Name: Key Date: 9/14 Hour: ____

Level 1

1. Find the distance between the points to the nearest tenth:

a) C(12,6) and D(-8,18)
$x_1\ y_1$ $x_2\ y_2$
$d = \sqrt{(12-(-8))^2 + (6-18)^2} = \sqrt{(20)^2 + (-12)^2} = \sqrt{400+144} = \sqrt{544}$
$d \approx 23.3$ units

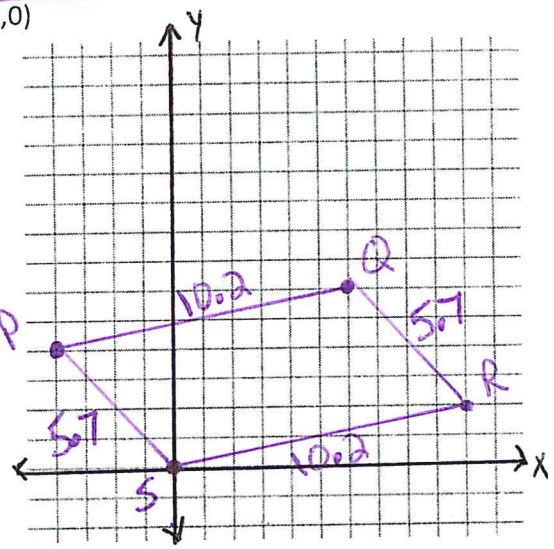
b) X(-3,-4) and Y(5,5)
$x_1\ y_1$ $x_2\ y_2$
$d = \sqrt{(-3-5)^2 + (-4-5)^2} = \sqrt{(-8)^2 + (-9)^2} = \sqrt{64+81} = \sqrt{145} \approx 12$ units

2. Find the length of $\overline{PQ}$. Leave your answer in the simplest radical form
P(-5,-3) and Q(-3,-5)
$x_1\ y_1$ $x_2\ y_2$
$d = \sqrt{(-5-(-3))^2 + (-3-(-5))^2} = \sqrt{(-2)^2 + (2)^2} = \sqrt{4+4} = \sqrt{8} = \sqrt{2\cdot 4} = \sqrt{2}\cdot\sqrt{4}$
$= 2\sqrt{2}$

Level 2

3. A boat at X(5, -2) needs to travel to Y(-6,9) or Z(17, -3). Which point is closer? What is the distance to the closer point?
$x_1\ y_1$ $x_2\ y_2$ $x_2\ y_2$
Z is closer @ 12 units

4. Quadrilateral PQRS has the same vertices: P(-4,4), Q(6,6), R(10,2) and S(0,0)
   a) What is the perimeter of the quadrilateral PQRS?
   b) What is the difference between the lengths of its diagonals?

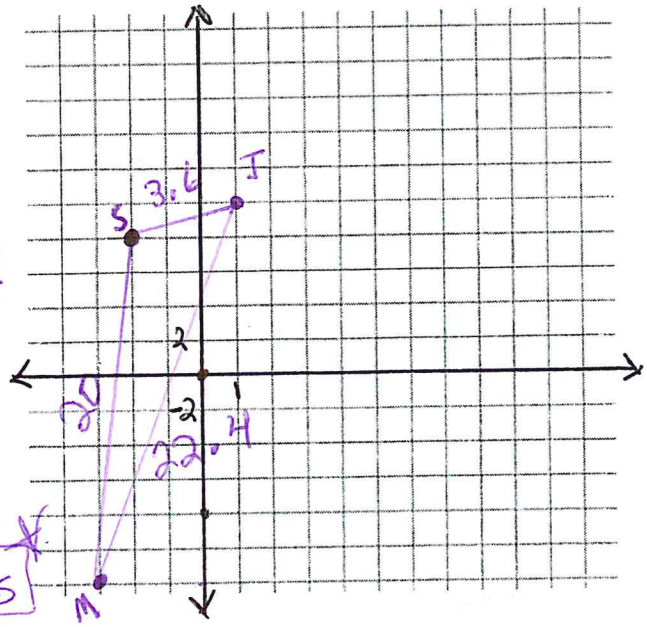


$\overline{XY}$: $d = \sqrt{(5-(-6))^2 + (-2-9)^2} = \sqrt{(11)^2 + (-11)^2} = \sqrt{121+121}$
$= \sqrt{242} \approx 15.6$ units

$\overline{XZ}$: $d = \sqrt{(5-17)^2 + (-2-3)^2} = \sqrt{(-12)^2 + (-5)^2} = \sqrt{144+1}$
$= \sqrt{145} \approx 12$ units

Level 3 #4 on seperate paper.

5. If Sam lives at the location (-2, 8), Jeni lives at (1,10) and Molly's house is located 12 units down and 3 units left from Molly's house, approximately how many miles less would Molly walk if she walks directly to Sam's house, rather than first to Jeni's house and then to Sam's house?



$\overline{SJ} = \sqrt{(-2-1)^2 + (8-10)^2} = \sqrt{(-3)^2 + (-2)^2} = \sqrt{9+4} = \sqrt{13}$
(-2,8) (1,10)
$x_1\ y_1$ $x_2\ y_2$
$\overline{SJ} \approx 3.6$ units

$\overline{JM} = \sqrt{(1-(-3))^2 + (10-(-2))^2} = \sqrt{(4)^2 + (12)^2} = \sqrt{16+144} = \sqrt{160}$
(1,10) (-3,-2)
$x_1\ y_1$ $x_2\ y_2$
$\overline{JM} = 22.4$ units

$\overline{MS} = \sqrt{(-3-(-2))^2 + (-12-8)^2} = \sqrt{(-1)^2 + (-20)^2} = \sqrt{1+400}$
$= \sqrt{401}$
(-3,-12) (-2,8)
$x_1\ y_1$ $x_2\ y_2$
$\overline{MS} \approx 20$ units

6 miles less

P(-4, 4) Q(6,6) R(10,2) S(0,0)

4.)

a.) $\overline{PQ} = \sqrt{(-4-6)^2 + (4-6)^2} = \sqrt{(-10)^2+(-2)^2} = \sqrt{100+4} = \sqrt{104}$

(-4,4) (6,6)
$x_1\ y_1$ $x_2\ y_2$

$\overline{PQ} \approx 10.2$ units

$\overline{QR} = \sqrt{(6-10)^2+(6-2)^2} = \sqrt{(-4)^2+(4)^2} = \sqrt{16+16} = \sqrt{32}$

(6,6) (10,2)
$x_1\ y_1$ $x_2\ y_2$

$\overline{QR} \approx 5.7$ units

$\overline{RS} = \sqrt{(10-0)^2+(2-0)^2} = \sqrt{(10)^2+(2)^2} = \sqrt{100+4} = \sqrt{104}$

(10,2) (0,0)

$\overline{RS} \approx 10.2$ units

$\overline{PS} = \sqrt{(-4-0)^2+(4-0)^2} = \sqrt{(-4)^2+(4)^2} = \sqrt{16+16} = \sqrt{32}$

(-4,4) (0,0)
$x_1\ y_1$ $x_2\ y_2$

$\overline{PS} \approx 5.7$ units

Perimeter of PQRS = 31.8 units

b.) $\overline{QS} = \sqrt{(6-0)^2+(6-0)^2} = \sqrt{(6)^2+(6)^2} = \sqrt{36+36} = \sqrt{72}$

(6,6) (0,0)
$x_1\ y_1$ $x_2\ y_2$

$\overline{QS} \approx 8.5$ units

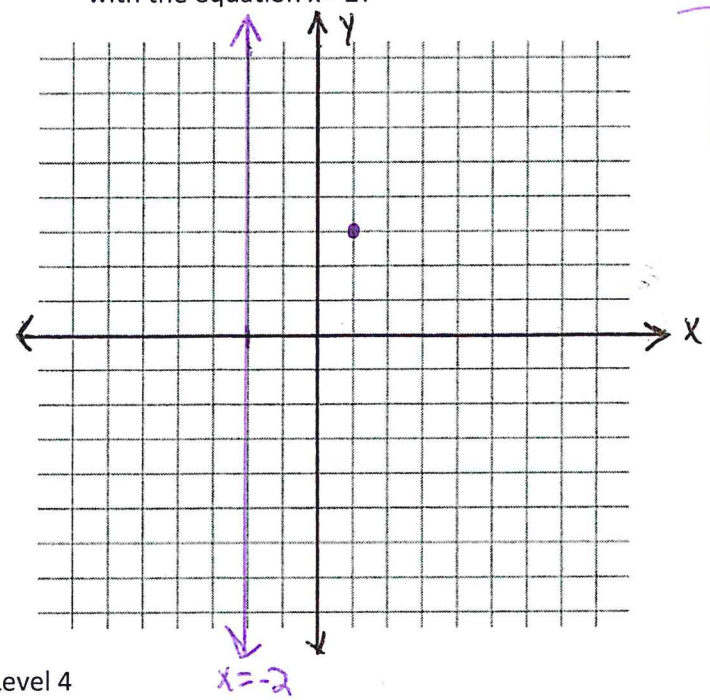
$\overline{PR} = \sqrt{(-4-10)^2+(4-2)^2} = \sqrt{(-14)^2+(2)^2} = \sqrt{196+4} = \sqrt{200}$

(-4,4) (10,2)
$x_1\ y_1$ $x_2\ y_2$

$\overline{PR} \approx 14.1$ units

$\overline{PR} - \overline{QS} = 14.1 - 8.5 =$ 5.6 units is the length difference

6. In a xy-coordinate plane, what is the shortest distance between the point with coordinates (1, 3) and the line with the equation x=-2?



3 units

Level 4

7. If point R has coordinates (x, y) and point S has coordinates (x+1, y+1), what is the distance between point R and point S?

$x_1\ y_1 \qquad x_2\ y_2$

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

A. $\sqrt{2}$
B. 2
C. $\sqrt{x^2+y^2}$
D. x^2+y^2+2
E. x+y+1

8. Two ships leave a port at the same time. One ship moves at 20 miles per hour and sails 2 hours north, and then 1 hour east. The other ship moves at 25 miles per hour and sails 2 hours east, and then one hour north. Which of the following is an expression for the number of miles apart the ships are 3 hours after they leave the port?

A. $3(25-20)$
B. $\sqrt{(50-20)^2+(25-40)^2}$
C. $\sqrt{(50-20)^2+(25+40)^2}$
D. $\sqrt{(50+20)^2+(25-40)^2}$
E. $\sqrt{(3*20)^2+(3*40)^2}$