

## Partitioning Segments

Formula:  $\left( \frac{m(x_2)+n(x_1)}{m+n}, \frac{m(y_2)+n(y_1)}{m+n} \right)$

m and n come from the ratio given in the problem.

Ratio: m : n

Example: 2:5 m = 2 and n = 5

Turning a fraction into a ratio:

m is always the numerator.

$$1/3 \quad m = 1$$

but, n is the difference between the denominator and the numerator.

$$1/3 \quad n = 3 - 1 = 2$$

so 1/3 turns into 1:2

### Example 1:

Point A is located at (2, 3) and point B is located at (10, 14). Find the point that partitions line AB into a 2:3 ratio.

$$\begin{array}{ccc} (2, 3) & (10, 14) & 2:3 \\ x_1, y_1 & x_2, y_2 & m \quad n \end{array}$$

$$\frac{2(10) + 3(2)}{2+3}$$

$$\frac{20 + 6}{5} = \frac{26}{5} = 5.2$$

$$\frac{2(14) + 3(3)}{2+3}$$

$$\frac{28 + 9}{5} = \frac{37}{5} = 7.4$$

$$\boxed{(5.2, 7.4)}$$

### Example 2:

Point A is located at (6, 5) and point B is located at (-1, -2). Point P is  $\frac{2}{5}$  of the way between point A and B. Find the location of point P.

$$\begin{array}{cc} (6, 5) & (-1, -2) \\ x_1, y_1 & x_2, y_2 \end{array}$$

$$\text{Ratio: } \begin{array}{cc} 2 & 3 \\ m & n \end{array}$$

$$\frac{2(-1) + 3(6)}{2+3}$$

$$\frac{2(-2) + 3(5)}{2+3}$$

$$\frac{-4 + 15}{5} = \frac{11}{5} =$$

$$\frac{-2 + 18}{5} = \frac{16}{5} = 3.2$$

$$2.2$$

$$\boxed{(3.2, 2.2)}$$