Quick Questions 6 Measuring Dispersion of Grouped Data

I. Place the number of the appropriate formula next to the item it describes.

A. Grouped sample standard deviation __2__
B. First quartile __3__
C. Median (second quartile) __1__
D. Third quartile __4__
E. Interquartile range __6__
F. Percentile __5__

II. Complete the first row of this table and calculate the following measurements.

Stated Class Limits	Frequency (f)	x	fx	x^2	fx^2
Totals	16.00	417.00	1,162.00	30,731.50	87,434.00

A. Range $H - L = 99.5 - 39.5 = 60$

B. Sample variance

$$S^2 = \frac{\sum fx^2 - \frac{\left(\sum fx\right)^2}{n}}{n-1} = \frac{87{,}434 - \frac{(1{,}162)^2}{16}}{16-1} = \frac{87{,}434 - 84{,}390}{15} = 202.9$$

C. Sample standard deviation

$$s = \sqrt{s^2} = \sqrt{202.9} = 14.2$$

D. First Quartile $\frac{n}{4} = \frac{16}{4} = 4$

$$Q_1 = L + \frac{\frac{n}{4} - CF_b}{f}(i)$$
$$= 59.5 + \frac{\frac{16}{4} - 3}{3}(10)$$
$$= 59.5 + \tfrac{1}{3}(10)$$
$$Q_1 = 62.8$$

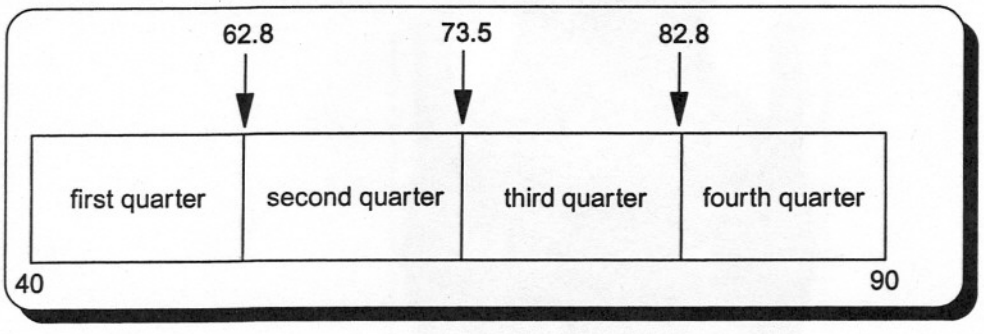
Median $\frac{n}{2} = \frac{16}{2} = 8$

$$Q_2 = L + \frac{\frac{n}{2} - CF_b}{f}(i)$$
$$= 69.5 + \frac{\frac{16}{2} - 6}{5}(10)$$
$$= 69.5 + \tfrac{2}{5}(10)$$
$$Q_2 = 73.5$$

Third Quartile $\frac{3n}{4} = \frac{(3)(16)}{4} = 12$

$$Q_3 = L + \frac{\frac{3n}{4} - CF_b}{f}(i)$$
$$= 79.5 + \frac{\frac{48}{4} - 11}{3}(10)$$
$$= 79.5 + \tfrac{1}{3}(10)$$
$$Q_3 = 82.8$$

E. Locate the three quartiles and the four quarters on this figure.



F. Interquartile range

$$Q_3 - Q_1 = 82.8 - 62.8 = 20.0$$

G. 95th percentile

$$\frac{xn}{100} = \frac{95(16)}{100} = 15.2$$

$$P_x = L + \frac{\frac{xn}{100} - CF_b}{f}(i) = P_{95} = 89.5 + \frac{\frac{95(16)}{100} - 14}{2}(10)$$
$$= 89.5 + \frac{1.2}{2}(10) = 95.5$$

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