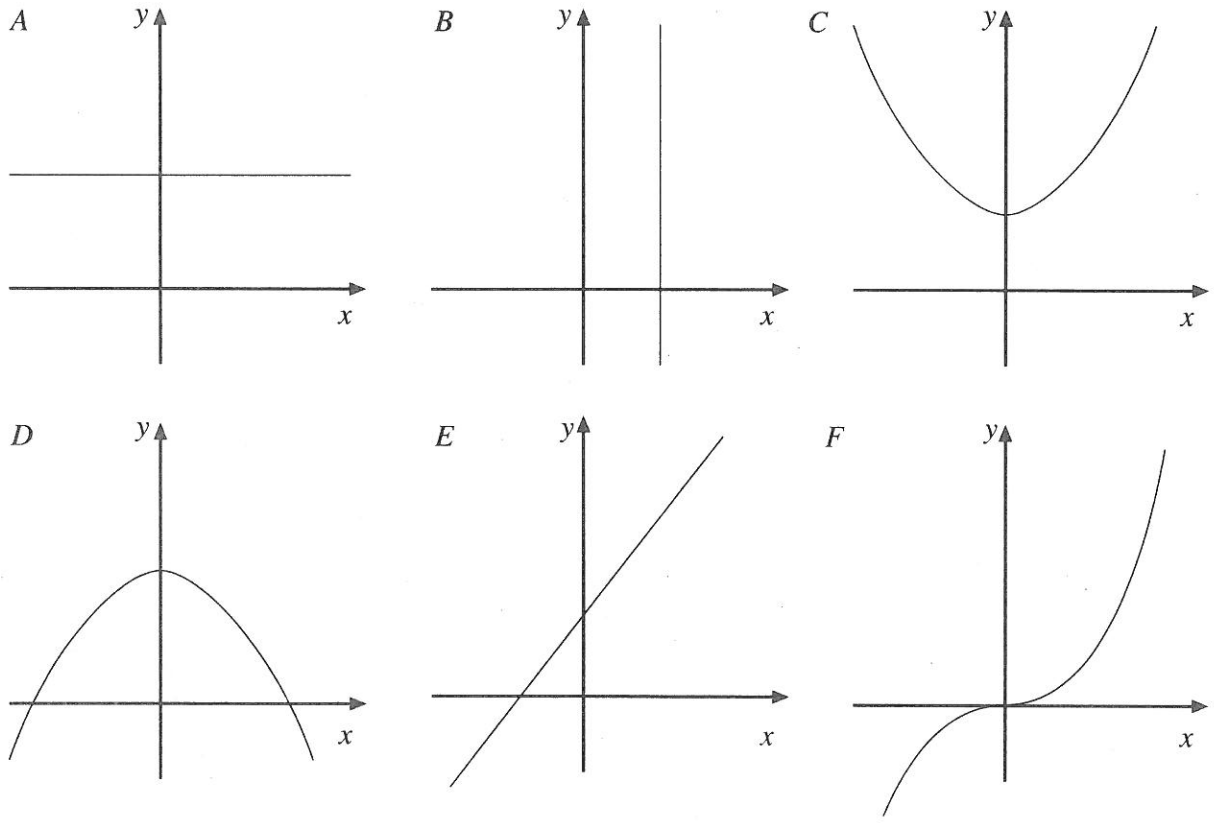
[2]

9. In the diagrams below there are six sketches of graphs labelled *A*, *B*, *C*, *D*, *E* and *F*.



THREE of the above are sketches of the graphs of the following functions. Write the letter denoting the graph next to the appropriate function.

(i) $y = -x^2 + 2$ .....

(ii) $y = 2$ .....

(iii) $y = x^3$ .....

[3]

10. A photograph measures 12 cm by 9 cm. Each side is **enlarged** in the ratio 3 : 2. What are the measurements of the photograph after it has been enlarged?

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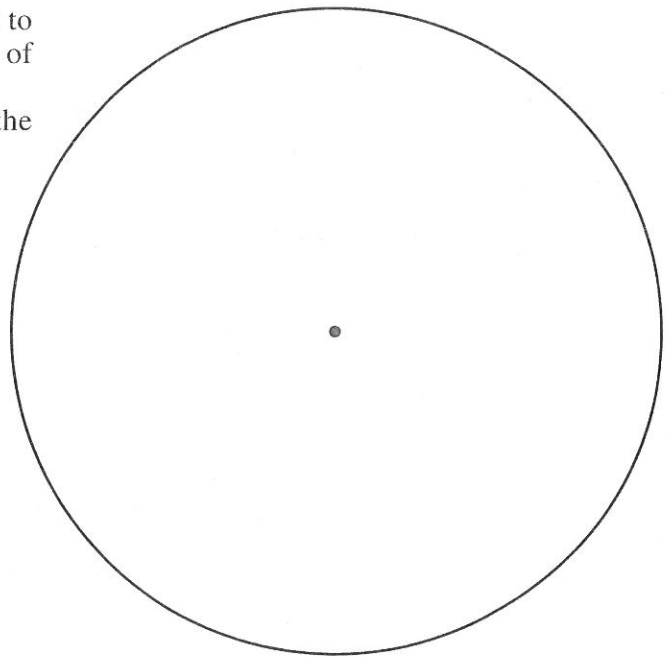
[3]

11. Shareen surveys the colours of the cars in a car park in Cardiff. This table shows her results.

Colour	White	Black	Green	Yellow	Red
Frequency	10	15	2	4	5

(a) In the circle opposite, draw a pie chart to show the distribution of the colours of the cars.
You must show how you calculate the angles of your pie chart.



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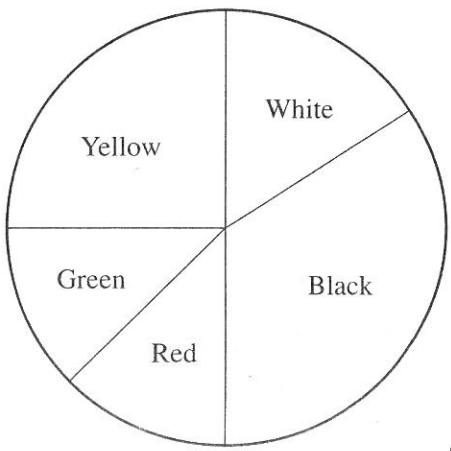
[3]

(b) The pie chart below shows the distribution of the colours of the cars in a car park in Swansea.

Why is it not possible to say whether there were more white cars in the car park in Cardiff than there were in the car park in Swansea?



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[1]

12. A sports ground is in the shape of a rectangle of length 100 m with a semi-circle of radius 40 m at each end as shown in the diagram.

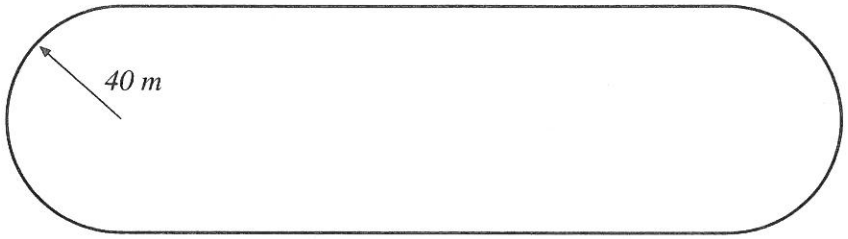

Diagram not drawn to scale.

(a) Calculate the perimeter of the sports ground. **State clearly the units of your answer.**

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[3]

(b) Calculate the area of the sports ground. **State clearly the units of your answer.**

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[4]

13. A building society offers a compound interest rate of 4% payable every six months.

(a) Jenny invests £100 in the building society. How much money does she have at the end of one year?

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[2]

(b) What annual rate of interest does this represent?

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[1]

14. An alloy is made by combining tin and copper in the ratio 3 : 5.
What weights of tin and copper are there in 240 kg of the alloy?

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[3]

15. A solution of the equation

$$x^3 - 4x = 14$$

lies between 2·9 and 3·0.
Use the method of trial and improvement to find this solution correct to 2 decimal places.

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[4]

16. The police measure the speeds, correct to the nearest mile per hour, of 100 cars passing a radar trap. The table below shows the results.

Speed (mph)	16 to 20	21 to 25	26 to 30	31 to 35	36 to 40	41 to 45	46 to 50
Frequency	2	20	32	28	8	6	4
Mid-point							

(a) Complete the mid-point row. [1]

(b) Calculate, in miles per hour, an estimate of the mean speed of the cars.

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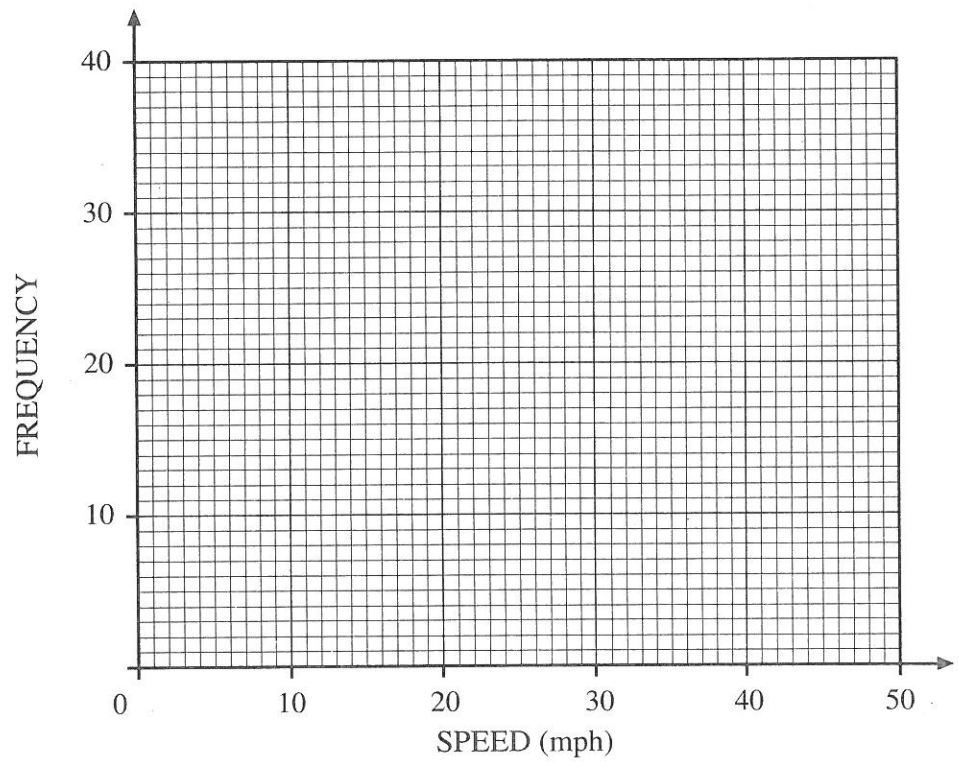
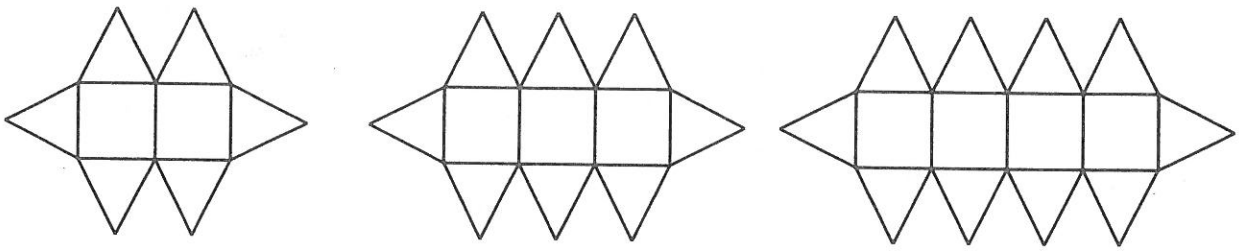
..... [3]

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



[2]

17. Squares and triangles are used to make the following patterns.



Pattern 1
2 squares
6 triangles

Pattern 2
3 squares
8 triangles

Pattern 3
4 squares
10 triangles

The patterns continue in this way.

(a) Write down, in terms of n, the number of squares that will be in the nth pattern.

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[1]

(b) Write down, in terms of n, the number of triangles that will be in the nth pattern.

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[2]

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

$$3x + 4y = -6$$
$$5x + 3y = 1$$

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[4]

19. The diagram below shows two ports A and B and a ship C. Port B is 7 km due south of port A. The ship, C, is anchored 6 km due east of port B.

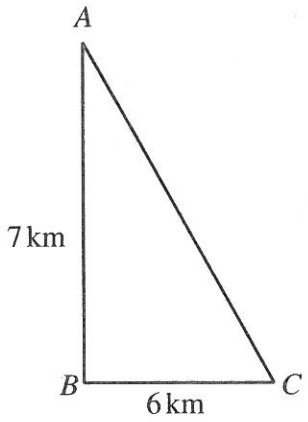

Diagram not drawn to scale.

(a) Calculate the distance of the ship C from port A.

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[2]

(b) Calculate the bearing of the ship C from port A.

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[3]

(c) A second ship, D, leaves port A and sails on a bearing of 105° (S 75°E).

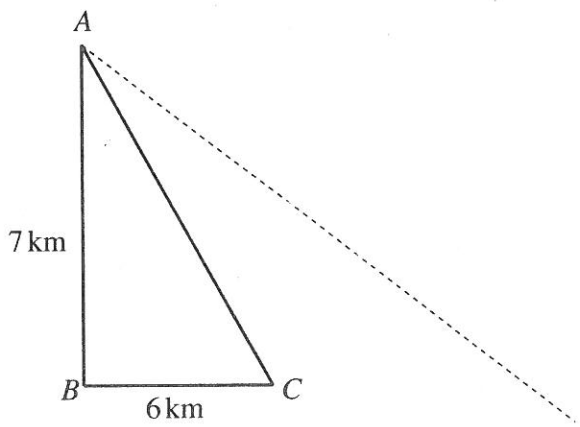

Diagram not drawn to scale.

Calculate the distance between ships C and D when they are closest to each other.

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[4]

20. *(a)* The mass of the Earth is $5{\cdot}98 \times 10^{24}$ kg. Calculate the mass of the Earth in tonnes, giving your answer in standard form.

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[2]

(b) The mass of the moon is $7{\cdot}34 \times 10^{22}$ kg. The mass of the Earth is N times the mass of the moon. Find the value of N correct to the nearest whole number.

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[2]

(c) The radius of the Earth is $6{\cdot}37 \times 10^{3}$ km. Calculate the cube of this radius, giving your answer in standard form.

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[2]

21. The table below shows the distribution of the ages, in complete years, of a sample of 80 people working in a factory.

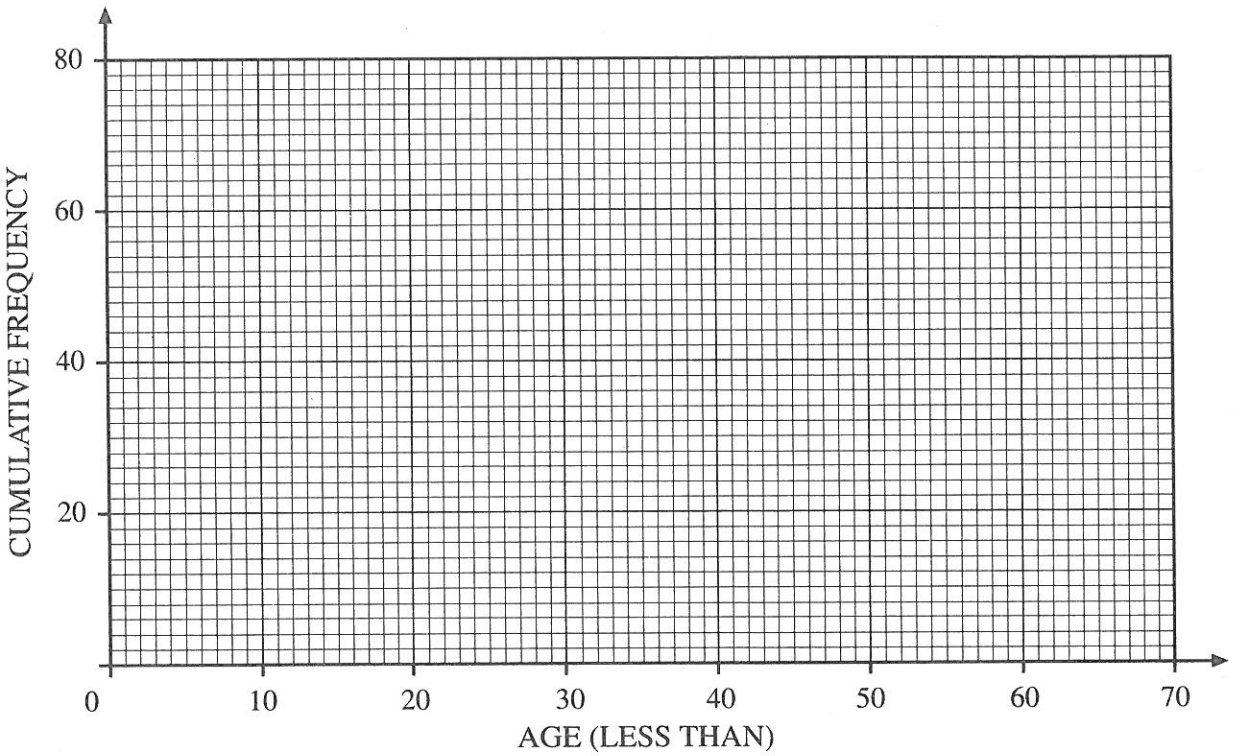
Age (complete years)	0 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 64
Frequency	4	8	13	20	19	16

(a) Complete this cumulative frequency table.

Age (less than)	20	30	40			
Cumulative frequency	4	12				

[2]

(b) On the grid below, draw a cumulative frequency diagram to show this information.



[2]

(c) The median age of the 350 people working in the factory is 47 years. The inter-quartile range is 20 years.
If the same people are working in the factory in 5 years time, what will the median and inter-quartile range of their ages be?

Median age ..... Inter-quartile range .....

[2]

22. The area of a triangle ABC is 40 cm^2. The length of its side BC is x cm long. The perpendicular height AN is 2 cm shorter than BC.

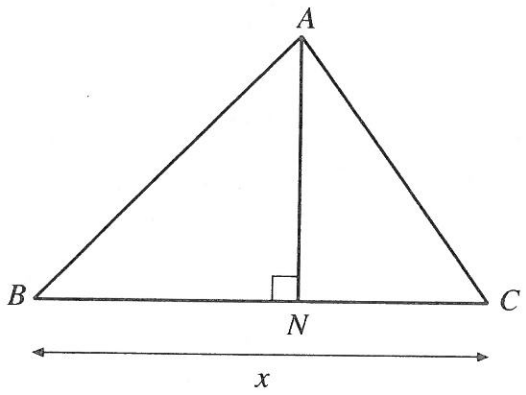


Diagram not drawn to scale.

(a) Showing all your working, prove that x satisfies the equation

$$x^2 - 2x - 80 = 0.$$

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[3]

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

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[3]

23. The diagram below shows the logo of a sailing club. Triangles ABC and ADE are similar, with $\widehat{BAC}$ equal to $\widehat{DAE}$ and $\widehat{ABC}$ equal to $\widehat{ADE}$. The lengths of AB, AD and DE are 4 cm, 7 cm and 9 cm respectively.

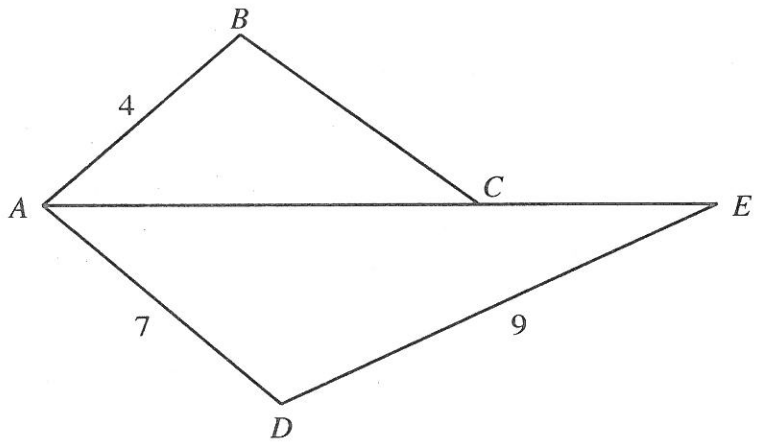

Diagram not drawn to scale.

Calculate the length of BC.

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[3]