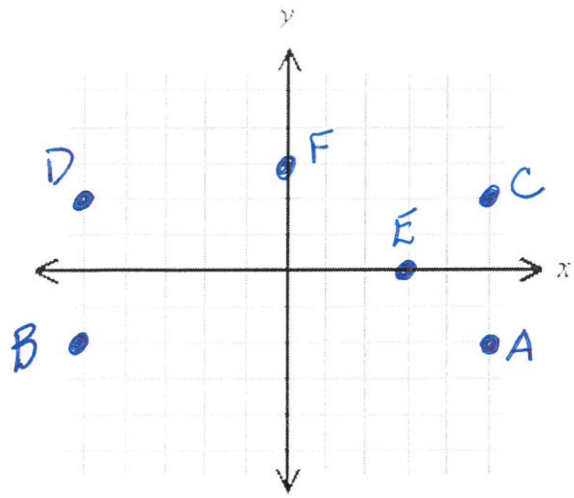
*AAT

Name: Key

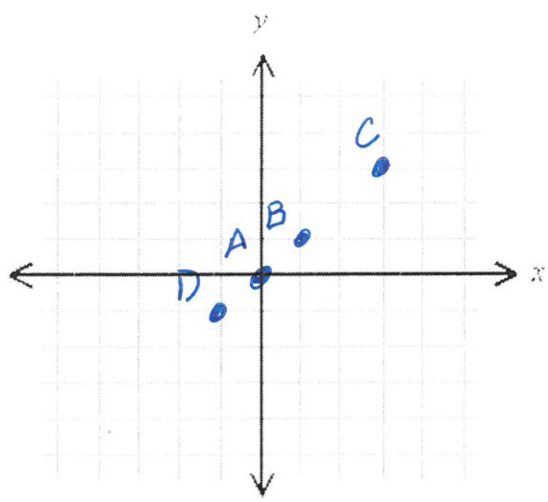
Chapter 3: 3-1 Rectangular Coordinate Systems (IC/HW)

Date: ____________ Period: ____________

1. **Plot the points A(5,-2), B(-5,-2), C(5,2), D(-5,2) E(3,0), and F(0,3) on a coordinate plane.**



2. **Plot the points A(0,0), B(1,1), C(3,3), D(-1,-1), and E(-2,-2). Describe the set of all points of the form (a,a), where a is a real number.**



line bisecting quadrants I & III

3. **Describe the set of all points P(x,y) in a coordinate plane that satisfy the given conditions.**

(a) $x = -2$

line ‖ to y-axis that intersects x-axis at (-2,0)

(b) $y = 3$

line ‖ to x-axis that intersects y-axis at (0,3)

(c) $x \geq 0$

set of all points to the right of & on the y-axis.

(d) $xy > 0$

set of all points in quadrants I & III

(e) $y < 0$

set of all points below x-axis

(f) $x = 0$

set of all points on y-axis

(a) **Find the distance d(A,B) between A and B. (b) Find the midpoint of the segment AB.**

4. A(4, -3), B (6, 2)

(a) $d = \sqrt{(6-4)^2+(2-(-3))^2}$

$= \sqrt{2^2+5^2} = \sqrt{4+25}$

$d = \sqrt{29}$

(b) $M = \left(\frac{4+6}{2}, \frac{-3+2}{2}\right)$

$M = (5, -\frac{1}{2})$

5. A(-5, 0), B(-2, -2)

(a) $d = \sqrt{(-2-(-5))^2+(-2-0)^2}$

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

$d = \sqrt{13}$

(b) $M = \left(\frac{-5+-2}{2}, \frac{0+-2}{2}\right)$

$M = (-\frac{7}{2}, -1)$

6. A(7, -3), B(3, -3)

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

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

$d = 4$

(b) $M = \left(\frac{7+3}{2}, \frac{-3+-3}{2}\right)$

$M = (5, -3)$

7. **Show that the triangle with vertices A(8, 5), B(1, -2), C(-3, 2) is a right triangle, and find its area.**

$(AC)^2 = (AB)^2 + (BC)^2$; $\left(\sqrt{(8-(-3))^2+(5-2)^2}\right)^2 = \left(\sqrt{(8-1)^2+(5-(-2))^2}\right)^2 + \left(\sqrt{(1-(-3))^2+(-2-2)^2}\right)^2$

$= (\sqrt{130})^2 = (\sqrt{98})^2 + (\sqrt{32})^2$; $130 = 98 + 32$ ✓

$\text{Area} = \frac{1}{2}bh = \frac{1}{2}(\sqrt{32})(\sqrt{98}) = \frac{1}{2}(4\sqrt{2})(7\sqrt{2})$

$= 28$

8. **Show that A(-4, 2), B(1, 4), C(3, -1), and D(-2, -3) are vertices of a square.**

$d(A,B) = d(B,C) = d(C,D) = d(D,A)$

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

✓ $\sqrt{29} = \sqrt{29} = \sqrt{29} = \sqrt{29}$

$(AC)^2 = (AB)^2 + (BC)^2$

$(\sqrt{58})^2 = (\sqrt{29})^2 + (\sqrt{29})^2$

$58 = 29 + 29$ ✓

9. **Given A(-3, 8), find the coordinates of the point B such that C(5, -10) is the midpoint of segment AB.**

$\left(\frac{-3+x}{2}, \frac{8+y}{2}\right) = (5, -10)$

$\frac{-3+x}{2} = 5$; $-3+x = 10$

$x = 13$

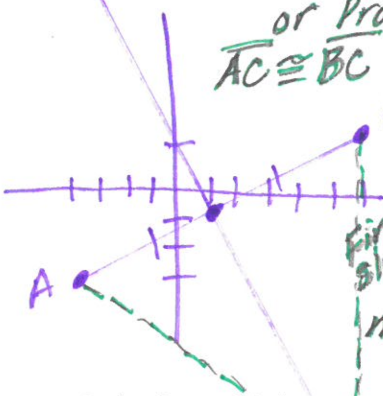
$\frac{8+y}{2} = -10$

$8+y = -20$; $y = -28$

$B(13, -28)$

10. **Prove that C is on the perpendicular bisector of segment AB. A(-4, -3), B(6, 1), C(5, -11)**

or Prove $\overline{AC} \cong \overline{BC}$



Midpt $(1, -1)$

$m = \frac{-5}{2}$

Find slope $(5, -11), (1, -1)$

$m = \frac{-1-(-11)}{1-5} = \frac{10}{-4} = -\frac{5}{2}$

$y = mx + b$

$-1 = \left(-\frac{5}{2}\right)(1) + b$

$\frac{3}{2} = b$

$y = \frac{-5}{2}x + \frac{3}{2}$

$2y = -5x + 3$

$5x + 2y = 3$

Check $5(5) + 2(-11) \stackrel{?}{=} 3$

$\checkmark\ 3 = 3$

11. **Find a formula that states that P(x, y) is a distance 5 from the origin. Describe the set of all points.**

$d(P, O) = 5$

$O(0, 0)$

$\sqrt{(x-0)^2 + (y-0)^2} = 5; \ \sqrt{x^2 + y^2} = 5$

$x^2 + y^2 = 25$

Circle $(0, 0)c; \ r = 5$

12. **Find all points on the y-axis that are a distance 6 from P(5, 3).**

$6 = \sqrt{(0-5)^2 + (y-3)^2}$

$36 = 25 + y^2 - 6y + 9$

$y^2 - 6y - 2 = 0; \quad y = 3 \pm \sqrt{11}$

$(0, 3 \pm \sqrt{11})$

or

$(0, 6.317)$ & $(0, -.317)$

13. **Find the point with coordinates of the form (2a, a) that is in the third quadrant and is a distance 5 from P(1, 3).**

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

$25 = 4a^2 - 4a + 1 + a^2 - 6a + 9$

$5a^2 - 10a - 15 = 0; \ a^2 - 2a - 3 = 0; \ (a-3)(a+1) = 0; \ a \not= 3; \ a = -1$

14. **The table lists the number of daily newspapers published in the U.S. for various years.**

Year	Newspapers
1900	2226
1920	2042
1940	1878
1960	1763
1980	1745
1993	1556

a) Plot the data in the viewing rectangle [1895, 2000, 10] by [0, 3000, 1000]

b) Use the midpoint formula to estimate the number of newspapers in 1930. Compare your answer with the true value, which is 1942.

$m\left(\frac{1920+1940}{2}, \frac{2042+1878}{2}\right) = (1930, 1960)$

* predicts 1960 newspapers published in 1930.