

section 3.3

3.3 $\perp$

$$y = mx + b$$

$$156) m=8 \quad (0, -6) \rightarrow b=-6 \quad y=(8)x+(-6)$$

$$\underline{\underline{y=8x-6}}$$

$$158) m=-1 \quad (0, 3) \rightarrow b=3 \quad y=(-1)x+(3)$$

$$\underline{\underline{y=-x+3}}$$

$$160) m=-\frac{3}{4} \quad (0, -2) \rightarrow b=-2 \quad y=(-\frac{3}{4})x+(-2)$$

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

$$162) m=-4 \quad (0, 0) \rightarrow b=0 \quad y=(-4)x+(0)$$

$$\underline{\underline{y=-4x}}$$

for 163-170 open the on-line text for picture of graph

164) diagonal line

point: (2, 0)

$$m = \frac{-2}{1} = -2$$

$$y - (0) = -2(x - (2))$$

$$y - 0 = -2(x - 2)$$

$$\underline{\underline{y = -2x + 4}}$$

166) diagonal line

point: (4, 5)

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

$$y - (5) = \frac{3}{4}(x - (4))$$

$$y - 5 = \frac{3}{4}(x - 4)$$

$$y - 5 = \frac{3}{4}x - 3$$

$$\begin{array}{cc} +5 & +5 \end{array}$$

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

168) diagonal line

point: (2, -4)

$$m = \frac{-3}{2}$$

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

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

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

$$\begin{array}{cc} -4 & -4 \end{array}$$

$$\underline{\underline{y = -\frac{3}{2}x - 1}}$$

170) Horizontal line

point: (-3, 6) $\underline{\underline{y=6}}$

$$y - y_1 = m(x - x_1)$$

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172) $m = \frac{5}{6}$; (6, 7)

$$y - (7) = \frac{5}{6}(x - (6))$$

$$y - 7 = \frac{5}{6}(x - 6)$$

$$\begin{array}{rcl} y - 7 & = & \frac{5}{6}x - 5 \\ +7 & & +7 \end{array}$$

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

174) $m = \frac{-3}{4}$; (8, -5)

$$y - (-5) = \frac{-3}{4}(x - (8))$$

$$y + 5 = \frac{-3}{4}(x - 8)$$

$$\begin{array}{rcl} y + 5 & = & \frac{-3}{4}x + 6 \\ -5 & & -5 \end{array}$$

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

176) $m = \frac{-5}{2}$; (-8, -2)

$$y - (-2) = \frac{-5}{2}(x - (-8))$$

$$y + 2 = \frac{-5}{2}(x + 8)$$

$$\begin{array}{rcl} y + 2 & = & \frac{-5}{2}x - 20 \\ -2 & & -2 \end{array}$$

$$\underline{\underline{y = \frac{-5}{2}x - 22}}$$

178) $m = -4$; (-2, -3)

$$y - (-3) = -4(x - (-2))$$

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

$$\begin{array}{rcl} y + 3 & = & -4x - 8 \\ -3 & & -3 \end{array}$$

$$\underline{\underline{y = -4x - 11}}$$

180) Horizontal line (-2, 5)

$$\underline{\underline{y = 5}}$$

182) Horizontal line (4, -8)

$$\underline{\underline{y = -8}}$$

184) (4, 3) ; (8, 1)

$$m = \frac{(1) - (3)}{(8) - (4)} = \frac{-2}{4} = \frac{-1}{2}$$

$$y - (3) = \frac{-1}{2}(x - (4))$$

$$y - 3 = \frac{-1}{2}(x - 4)$$

$$y - 3 = \frac{-1}{2}x + 2$$

$$\begin{array}{rcl} & +3 & +3 \end{array}$$

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

$$186) (-5, -3); (4, -6)$$

$$m = \frac{(-6) - (-3)}{(4) - (-5)} = \frac{-3}{9} = -\frac{1}{3}$$

$$y - (-3) = -\frac{1}{3}(x - (-5))$$

$$y + 3 = -\frac{1}{3}(x + 5)$$

$$y + 3 = -\frac{1}{3}x - \frac{5}{3}$$

$$y = -\frac{1}{3}x - \frac{5}{3} - 3$$

$$y = -\frac{1}{3}x - \frac{14}{3}$$

$$188) (-2, 8); (-4, -6)$$

$$m = \frac{(-6) - (8)}{(-4) - (-2)} = \frac{-14}{-2} = 7$$

$$y - (8) = 7(x - (-2))$$

$$y - 8 = 7(x + 2)$$

$$y - 8 = 7x + 14$$

$$y = 7x + 22$$

$$190) (0, -2); (-5, -3)$$

$$m = \frac{(-3) - (-2)}{(-5) - (0)} = \frac{-1}{-5} = \frac{1}{5}$$

$$y - (-2) = \frac{1}{5}(x - (0))$$

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

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

$$192) (-2, 1); (-2, -4)$$

$$m = \frac{(-4) - (1)}{(-2) - (-2)} = \frac{-5}{0}$$

no slope $\Rightarrow$ Vertical line:

$$\underline{x = -2}$$

$$194) (-6, -3); (-1, -3)$$

$$m = \frac{(-3) - (-3)}{(-1) - (-6)} = \frac{0}{5} = 0$$

0 slope $\rightarrow$ Horizontal line

$$\underline{y = -3}$$

$$196) \parallel \text{ to } y = -3x - 1$$

$$m_1 = -3$$

$$m_2 = m_1 = -3$$

point (2, -3)

$$y - (-3) = -3(x - (2))$$

$$y + 3 = -3(x - 2)$$

$$\begin{array}{r} y + 3 = -3x + 6 \\ -3 \qquad -3 \end{array}$$

$$\underline{\underline{y = -3x + 3}}$$

$$198) \parallel \text{ to } 2x + 3y = 6$$

$$\begin{array}{r} -2x \qquad -2x \\ \hline 3y = -2x + 6 \\ \frac{3y}{3} = \frac{-2x + 6}{3} \end{array}$$

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

$$m_1 = \frac{-2}{3}$$

$$m_2 = m_1 = \frac{-2}{3}$$

point: (0, 5)

$$y - (5) = \frac{-2}{3}(x - (0))$$

$$\begin{array}{r} y - 5 = \frac{-2}{3}x \\ +5 \qquad +5 \end{array}$$

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

$$200) \parallel \text{ to } x - 2 = 0$$

$$\begin{array}{r} +2 \quad +2 \\ \hline x = 2 \end{array}$$

Vertical line

point: (1, -2)

$$\underline{\underline{x = 1}}$$

$$202) \parallel \text{ to } y + 2 = 0$$

$$\begin{array}{r} -2 \quad -2 \\ \hline y = -2 \end{array}$$

Horizontal line

point: (3, -3)

$$\underline{\underline{y = -3}}$$

$$204) \perp \text{ to } y = -x + 5$$

$$m_1 = -1$$

$$m_2 = \frac{-1}{m_1} = \frac{-1}{(-1)} = 1$$

$$\text{point: } (3, 3)$$

$$y - (3) = 1(x - (3))$$

$$y - 3 = 1(x - 3)$$

$$\begin{array}{r} y - 3 = x - 3 \\ +3 \quad \quad +3 \\ \hline \end{array}$$

$$y = x + 0$$

$$\underline{\underline{y = x}}$$

$$206) \perp \text{ to } y = \frac{2}{3}x - 4$$

$$m_1 = \frac{2}{3}$$

$$m_2 = \frac{-1}{m_1} = \frac{-1}{(\frac{2}{3})} = \frac{-3}{2}$$

$$\text{point: } (2, -4)$$

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

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

$$\begin{array}{r} y + 4 = \frac{-3}{2}x + 3 \\ -4 \quad \quad -4 \\ \hline \end{array}$$

$$\underline{\underline{y = \frac{-3}{2}x - 1}}$$

$$208) \perp \text{ to } 4x - 3y = 5$$

$$\begin{array}{r} -5 + 3y \quad -5 + 3y \\ \hline \end{array}$$

$$\begin{array}{r} 4x - 5 = 3y \\ 3 \quad \quad 3 \\ \hline \end{array}$$

$$\frac{4}{3}x - \frac{5}{3} = y$$

$$m_1 = \frac{4}{3}$$

$$m_2 = \frac{-1}{m_1} = \frac{-1}{(\frac{4}{3})} = \frac{-3}{4}$$

$$\text{point: } (-3, 2)$$

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

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

$$y - 2 = \frac{-3}{4}x - \frac{9}{4}$$

$$\begin{array}{r} +2 \quad \quad +2 \\ \hline \end{array}$$

$$y = \frac{-3}{4}x - \frac{9}{4} + 2$$

$$y = \frac{-3}{4}x - \frac{9}{4} + \frac{8}{4}$$

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

$$210) \perp \text{ to } 4x + 5y = -3$$

$$\begin{array}{r} -4x \quad -4x \\ \hline 5y = -4x - 3 \\ \hline \end{array}$$

$$y = \frac{-4}{5}x - \frac{3}{5}$$

$$m_1 = \frac{-4}{5}$$

$$m_2 = \frac{-1}{m_1} = \frac{-1}{\left(\frac{-4}{5}\right)} = \frac{5}{4}$$

$$\text{point: } (0, 0)$$

$$y - (0) = \frac{5}{4}(x - (0))$$

$$\underline{\underline{y = \frac{5}{4}x}}$$

$$212) \perp \text{ to line } x = -5$$

$\perp$ to Vertical line is Horizontal line

$$\text{point: } (1, -2) \quad \underline{\underline{y = -2}}$$

$$214) \perp \text{ to line } x = -1$$

$\perp$ to Vertical line is Horizontal line

$$\text{point: } (-4, 0) \quad \underline{\underline{y = 0}} \leftarrow x\text{-axis}$$

$$216) \perp \text{ to line } \begin{array}{r} y - 6 = 0 \\ +6 \quad +6 \\ \hline \end{array}$$

$$y = 6$$

$\perp$ Horizontal line is Vertical line

$$\text{point: } (-5, -3) \quad \underline{\underline{x = -5}}$$

218) $\perp$ to y -axis $\rightarrow x=0$

$\perp$ to Vertical line is Horizontal line

point: $(2, 1)$ $y = 1$

220) $(-2, 0); (-3, -2)$

$$y - (0) = 2(x - (-2))$$

$$y = 2(x + 2)$$

$$m = \frac{(-2) - (0)}{(-3) - (-2)} = \frac{-2}{-1} = 2$$

$$y = 2x + 4$$

222) $m = \frac{5}{6}$

point $(6, 7)$

$$y - (7) = \frac{5}{6}(x - (6))$$

$$y - 7 = \frac{5}{6}(x - 6)$$

$$y - 7 = \frac{5}{6}x - 5$$

$$\begin{array}{r} +7 \qquad \qquad +7 \\ \hline y = \frac{5}{6}x + 2 \end{array}$$

224) $\perp$ to $2x + 3y = 6$

$$\begin{array}{r} -2x \qquad -2x \\ \hline 3y = -2x + 6 \\ \hline 3 \qquad 3 \end{array}$$

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

$$m_1 = -\frac{2}{3}$$

$$m_2 = \frac{-1}{m_1} = \frac{-1}{(-\frac{2}{3})} = \frac{3}{2}$$

point: $(0, 5)$

$$y - (5) = \frac{3}{2}(x - (0))$$

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

$$\begin{array}{r} +5 \qquad \qquad +5 \\ \hline y = \frac{3}{2}x + 5 \end{array}$$

$$226) m = \frac{-3}{5}$$

point (10, -5)

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

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

$$y + 5 = \frac{-3}{5}x + 6$$

$$\underline{\underline{y = \frac{-3}{5}x + 1}}$$

$$228) \perp \text{ to } y\text{-axis} \rightarrow x = 0$$

$\perp$ to Vertical line is Horizontal line

point (-6, 2)

$$\underline{\underline{y = 2}}$$

$$230) \parallel \text{ to } x = -4 \quad \text{Vertical line}$$

point: (-3, -5)

$$\underline{\underline{x = -3}}$$

$$232) (-5, -3); (4, -6)$$

$$m = \frac{(-6) - (-3)}{(4) - (-5)} = \frac{-3}{9} = \frac{-1}{3}$$

$$y - (-6) = \frac{-1}{3}(x - (4))$$

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

$$y + 6 = \frac{-1}{3}x + \frac{4}{3}$$

$$\underline{\underline{y = \frac{-1}{3}x - 6}}$$

$$234) \perp \text{ to } 4x + 3y = 1$$

$$\frac{-4x}{3} \quad \frac{-4x}{3}$$

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

$$m_1 = \frac{-4}{3}$$

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

$$y = \frac{-1}{3}x + \frac{4}{3} - 6$$

$$y = \frac{-1}{3}x + \frac{4}{3} - \frac{18}{3}$$

$$\underline{\underline{y = \frac{-1}{3}x - \frac{14}{3}}}$$

$$m_2 = \frac{-1}{m_1} = \frac{-1}{(\frac{-4}{3})} = \frac{3}{4}$$

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

$$\underline{\underline{y = \frac{3}{4}x}}$$

point: (0, 0)