

- 11 The manager of a call centre asked the 120 people, who rang the call centre last week, how long they each waited before their call was answered.

The table gives information about their replies.

Time waited (t minutes)	Frequency
$0 < t \leq 5$	8
$5 < t \leq 10$	15
$10 < t \leq 15$	17
$15 < t \leq 20$	28
$20 < t \leq 25$	33
$25 < t \leq 30$	19

- (a) Complete the cumulative frequency table.

Time waited (t minutes)	Cumulative frequency
$0 < t \leq 5$	
$0 < t \leq 10$	
$0 < t \leq 15$	
$0 < t \leq 20$	
$0 < t \leq 25$	
$0 < t \leq 30$	

(1)

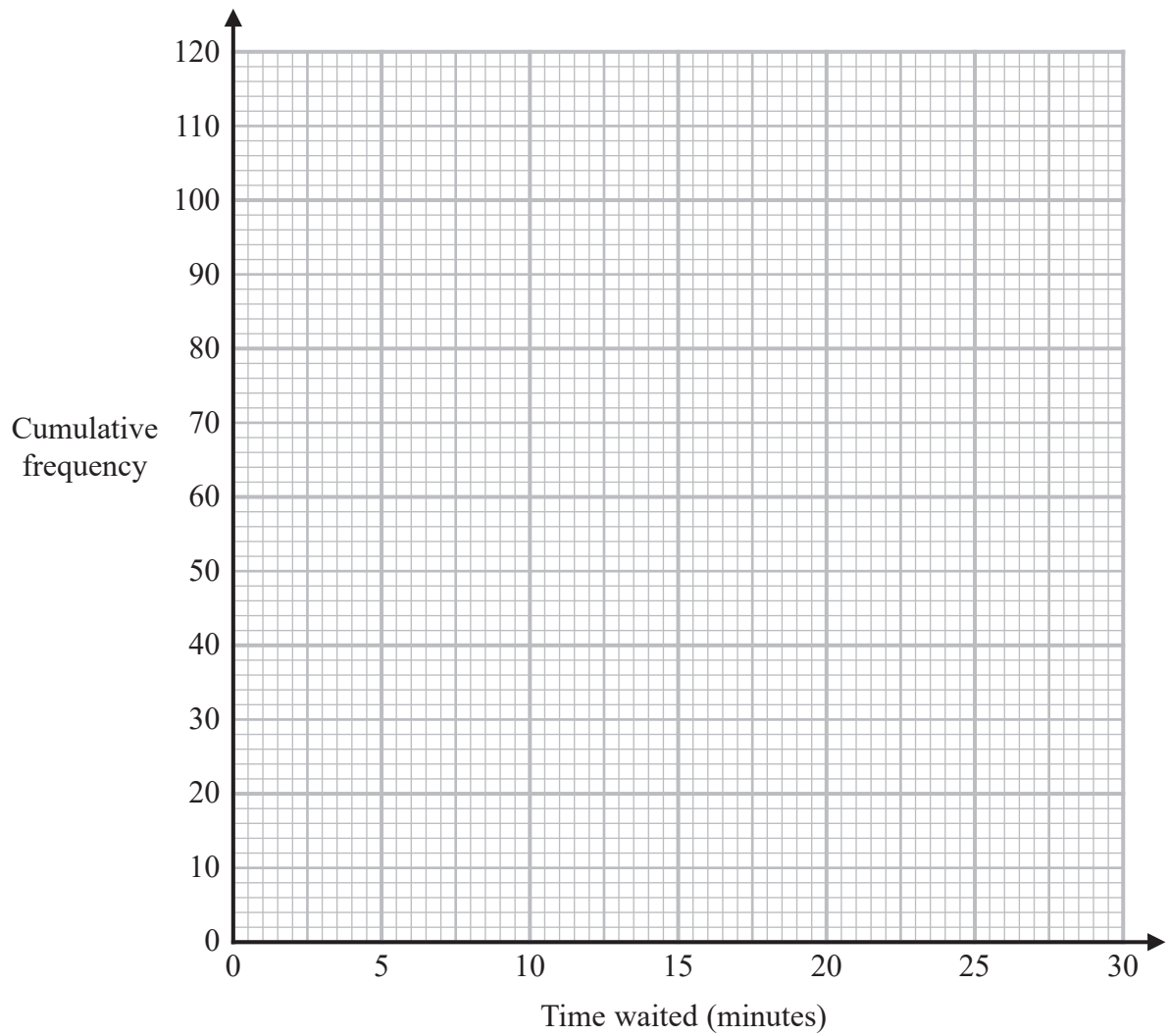
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(b) On the grid below, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median of the times waited.

..... minutes
(1)

(d) Using your graph, find an estimate for the percentage of the 120 people who said that they waited longer than 23 minutes before their call was answered.
Show your working clearly.

..... %
(2)

(Total for Question 11 is 6 marks)

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12 (a) Simplify $(16e^{10}f^6)^{\frac{1}{2}}$

.....
(2)

(b) Write $\frac{2x+1}{4} + \frac{x-2}{3}$ as a single fraction in its simplest form.

.....
(3)

Given that $4^{k+3} = 16 \times 2^k$

(c) find the value of k .
Show your working clearly.

$k =$
(4)

(Total for Question 12 is 9 marks)



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13 Here are two vectors.

$$\vec{AB} = \begin{pmatrix} 5 \\ 3 \end{pmatrix} \quad \vec{CB} = \begin{pmatrix} -2 \\ 4 \end{pmatrix}$$

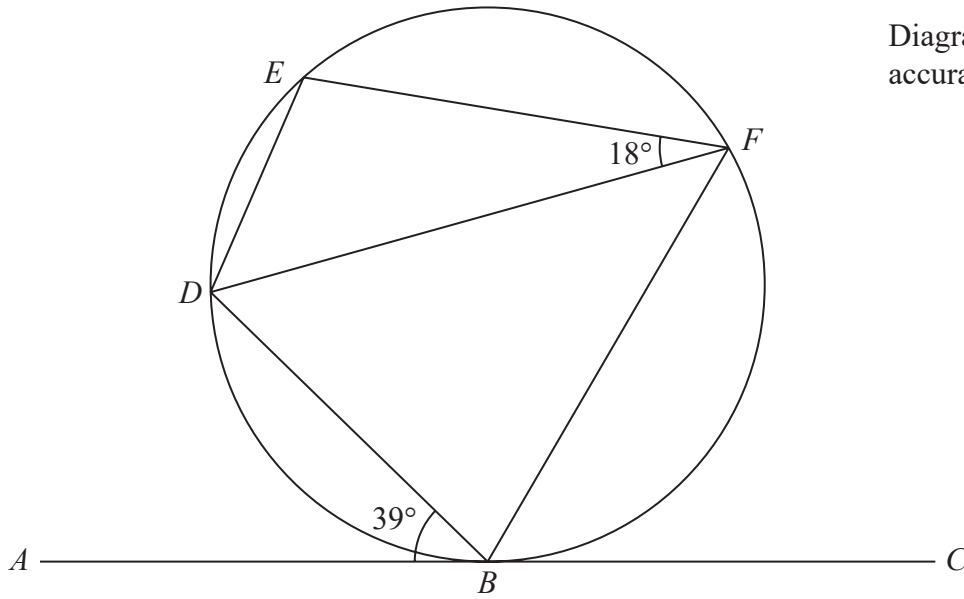
Find, as a column vector, \vec{AC}

(Total for Question 13 is 2 marks)



14

Diagram NOT accurately drawn



B , D , E and F are points on a circle.

ABC is the tangent at B to the circle.

Angle $ABD = 39^\circ$

Angle $EFD = 18^\circ$

Work out the size of angle BDE .

Give reasons for your working.

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(Total for Question 14 is 4 marks)



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15 (a) Use algebra to show that $4.\dot{5}\dot{7} = 4\frac{19}{33}$

(2)

(b) Show that $\frac{2}{6 - 3\sqrt{2}}$ can be written in the form $\frac{a + \sqrt{a}}{b}$
where a and b are integers.
Show your working clearly.

(3)

(Total for Question 15 is 5 marks)



16 (a) Expand and simplify $(x + 4)(x - 2)(x + 1)$

..... (3)

(b) Express $x^2 - 10x + 40$ in the form $(x + a)^2 + b$, where a and b are integers.

..... (2)

(Total for Question 16 is 5 marks)



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17 Solve the simultaneous equations

$$\begin{aligned}x - 6y &= 5 \\xy - 2y^2 &= 6\end{aligned}$$

Show clear algebraic working.

.....
(Total for Question 17 is 5 marks)

