$$\mathbf{P_p} \text{ is the } p^{th} \text{ percentile of the data}$$

$$\mathbf{L_p} \text{ is the locator variable for } P_p$$

$$\mathbf{n} \text{ is the size of the data set}$$

$$L_p = (n+1) \times \frac{p}{100} \text{ (the location of } P_p \text{ within the data set)}$$

For the ordered data set   **1 7 12 12 15 15 19** $n = 7$.

Example 1: The 75th percentile, P_{75}, is found as follows:

$$L_{75} = (7+1) \times \frac{75}{100} = (8) \times 0.75 = \mathbf{6} \qquad \underline{\text{A WHOLE NUMBER}}$$

1 7 12 12 15 15 19   Since **15** is the $\mathbf{6}^{th}$ element, then $P_{75} = \mathbf{15}$.

Example 2: The 30th percentile, P_{30}, is found as follows:

$$L_{30} = (7+1) \times \frac{30}{100} = (8) \times 0.3 = 2.4 = \quad \mathbf{2} \quad + \quad \mathbf{0.4} \qquad \underline{\text{A DECIMAL NUMBER}}$$

$$\qquad \qquad \qquad \qquad \qquad \qquad \qquad \downarrow \qquad \quad \downarrow$$

$$\qquad \qquad \qquad \qquad \qquad \qquad \mathbf{2}^{nd} \qquad \mathbf{40\%} \text{ of the way from}$$

$$\qquad \qquad \qquad \qquad \qquad \text{element} \quad \text{the } \mathbf{2}^{nd} \text{ to } \mathbf{3}^{rd} \text{ element}$$

2.4 is between the $\mathbf{2}^{nd}$ element and the $\mathbf{3}^{rd}$ element

1 7 12 12 15 15 19

$$P_{30} = \mathbf{2}^{nd} element + [\mathbf{0.4} \times (\mathbf{3}^{rd} element - \mathbf{2}^{nd} element)]$$
$$= \mathbf{7} + [(\mathbf{0.4}) \times (\mathbf{12} - \mathbf{7})]$$
$$= 7 + [0.4 \times (5)]$$
$$= 7 + 2$$
$$= 9$$

Therefore, $P_{30} = 9$.

Version 1.2

Math Centre
Liberal Arts and Science

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