

Section 3.2 – Practice Problems

Find the equation of the line in **General Form**, that passes through the given point and is **parallel** to the given line.

EMERGING LEVEL QUESTIONS

1. $P(0,0); y = 2x - 5$

$m=2$ parallel = same slope

$$\left. \begin{array}{l} y = mx + b \\ 0 = (2)0 + b \\ 0 = b \end{array} \right\} \begin{array}{l} y = 2x + 0 \\ \downarrow \\ \boxed{2x - y = 0} \end{array}$$

↑
(Ax + By + C) general form

2. $P(0,0); x = 2y + 5$

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

$$\left. \begin{array}{l} y = \frac{1}{2}x + b \\ 0 = \frac{1}{2}(0) + b \\ 0 = b \end{array} \right\} \begin{array}{l} y = \frac{x}{2} + 0 \\ \downarrow \\ \frac{x}{2} - y = 0 \\ \boxed{x - 2y = 0} \end{array}$$

3. $P(1,3); 3x - y = 6$

$y = 3x - 6$
 $m=3$

$$\left. \begin{array}{l} (3) = 3(1) + b \\ \overset{-3}{3} = \overset{-3}{3} + b \\ 0 = b \end{array} \right\} \begin{array}{l} y = 3x + 0 \\ \boxed{3x - y = 0} \end{array}$$

4. $P(-2,0); 2x + 5y = 3$

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

$$\left. \begin{array}{l} 0 = \left(\frac{-2}{5}\right)(-2) + b \\ 0 = \frac{4}{5} + b \\ \overset{-4}{0} = \overset{-4}{5} + b \end{array} \right\} \begin{array}{l} y = \frac{-2}{5}x \\ \frac{-2}{5}x - y - \frac{4}{5} = 0 \\ -2x - 5y - 4 = 0 \\ \boxed{2x + 5y + 4 = 0} \end{array}$$

5. $P(-6, 3); y + 4x = -8$

$$y = -4x - 8$$

↑ $m = -4$

$$3 = (-4)(-6) + b$$

$$\begin{matrix} -24 & -24 \\ 3 = 24 + b \end{matrix}$$

$$-21 = b$$

$$y = -4x - 21$$

$$-4x - y - 21 = 0$$

$4x + y + 21 = 0$

6. $P(5, -2); 3y + 1 = -4x$

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

↑ $-\frac{4}{3} = m$

$$-2 = -\frac{4}{3}(5) + b$$

$$-2 = -\frac{20}{3} + b$$

$$-2 + \frac{20}{3} = b$$

$$\frac{-6}{3} + \frac{20}{3} = b$$

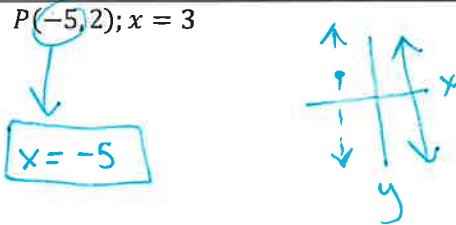
$$\frac{14}{3} = b$$

$$y = -\frac{4}{3}x + \frac{14}{3}$$

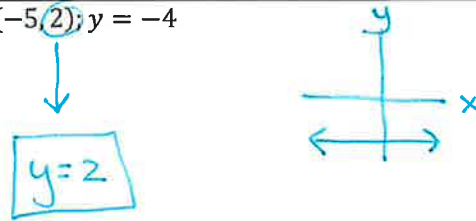
$$\frac{4}{3}x + y - \frac{14}{3} = 0$$

$4x + 3y - 14 = 0$

7. $P(-5, 2); x = 3$



8. $P(-5, 2); y = -4$



Find the equation of the line in **General Form**, that passes through the given point and is **perpendicular** to the given line.

PROFICIENT LEVEL QUESTIONS

9. $P(0,0); y = 2x - 5$

$\uparrow m = -\frac{1}{2}$
 $0 = 0(-\frac{1}{2}) + b$
 $b = 0$
 $y = -\frac{1}{2}x + 0$
 $-\frac{1}{2}x - y = 0$
 $x + 2y = 0$

10. $P(0,0); x = 2y + 5$

$y = \frac{1}{2}x - \frac{5}{2}$
 $\uparrow m = -2$
 $0 = -2(0) + b$
 $b = 0$
 $y = -2x + 0$
 $2x + y = 0$

11. $P(1,3); 3x - y = 6$

$y = 3x - 6$
 $\uparrow m = -\frac{1}{3}$
 $3 = -\frac{1}{3}(1) + b$
 $b = 3 + \frac{1}{3}$
 $b = \frac{9}{3} + \frac{1}{3}$
 $b = \frac{10}{3}$
 $y = -\frac{1}{3}x + \frac{10}{3}$
 $\frac{1}{3}x + y - \frac{10}{3} = 0$
 $x + 3y - 10 = 0$

12. $P(-2,0); 2x + 5y = 3$

$y = -\frac{2}{5}x + \frac{3}{5}$
 $\uparrow m = \frac{5}{2}$
 $0 = \frac{5}{2}(-2) + b$
 $b = 5$
 $y = \frac{5}{2}x + 5$
 $\frac{5}{2}x - y + 5 = 0$
 $5x - 2y + 10 = 0$

13. $P(-6, 3); y + 4x = -8$

$$y = -4x - 8$$

$\nearrow m = \frac{1}{4}$

$$3 = \frac{1}{4}(-6) + b$$

$$3 + \frac{6}{4} = b$$

$$3 + \frac{3}{2} = b$$

$$\frac{6}{2} + \frac{3}{2} = b$$

$$\frac{9}{2} = b$$

$$y = \frac{1}{4}x + \frac{9}{2}$$

$$\frac{1}{4}x - y + \frac{9}{2} = 0$$

$$\boxed{x - 4y + 18 = 0}$$

14. $P(5, -2); 3y + 1 = -4x$

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

$\nearrow m = \frac{3}{4}$

$$-2 = \left(\frac{3}{4}\right)5 + b$$

$$-2 - \frac{15}{4} = b$$

$$-\frac{8}{4} - \frac{15}{4} = b$$

$$-\frac{23}{4} = b$$

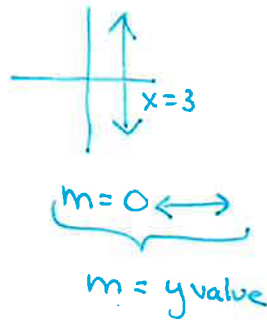
$$y = \frac{3}{4}x - \frac{23}{4}$$

$$\frac{3}{4}x - y - \frac{23}{4} = 0$$

$$\boxed{3x - 4y - 23 = 0}$$

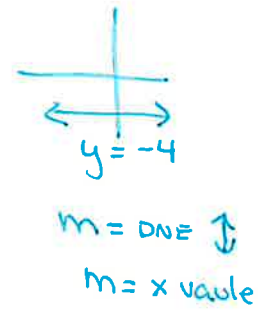
15. $P(-5, 2); x = 3$

$$\boxed{y = 2}$$



16. $P(-5, 2); y = -4$

$$\boxed{x = -5}$$



EXTENDING LEVEL QUESTIONS

17. Find the equation of a line **parallel** to $3x + 4y = 8$ with the same y -intercept as $5x - 3y = 10$

find m from this

$$\rightarrow 3x + 4y = 8$$

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

$m \rightarrow m = \frac{-3}{4}$

find b from this

$$\rightarrow 5x - 3y = 10$$

$$y = \frac{5}{3}x - \frac{10}{3}$$

$b = -\frac{10}{3}$

$$y = \frac{-3}{4}x - \frac{10}{3} \quad \text{or} \quad 9x + 12y = -40$$

18. Find the equation of a line **perpendicular** to $x - 3y = 8$ with the same y -intercept as $3x + 2y = 6$

$-3y = -x + 8$

$$y = \frac{1}{3}x - \frac{8}{3}$$

$m = -3$

$2y = -3x + 6$

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

$b = 3$

$$y = -3x + 3 \quad \text{or} \quad 3x + y = 3$$

19. Find the equation of a line **parallel** to $2x + 7y = 10$ with the same x -intercept as $3x - 4y = 5$

$$7y = -2x + 10$$

$$y = -\frac{2}{7}x + \frac{10}{7}$$

$m = -\frac{2}{7}$

for x -intercept, set $y = 0$

$$\rightarrow 3x - 4(0) = 5$$

$$3x = 5$$

$$x = \frac{5}{3} \rightarrow \left(\frac{5}{3}, 0\right)$$

solve for b with m and point \nearrow

$$\rightarrow 0 = -\frac{2}{7}\left(\frac{5}{3}\right) + b$$

$$b = \frac{10}{21}$$

$$y = -\frac{2}{7}x + \frac{10}{21}$$