1   **(a)**   Solve the simultaneous equations
$$5x - 6y = 27,$$
$$3x - 2y = 13.$$

Answer x = ..., *y* = ... [3]

(b)   In the diagram,
BCD is a straight line,
BA is parallel to *CE*,
ED = *CD*,
$B\hat{A}C$ = 40°,
$A\hat{B}C$ = 72°,
$C\hat{E}A$ = 82°.
Calculate
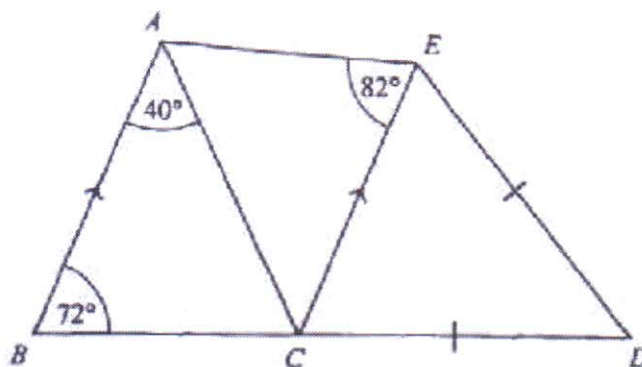
(i) $C\hat{A}E$

Answer :........... ° [1]

(ii) $C\hat{D}E$

Answer :............ ° [2]

(c) The exterior angle of a regular polygon is 30°. Find the sum of its interior angles.

Answer :............ ° [2]

2   Two cars each complete a journey of 120 km.
The first car is driven at an average speed of x km/h.
The second car is driven at an average speed 3 km/h faster than the first car.
The first car takes 6 **minutes** longer to complete the journey.

   (i)   Write down an equation in x and show that it simplifies to $x^2 + 3x - 3600 = 0$.

[3]

   (ii)   Solve the equation $x^2 + 3x - 3600 = 0$, giving each answer correct to one decimal place.
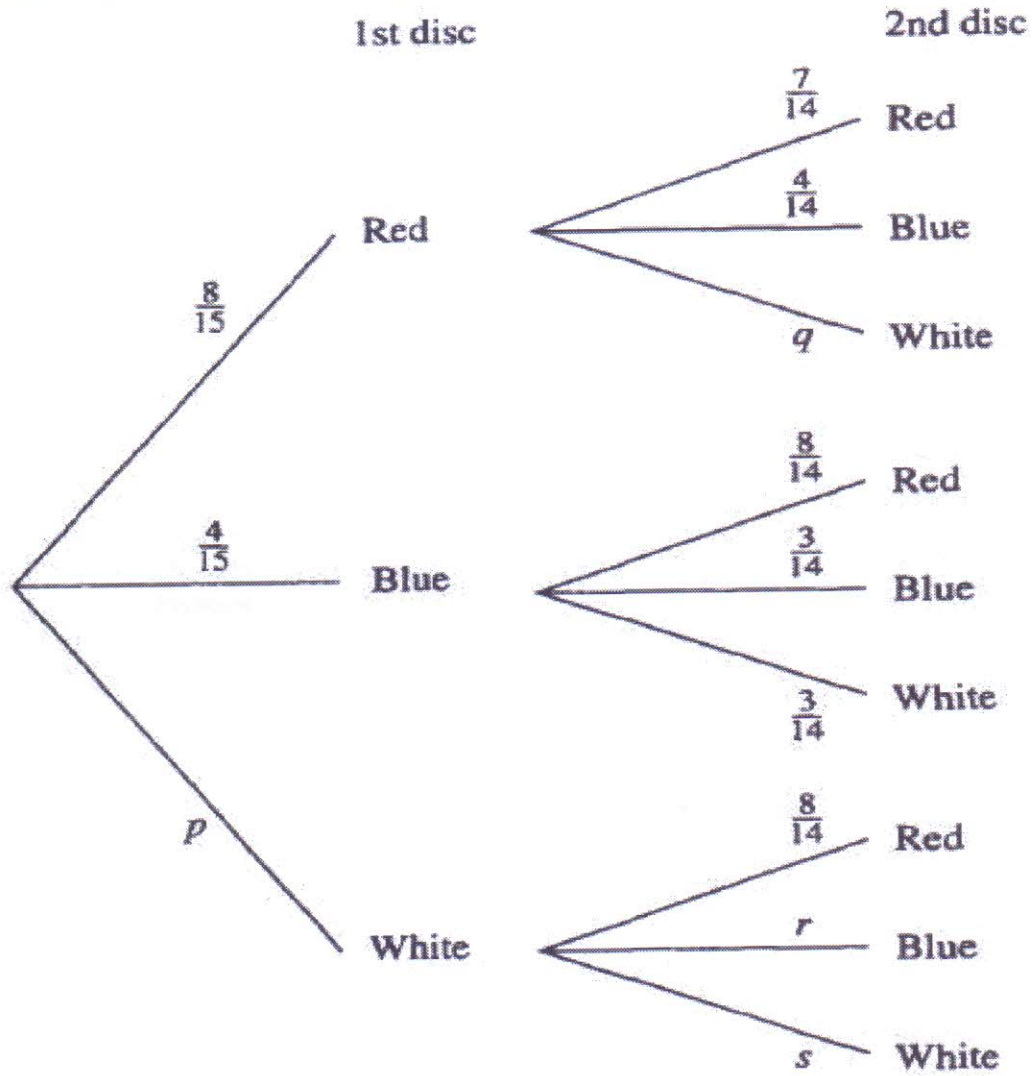
Answer x = ... or .... [3]

(iii)   How many **minutes** does the **first** car take to travel the 120 km?

Answer .... minutes [2]

3   A bag contains 15 identical discs.
     There are 8 red, 4 blue and 3 white discs.
     A disc is picked out at random and not replaced.
     A second disc is then picked out at random and not replaced.
     The tree diagram below shows the possible outcomes and some of their probabilities.

1st disc

2nd disc

$\frac{7}{14}$ Red

$\frac{4}{14}$ Blue

q White

$\frac{8}{15}$ Red

$\frac{4}{15}$ Blue

$\frac{8}{14}$ Red

$\frac{3}{14}$ Blue

$\frac{3}{14}$ White

p White

$\frac{8}{14}$ Red

r Blue

s White

(i)   Calculate the values of p, q, r and s shown on the tree diagram.

Answer : p = ..., r =.........., s =.......... [2]

(ii) Expressing each of your answers as a fraction **in its lowest terms**, calculate the probability that

(a) both discs will be red,

Answer :.................... [1]

(b) one disc will be red and the other blue.

Answer :.................... [2]
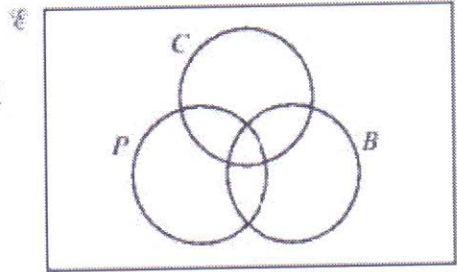
(iii) A third disc is now picked out at random.
Calculate the probability that none of the three discs is white.
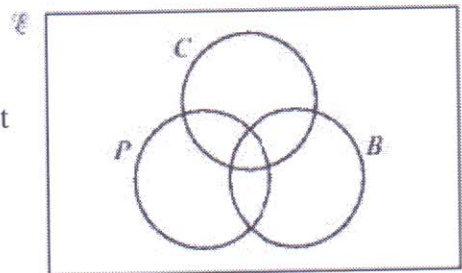
Answer :.................... [2]

4   (a)   The Venn diagrams below represents the universal set $\mathcal{E}$ of all teachers in a school. The sets C, B and P represent teachers who teach Chemistry, Biology and Physics respectively.

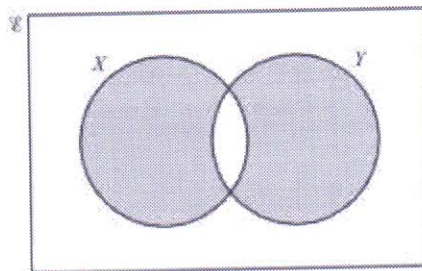(i)   Shade the region which represents those teachers who teach Physics and Chemistry but not Biology.   [1]

(ii)   Shade the region which represents those teachers who teach either Biology or Chemistry or both, but not Physics.   [1]

(b)   Express, in set notation, the set represented by the shaded region.

Answer :...[2]

(c) $\mathcal{E} = \{x: x$ is an integer and $5 \leq x \leq 15\}$

   $A = \{x : x$ is a multiple of 3$\}$

   $B = \{x : x$ is a factor of 60$\}$

   $C = \{x : x$ is a prime number$\}$

   (i)   Write down the elements of set C.

   Answer : {...} [1]

   (ii)   Find n(A B C).

   Answer :................... [2]

   (iii)   Find $(A \cap B)$'

   Answer : {...} [1]

5 **(a)** Given that $f(x) = \dfrac{3x - 2}{x - 6}$. Calculate

(i) $f(2)$

Answer :..................... [1]

(ii) $f^{-1}(x)$,

Answer :..................... [2]

(b) Evaluate $\dfrac{\sqrt{3}\cos 65°}{2.3 + 0.9} + \dfrac{3.5 \times 4.5}{3.5 + 4.5}$ correct to 3 decimal place.
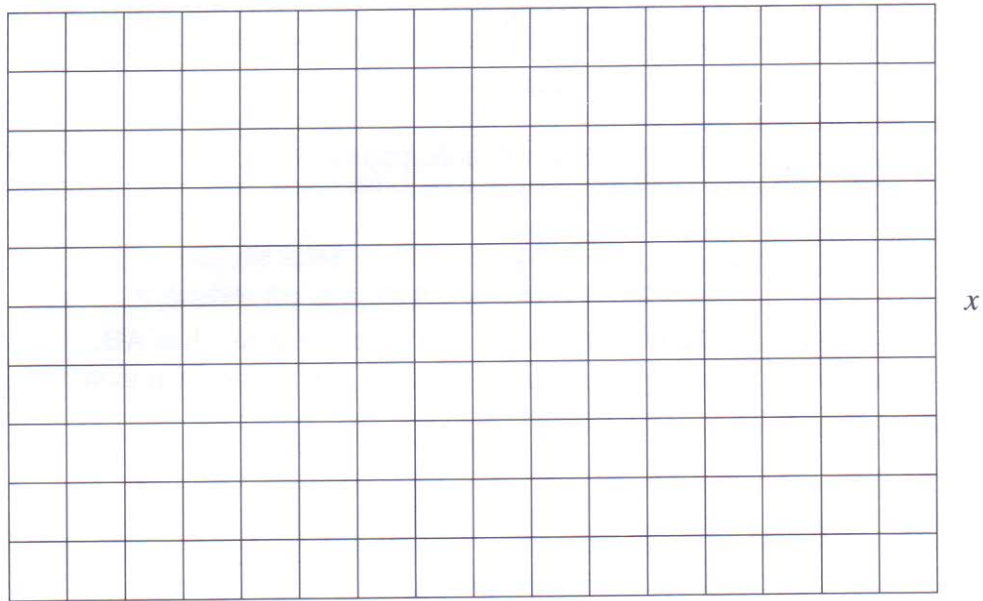
Answer :..................... [2]

(c) Tickets for a concert were priced at $5, $8 and $12. The number of $5 tickets sold was twice the number of $8 tickets. The number of $12 tickets sold was 80 more than the number of $8 tickets. The number of $8 tickets sold was x.

(i) Find an expression, in terms of x, for the total sum of money received from the sale of the tickets.

Answer :................................[1]

(ii) Given that $9360 was received from the sale of the tickets, form an equation in x. Solve this equation and hence find the total number of tickets that were sold.

Answer :........................[3]

6

The diagram above shows a triangle *ABC* with vertices (1, 2), (3, 2) and (3, 2) respectively.

(a)   Write down the equation of line *AB*.

Answer .... [2]

(b)   Given that (2, 0) is the mid-point of the line joining points *B* and *D*, write down the coordinates of point *D*.

Answer *D* = (......, ...) [1]

(c)   What is the special name given to the quadrilateral *ABCD* ?

Answer .... [2]

(d)   Given that *x* = 0 is the line of symmetry of the trapezium *ACBE*. Write down the coordinates of point *E*.

Answer *E* = (......, ...) [1]

7   A, B and C are three ports shown in the figure given below. B is due east of A. Given that 1*cm* represents 100 *km*, find

        (a)   the actual distance between A and C.   [1]

        (b)   the bearing of C from B.   [1]

        (c)   On your diagram, draw the locus of all the points

                 (i)   4.8 *cm* from C   [1]

                 (ii)   3 *cm* from AB.   [1]

                 (iii)   Equidistant from AB and AC.   [1]

        (d)   Point X lies inside the triangle, such that it is nearer to AC than AB, within 4.8 cm from C and less than 3 cm from AB. Shade the region where X must lie.   [1]
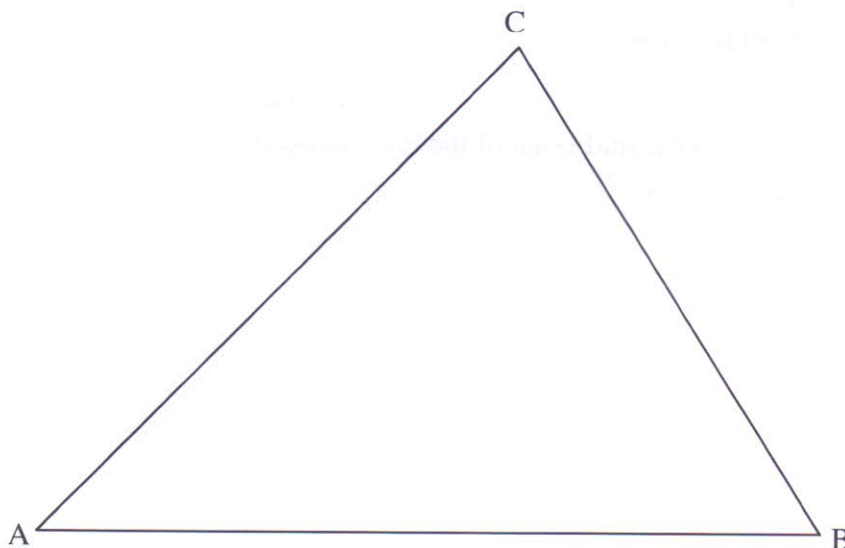
Section B [48 marks]

Answer **four** questions in this section.

Each question in this section carries 12 marks.

8   Yahya makes pieces of furniture and sends them to a shop where they are sold. When a piece is sold, the shopkeeper receives 15% of the selling price, and Yahya receives the rest.

(a)   A table is sold for $200.

      (i)   Calculate the amount the shopkeeper receives.

Answer $ .... [1]

      (ii)   The cost of making this table was $131.80.
            Calculate the percentage profit that Yahya makes when this table is sold.

Answer .... % [3]

      (iii)   The weight of each table is 20 *kg* correct to the nearest kilogram. Calculate the minimum weight of 45 such tables ?

Answer .... *kg* [2]

(b)   Yahya made a bookcase.

The cost of making the bookcase was $647.50.

After the bookcase is sold and the shopkeeper has received 15% of the selling

price,

Yahya makes a profit of $160.

Calculate the selling price of the bookcase.

Answer $ .... [3]

(c)   A British buyer wants to buy some tables directly from Yahya and agreed to pay $ 180 per table. The exchange rate was 1 £ = 1.65 $.

What is the maximum number of tables he can buy with £ 5600 ?

Answer .... tables [3]

9
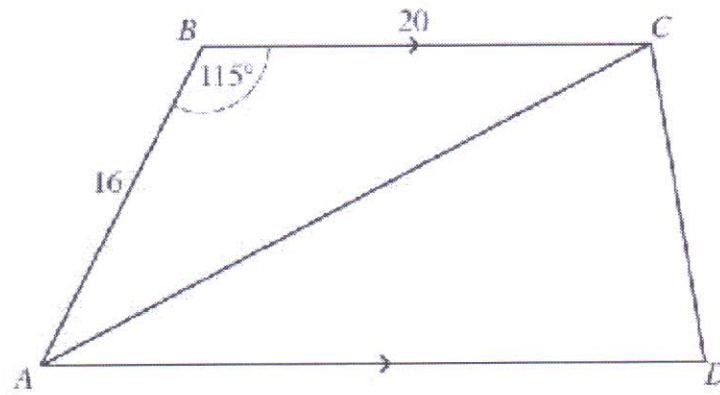
ABCD is a trapezium with AD parallel to BC.
AB = 16 cm, BC = 20 cm and ABC = 115°.

(a) Find AC.

Answer :.............................. cm [4]

(b) Show that the perpendicular distance between BC and AD is 14.5 cm.

[2]

(c) The area of the trapezium *ABCD* is 348 cm^2.

(i) Find *AD*.

Answer :.................... cm [2]

(ii) Show that the area of triangle *ACD* is 203 cm^2.

[1]

(iii) Hence, or otherwise, find *CÂD*.

Answer .... [3]

10 The table below gives some values of x and the corresponding values of y, given correct to two decimal places, for

$$y = \frac{1}{4}(x^3 - 6x^2 + 8x)$$

x	-1	-0.5	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
y	-3.75	-1.41	0	0.66	0.75	0.47	0	-0.47	-0.75	-0.66	0	p	3.75

(a) Calculate the value of p.

Answer : p = ... [1]

(b) Using a scale of 2 cm to represent 1 unit on each axis, draw a horizontal x–axis for $-1 \le x \le 5$ and a vertical y–axis for $-4 \le y \le 4$.

On your axes, plot the points given in the table and join them with a smooth curve. [3]

(c) Describe the symmetry of this curve.

Answer : ....[1]

(d) Use your graph to solve the equation $x^3 - 6x^2 + 8x = 8$.

Answer : x = ... [2]

(e) By drawing a tangent, find the gradient of the curve at $x = 4$.

Answer : m = ... [2]

(f) **(i)** On the axes used in part **(b)**, draw the graph of $y = 3 - x$. [1]

(ii) Write down the coordinates of the point where the line intersects the curve.

Answer : (......... , ...) [1]

(iii) The x coordinate of this point of intersection satisfies the equation $x^3 = Ax^2 + Bx + C$.
Find the value of A, B and C.

Answer: A = ... , B = ... , C = ... [1]
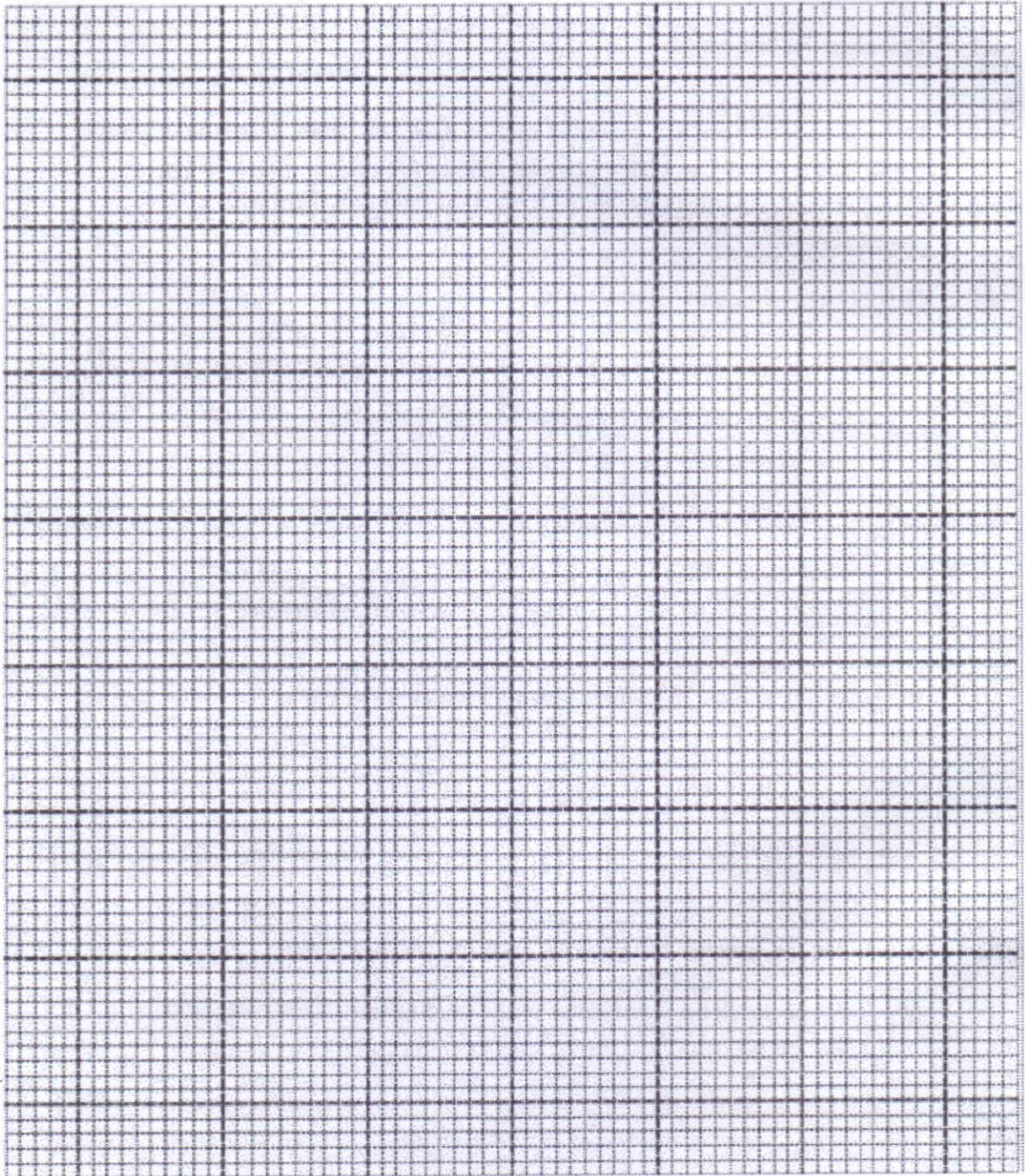
11 The table shows information about the number of hours that 120 children used a computer last week.

Number of hours (h)	Frequency
$0 < h \leq 2$	10
$2 < h \leq 4$	15
$4 < h \leq 6$	30
$6 < h \leq 8$	35
$8 < h \leq 10$	25
$10 < h \leq 12$	5

(a) **(i)** Work out an estimate for the mean number of hours that the children used a computer. Give your answer correct to two decimal places.

Answer ……………….hours [3]

(ii) In which interval does the median of the distribution lie?

Answer : ……….. $< h \leq$ ………..[1]

(iii) If the above information is represented on a pie-chart, what will be the angle of sector of the interval $6 < h \leq 8$?
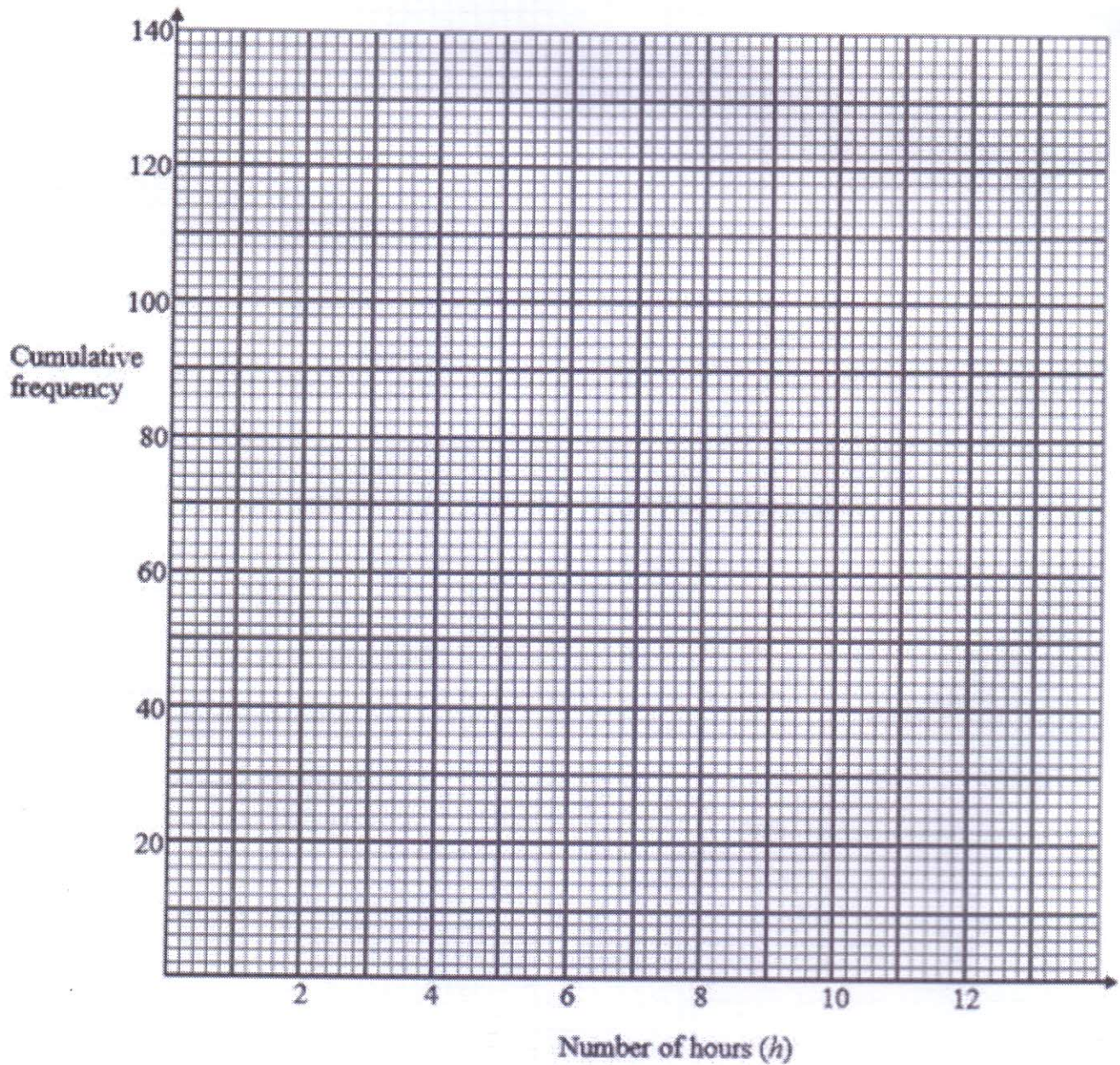
Answer: ……………..° [1]

(b) Complete the cumulative frequency table.

Number of hours (h)	Cumulative Frequency
$0 < h \leq 2$	10
$0 < h \leq 4$	
$0 < h \leq 6$	
$0 < h \leq 8$	
$0 < h \leq 10$	
$0 < h \leq 12$	

[1]

(c) On the grid given below, draw a cumulative frequency graph for your table. [2]

Number of hours (h)

(d) **(i)** Use your graph to find the interquartile range.

Answer .... [2]

(ii) Use your graph to find an estimate for the number of children who used a computer for less than 7 hours last week.

Answer .... [1]

(iv) Ten students were regarded as the computer expert on the basis of the higher number of hours they spent on the computer. What is the minimum number of hours they spent on computer ?

Answer .... [1]

12 **(a)** The points P and Q have coordinates $(4, 0)$ and $(9, 0)$ respectively.
The points P' and Q' have coordinates $(4, 4)$ and $(7, 8)$ respectively.

(i) Write down the length of PQ.

Answer PQ = ... *units* [1]

(ii) **Calculate** the length of $P'Q'$.

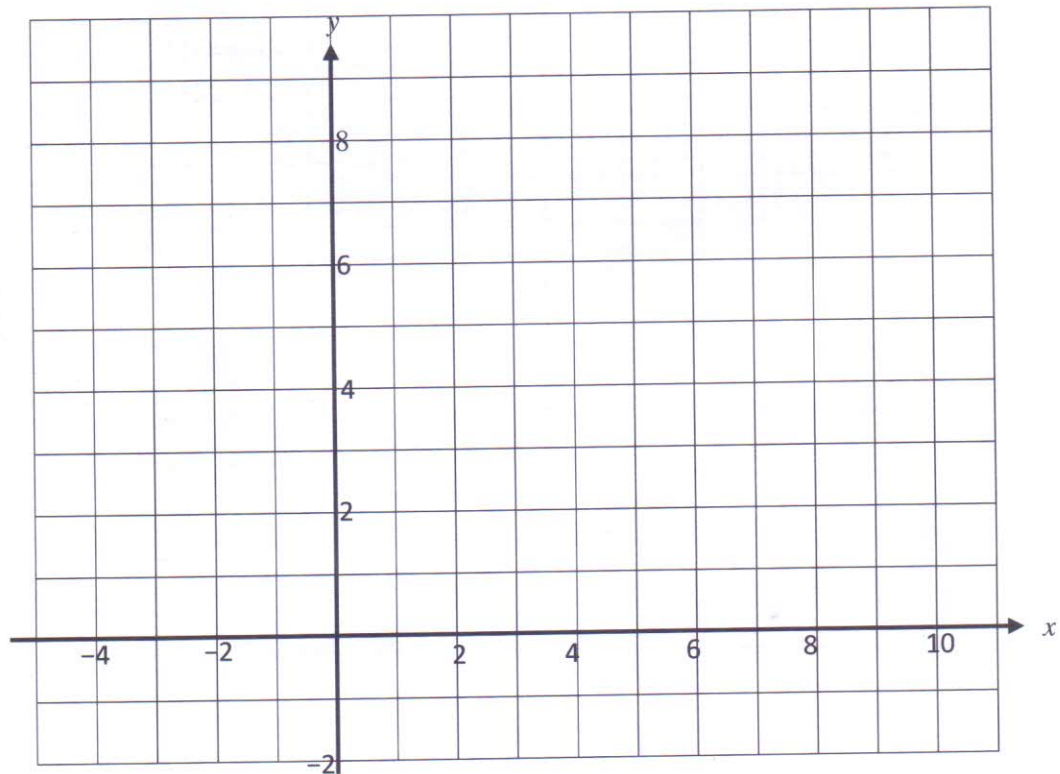*Answer P'Q' =* .... *units* [2]

(iii) PQ is mapped onto $P'Q'$ by a single rotation.
By using the grid below,

      (a) find, by drawing, the coordinates of the centre of this rotation,

Answer (.......... , ...) [2]

      (b) measure the clockwise angle of rotation.

Answer ....° [1]

(b) A single transformation maps *A* with coordinates (1, 2), (1, 1) and (3, 1) onto *B* with coordinates (1, 2), (1, 5) and (3, 9).

  (i) Draw and label *A* and *B*. [1]

  (ii) Describe fully the transformation that maps *A* onto *B*.

Answer ....

....

.... [2]

(c) Point *C* (3, 2) is mapped onto point *D* by a reflection in the line *y = x*.

  (i) Write down the coordinates of point *D*.

Answer (......, ...) [2]

  (iii) Write down the matrix representing this transformation.

Answer $\begin{pmatrix} \end{pmatrix}$ [1]