Unit 5 Study Guide Answer Key

A. Find the center and radius of the following equations of a circle.

1. $(x-5)^2+(y-2)^2=32$
$C=(5,2)$ radius $= 4\sqrt{2}$ or 5.66

2. $x^2+(y-4)^2=16$
$C=(0,4)$ $r=4$

3. $(x-8)^2+(y+9)^2=72$
$C=(8,-9)$ $r=6\sqrt{2}$ or 8.49

4. $(x+3)^2+y^2=36$
$C=(-3,0)$ $r=6$

5. $(x-\frac{1}{2})^2+(y+3)^2=12$
$C=(\frac{1}{2},-3)$ $r=2\sqrt{3}$ 3.46

6. $(y-3)^2+(x+5)^2=64$
$C=(3,-5)$ $r=8$

B. Complete the square of the following equations.

7. x^2+4x+ 4

8. y^2+16y+ 64

9. x^2-14x+ 49

10. y^2-18y+ 81

11. x^2+2x+ 1

12. $y^2+\frac{16}{5}y+\frac{64}{25}$ or 2.56

C. Find the distance between the following pairs of points. Give your answer in simplified radical form and decimal form.

13. (5, -2), (8, 4)
$$\sqrt{(8-5)^2+(4+2)^2}$$
$$=\sqrt{9+36}$$
$$=\sqrt{45}=\boxed{3\sqrt{5}}=\boxed{6.71}$$

14. (3, 6), (-4, -2)
$$\sqrt{(-4-3)^2+(-2-6)^2}$$
$$=\sqrt{49+64}=\boxed{\sqrt{113}}=\boxed{10.63}$$

15. (7, 5), (7, 8)
$$\sqrt{(7-7)^2+(8-5)^2}$$
$$=\sqrt{9}=\boxed{3}$$

16. (4, -3), (-3, -6)
$$\sqrt{(-3-4)^2+(-6+3)^2}$$
$$=\sqrt{49+9}=\boxed{\sqrt{58}}=\boxed{7.62}$$

D. Determine whether the following lines are perpendicular, parallel or neither.

19. y = 2x + 8 and -2y + 8x = 14
$-8x$, $\div -2$
$y=-7+4x$
$y=4x-7$
$\boxed{\text{neither}}$

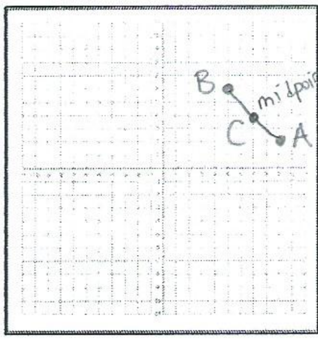
20. y = -3x +5 and 6x -2y = 4
$\frac{-6x}{-2} \rightarrow y=3x-2$
$\boxed{\text{neither}}$

21. 18x + 9y = 27 and y = -2x + 6
$-18x$
$9y=-18x+27$, $\div 9$
$y=-2x+3$
$\boxed{\text{parallel}}$

22. -2x-9 = -y and 6x + 3y = 12
$-6x$, $\div 3$
$y=-2x-9$
$y=-2x+4$
$\boxed{\text{parallel}}$

E. Find the distance and midpoint of the following pairs of points and show the outcome on the graphs provided.

17. A (9, 2), B (5, 6)



$\sqrt{(5-9)^2+(6-2)^2}$

$=\sqrt{16+16}$

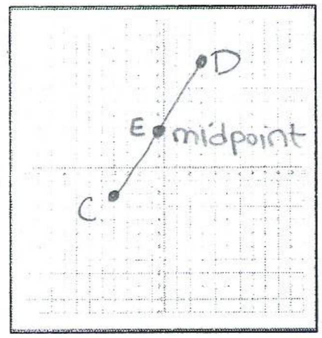
$=\sqrt{32}$

$=4\sqrt{2}$ or $\boxed{5.66}$

$\left(\frac{5+9}{2}, \frac{6+2}{2}\right)$

$C=(7,4)$

18. C (-4, -2), D (3, 8)



$\sqrt{(3+4)^2+(8+2)^2}$

$=\sqrt{49+100}$

$=\sqrt{149}=\boxed{12.21}$

$\left(\frac{3+(-4)}{2}, \frac{8+(-2)}{2}\right)$

$E=\left(-\frac{1}{2}, 3\right)$

F. Find the slope-intercept form of the line that passes through the point and satisfies the given conditions. $y-y_1=m(x-x_1)$

19. Point D (-3, 5); perpendicular to 6x – 3y = 12 $-6x$

$\frac{}{-3}$ $y=2x-4$

$y-5=-\frac{1}{2}(x+3)$

$y-5=-\frac{1}{2}x-\frac{3}{2} \rightarrow \boxed{y=-\frac{1}{2}x+3.5}$

20. Point M (2, 7); parallel to y = $\frac{3}{4}$x – 5

$y-7=\frac{3}{4}(x-2)$

$y-7=\frac{3}{4}x-\frac{3}{2} \rightarrow \boxed{y=\frac{3}{4}x+5.5}$

21. Point C ($\frac{1}{2}$, 9); parallel to -5x + 9y = 14 $+5x$

$\frac{}{9}$ $y=\frac{5}{9}x+\frac{14}{9}$

$y-9=\frac{5}{9}\left(x-\frac{1}{2}\right)$

$y-9=\frac{5}{9}x-\frac{5}{18} \rightarrow \boxed{y=\frac{5}{9}x+\frac{157}{18}}$

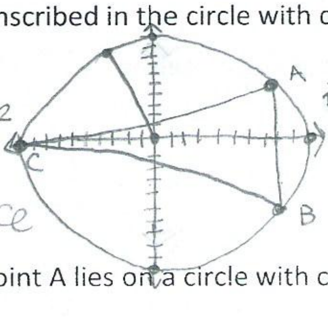
22. Point H (-4, 8); perpendicular to y = $\frac{3}{9}$x + 15 $m=-\frac{9}{3}=-$

$y-8=-3(x+4)$

$y-8=-3x-12 \rightarrow \boxed{y=-3x-4}$

23. Prove or disprove that the triangle with points A (8, 6), B (8, -6) and C (-10, 0) are the vertices of an isosceles triangle inscribed in the circle with center at the origin Q and passes through the point P(-3,√91).

≈ 9.54 radius = 10



$\sqrt{(0+3)^2+(0-9.54)^2}$

$=\sqrt{9+91.01}$

$=10.0=$ Distance

$\overline{PA}=\sqrt{(0-8)^2+(0-6)^2}$

$=\sqrt{64+36}$

$=\sqrt{100}=\boxed{10}$

$\overline{PB}=\sqrt{(0-8)^2+(0+6)^2}$

$=\sqrt{64+36}$

$=\sqrt{100}=\boxed{10}$

$\overline{PC}=\sqrt{(0+10)^2+(0-0)^2}$

$=\sqrt{100}=\boxed{10}$

Answer: $\boxed{\text{Yes}}$

25. Determine if point A lies on a circle with center C and point P on the circle.

a) A(5, 0) C(0, 0) P(3, 4)

$\overline{CP}=\sqrt{(3-0)^2+(4-0)^2}$

$=\sqrt{9+16}$

$=\sqrt{25}=\boxed{5=\text{radius}}$

$\overline{AC}=\sqrt{(5-0)^2+(0-0)^2}$

$\overline{AC}=\sqrt{25}=\boxed{5}$

$\boxed{\text{Yes}}$

b) A (0, 4) C(2, 1) P(5, 3)

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

$=\sqrt{9+4}$

radius $=\sqrt{13}=\boxed{3.61}$

$\sqrt{(0-2)^2+(4-1)^2}=\overline{AC}$

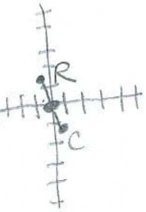
$=\sqrt{4+9}$

$=\sqrt{13}=\boxed{3.61}$

$\boxed{\text{Yes}}$

Claire = C
resort = R

24. A new resort is being built on the shore of a lake that is roughly circular. Claire also lives on the lakeshore and she finds that the new resort is directly across the lake from her house. If the lake is put on a coordinate plane with x and y in miles, the coordinates of Claire's house are (0.5, -1.2) and the coordinates of the new resort are (-0.5, 1.2).



a) Is the center of the lake at the origin? Explain. Midpoint $= \left(\frac{0.5+-0.5}{2}, \frac{-1.2+1.2}{2}\right) = (0,0)$ $\boxed{\text{yes.}}$

b) Find an equation that models the shoreline of the lake. slope : $\frac{-1.2-1.2}{0.5+0.5} = -2.4$

$y = -2.4x + 0 \leftarrow y + 1.2 = -2.4(x - 0.5)$

c) If Claire's boat is sitting at the coordinates of (0.3, 1.25), is her boat in or out of the water?

radius $= \sqrt{(0.5-0)^2+(-1.2-0)^2} = \sqrt{1.69} = 1.3$

$\sqrt{(0.3-0)^2+(1.25-0)^2} = \sqrt{0.09+1.5625} = 1.29 \leftarrow$ $\boxed{\text{she is in the water or at the shoreline}}$

26. Melissa lives at the corner of 3rd Street and 28th Avenue. Her sister Rebecca lives at the corner of 27th Street and 16th Avenue. Find the cross street that:

M = (3,28)
R = (27,16)

a. is halfway between their homes $\left(\frac{3+27}{2}, \frac{28+16}{2}\right) = (15,22)$

$\boxed{15^{th} \text{ and } 22^{nd}}$

b. is of the way from Melissa's to Rebecca's

$\sqrt{(27-3)^2+(16-28)^2} = \sqrt{576+144} = \sqrt{720} = 12\sqrt{5}$ or $\boxed{\text{27 streets away}}$

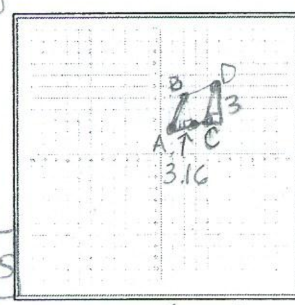
c. separates their homes in a ratio of 3 : 1 $\frac{A}{A+B} = \frac{3}{4}$ $\left(3+\frac{3}{4}(24), 28+\frac{3}{4}(-12)\right) = \boxed{(21,19)}$

$\Delta x = 27-3 = 24$
$\Delta y = 16-28 = -12$

d. separates their homes in a ratio of 1 : 5

$\Delta x = 24$
$\Delta y = -12$ $\frac{A}{A+B} = \frac{1}{6}$ $\left(3+\frac{1}{6}(24), 28+\frac{1}{6}(-12)\right) = \boxed{(7,26)}$

27. ABCD has vertices A (1, 2) B (2, 5) C (4, 3) D (5, 6). Determine which type of polygon this is. Prove your assertion. Find the area and perimeter of the polygon.



Polygon = $\boxed{\text{rhombus}}$

$\overline{AB} = \sqrt{(2-1)^2+(5-2)^2} = \sqrt{10} = 3.16$

$\overline{BD} = \sqrt{(5-2)^2+(6-5)^2} = \sqrt{10} = 3.16$

$\overline{DC} = \sqrt{(4-5)^2+(3-6)^2} = \sqrt{10} = 3.16$

$\overline{CA} = \sqrt{(1-4)^2+(2-3)^2} = \sqrt{10} = 3.16$

Area $= 3 \cdot 3.16 = \boxed{9.42 \text{units}^2}$

Perimeter $= \boxed{12.64 \text{units}}$

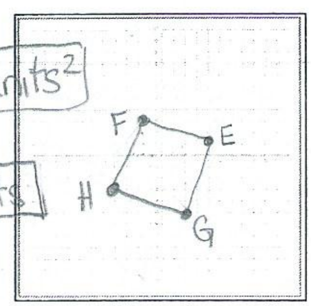
Slope $= \frac{5-2}{2-1} = 3$

$-\frac{1}{3}$

(3,3)

$\sqrt{(3-2)^2+(3-5)^2} = \sqrt{5} = 2.24$

28. EFGH has vertices E (4, 1) F (-2, 3) G (2, -5) H (-4, -3). Determine which type of polygon this is. Prove your assertion. Find the area and the perimeter of the polygon. Polygon = $\boxed{\text{square}}$



$\overline{HG} = \sqrt{(2+4)^2+(-5+3)^2} = \sqrt{40} = 2\sqrt{10} = 6.32$

$\overline{HF} = \sqrt{(-2+4)^2+(3+3)^2} = \sqrt{40} = 2\sqrt{10} = 6.32$

$\overline{FE} = \sqrt{(4+2)^2+(1-3)^2} = \sqrt{40} = 2\sqrt{10} = 6.32$

$\overline{EG} = \sqrt{(4-2)^2+(1+5)^2} = \sqrt{40} = 2\sqrt{10} = 6.32$

Area = $\boxed{39.9 \text{units}^2}$

Perimeter = $\boxed{25.28 \text{units}}$

G. Write each equation in standard form for the equation of a circle. State the center and radius.

29. $2x^2 + 6x - 13 + 2y^2 - 1 = 0$

$\boxed{C = (-1.5, 0) \quad R = 3.04}$

$\frac{2x^2+6x+2y^2-14=0}{2}$

$x^2+3x+y^2 = 7$

$x^2+3x+2.25+y^2+0y+0 = 7+2.25+0$

$\boxed{(x+1.5)^2+y^2 = 9.25}$

30. $x^2 + 4x + 10y + y^2 = 0$

$x^2+4x+4+y^2+10y+25 = 0+4+25$

$\boxed{(x+2)^2+(y+5)^2 = 29}$

$\boxed{C = (-2,-5) \quad R = 5.39}$