Geometry Name: Key

Review for Quiz – Circle Equations and Parallel & Perpendicular Lines Date: _____

PART 1: Circles

Identify the center and radius of each.

1. $(x + 5)^2 + (y - 13)^2 = 9$

C: (-5, 13) r = 3

2. $(x - 14)^2 + (y - 12)^2 = 4$

C: (14, 12) r = 2

3. $x^2 + y^2 - 8x + 28y + 187 = 0$

$x^2 - 8x + 16 + y^2 + 28y + 196 = -187 + 16 + 196$

$(x-4)^2 + (y+14)^2 = 25$

C: (4, -14) r = 5

4. $x^2 + y^2 + 28x - 16y + 259 = 0$

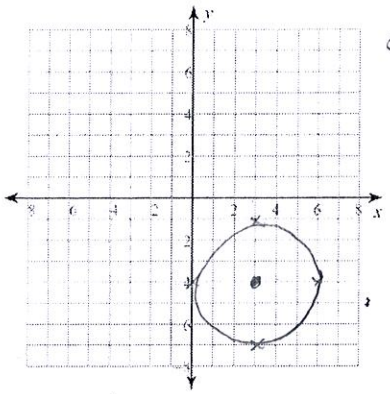
$x^2 + 28x + 196 + y^2 - 16y + 64 = -259 + 196 + 64$

$(x+14)^2 + (y-8)^2 = 1$

C: (-14, 8) r = 1

Identify the center and radius of each. Then sketch the graph.

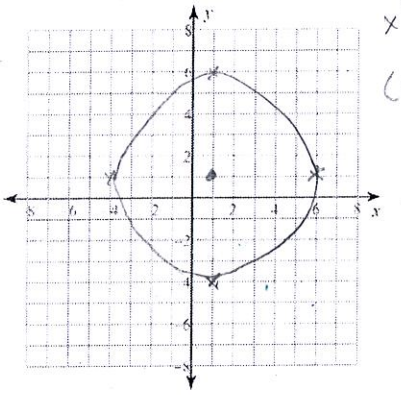
5. $(x - 3)^2 + (y + 4)^2 = 9$



C: (3, -4)

r = 3

6. $x^2 + y^2 - 2x - 2y - 23 = 0$



$x^2 - 2x + 1 + y^2 - 2y + 1 = 23 + 1 + 1$

$(x-1)^2 + (y-1)^2 = 25$

C: (1, 1)

r = 5

Use the information provided to write the standard form equation of each circle.

7. Center: (10, 6)
Radius: 1

$(x-10)^2 + (y-6)^2 = 1$

8. Center: (13, 12)
Radius: 4

$(x-13)^2 + (y-12)^2 = 16$

9. Center: (15, 5)
Point on Circle: (13, 6)

$d = \sqrt{(13-15)^2 + (6-5)^2} = \sqrt{4+1} = \sqrt{5}$

$(x-15)^2 + (y-5)^2 = \sqrt{5}^2$

$(x-15)^2 + (y-5)^2 = 5$

10. Center: (-4, 3)
Point on Circle: (1, 13)

$d = \sqrt{(1-(-4))^2 + (13-3)^2} = \sqrt{25+100} = \sqrt{125}$

$(x+4)^2 + (y-3)^2 = \sqrt{125}^2$

$(x+4)^2 + (y-3)^2 = 125$

11. Ends of a diameter: (8, -12) and (10, -14)

$M = \left(\frac{8+10}{2}, \frac{-12+-14}{2}\right)$

$= (9, -13)$ ⇒ Center

$\sqrt{(9-8)^2 + (-13-12)^2} = \sqrt{2}$

$(x-9)^2 + (y+13)^2 = 2$

12. Ends of a diameter: (1, -9) and (-9, -5)

$M = \left(\frac{1+-9}{2}, \frac{-9+-5}{2}\right) = (-4, -7)$ Center

$\sqrt{(-4-1)^2 + (-7-(-9))^2} = \sqrt{29}$

$(x+4)^2 + (y+7)^2 = 29$

Use the information provided to write the general form equation of each circle.

13. $(x - 12)^2 + (y - 16)^2 = 4$

$(x-12)(x-12) + (y-16)(y-16) = 4$

$x^2 - 12x - 12x + 144 + y^2 - 16y - 16y + 256 - 4 = 0$

$x^2 + y^2 - 24x - 32y + 396 = 0$

14. $(x - 15)^2 + (y - 9)^2 = 9$

$(x-15)(x-15) + (y-9)(y-9) = 9$

$x^2 - 15x - 15x + 225 + y^2 - 9y - 9y + 81 - 9 = 0$

$x^2 + y^2 - 30x - 18y + 297 = 0$

Use the information provided to write the standard form equation of each circle.

15. $x^2 + y^2 - 12x + 6y + 21 = 0$

$x^2 - 12x + 36 + y^2 + 6y + 9 = -21 + 36 + 9$

$(x-6)^2 + (y+3)^2 = 24$

16. $x^2 + y^2 + 20x - 20y + 184 = 0$

$x^2 + 20x + 100 + y^2 - 20y + 100 = -184 + 100 + 100$

$(x+10)^2 + (y-10)^2 = 16$

State if the following points are inside, outside, or on the circle $(x - 5)^2 + y^2 = 36$.

17. (6, -5)

x y

$(6-5)^2 + (-5)^2 = 36$

$1 + 25 = 36$

$26 < 36$

Inside

18. (5, -6)

$(5-5)^2 + (-6)^2 = 36$

$0 + 36 = 36$

$36 = 36$

ON the circle

19. (-2, 3)

$(-2-5)^2 + 3^2 = 36$

$49 + 9 = 36$

$58 > 36$

outside

PART 2: Parallel & Perpendicular Lines

Remember

- Two lines are **PARALLEL** if and only if their slopes are **EQUAL**.
  - Any two **horizontal** lines (**y = #**) are parallel. (Slopes are both **0**.)
  - Any two **vertical** lines (**x = #**) are parallel. (Slopes are both **undefined**.)

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- Two lines are **PERPENDICULAR** if and only if their slopes are **NEGATIVE/OPPOSITE RECIPROCALS**.
  - Two lines are perpendicular if and only if the product of their slopes is -1.
  - A **horizontal** and a **vertical** line are always **perpendicular** to each other.

Determine if the lines are *parallel*, *perpendicular*, or *neither*.

1. Line *p* contains points (2, 6) & (-2, 8)
   Line *b* contains points (1, 5) & (3, 9)

p: $m = \frac{8-6}{-2-2} = \frac{2}{-4} = -\frac{1}{2}$ $m_{line\ p} = -\frac{1}{2}$

b: $m = \frac{9-5}{3-1} = \frac{4}{2} = 2$ $m_{line\ b} = 2$

Circle one: **PARALLEL** (**PERPENDICULAR**) **NEITHER**

2. Line k: y = 2x + 4
   Line h: 8x – 4y = 12

$\frac{-4y}{-4} = \frac{-8x}{-4} + \frac{12}{-4}$ $m_{line\ k} = 2$

$y = 2x - 3$ $m_{line\ h} = 2$

Circle one: (**PARALLEL**) **PERPENDICULAR** **NEITHER**

Find the slope of a line parallel and perpendicular to each given line.

3. x = 3 Vertical Line

$m_{||}$ = undefined

$m_{\perp}$ = 0

4. 2y + 3x = 6

$\frac{2y}{2} = \frac{-3x}{2} + \frac{6}{2}$ $m_{||} = -\frac{3}{2}$

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

Write the equation for a line that is *parallel* to the given line and contains the following points.

5. y = 4 Contains the point (3, 8)

Horizontal Line (x y)
Use y value from ordered pair for parallel line.

equation: $y = 8$

6. 2x = 3 – 4y Contains the point (-4, 3) (x y)

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

$y = -\frac{1}{2}x + \frac{3}{4}$

$m = -\frac{1}{2}$

$3 = -\frac{1}{2}(-4) + b$

$3 = 2 + b$

$1 = b$

equation: $y = -\frac{1}{2}x + 1$

Write the equation for a line that is *perpendicular* to the given line and contains the following points.

7. 5x – 3y = 6 Contains the point (10, -6)

$\frac{-3y}{-3} = \frac{-5x}{-3} + \frac{6}{-3}$

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

$m = 5/3$

$\perp m = -\frac{3}{5}$

$-6 = -\frac{3}{5}(10) + b$

$-6 = -6 + b$

$b = 0$

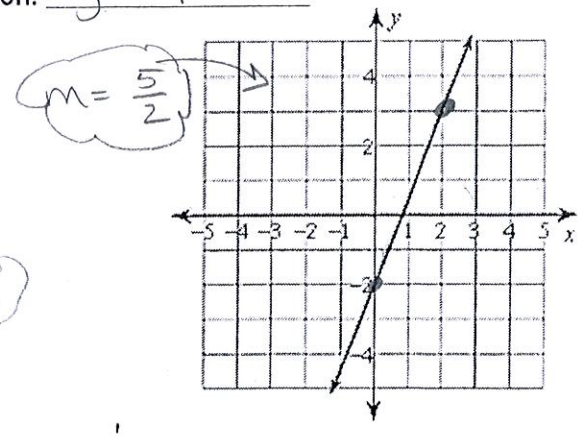
equation: $y = -\frac{3}{5}x$

8. x = -11 Contains the point (-5, -7)

Vertical Line m = und.
Use y value from ordered pair for perpendicular line.

equation: $y = -7$

Consider the graph to the right.



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

9. Write the equation of the line that is **parallel** to the graphed line and contains the point (1, -3).

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

$-3 = 2.5 + b$

$-5.5 = b$

$y = \frac{5}{2}x - 5.5$

10. Write the equation of the line that is **perpendicular** to the graphed line and contains the point (5, 3).

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

$3 = -\frac{2}{5}(5) + b$

$3 = -2 + b$

$5 = b$

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