Distance Formula Notes

The **Distance Formula** allows you to find the <u>distance</u> 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***.

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

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

$x_1\ y_1 \quad x_2\ y_2$

$d=\sqrt{(-3-1)^2+(6+{+2})^2}$

$\sqrt{(-4)^2+(8)^2}$

$\sqrt{16+64}$

$\sqrt{80}\approx 8.9$

$=4\sqrt{5}$

80

$\cancel{8}\cdot\cancel{10}$

$2\cdot\cancel{4}\quad 2\cdot 5$

$2\cdot 2$

$2\cdot 2\ \ 2\cdot 2\ \boxed{5}$

2. Find the distance between (8, -3) and (4, -7).

$x_1\ y_1 \quad x_2\ y_2$

$d=\sqrt{(4-8)^2+(-7+{+3})^2}$

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

$\sqrt{16+16}$

$\sqrt{32}\approx 5.7$

$4\sqrt{2}$

32

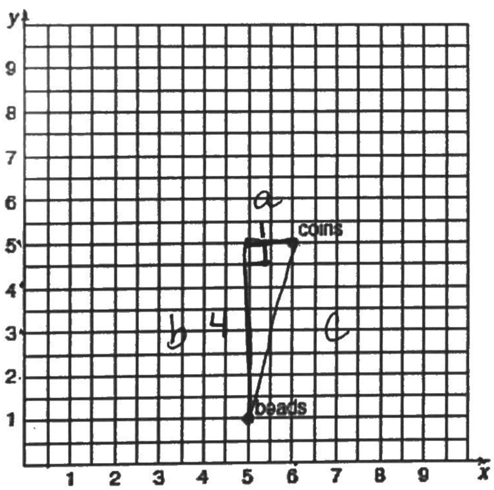
$\cancel{4}\cdot\cancel{8}$

$2\cdot 2\quad 2\cdot\cancel{4}$

$2\cdot 2$

$2\cdot 2\ \ 2\cdot 2\ \boxed{2}$

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



Coins are located at $(6, 5)$

$x_1\ y_1$

Beads are located at $(5, 1)$

$x_2\ y_2$

Distance $\sqrt{17}\approx 4.1$

$d=\sqrt{(5-6)^2+(1-5)^2}$

$(1)^2+(4)^2=c^2$

$1+16=c^2$

$\sqrt{17}=\sqrt{c^2}$

$\sqrt{17}=c$

17

$1\cdot 17$

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

$x_1\ y_1 \quad x_2\ y_2$

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

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

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

$(5)^2=\left(\sqrt{(x-1)^2+9}\right)^2$

$25=(\boxed{x}-1)^2+9$

$-9 \qquad\qquad -9$

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

$4=\boxed{x}-1$

$\boxed{x=5}$

5. Use the distance formula to find the value of y if the distance between (-1, 4) & (5, y) is <u>10 units</u>.

$x_1\ y_1 \quad x_2\ y_2 \quad d$

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

$10=\sqrt{(6)^2+(y-4)^2}$

$(10)^2=\left(\sqrt{36+(\boxed{y}-4)^2}\right)^2$

$100=36+(\boxed{y}-4)^2$

$-36 \quad -36$

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

$8=\boxed{y}-4$

$+4 \qquad +4$

$\boxed{y=12}$