Distance between two points

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

** subtract, square, add, then square root

Midpoint between two points

$$M = \left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$$

** similar to finding an average

Find the midpoint between the two points. Leave in fraction form.

1) $(5, 8)$ $(-2, 3)$

$$M = \left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$$

$$\frac{5 + {}^-2}{2} , \frac{8 + 3}{2}$$

$$\left(\frac{3}{2} , \frac{11}{2} \right)$$

Find the distance between the two points. Write in simplified radical form and as a decimal to the nearest hundredth.

2) $(0, -3)$ $(-4, 2)$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
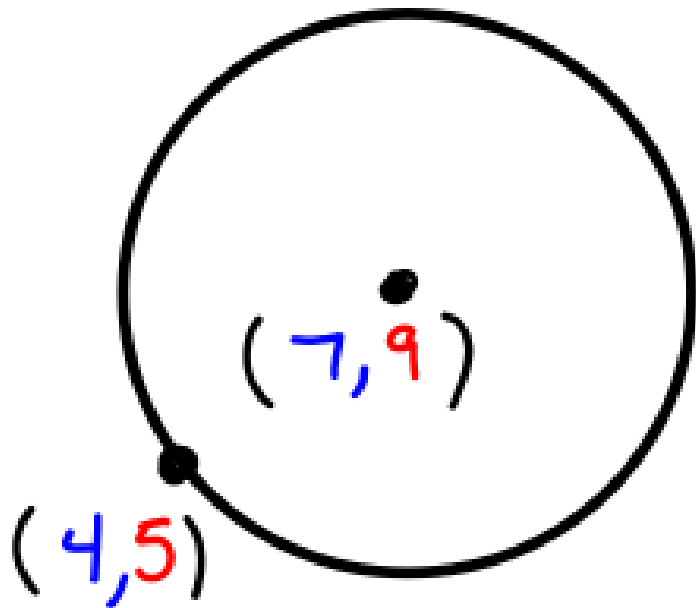
$$d = \sqrt{(0 - {}^-4)^2 + (-3 - 2)^2}$$

$$d = \sqrt{4^2 + {}^-5^2}$$

$$d = \sqrt{16 + 25}$$

$$d = \sqrt{41} \approx 6.40$$

3) The point (4 , 5) lies on a circle. What is the diameter of the circle if the center is located at (7 , 9)?

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$$d = \sqrt{(7-4)^2 + (9-5)^2}$$

$$d = \sqrt{3^2 + 4^2}$$

$$d = \sqrt{9 + 16}$$

$$d = \sqrt{25}$$

$$d = 5$$

(7,9)

(4,5)

This distance represents the radius. Diameter is twice the radius, so the diameter is 10.

Find the midpoint between the two points. Leave in fraction form.

4) $\left(-\dfrac{1}{9}, -\dfrac{1}{2}\right)$, $\left(\dfrac{14}{9}, \dfrac{4}{3}\right)$

Find the midpoint between the two points. Leave in fraction form.

4) $\left(-\dfrac{1}{9}, -\dfrac{1}{2}\right), \left(\dfrac{14}{9}, \dfrac{4}{3}\right)$

$\dfrac{13}{18}, \dfrac{5}{12}$

$$M = \dfrac{-\dfrac{1}{9} + \dfrac{14}{9}}{2}$$

$\dfrac{\dfrac{13}{9}}{2}$

$\dfrac{13}{9} \cdot \dfrac{1}{2} = \boxed{\dfrac{13}{18}}$

,

$$\dfrac{-\dfrac{1}{2} + \dfrac{4}{3}}{2}$$

$\dfrac{-\dfrac{3}{6} + \dfrac{8}{6}}{2} = \dfrac{\dfrac{5}{6}}{2}$

$\dfrac{5}{6} \cdot \dfrac{1}{2} = \boxed{\dfrac{5}{12}}$

Find the distance between the two points. Write in simplified radical form and as a decimal to the nearest hundredth.

5) $\left(-\sqrt{2}, -\sqrt{2}\right), \left(\sqrt{2}, 6\sqrt{2}\right)$

Find the distance between the two points. Write in simplified radical form and as a decimal to the nearest hundredth.

5) $(-\sqrt{2}, -\sqrt{2}), (\sqrt{2}, 6\sqrt{2})$

$$d = \sqrt{\left(-\sqrt{2} - \sqrt{2}\right)^2 + \left(-\sqrt{2} - 6\sqrt{2}\right)^2}$$

$$= \sqrt{\left(-2\sqrt{2}\right)^2 + \left(-7\sqrt{2}\right)^2}$$

$$= \sqrt{8 + 98}$$

$$= \sqrt{106} \approx 10.30$$

7) You live 4 miles south and 2 miles west of school. Your friend lives 3 miles north and 2 miles east of school. To the nearest tenth of a mile, how far apart do you live? Describe the approximate midpoint between the two of you in relation to the school.

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$(2,3)$ You
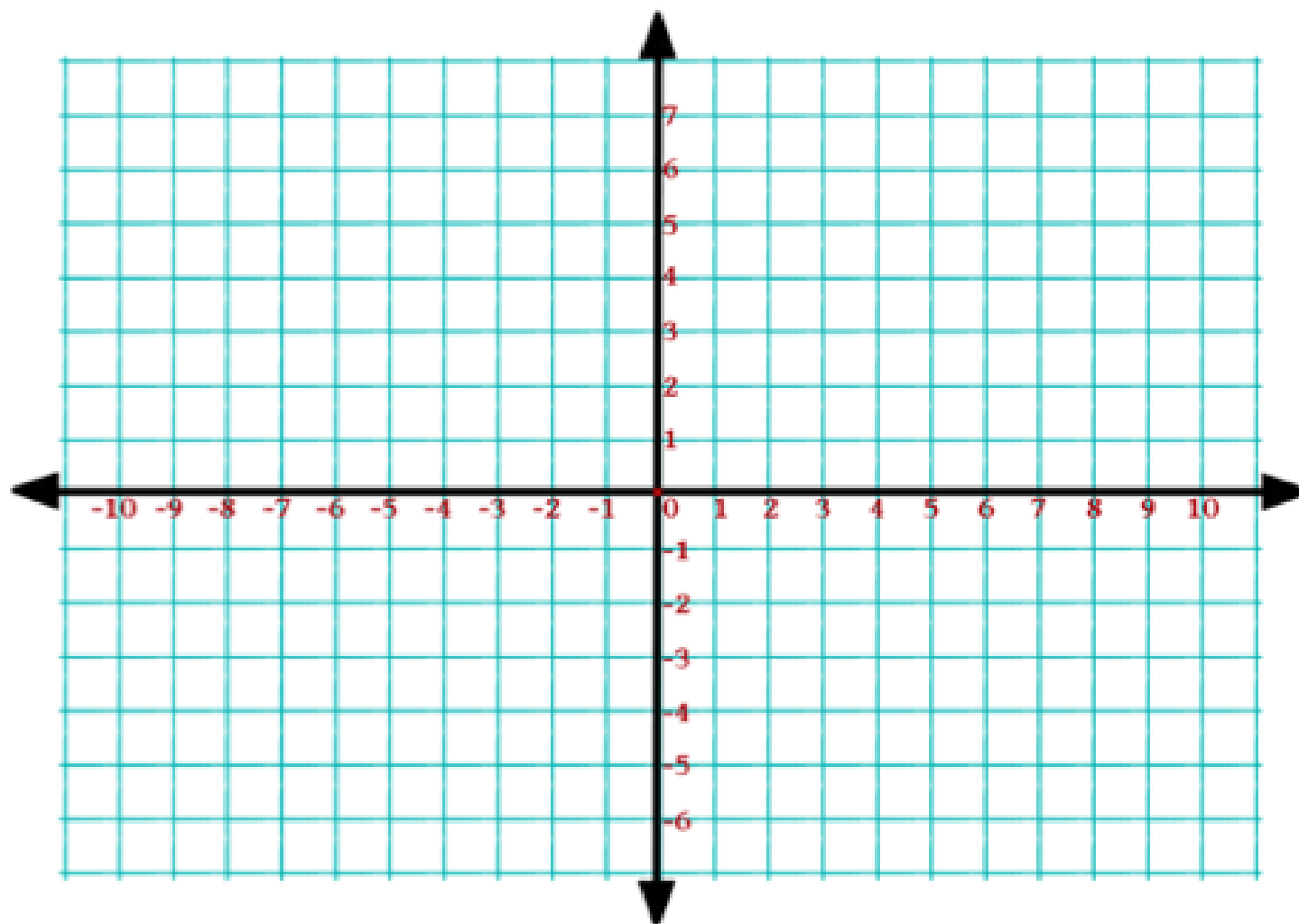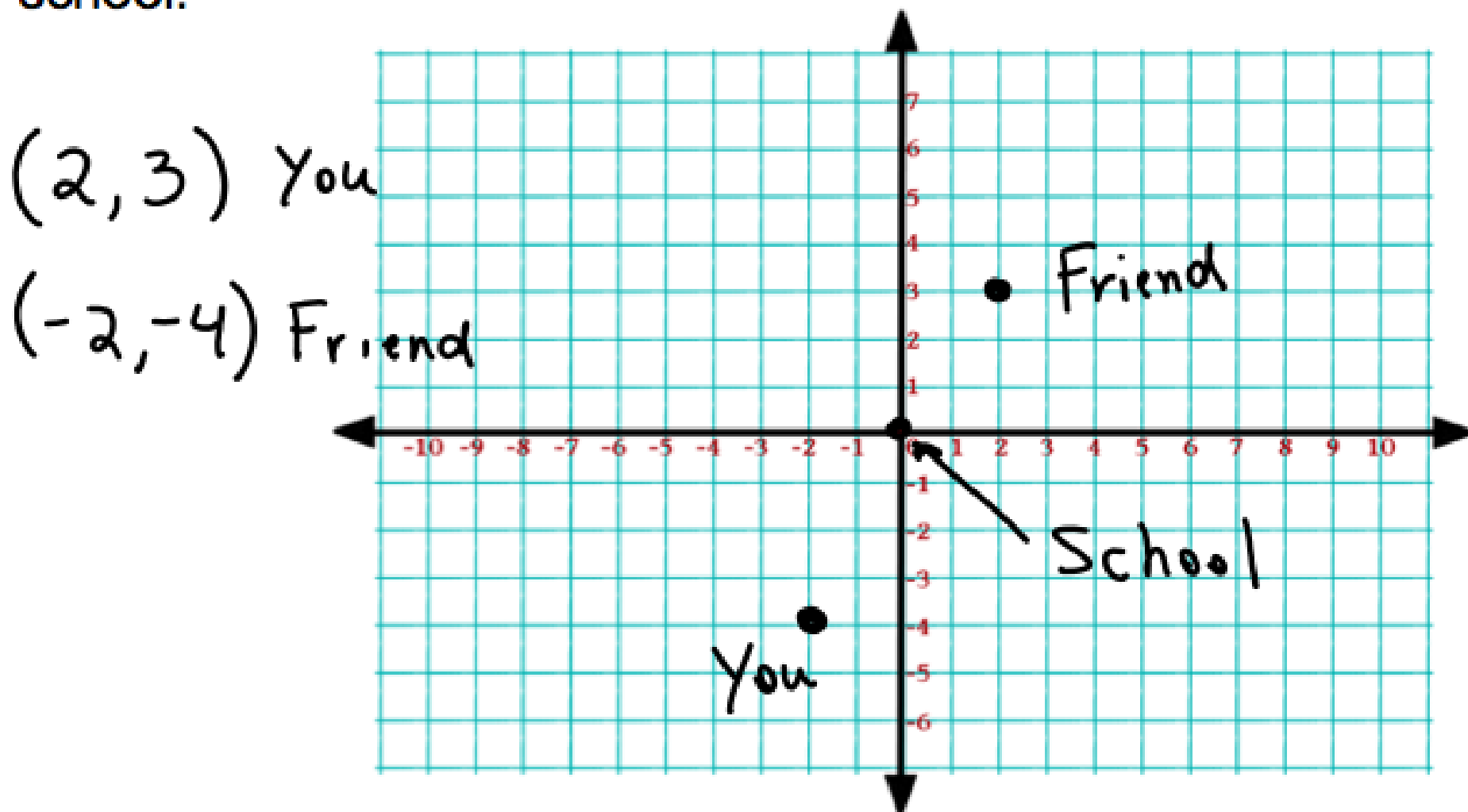
$(-2,-4)$ Friend

Points $(2,3)(-2,-4)$

$$d = \sqrt{(2--2)^2 + (3--4)^2}$$

$$d = \sqrt{4^2 + 7^2}$$

$$= \sqrt{16 + 49}$$

$$= \sqrt{65} \approx 8.1 \text{ miles}$$

You and your friend live about 8.1 miles apart from one another.

$$M = \frac{2+-2}{2}, \frac{3+-4}{2}$$

$$= \frac{0}{2}, \frac{-1}{2}$$

$$= 0, -\frac{1}{2}$$

The midpoint is 0 miles east/west of school and 1/2 mile south of the school.