

Formula for the Day:

$$\text{Midpoint} = \frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}$$

Find the Midpoint for each set of given points.

1. $(-10, -5)$ and $(4, -1)$
 x_1, y_1 x_2, y_2 $(-3, -3)$

$$\left(\frac{-10+4}{2}, \frac{-5+(-1)}{2} \right) = \left(\frac{-6}{2}, \frac{-6}{2} \right)$$

2. $(-4, -9)$ and $(-10, -11)$

$$\left(\frac{-4+(-10)}{2}, \frac{-9+(-11)}{2} \right) = \left(\frac{-14}{2}, \frac{-20}{2} \right) = (-7, -10)$$

3. $(3, -5)$ and $(0, -2)$

$$\left(\frac{3+0}{2}, \frac{-5+(-2)}{2} \right) = \left(\frac{3}{2}, \frac{-7}{2} \right)$$

or

$$(1.5, -3.5)$$

4. $(9, -1)$ and $(10, -11)$

$$\left(\frac{9+10}{2}, \frac{-1+(-11)}{2} \right) = \left(\frac{19}{2}, \frac{-12}{2} \right) = \left(\frac{19}{2}, -6 \right)$$

or

$$(9.5, -6)$$

5. $(-3, -4)$ and $(3, -3)$

$$\left(\frac{-3+3}{2}, \frac{-4+(-3)}{2} \right) = \left(\frac{0}{2}, \frac{-7}{2} \right)$$

(0, -3.5)

6. $(-12, -3)$ and $(5, 11)$

$$\left(\frac{-12+5}{2}, \frac{-3+11}{2} \right) = \left(\frac{-7}{2}, \frac{8}{2} \right)$$

(-3.5, 4) or (-3.5, 4)

Find the missing Endpoint, B, given a midpoint, M, and an endpoint, A.

7. A $(-5, 7)$ and M $(-2, 2)$
 x_1, y_1 x_m, y_m $(1, -3)$

$$x_m = \frac{x_1 + x_2}{2} \quad 2 \cdot -2 = \frac{-5 + x_2}{2}$$

$$y_m = \frac{y_1 + y_2}{2} \quad 2 \cdot 2 = \frac{7 + y_2}{2}$$

$$\frac{-4}{2} = \frac{-5 + x_2}{2} \quad \frac{-4 + 5}{2} = \frac{-5 + x_2}{2}$$

$$-1 = \frac{-5 + x_2}{2} \quad -2 = -5 + x_2$$

$$-2 + 5 = -5 + x_2 \quad 3 = -5 + x_2$$

$$-3 = x_2$$

8. A $(-3, 2)$ and M $(4, -1)$
 x_1, y_1 x_m, y_m $(11, -4)$

$$2 \cdot 4 = \frac{-3 + x_2}{2} \quad 2 \cdot -1 = \frac{2 + y_2}{2}$$

$$8 = \frac{-3 + x_2}{2} \quad -2 = \frac{2 + y_2}{2}$$

$$\frac{8 + 3}{2} = \frac{-3 + x_2}{2} \quad \frac{-2 - 2}{2} = \frac{2 + y_2}{2}$$

$$11 = x_2 \quad -4 = y_2$$

9. A $(-3, -5)$ and M $(-6, -2)$
 x_1, y_1 x_m, y_m

$$-6 = \frac{-3 + x_2}{2} \quad -2 = \frac{-5 + y_2}{2}$$

$$\frac{-12}{2} = \frac{-3 + x_2}{2} \quad \frac{-4}{2} = \frac{-5 + y_2}{2}$$

$$-6 = -3 + x_2 \quad -4 = -5 + y_2$$

$$-6 + 3 = -3 + x_2 \quad -4 + 5 = -5 + y_2$$

$$-9 = x_2 \quad 1 = y_2$$

(-9, 1)

10. A $(5, 3)$ and M $(6, 4)$
 x_1, y_1 x_m, y_m

$$6 = \frac{5 + x_2}{2} \quad 4 = \frac{3 + y_2}{2}$$

$$12 = 5 + x_2 \quad 8 = 3 + y_2$$

$$7 = x_2 \quad 5 = y_2$$

(7, 5)

11. A $(2, 5)$ and M $(-1, 3)$
 x_1, y_1 x_m, y_m $(-4, 1)$

$$-1 = \frac{2 + x_2}{2} \quad 3 = \frac{5 + y_2}{2}$$

$$-2 = 2 + x_2 \quad 6 = 5 + y_2$$

$$-4 = x_2 \quad 1 = y_2$$

12. A $(-3, -1)$ and M $(3, -4)$
 x_1, y_1 x_m, y_m $(9, -7)$

$$3 = \frac{-3 + x_2}{2} \quad -4 = \frac{-1 + y_2}{2}$$

$$6 = -3 + x_2 \quad -8 = -1 + y_2$$

$$9 = x_2 \quad -7 = y_2$$