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Date _____
Geometry

Parallel and Perpendicular Slopes

1. The lines $3y + 1 = 6x + 4$ and $2y + 1 = x - 9$ are

- 1) parallel
2) perpendicular
3) the same line
4) neither parallel nor perpendicular

$$\begin{aligned} 3y + 1 &= 6x + 4 & 2y + 1 &= x - 9 \\ -1 & & -1 & \\ \hline 3y &= 6x + 3 & 2y &= x - 10 \\ \frac{3y}{3} &= \frac{6x+3}{3} & \frac{2y}{2} &= \frac{x-10}{2} \\ y &= 2x + 1 & y &= \frac{1}{2}x - 5 \\ m &= 2 & m &= \frac{1}{2} \end{aligned}$$

not same
not negative reciprocal

2. What is the slope of a line perpendicular to the line whose equation is $5x + 3y = 8$?

- 1) $\frac{5}{3}$
2) $\frac{3}{5}$
3) $\frac{3}{5}$
4) $-\frac{5}{3}$

negative reciprocal slopes

$$\begin{aligned} -5x & & -5x & \\ \hline 3y &= -5x + 8 \\ \frac{3y}{3} &= \frac{-5x+8}{3} \\ y &= -\frac{5}{3}x + \frac{8}{3} \end{aligned}$$

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

3. Which equation represents a line perpendicular to the line whose equation is $2x + 3y = 12$?

- 1) $6y = -4x + 12$
2) $2y = 3x + 6$
3) $2y = -3x + 6$
4) $3y = -2x + 12$

negative reciprocal slopes

$$-2x & & -2x & \\ \hline 3y &= -2x + 12 \\ \frac{3y}{3} &= \frac{-2x+12}{3} \\ y &= -\frac{2}{3}x + 4 \\ m &= -\frac{2}{3} \quad m_{\perp} = \frac{3}{2}$$

$$\frac{3y}{3} = \frac{-2x+12}{3}$$

4. What is the equation of a line that is parallel to the line whose equation is $y = x + 2$?

- 1) $x + y = 5$
2) $2x + y = -2$
3) $y - x = -1$
4) $y - 2x = 3$

same slope

$$y = x - 1$$

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

$$m = 1 \\ m_{\parallel} = 1$$

5. What is the slope of a line perpendicular to the line whose equation is $y = -\frac{2}{3}x - 5$?

- 1) $\frac{3}{2}$
2) $-\frac{2}{3}$
3) $\frac{2}{3}$
4) $\frac{3}{2}$

negative reciprocal slopes

$$m = -\frac{2}{3} \quad m_{\perp} = \frac{3}{2}$$

6. Which equation represents a line parallel to the line whose equation is $2y - 5x = 10$?

- 1) $5y - 2x = 25$
2) $5y + 2x = 10$
3) $4y - 10x = 12$
4) $2y + 10x = 8$

same slope

$$\begin{aligned} 4y - 10x &= 12 \\ +10x &+10x \\ \hline 4y &= 10x + 12 \\ \frac{4y}{4} &= \frac{10x+12}{4} \\ y &= \frac{5}{2}x + 3 \end{aligned}$$

$$\begin{aligned} 2y - 5x &= 10 \\ +5x &+5x \\ \hline 2y &= 5x + 10 \\ \frac{2y}{2} &= \frac{5x+10}{2} \\ y &= \frac{5}{2}x + 5 \\ m &= \frac{5}{2} \\ m_{\parallel} &= \frac{5}{2} \end{aligned}$$

7. What is the slope of a line that is perpendicular to the line whose equation is $3x + 4y = 12$?

- 1) $\frac{3}{4}$
2) $-\frac{3}{4}$
3) $\frac{4}{3}$
4) $-\frac{4}{3}$

negative reciprocal slopes

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

$$m = -\frac{3}{4} \quad m_{\perp} = \frac{4}{3}$$

negative reciprocal slope

8. What is the slope of a line perpendicular to the line whose equation is $y = 3x + 4$?

- 1) $\frac{1}{3}$
- 2) $-\frac{1}{3}$
- 3) 3
- 4) -3

$m = 3$
 $m_{\perp} = -\frac{1}{3}$

9. Two lines are represented by the equations $-\frac{1}{2}y = 6x + 10$ and $y = mx$. For which value of m will the lines be parallel?

- 1) -12 same slope
- 2) -3
- 3) 3
- 4) 12

$-\frac{1}{2}y = 6x + 10$
 $-\frac{1}{2}y = -\frac{1}{2}$
 $y = -12x - 20$
 $m = -12$
 $m_{\parallel} = -12$

10. The lines represented by the equations $y + \frac{1}{2}x = 4$ and $3x + 6y = 12$ are

- 1) the same line
- 2) parallel
- 3) perpendicular
- 4) neither parallel nor perpendicular

$y + \frac{1}{2}x = 4$
 $-\frac{1}{2}x - \frac{1}{2}x = -\frac{3}{2}x$
 $y = -\frac{3}{2}x + 4$
 $3x + 6y = 12$
 $-3x - 3x = -6x$
 $6y = -3x + 12$
 $y = -\frac{1}{2}x + 2$
same slope

11. What is the slope of a line perpendicular to the line whose equation is $2y = -6x + 8$?

- 1) -3
- 2) $\frac{1}{6}$
- 3) $\frac{1}{3}$
- 4) -6

negative reciprocal slopes

$2y = -6x + 8$
 $\frac{2y}{2} = \frac{-6x + 8}{2}$
 $y = -3x + 4$
 $m = -3$
 $m_{\perp} = \frac{1}{3}$

12. Find the slope of a line perpendicular to the line whose equation is $2y - 6x = 4$.

negative reciprocal slopes

$2y - 6x = 4$
 $\frac{2y}{2} = \frac{6x + 4}{2}$
 $y = 3x + 2$
 $m = 3$
 $m_{\perp} = -\frac{1}{3}$