4.3 Distance Formula Homework

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

Name: Key

Date: _____ Block: _____

Find the distance between each pair of points. Leave your answer in simplest radical form if necessary.

1. $(4, 7), (1, 3)$

$x_1\ y_1\ x_2\ y_2$

$D = \sqrt{(1-4)^2 + (3-7)^2} = \sqrt{(-3)^2 + (-4)^2}$

$= \sqrt{9+16} = \sqrt{25} = \boxed{5}$

2. $(4, -6), (3, -9)$

$x_1\ y_1\ x_2\ y_2$

$D = \sqrt{(3-4)^2 + (-9+6)^2} = \sqrt{(-1)^2 + (-3)^2}$

$= \sqrt{1+9} = \boxed{\sqrt{10}}$

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

$x_1\ y_1\ x_2\ y_2$

$D = \sqrt{(3-0)^2 + (2+4)^2} = \sqrt{(3)^2 + (6)^2}$

$= \sqrt{9+36} = \sqrt{45} = \boxed{3\sqrt{5}}$

4. $(6, 2), \left(4, \frac{1}{2}\right)$

$D = \sqrt{(4-6)^2 + (\frac{1}{2}-2)^2} = \sqrt{(-2)^2 + (-\frac{3}{2})^2}$

$= \sqrt{4 + \frac{9}{4}} = \sqrt{\frac{25}{4}} = \boxed{\frac{5}{2}}$

5. $\left(2, -\frac{1}{2}\right), \left(1, \frac{1}{2}\right)$

$D = \sqrt{(1-2)^2 + (\frac{1}{2}+\frac{1}{2})^2} = \sqrt{(-1)^2 + (1)^2}$

$= \sqrt{1+1} = \boxed{\sqrt{2}}$

6. $(\sqrt{3}, 3), (2\sqrt{3}, 5)$

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

$= \sqrt{3+4} = \boxed{\sqrt{7}}$

Find the possible values of *a* if the points with the given coordinates are the indicated distance apart.

7. $(4, -1), (a, 5); d = 10$

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

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

$100 = a^2 - 8a + 16 + 36$

$0 = a^2 - 8a - 48$

$0 = (a-12)(a+4)$

$\boxed{a = 12}$ $\boxed{a = -4}$

8. $(6, -7), (a, -4); d = \sqrt{18}$

$(\sqrt{18})^2 = \left(\sqrt{(a-6)^2 + (-4+7)^2}\right)^2$

$18 = (a-6)^2 + (3)^2$

$18 = a^2 - 12a + 36 + 9$

$0 = a^2 - 12a + 27$

$0 = (a-9)(a-3)$

$\boxed{a = 9}$ $\boxed{a = 3}$

9. $(8, -5), (a, 4); d = \sqrt{85}$

$(\sqrt{85})^2 = \left(\sqrt{(a-8)^2 + (4+5)^2}\right)^2$

$85 = (a-8)^2 + (9)^2$

$85 = a^2 - 16a + 64 + 81$

$0 = a^2 - 16a + 60$

$0 = (a-10)(a-6)$

$\boxed{a = 10}$ $\boxed{a = 6}$

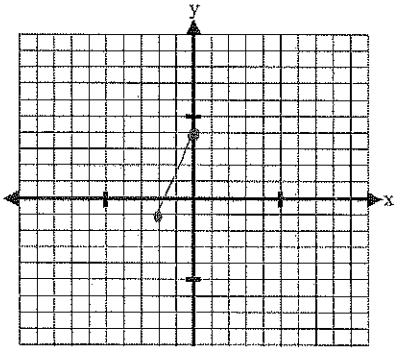
10. The point $(-2, -1)$ lies on a circle. What is the length of the radius of this circle if the center is located at $(0, 4)$?

$D = \sqrt{(4+1)^2 + (0+2)^2}$

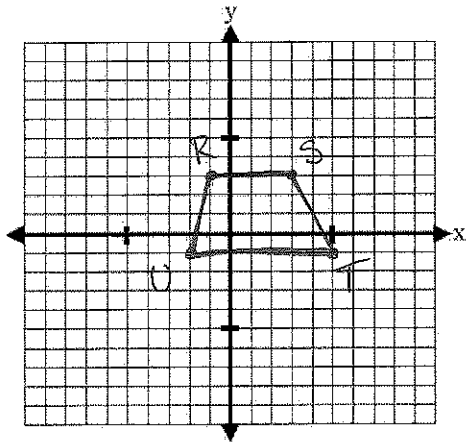
$D = \sqrt{(5)^2 + (2)^2}$

$D = \sqrt{25+4}$

$\boxed{D = \sqrt{29}}$



11. The coordinates of the vertices of a quadrilateral are $R(-1,3), S(3,3), T(5,-1), and\ U(-2,-1)$. Find the perimeter of the quadrilateral. Round to the nearest tenth.



$\overline{RS}$ $D = \sqrt{(3-3)^2+(3+1)^2} = \sqrt{0^2+4^2} = \sqrt{16} = 4$

$\overline{ST}$ $D = \sqrt{(-1-3)^2+(5-3)^2} = \sqrt{(-4)^2+(2)^2} = \sqrt{16+4} = \sqrt{20} = 4.47$

$\overline{TU}$ $D = \sqrt{(-1+1)^2+(-2-5)^2} = \sqrt{0^2+(-7)^2} = \sqrt{49} = 7$

$\overline{UR}$ $D = \sqrt{(3+1)^2+(-1+2)^2} = \sqrt{4^2+1^2} = \sqrt{16+1} = \sqrt{17} = 4.12$

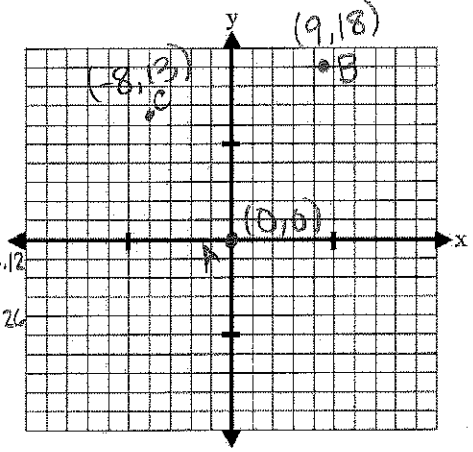
$P = 19.6$ units

12. Three players are warming up for a baseball game. Player B stands 9 feet to the right and 18 feet in front of Player A. Player C stands 8 feet to the left and 13 feet in front of Player A.

a. Draw a model of the situation on a coordinate grid. Assume that Player A is located at $(0,0)$.

b. To the nearest tenth, what is the distance between Players A and B and between Players A and C?

c. What is the distance between Players B and C?



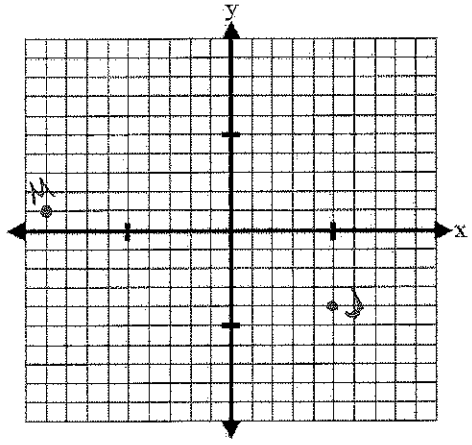
b) $\overline{AB}$ $D = \sqrt{(9-0)^2+(18-0)^2} = \sqrt{9^2+18^2} = \sqrt{81+324} = \sqrt{405} = 20.12$

$\overline{AC}$ $D = \sqrt{(13-0)^2+(-8-0)^2} = \sqrt{13^2+(-8)^2} = \sqrt{169+64} = \sqrt{233} = 15.26$

c) $\overline{BC}$ $D = \sqrt{(18-13)^2+(9+8)^2} = \sqrt{(5)^2+(17)^2} = \sqrt{25+289} = \sqrt{314}$

$= 17.72$

13. Maria and Jackson live in adjacent neighborhoods. If they superimpose a coordinate grid on the map of their neighborhoods, Maria lives at $(-9,1)$ and Jackson lives at $(5,-4)$. If each unit on the grid is equal to approximately 0.132 mile, how far apart do Maria and Jackson live?



$D = \sqrt{(-4-1)^2+(5+9)^2} = \sqrt{(-5)^2+(14)^2} = \sqrt{25+196}$

$= \sqrt{221} = 14.86$ units

14.86 unit x .132 mi = 1.96 mi apart

14. Name a point that is $\sqrt{2}$ away from $(-1,5)$.

(0,6) (0,4) (-2,6) (-2,4)