

Geometry
Writing Equations

Name KEY
Date _____ Period _____

I. State whether the given line passes through the given point.

1. $x + y = 7$ (4, 3) <u>yes</u>	2. $x - y = 5$ (9, 4) <u>yes</u>	3. $x + 2y = 7$ (1, 3) <u>yes</u>	4. $3x - 2y = 8$ (2, -1) <u>yes</u>
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II. A point is to lie on the given line. Find the missing coordinate.

5. $2x - y = 8$ (x, -2) $2x - (-2) = 8$ $2x + 2 = 8$ $2x = 6$ <u>$x = 3$</u>	6. $3x + 2y = 24$ (x, 3) $3x + 2(3) = 24$ $3x + 6 = 24$ $3x = 18$ <u>$x = 6$</u>	7. $x + 2y = 9$ (3, y) $3 + 2y = 9$ $2y = 6$ <u>$y = 3$</u>	8. $2x + 3y = 5$ (-2, y) $2(-2) + 3y = 5$ $-4 + 3y = 5$ $3y = 9$ <u>$y = 3$</u>
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III. Write the equation of the line that contains the given two points.

9. (-2, 2), (0, 8) $m = \frac{2-8}{-2-0} = \frac{-6}{-2} = 3$ $y - 8 = 3(x - 0)$ <u>$y - 8 = 3x$ or $y = 3x + 8$</u>	10. (2, -6), (-5, - $\frac{1}{2}$) $m = \frac{-6 + \frac{1}{2}}{2 + 5} = \frac{-5.5}{7} = -\frac{11}{14}$ $y + 6 = -\frac{11}{14}(x - 2)$ $y + 6 = -\frac{11}{14}x + \frac{11}{7}$ <u>$y = -\frac{11}{14}x - \frac{49}{14}$</u>	11. (9, -11), (9, 13) $m = \frac{-11 - 13}{9 - 9} = \frac{-24}{0}$ (undefined) <u>$x = 9$</u>
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IV. Answer the following.

12. A line contains (4, 3) and (x, 7). It has a slope of 2. Find x. $2 = \frac{3-7}{4-x}$ $2(4-x) = 3-7$ $8-2x = -4$ $-2x = -12$ <u>$x = 6$</u>	13. A line with slope 6 contains (-4, y) and (2, 4y). Find y. $6 = \frac{4y-y}{2+4} \rightarrow 6 = \frac{3y}{6}$ $36 = 3y$ <u>$y = 12$</u>	14. A line contains (-5, 2) and (x, 6). It has a slope of $-\frac{2}{7}$. Find x. $-\frac{2}{7} = \frac{6-2}{x+5} \rightarrow -\frac{2}{7} = \frac{4}{x+5}$ $28 = -2x - 10$ $-2x = 38$ <u>$x = -19$</u>
15. Write the equation of the <u>y-axis</u> in standard form. <u>$x = 0$</u>	16. Write the equation of the line parallel to the <u>x-axis</u> and 10 units below it in standard form. <u>$y = -10$</u>	17. Write the equation of the line with an <u>undefined slope</u> and passes through the point (-7, 9) in standard form. <u>$x = -7$</u>

18. Write the equation of the line with a slope of 0 and passes through the point $(-11, -6)$ in standard form.

$$\boxed{y = -6}$$

19. Write the equation of the line parallel to the x-axis and intersecting the y-axis at $(0, 3)$ in standard form.

$$\boxed{y = 3}$$

20. Find the value m in $y = mx + 3$ so that the point $(3, 4)$ will be on the line.

$$\begin{aligned} & \text{x y} \\ & 4 = 3m + 3 \\ & 3m = 1 \\ & \boxed{m = \frac{1}{3}} \end{aligned}$$

21. Write the equation for the line containing $(2, -3)$ and parallel to the line $3x - y + 4 = 0$ in point slope form.

$$\begin{aligned} 3x - y &= -4 \\ -y &= -3x - 4 \\ y &= 3x + 4 \\ m &= 3 \rightarrow \boxed{y + 3 = 3(x - 2)} \end{aligned}$$

22. Write the equation for the line that contains the point $(5, -1)$ and has the same y-intercept as $x - 3y = 6$ in point slope form.

$$\begin{aligned} x - 3y &= 6 \\ -3y &= -x + 6 \\ y &= \frac{1}{3}x - 2 \quad \text{y-int. } (0, -2) \\ (0, -2) (5, -1) \quad m &= \frac{1}{5} \\ \boxed{y + 2} &= \frac{1}{5}x \end{aligned}$$

23. Write the equation of the line that is perpendicular to $2x - 3y = 6$ and has the same x-intercept as $3x + 4y = 12$ in point slope form.

$$\begin{aligned} 2x - 3y &= 6 \\ -3y &= -2x + 6 \\ y &= \frac{2}{3}x - 2 \\ m &= \frac{2}{3} \\ \perp m &= -\frac{3}{2} \\ 3x + 4y &= 12 \\ 4y &= -3x + 12 \\ y &= -\frac{3}{4}x + 3 \quad \text{y-int. } (0, 3) \\ \boxed{y - 3} &= -\frac{3}{2}x \end{aligned}$$

IV. Write the linear equations in standard form. State the x and y-intercepts.

24. $3y - 12 = 9x$

$$\begin{aligned} 9x - 3y &= -12 \\ 9x &= -12 \\ x &= -\frac{4}{3} \\ -3y &= -12 \\ y &= 4 \end{aligned}$$

$$\boxed{\left(-\frac{4}{3}, 0\right) (0, 4)}$$

25. $x = y$

$$x - y = 0$$

$$\boxed{(0, 0) \text{ both x and y intercepts}}$$

26. $y + 9 = \frac{3}{7}(x - 5)$

$$y + 9 = \frac{3}{7}x - \frac{15}{7}$$

$$7y + 63 = 3x - 15$$

$$\boxed{-3x + 7y = -78} \text{ or } \boxed{3x - 7y = 78}$$

27. $3(x + 4) = y - 8x + 3$

$$3x + 12 = y - 8x + 3$$

$$12 = y - 11x + 3$$

$$\boxed{-11x + y = 9} \text{ or } \boxed{11x - y = -9}$$

Extension:

The graphs of $5x + 2y = 12$ and $5x + 2y = 2$ are parallel lines. Find the equation of the line that is parallel to both lines and lies midway between them. Explain why your answer is correct.

$$5x + 2y = 12$$

$$2y = -5x + 12$$

$$y = -\frac{5}{2}x + 6$$

$$5x + 2y = 2$$

$$2y = -5x + 2$$

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

$$\boxed{y = -\frac{5}{2}x + \frac{7}{2}}$$

* The y intercept is the average of the other two. The slopes are the same.