Following examples showing graphical methods to find different locations of Quartiles, Deciles and Percentiles with appropriate data values.

EXAMPLE 14

The maximum daily temperatures (in °C) in Campbelltown in June were recorded and grouped into the frequency table shown.

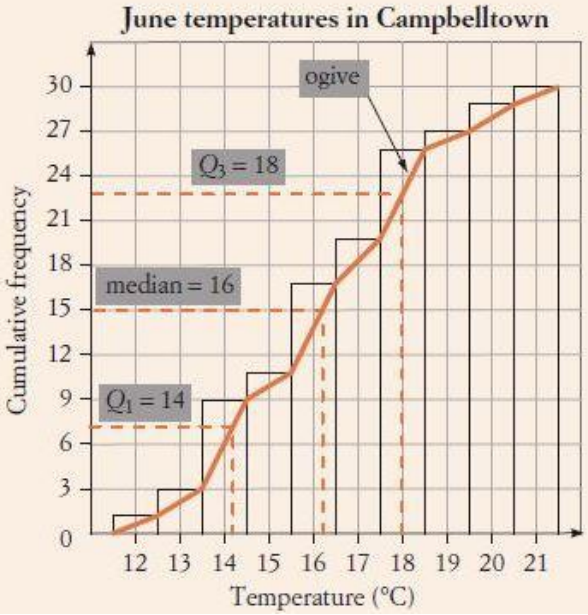
a Draw a cumulative frequency histogram and polygon for the data.

b Use the frequency polygon to find the median and calculate the interquartile range.

Temperature (°C)	Frequency	Cumulative frequency
12	1	1
13	2	3
14	6	9
15	2	11
16	6	17
17	3	20
18	6	26
19	1	27
20	2	29
21	1	30

Solution

a



The ogive (polygon) is always inside the columns.

b Draw a horizontal line from the halfway mark (15) on the cumulative frequency axis to where it meets the ogive. The median is the corresponding value on the 'Temperature' axis.

Median = 16

To find Q_1, draw a horizontal line from the quarter mark ($\frac{1}{4} \times 30 = 7.5$) on the cumulative frequency axis to where it meets the ogive, then read the temperature value.

$Q_1 = 14$

To find Q_3, draw a horizontal line from the three-quarter mark ($\frac{3}{4} \times 30 = 22.5$) on the cumulative frequency axis.

$Q_3 = 18$

Interquartile range $= Q_3 - Q_1$

$= 18 - 14$

$= 4$

EXAMPLE 15

Use the cumulative frequency graph from Example **14** to answer the following questions.

a Find:

i the 4th decile, D_4

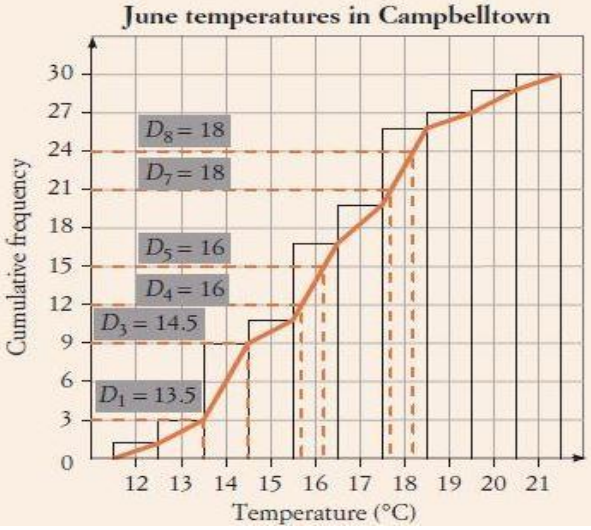
ii the 7th decile, D_7.

b What value cuts off the top 20% of temperatures?

c Between which two deciles would you find a temperature of 14°C?

Solution

a



The deciles are marked at intervals of three units on the cumulative frequency axis.

i $D_4 = 16$

ii $D_7 = 18$

b D_8 cuts off the top 20% of temperatures, so the value is 18.

c Between D_1 and D_3.

EXAMPLE 16

The number of cases of ovarian cancer in women from various age groups is shown below.

Age (years)	Class centre	Frequency	Cumulative frequency
35–<45	40	28	28
45–<55	50	61	89
55–<65	60	65	154
65–<75	70	92	246
75–<85	80	74	320

Draw an ogive for this data and use it to find an estimate for:

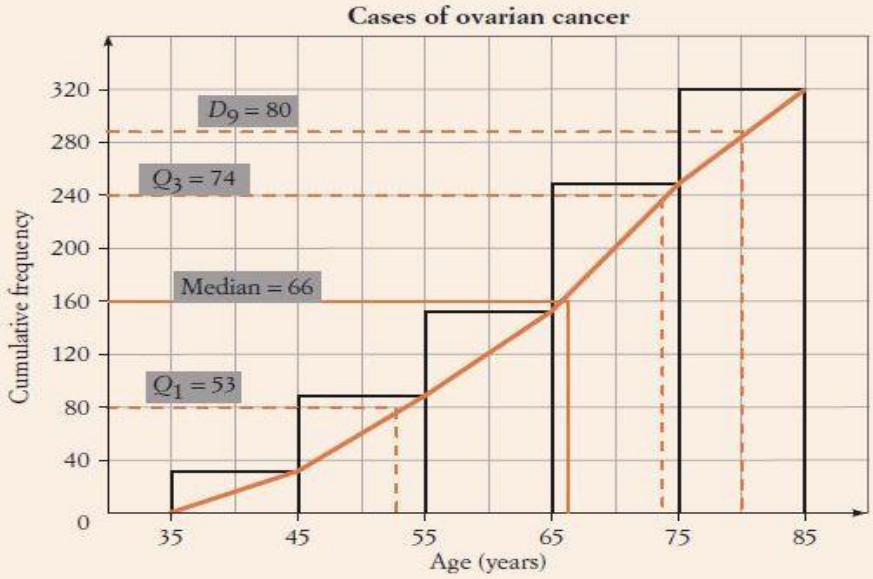
a the median

b the 3rd quartile

c the 9th decile

d the interquartile range.

Solution



All these values are estimates because the

a Halfway point on the 'Cumulative frequency' axis = 160 ← data has been grouped into class intervals.

Median ≈ 66 **Estimating from the 'Age' axis.**

b The three-quarter point on the 'Cumulative frequency' axis $= \frac{3}{4} \times 320 = 240$

$Q_3 \approx 74$

c 90% point on the 'Cumulative frequency' axis $= 0.9 \times 320$

$= 288$

$D_9 \approx 80$

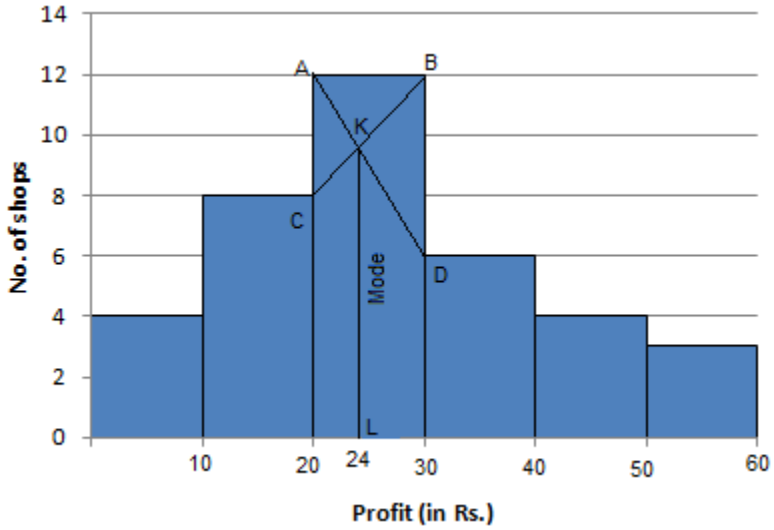
d Quarter point on the 'Cumulative frequency' axis $= \frac{1}{4} \times 320$

$= 80$

$Q_1 \approx 53$

Interquartile range $= Q_3 - Q_1 = 74 - 53$

$= 21$


14
12
10
8
6
4
2
0
No. of shops
A
B
K
C
D
Mode
L
10
20
24
30
40
50
60
Profit (in Rs.)