

MPM2D -  
LENGTH & MIDPOINT - QUIZ

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Name: \_\_\_\_\_

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1. Express each radical in lowest terms.

a)  $\sqrt{48}$

$$\begin{aligned} &= \sqrt{4 \cdot 12} \\ &= \sqrt{2 \cdot 2 \cdot 2 \cdot 6} \\ &= \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3} \\ &= (2)(2)\sqrt{3} \\ &= 4\sqrt{3} \end{aligned}$$

b)  $2\sqrt{75}$

$$\begin{aligned} &= 2\sqrt{15 \cdot 5} \\ &= 2\sqrt{3 \cdot 5 \cdot 5} \\ &= 2(5)\sqrt{3} \\ &= 10\sqrt{3} \end{aligned}$$

c)  $\sqrt{162}$

$$\begin{aligned} &= \sqrt{2 \cdot 81} \\ &= \sqrt{2 \cdot 9 \cdot 9} \\ &= \sqrt{2 \cdot 3 \cdot 3 \cdot 3 \cdot 3} \\ &= (3)(3)\sqrt{2} \\ &= 9\sqrt{2} \end{aligned}$$

2. Determine the length of the line segment joining A(2,7) and B(24,3). Express your answer in exact form.

$$\begin{aligned} d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(24 - 2)^2 + (3 - 7)^2} \\ &= \sqrt{(22)^2 + (-4)^2} \\ &= \sqrt{484 + 16} \end{aligned}$$

$$\begin{array}{r} 22 \\ \times 22 \\ \hline 44 \\ + 440 \\ \hline 484 \end{array}$$

$$\begin{aligned} &= \sqrt{500} \\ &= \sqrt{5 \cdot 100} \\ &= \sqrt{5 \cdot 20} \\ &= \sqrt{5 \cdot 4 \cdot 5} \\ &= 5 \cdot 2 \cdot \sqrt{5} \\ &= (5)(2)\sqrt{5} \\ &= 10\sqrt{5} \end{aligned}$$

$\therefore$  the length of the line segment is  $10\sqrt{5}$

3. Determine the midpoint of the line segment joining the two points in question 2.

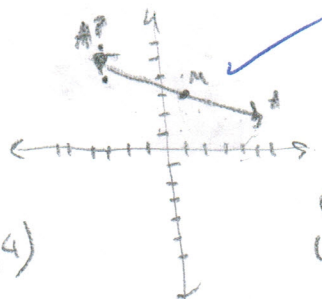
$$\begin{aligned} M &= \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \\ &= \frac{2 + 24}{2}, \frac{7 + 3}{2} \\ &= (13, 5) \end{aligned}$$

$\therefore$  the midpoint of the line segment is (13, 5)

4. M(1,3) is the midpoint of A(5,2) and the point B. Determine the coordinates of point B.

$$\begin{aligned} \text{Midpoint} &= (1, 3) \\ \text{where } &= (5, 2) \\ d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(2 - 5)^2 + (3 - 2)^2} \\ &= \sqrt{(-3)^2 + (1)^2} \\ &= \sqrt{9 + 1} \\ &= \sqrt{10} \end{aligned}$$

$$\begin{aligned} y^2 + x^2 &= r^2 \\ 3^2 + 1^2 &= \sqrt{10}^2 \\ 9 + 1 &= 10 \\ y_2 - y_1 &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{3 - 2}{5 - 1} \\ &= \frac{1}{4} \end{aligned}$$



B = (-3, 4)

$$\begin{aligned} \therefore \text{The coordinates of point B is } &(-3, 4) \\ M &= \frac{5 + (-3)}{2}, \frac{2 + 4}{2} \\ M &= (1, 3) \end{aligned}$$

$$\begin{aligned} y &= mx + b \\ y &= \frac{1}{4}x + b \\ 2 &= \frac{1}{4}(5) + b \\ 2 &= \frac{5}{4} + b \\ 2 - \frac{5}{4} &= b \\ \frac{8}{4} - \frac{5}{4} &= b \\ \frac{3}{4} &= b \\ y &= \frac{1}{4}x + \frac{3}{4} \end{aligned}$$