

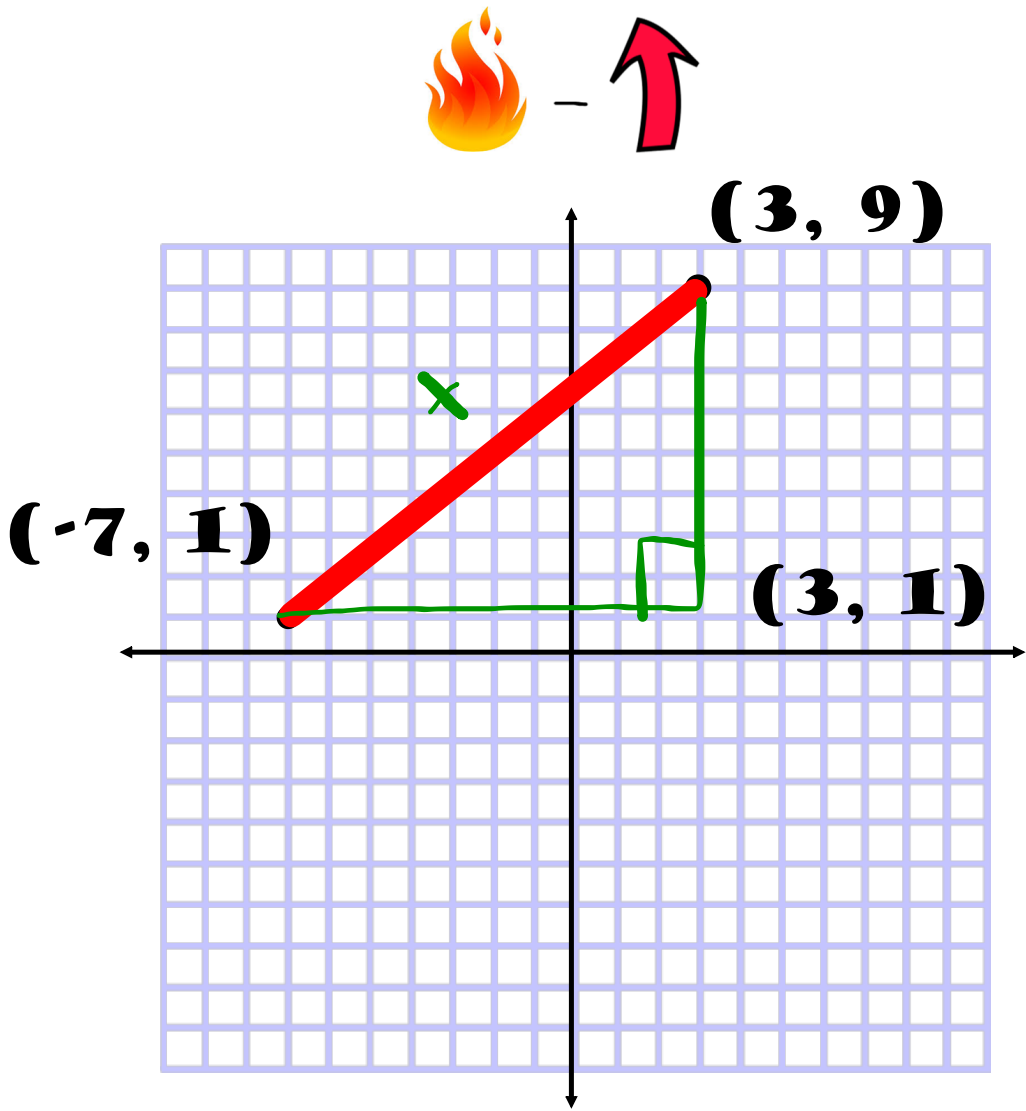
Brain Teaser



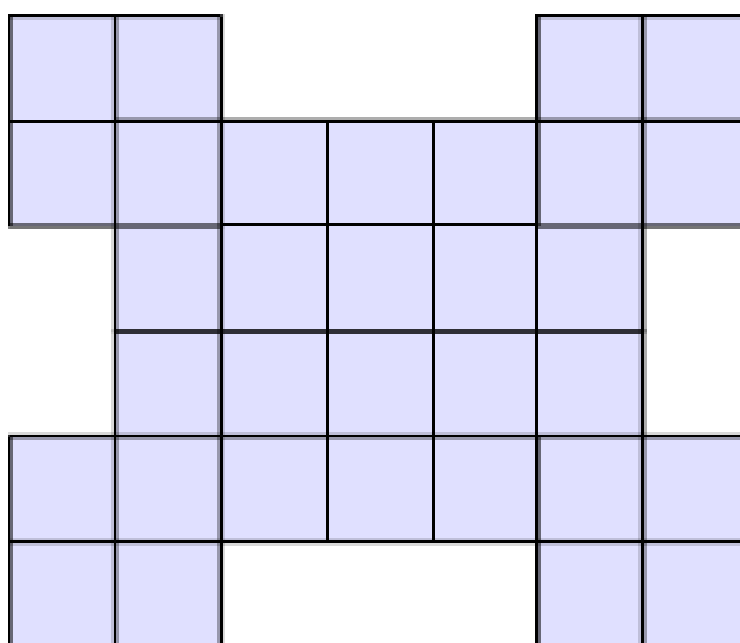
NOTES:

**DISTANCE AND
MIDPOINT**





How many squares can you see in this pattern?

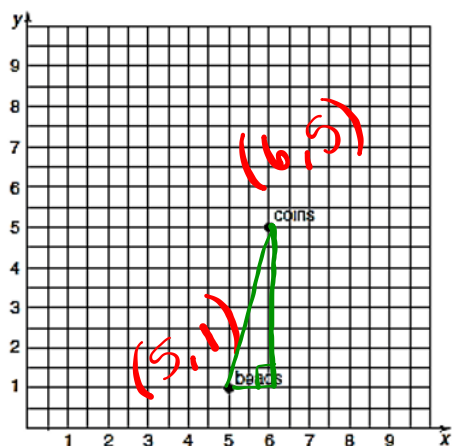


How many rectangles are there?





How would you find the distance between the coins and beads?



$$\begin{array}{l} (6, 5) \\ x_1, y_1 \\ (5, 1) \\ x_2, y_2 \end{array}$$

$$\begin{aligned} d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ d &= \sqrt{(5 - 6)^2 + (1 - 5)^2} \\ d &= \sqrt{(-1)^2 + (-4)^2} \\ &\quad \sqrt{1 + 16} \\ &\quad \sqrt{17} \quad 4.12 \end{aligned}$$

The **Distance Formula** allows you to find the distance between two points. The subscripts (x_1, y_1) only indicate that there is a first and second point. However, whichever point is first or second is up to you.

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

1. Find the distance between (1, -2) and (-3, 6).
 $x_1, y_1 \quad x_2, y_2$

$$\begin{aligned} d &= \sqrt{(-3 - 1)^2 + (6 - (-2))^2} \\ d &= \sqrt{(-4)^2 + 8^2} \\ &\quad \sqrt{16 + 64} \\ &\quad \sqrt{80} \\ &\quad 8.94 \end{aligned}$$

2. Find the distance between (-2, -3) & (-4, 4).
 $x_1, y_1 \quad x_2, y_2$

$$\begin{aligned} &\sqrt{(-4 - (-2))^2 + (4 - (-3))^2} \\ &\sqrt{(-2)^2 + (7)^2} \\ &\quad \sqrt{4 + 49} \\ &\quad \sqrt{53} = 7.28 \end{aligned}$$

3. Use the distance formula to find the value of x if the distance between $(1, 2)$ and $(x, 5)$ is 5 units.

x_1, y_1 x_2, y_2

$$5 = \sqrt{(x-1)^2 + (5-2)^2}$$

$$5^2 = (\sqrt{(x-1)^2 + 3^2})^2$$

$$25 = (x-1)^2 + 9$$

$$\sqrt{16} = \sqrt{(x-1)^2}$$

$$\pm 4 = x - 1$$

$$\boxed{\begin{array}{l} x = 5 \\ x = -3 \end{array}}$$

4. Use the distance formula to find the value of y if the distance between $(-1, 4)$ & $(5, y)$ is 10

x_1, y_1 x_2, y_2

$$10^2 = (\sqrt{(5-(-1))^2 + (y-4)^2})^2$$

$$100 = (6)^2 + (y-4)^2$$

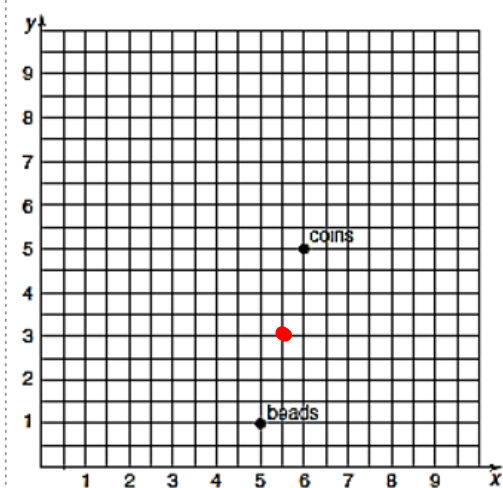
$$100 = 36 + (y-4)^2$$

$$\sqrt{64} = \sqrt{(y-4)^2}$$

$$\pm 8 = y - 4$$

$$\boxed{\begin{array}{l} y = 12 \\ y = -4 \end{array}}$$

How would you find the midpoint between the coins and beads?



$$(6, 5)$$

$$x_1, y_1$$

$$(5, 1)$$

$$x_2, y_2$$

$$\left(\frac{6+5}{2}, \frac{5+1}{2} \right)$$

$$\left(\frac{11}{2}, \frac{6}{2} \right)$$

$$(5.5, 3)$$

The **Midpoint Formula** allows you to find the **midpoint** or **center** between two points.

$$\text{Midpoint Formula: } \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

5. Find the midpoint between (1, -2) and (-3, 6).

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

$$\left(\frac{-2}{2}, \frac{4}{2} \right)$$

$$(-1, 2)$$

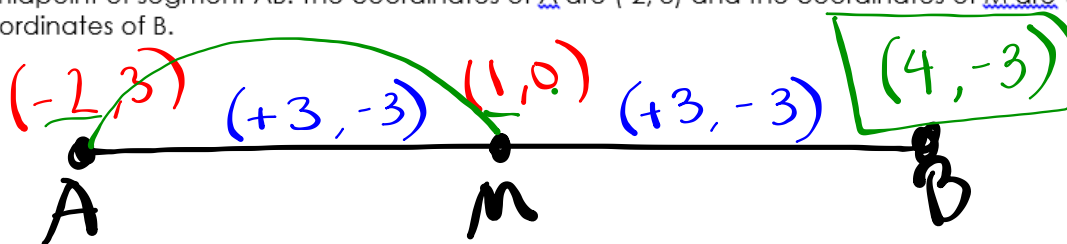
6. Find the midpoint between (6.4, 3) and (-10.7, 4).

$$\left(\frac{-10.7+6.4}{2}, \frac{4+3}{2} \right)$$

$$\left(\frac{-4.3}{2}, \frac{7}{2} \right)$$

$$(-2.15, 3.5)$$

7. M is the midpoint of segment AB. The coordinates of A are $(-2, 3)$ and the coordinates of M are $(1, 0)$. Find the coordinates of B.



8. B is the midpoint of segment AC. The coordinates of A are $(-10, 4)$ and the coordinates of B are $(-2, 4)$. Find the coordinates of C.

