Unit 2.5 Practice Slopes of Parallel and Perpendicular Lines   **Period: _____**

Write an equation of the line that passes through the given point and is parallel to the graph of the given equation. Give your answer in slope intercept form.

1. $(3, 2)$; $y = 3x - 2$

   $y = 3x - 7$

2. $(-4, -1)$; $y = 2x + 14$

   $y = 2x + 7$

3. $(-8, 6)$; $y = -\frac{1}{4}x + 5$

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

4. $(6, 2)$; $y = \frac{2}{3}x + 19$

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

5. $(10, -5)$; $y = \frac{3}{2}x - 7$

   $y = \frac{3}{2}x - 20$

6. $(-3, 4)$; $y = 2$

   $y = 4$

Determine whether the graphs of the given equations are parallel, perpendicular, or neither.

7. $y = 4x + 5$ Parallel
       $-4x + y = -13$

8. $y = \frac{7}{9}x - 7$ Neither
       $y = -\frac{7}{9}x + 3$

9. $y = \frac{7}{8}$ Perpendicular
       $x = -4$

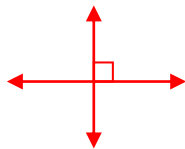10. $y = -6x - 8$ Perpendicular
       $-x + 6y = 12$

11. $3x + 6y = 12$ Parallel
       $y - 4 = -\frac{1}{2}(x + 2)$

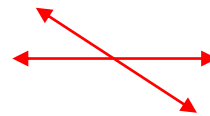12. $y = 4x + 12$ Perpendicular
       $x + 4y = 32$

Determine whether each statement is always, sometimes, or never true. Explain why.

13. Two lines with different slopes are perpendicular.

   Sometimes.

   Different slopes and perpendicular   Different slopes and not perpendicular

14. The slopes of vertical lines and horizontal lines are opposite reciprocals.

   Never.   This one is tricky, because although they are always perpendicular to each other, since a vertical lines slope is undefined then it does not have an opposite reciprocal.

15. A vertical line is perpendicular to the x-axis.

   Always.   All vertical lines are perpendicular to all horizontal lines.

Write an equation of the line that passes through the given point and is perpendicular to the graph of the given equation. Give your answer in slope intercept form.

16. $(2, -1);\quad y = -2x + 1$

$$y = \frac{1}{2}x - 2$$

17. $(5, 7);\quad y = \frac{1}{3}x + 2$

$$y = -3x + 22$$

18. $(3, -6);\quad x + y = -4$

$$y = x - 9$$

19. $(-9, 3);\quad 3x + y = 5$

$$y = \frac{1}{3}x + 6$$

20. $(-8, 3);\quad y + 4 = -\frac{2}{3}(x - 2)$

$$y = \frac{3}{2}x + 15$$

21. $(0, -5);\quad x - 6y = -2$

$$y = -6x - 5$$

22. Write the equation of three lines whose graphs are parallel to one another.

Answers will vary.　　　Possible answers:　$y = x - 9$　　$y = x + 9$　　$y = x - 1$

23. Write the equation of two lines whose graphs are perpendicular to one another.

Answers will vary.　　　Possible answers:　$y = x - 9$　　$y = -x + 9$

24. What is the slope of a line that is parallel to the x-axis?

Slope is zero

25. What is the slope of a line that is perpendicular to the x-axis?

Slope is undefined

26. What is the slope of a line that is parallel to the y-axis?

Slope is undefined

27. What is the slope of a line that is perpendicular to the y-axis?

Slope is zero

28.　　On a map, Sandusky St. passes through coordinates $(2, -1)$ and $(4, 8)$.
　　　Pennsylvania Ave. intersects Sandusky St. and passes through coordinates $(1, 3)$ and $(6, 2)$.
　　　Are these streets perpendicular? Explain why or why not.

Sandusky St. has slope of $\frac{9}{2}$, Pennsylvania Ave. has slope $-\frac{1}{5}$.
The slopes are not opposite reciprocals of each other so the streets are not perpendicular.

29. Explain how you can determine if the graphs of two lines are parallel or perpendicular without graphing the lines.

Find the slopes of each line.
If the slopes are equal then the lines are parallel.
If the slopes are opposite reciprocals of each other, or vertical and horizontal, then the lines are perpendicular.