

GEOMETRY – UNIT 10 AGENDA

Name: _____

Modeling in the Coordinate Plane Part 2 – 2023

DATE	DAY	LESSON	PAGE	CLASSWORK/ HOMEWORK
WED 3/22	10.1	Intro to Circle Equations Distance & Midpoint Formulas	1 – 3	Complete page 4 DeltaMath 10.1 due 3/27
THURS 3/23	10.2	Circles Equations Standard & General Forms	5 – 6	Complete pages 7 – 8
FRI 3/24	10.3	Partner Practice Activity	9 – 11	DeltaMath due tomorrow! Study!
MON 3/27	10.4	QUIZ TODAY! GOOD LUCK!!		DELTAMATH DUE TODAY!
TUES 3/28	10.5	Parallel and Perpendicular Lines	12 – 13	DeltaMath 10.2 due 3/21
WED 3/29	10.6	Parallel and Perpendicular Lines Activity	14 – 15	Complete page 16
THURS 3/30	10.7	Test Review	17 – 20	Finish Test Review & DeltaMath
FRI 3/21	10.8	TEST TODAY! GOOD LUCK!!		

HAVE A GREAT SPRING BREAK!

10.1 Notes

Geometry
Equations of Circles

Name: _____

Date: _____

Equation of a Circle: $(x - h)^2 + (y - k)^2 = r^2$ **Radius:** r
Center: (h, k)

Use the following information to write the equation of the circle.

1. Center: $(6, 13)$

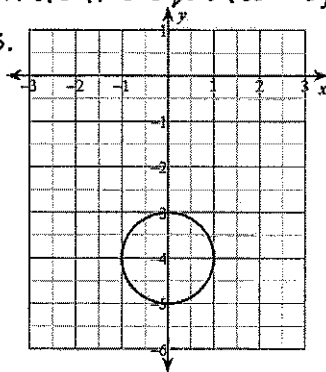
Radius: 3

2. Center: $(15, -8)$

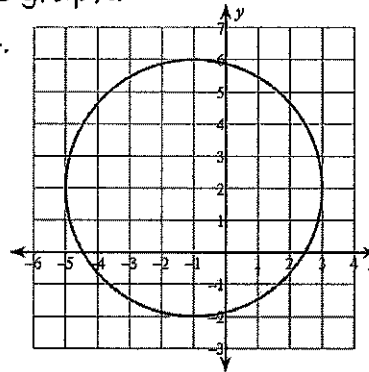
Radius: 4

Write the equation of the circle from the graph.

3.

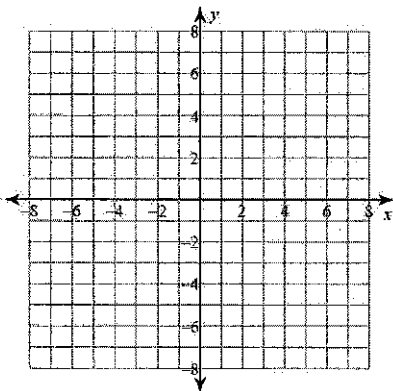


4.

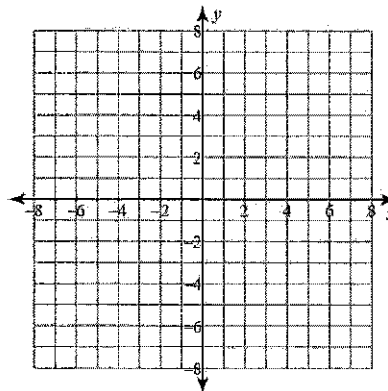


Identify the center and radius of the circle and then graph.

5. $(x + 2)^2 + y^2 = 25$



6. $(x - 1)^2 + (y + 2)^2 = 16$



Determine if the given point is inside, on, or outside the circle.

7. $(x - 3)^2 + (y - 1)^2 = 8$

Point: $(5, -1)$

8. $(x + 1)^2 + (y + 1)^2 = 9$

Point: $(-2, 2)$

DISTANCE FORMULA: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

1. Using the distance formula, write the equation of a circle whose center is $(5, -3)$ and goes through $(2, 5)$.
2. Using the distance formula, write the equation of a circle whose center is $(4, -3)$ and goes through $(1, 5)$.
3. If the center of a circle is at $(1, -1)$ and the radius is 4, does the point $(2, 3)$ lie on the circle?

MIDPOINT FORMULA: $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

1. What is the center of a circle whose diameter has endpoints at $(-5, -4)$ and $(-1, -4)$?
2. Give the equation whose endpoints of a diameter are $(-4, 1)$ and $(4, -5)$.
3. Give the equation whose endpoints of a diameter are $(-3, 2)$ and $(1, -5)$.

10.1 CLASSWORK

Identify the center and radius of each.

1) $(x + 10)^2 + (y + 13)^2 = 25$

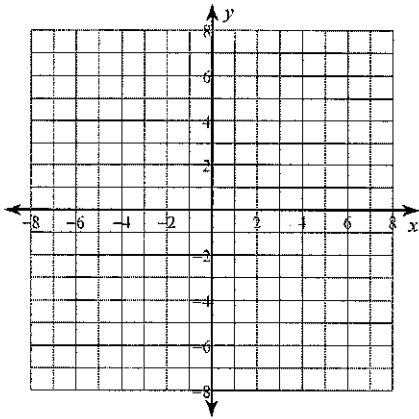
2) $(x - 5)^2 + (y + 4)^2 = 83$

3) $(x - 12)^2 + (y - 14)^2 = 9$

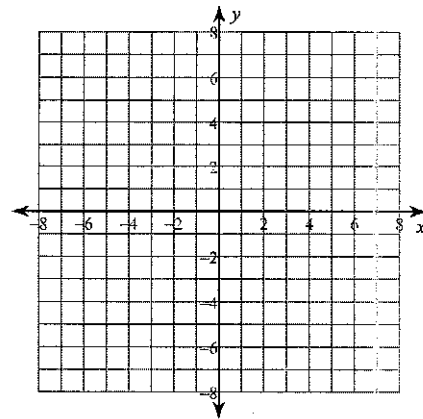
4) $(x + 7)^2 + (y + 10)^2 = 16$

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

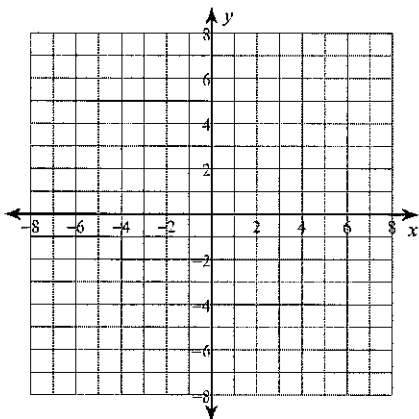
5) $(x - 3)^2 + (y - 4)^2 = 4$



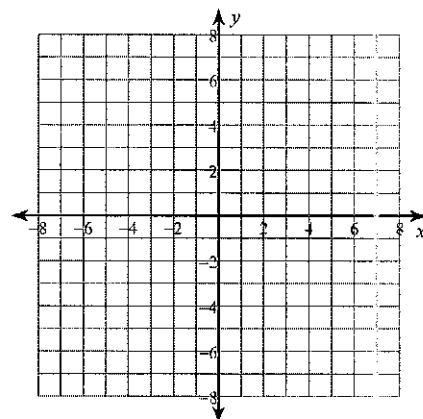
6) $(x + 2)^2 + (y - 2)^2 = 16$



7) $(x + 1)^2 + (y + 1)^2 = 4$



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



10.2 NOTES

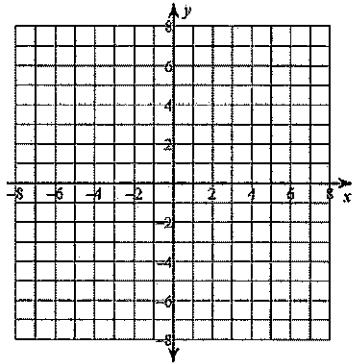
Geometry
Equations of Circles

Name: _____

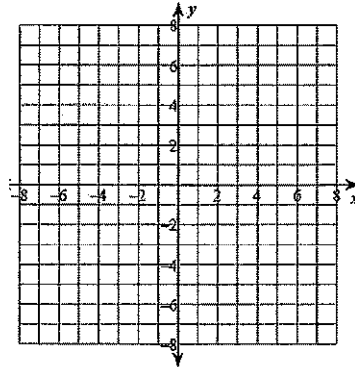
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WARM UP: Identify the center and radius and then graph.

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



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

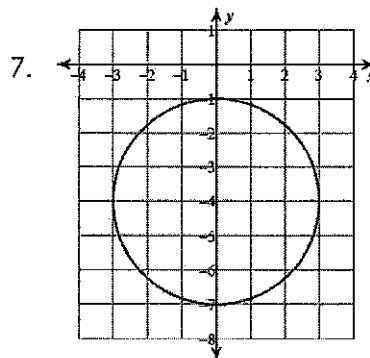
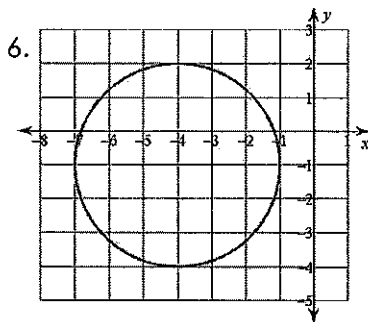


Write the equation of the circle given the center and radius or the graph.

3. Center: $(-4, 0)$
Radius: 4

4. Center: $(-12, 6)$
Radius: 2

5. Center: $(2, -14)$
Radius: $\sqrt{10}$



DISTANCE FORMULA: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

MIDPOINT FORMULA: $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

8. Using the distance formula, write the equation of a circle whose center is $(-2, 4)$ and goes through $(2, -1)$.

9. Give the equation whose endpoints of a diameter are $(-3, 4)$ and $(-5, -2)$.

STANDARD FORM: $(x-h)^2 + (y-k)^2 = r^2$

GENERAL FORM: $ax^2 + by^2 + cx + dy + e = 0$

1. Convert to general form: $x^2 + (y + 4)^2 = 9$.

2. Convert to general form: $(x + 1)^2 + (y - 4)^2 = 8$.

CONVERTING FROM GENERAL TO STANDARD FORM!!!

If the quadratic equation isn't in the standard form for a circle, we must first **complete the square** to get it in the correct form.

Steps to complete the square.

First, prepare the terms:

- Group _____ and leave a space.
- Group _____ and leave a space.
- Move the constant and leave _____.

Then, complete the square:

- $\frac{1}{2}$ the linear term and square it.
- Add to both sides.
- Do this for both x and y.
- Factor and simplify.

1. $x^2 + y^2 + 16x - 22y - 20 = 0$

2. $x^2 + y^2 - 12x + 8y + 32 = 0$

3. $x^2 + y^2 + 2x - 15 = 0$

CLASSWORK 10.2

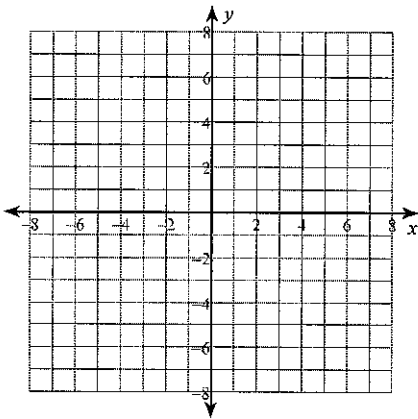
Identify the center and radius of each.

1) $(x + 15)^2 + (y - 12)^2 = 12$

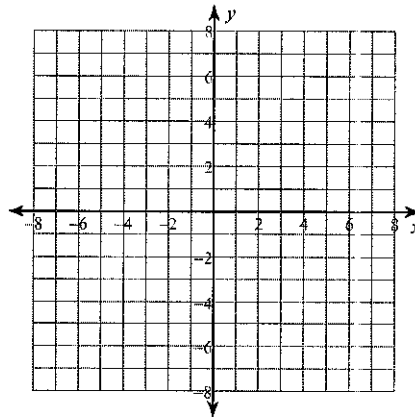
2) $(x + 1)^2 + (y - 4)^2 = 49$

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

3) $x^2 + (y - 1)^2 = 9$



4) $(x - 1)^2 + (y - 1)^2 = 16$



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

5) $x^2 + y^2 - 30x - 26y + 390 = 0$

6) $x^2 + y^2 + 24x + 2y + 129 = 0$

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

9) Center: $(-9, 4)$
Radius: 6

10) Center: $(8, -6)$
Radius: $\sqrt{66}$

11) Center: $(-1, -6)$
Circumference: 12π

12) Center: $(9, 16)$
Circumference: 6π

13) Center: $(15, -11)$
Area: 7π

14) Center: $(\sqrt{146}, -15)$
Area: 4π

15) Center: $(-3, 6)$
Point on Circle: $(-9, 16)$

16) Center: $(0, 9)$
Point on Circle: $(-5, 13)$

17) Ends of a diameter: $(7, 16)$ and $(-11, -14)$

18) Ends of a diameter: $(1, 13)$ and $(5, 17)$

Name _____

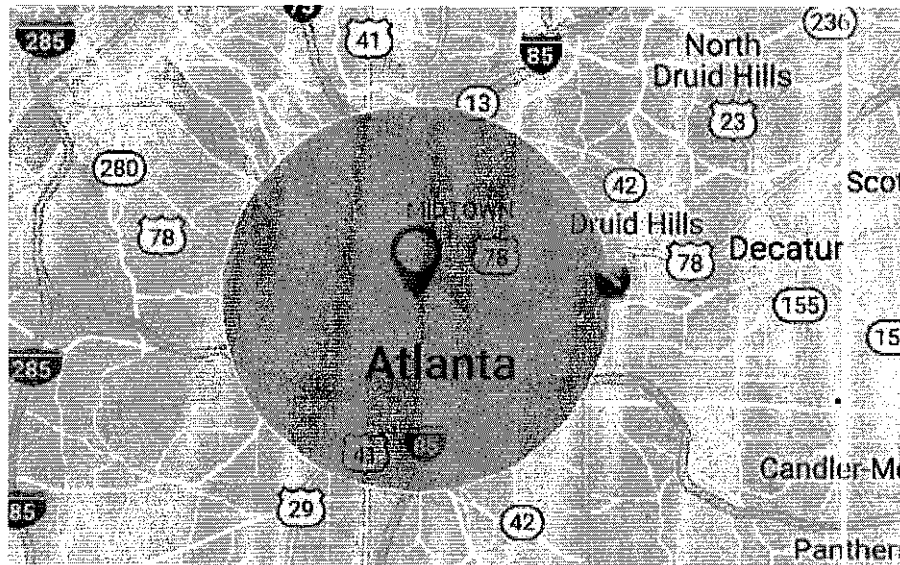
Partner's Name _____

10.3

Circle Word Problems

For today, you and your partner are looking at several circles that surround different locations. Answer the following questions below.

1. A family from out of state comes to visit Atlanta for a vacation. They want to go to certain places around where they are staying, but hope to not drive over a 3 mile radius. They are staying near the Georgia Aquarium, and would like to go to the Botanical Gardens, Little Five points, and Zoo Atlanta. Answer questions 1-2 and figure out what stops they can and cannot make.



A. The Georgia Aquarium is in the center of the shaded circle and has the coordinates (2, 3). The radius of this circle is 3 miles. Write the equation for this circle?

B. Determine whether or not the following locations are inside, outside or on the edge of the circle. Circle the places that the Smith family can visit

a. Atlanta Botanical Gardens (4, 5)

a. _____

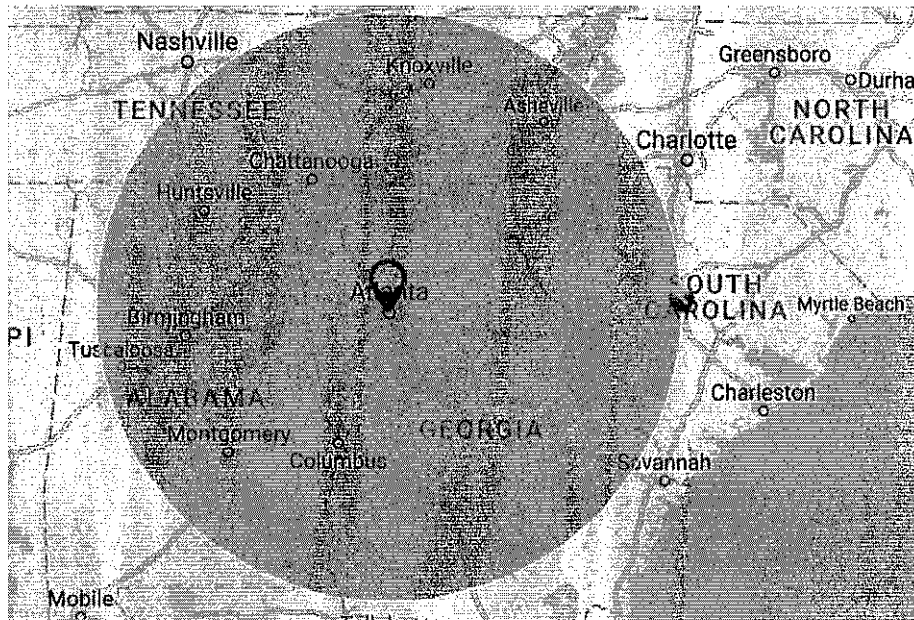
b. Zoo Atlanta (3, 1)

b. _____

c. Little Five Points (5, 3)

c. _____

2. Jenny's parents have decided that she can apply for any college that is within a 150 mile radius from Atlanta. Answer the questions below.



- a. Atlanta is the center of the shaded circle and its coordinates are $(-1, 3)$. Write the equation of the circle if the radius is 150 miles.
- b. Determine whether or not the following colleges lie inside, outside, or on the edge of the circle by using the directional mileage combined with the coordinates for Atlanta (remember Atlanta is the center of our circle). Write each coordinate, whether they are inside, outside, or on the circle, and finally circle the colleges/universities that Jenny **cannot** apply for.

- | | | | |
|------------------------------|-----------|-----------|----------|
| a. Troy University, Alabama | S93 W103 | (,) | a. _____ |
| b. The University of Alabama | S38 W182 | (,) | b. _____ |
| c. Lee University, Tennessee | N96 W27 | (,) | c. _____ |
| d. Valdosta State University | S200 E64 | (,) | d. _____ |
| e. West Carolina University | N123 E89 | (,) | e. _____ |
| f. UNC Chapel Hill | E302 N153 | (,) | f. _____ |
| g. Birmingham Southern Col. | W141 S18 | (,) | g. _____ |
| h. The Citadel | E253 S64 | (,) | h. _____ |

10.3
cont.

Practice with Circles Sudoku

Name _____

Directions: Solve each problem and place the answer in the indicated column and row of the puzzle. (You may need to use a scrap sheet of paper for your work.) When finished, solve the remaining Sudoku puzzle. Remember, each row, each column, and each 3x3 square should have the numbers 1 – 9, with no repetition. Hint: Answers should be **positive integers**.

	A	B	C	D	E	F	G	H	I
1		5				7		6	
2		9	1		4			7	5
3	4	6							3
4				8		9		3	
5	1			7	6	4			2
6		7		5		2			
7	6							5	7
8	7	8			5		1	4	
9		1		9				2	

- Identify the radius of $x^2 + y^2 = 9$. E - 6
- Identify the radius of $(x + 2)^2 + (y - 4)^2 = 49$. E - 9
- Identify the x-coordinate of the center:
 $(x - 5)^2 + (y + 3)^2 = 16$. F - 3
- Identify the y-coordinate of the center:
 $(x + 6)^2 + (y - 4)^2 = 81$. D - 7
- Identify the radius of $x^2 + y^2 - 6x - 2y - 15 = 0$. G - 5
- Identify the y-coordinate of the center:
 $x^2 + y^2 - 2x - 4y = 4$. A - 4
- Identify the x-coordinate of the center:
 $x^2 + y^2 - 12x - 16y + 84 = 0$. I - 4
- Identify the y-coordinate of the center:
 $x^2 + y^2 + 6x - 8y = -4$. B - 4
- Identify the radius of the circle that has a center of (4, 2) and passes through the point (1, 6). A - 9
- Identify the y-coordinate of the center of a circle that passes through the points (-6, 7) and (4, -1). B - 5
- Identify the radius of $x^2 + y^2 - 8x + 4y - 44 = 0$. E - 7
- Identify the x-coordinate of the center of a circle that has endpoints on its diameter of (11, -2) and (7, -8). A - 6

10.5 NOTES

Geometry Parallel & Perpendicular Lines

Name: _____

Date: _____

WARM-UP: What do you remember about slope?

Slope intercept form: $y = mx + b$ *remember: **m** is the slope and **b** is the y-intercept

What is the slope of the following equations? (you might need to solve for y first!)

a. $y = 4x + 3$

b. $y + 3x = 4$

c. $2y - 5x = 12$

Slope between two points: Slope formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$

*remember: when you divide by 0, the slope is _____

Find the slope between the following points:

a. (3, 5) (6, 9)

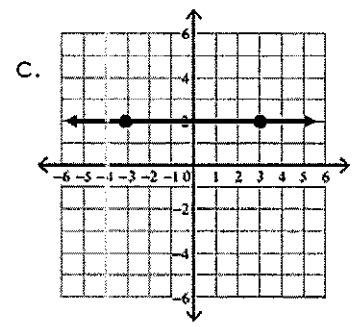
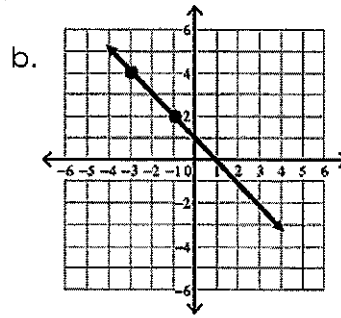
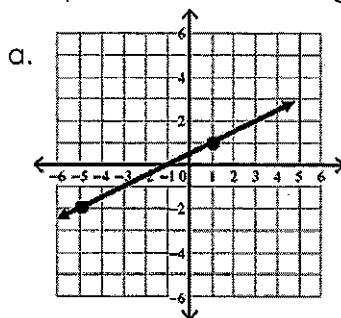
b. (-3, 4) (2, 8)

c. (7, 5) (7, -1)

Slope on a graph: Slope: $\frac{\Delta y}{\Delta x}$ or $\frac{\text{rise}}{\text{run}}$

*ALWAYS count from _____ to _____. ("Run" should be positive)

Find the slope from the following graphs:



Parallel Lines

- **Graphs:**

- Lines _____ intersect and are in the _____ plane.

- **Equations:**

- _____ slopes
 - _____ y - intercepts
-

Are these lines parallel?

1. $y = -2x + 1$ and $y = -2x - 4$

2. $y = 3x - 4$ and $-x + 3y = 9$

Writing an Equation of a Line PARALLEL to another and given a point.

- A. Given equation should be solved for y ($y = mx + b$).
 - B. Write down the slope of that line.
 - C. Substitute m and (x, y) in $y = mx + b$. Solve for b .
 - D. Write the equation using the slope and y -intercept.
-

3. Write a line parallel to the line $2x + y = 3$ and passes through the point $(-2, 5)$.

4. Write a line parallel to the line $y = 3x - 5$ and passes through the point $(-5, -2)$.

5. Write a line parallel to the line $y = -4x + 1$ and passes through the point $(2, -1)$.

6. Write a line parallel to the line $y = -x - 7$ and passes through the point $(-4, -4)$.

10.6 NOTES

Perpendicular Lines

- Graphs:

- Lines intersect at a _____ angle.

- Equations:

- _____ slopes

- _____ y - intercepts

Writing an Equation of a Line PERPENDICULAR to another and given a point.

- A. Given equation should be solved for y. ($y = mx + b$).
- B. Write down the perpendicular slope of that line.
- C. Substitute the new slope and (x, y) in $y = mx + b$. Solve for b.
- D. Write the equation using m and b.

7. Write a line perpendicular to the line $y = \frac{1}{2}x - 2$ and passes through the point $(1, 0)$.

8. Write a line perpendicular to the line $y = -3x + 2$ and passes through the point $(6, 5)$.

9. Write a line perpendicular to the line $2x + 3y = 9$ and passes through the point $(6, -1)$.

10. Write a line perpendicular to the line $y = 2x - 1$ and passes through the point $(2, 4)$.

Parallel Lines

- Parallel lines have the _____ slope.
- Parallel lines _____ intersect.
- Symbol for parallel \rightarrow _____
- Horizontal lines are _____ to each other.
- Vertical lines are _____ to each other.

Perpendicular Lines

- Perpendicular lines have _____ slopes.
- Perpendicular lines intersect at _____ angles.
- Symbol for perpendicular \rightarrow _____
- Horizontal and _____ lines are always perpendicular to each other.

Decide whether the following lines are parallel, perpendicular, or neither.

1. Line p contains points (-3, -1) & (-5, -2)
Line b contains points (-4, -1) & (12, -9)

2. $3x + y = 11$
 $2x - 6y = -18$

$$m_{\text{line p}} = \underline{\hspace{2cm}}$$

$$m_{\text{line b}} = \underline{\hspace{2cm}}$$

$$m_{\text{line j}} = \underline{\hspace{2cm}}$$

$$m_{\text{line s}} = \underline{\hspace{2cm}}$$

Circle: **PARALLEL PERPENDICULAR NEITHER**

Circle: **PARALLEL PERPENDICULAR NEITHER**

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

3. $y = 6$

$$m_{\parallel} = \underline{\hspace{2cm}}$$

$$m_{\perp} = \underline{\hspace{2cm}}$$

4. $3y = 2x - 24$

$$m_{\parallel} = \underline{\hspace{2cm}}$$

$$m_{\perp} = \underline{\hspace{2cm}}$$

Write the slope-intercept equation for a line PARALLEL to the given line and contains the given point.

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

6. $y = -1/2 x + 8$
Contains the point (4, -6)

Write the slope-intercept equation for a line PERPENDICULAR to the given line and contains the point.

7. $y = -1/5 x + 6$
Contains the point (4, 8)

8. $y = 2x - 5$
Contains the point (-8, 2)

Geometry

HW: Parallel & Perpendicular Lines

Name: _____

Date: _____

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

1. Line k contains points (0, 4) & (-3, 2)
Line h contains points (-4, 6) & (2, 10)

2. Line c: $y = -2x + 13$
Line d: $4y - 2x = -8$

$m_{\text{line k}} = \underline{\hspace{2cm}}$

$m_{\text{line c}} = \underline{\hspace{2cm}}$

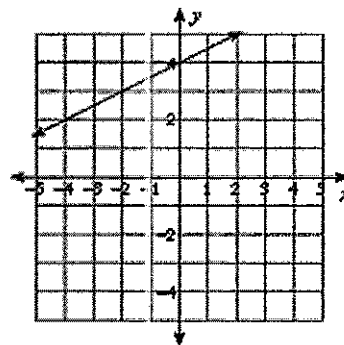
$m_{\text{line h}} = \underline{\hspace{2cm}}$

$m_{\text{line d}} = \underline{\hspace{2cm}}$

Circle one: **PARALLEL** **PERPENDICULAR** **NEITHER**

Circle one: **PARALLEL** **PERPENDICULAR** **NEITHER**

3. Write the equation of a line that is parallel to the line graphed and passes through the point (4, -2).



Equation: $y = \underline{\hspace{2cm}}$

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

4. $y = 7$

5. $2y = 3x - 6$

$m_{\parallel} = \underline{\hspace{2cm}}$

$m_{\parallel} = \underline{\hspace{2cm}}$

$m_{\perp} = \underline{\hspace{2cm}}$

$m_{\perp} = \underline{\hspace{2cm}}$

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

8. $y = 3x - 7$
Contains the point (4, 7)

equation: _____

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

9. $y = \frac{1}{2}x + 10$
Contains the point (5, -6)

equation: _____

_____ 10. What is the slope of a horizontal line?

- A. 0 B. 2 C. undefined D. $\frac{1}{2}$

_____ 11. What is the slope of a vertical line?

- A. 0 B. 2 C. undefined D. $\frac{1}{2}$

Test Review:

Geometry

Review - Circle Equations and Parallel & Perpendicular Lines

Name: _____

Date: _____

PART 1: Circles

Identify the center and radius of each.

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

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

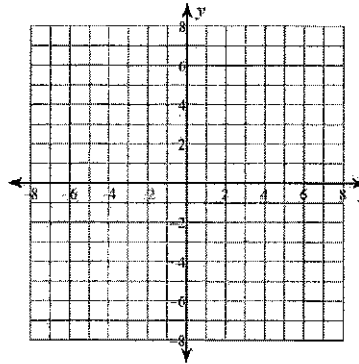
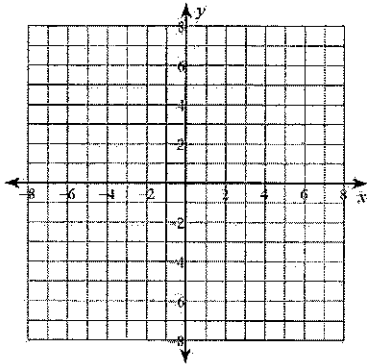
3. $x^2 + y^2 - 8x + 28y + 187 = 0$

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

17. (6, -5)

18. (5, -6)

19. (-2, 3)

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**.)
- * VUX HOY ***
- Two lines are **PERPENDICULAR** if and only if their slopes are **NEGATIVE/OPPOSITE RECIPROCALLS**.
 - 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 $(1, 5)$ & $(3, 9)$

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

$m_{\text{line } p} = \underline{\hspace{2cm}}$

$m_{\text{line } k} = \underline{\hspace{2cm}}$

$m_{\text{line } b} = \underline{\hspace{2cm}}$

$m_{\text{line } h} = \underline{\hspace{2cm}}$

Circle one: **PARALLEL PERPENDICULAR NEITHER**

Circle one: **PARALLEL PERPENDICULAR NEITHER**

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

3. $x = 3$

4. $2y + 3x = 6$

$m_{\parallel} = \underline{\hspace{2cm}}$

$m_{\parallel} = \underline{\hspace{2cm}}$

$m_{\perp} = \underline{\hspace{2cm}}$

$m_{\perp} = \underline{\hspace{2cm}}$

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

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

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

equation:

equation:

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

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

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

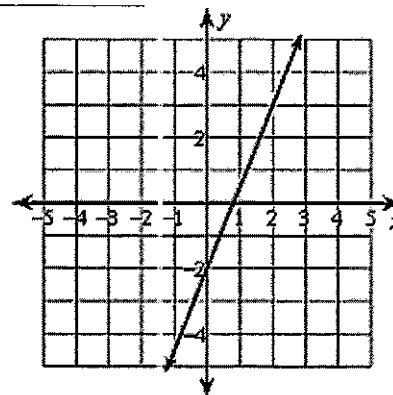
equation:

equation:

Consider the graph to the right.

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

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



part 3: Mixed Review

Name: _____

Date: _____ Period: ____

1. a. Write the equation of this circle in **general** form: $y^2 + x^2 - 1 = -4x + 4y$

b. Now write that equation in **standard** form.

2. What is the slope of a line parallel and perpendicular to a line with a slope of $-5/6$?

$$m_{\parallel} = \underline{\hspace{2cm}}$$

$$m_{\perp} = \underline{\hspace{2cm}}$$

3. A side of a **square** has coordinates $(-3, 2)$ and $(2, 5)$. What is the perimeter of the square?

4. Determine if the following points are inside, outside, or on the circle $(x - 2)^2 + (y + 3)^2 = 220$?

a. $(-8, 8)$

b. $(4, -13)$

c. $(-9, -2)$

5. Find the slope, distance, and midpoint of $(21, 5)$ and $(5, 7)$.

Slope: _____

Distance: _____

Midpoint: _____

6. Find the perpendicular slope of $(12, 4)$ and $(18, 12)$.

7. Write the equation of this circle in general form: $(x - 1)^2 + (y + 2)^2 = 9$

8. Write the equation of this circle in standard form: $y^2 + 8y = -12 - x^2$

Then find the center and radius.

Equation: _____

Center: _____

Radius: _____

9. What is the equation of a circle that has a center $(8, 12)$ and a point on the circle at $(2, -4)$?

10. What is the equation of a circle that has endpoints of a diameter at $(-2, 1)$ and $(5, 5)$?

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

11. $x = -7$ Contains the point $(3, 8)$

12. $3y = x + 15$ Contains the point $(-3, 10)$

equation: _____

equation: _____

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

13. $5x - 3y = 6$ Contains the point $(5, -6)$

14. $y = 4$ Contains the point $(-5, -7)$

equation: _____

equation: _____