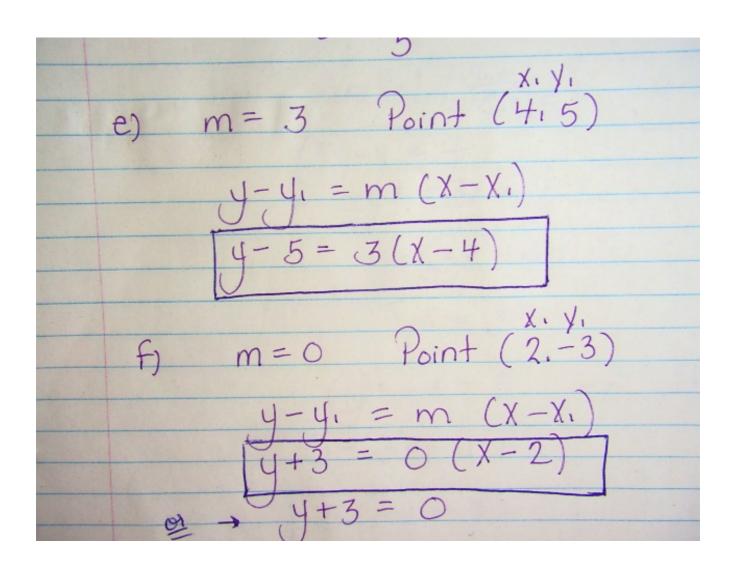1. Find the equation of each line. (Answers in Slope - Point Form)

   (a) It has slope $-\frac{2}{3}$ and x-intercept 3.   (b) It passes through (4, 5) and (−1, −1).

   (c) It has y-intercept $\frac{3}{2}$ and slope −2.   (d) It has slope $-\frac{1}{2}$ and x-intercept $\frac{2}{3}$.

   (e) It has slope 3 and passes through (4, 5).
   (f) It has slope 0 and passes through (2, −3).
   (g) It has an undefined slope and passes through (−1, 2).

2. Find the equation for the line that has the following properties. (Answers in General Form)

   (a) y-intercept −3, slope $\frac{2}{3}$ (b) parallel to $3x - y = 4$, y-intercept 5

   (c) perpendicular to $2x - y = 5$, passes through (−3, 0)
   (d) passes through (−2, 1), parallel to the x-axis

   (e) x-intercept $\frac{2}{3}$, slope 3   (f) perpendicular to $y = 2x$, x-intercept $-\frac{1}{2}$

   (g) A line is perpendicular to $y = 2x - 1$ and passes through (2, −3). Find its equation.
   (h) A line has the same x-intercept as $2x + y = 8$ and passes through (0, 1). Find its equation.
   (i) A line passes through (−4, 2) and has the same y-intercept as $2x - y = 3$. Find its equation.

3. Points A(−4, −3), B(−2, 3), and C(3, 0) are given.
   (a) Find the equation of the line AB. (Slope- Point Form)
   (b) Find the equation of the line through C perpendicular to AB. (General Form)

4. ΔPQR is given by the co-ordinates P(−4, 5), Q(3, 7), and R(0, −4).
   (a) Find the equation of the line through P and parallel to RQ. (Slope- Point Form)
   (b) Find the equation of the line through P, which is perpendicular to RQ. (Slope- Point Form)

1. a) $m = -\dfrac{2}{3}$ x-int = $\overset{x_1 \; y_1}{(3, 0)}$

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

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

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

b) $\overset{x_1 \; y_1}{(4, 5)}$ $\overset{x_2 \; y_2}{(-1, -1)}$

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$m = \dfrac{-1 - 5}{-1 - 4}$

$m = \dfrac{-6}{-5}$

$m = \dfrac{6}{5}$

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

$$\boxed{y - 5 = \frac{6}{5}(x - 4)}$$

e) $m = 3$ Point $\overset{x_1 \; y_1}{(4, \; 5)}$

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

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

f) $m = 0$ Point $\overset{x_1 \; y_1}{(2, -3)}$

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

$$\boxed{y + 3 = 0(x - 2)}$$

$$y + 3 = 0$$

g) $m = \dfrac{1}{0}$ Point $(-1, 2)$

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

$\boxed{y - 2 = \dfrac{1}{0}(x + 1)}$

#2.   a) $b = -3$ $m = \dfrac{2}{3}$

$y = \dfrac{2}{3}x - 3$ $\longrightarrow$ General.

$(3y) = 2x - 9$

$0 = 2x - 3y - 9$

$\boxed{2x - 3y - 9 = 0}$

b)   Parallel $\left(\frac{\text{Same}}{\text{Slope}}\right)$ $y\text{-int} = 5.$

$\boxed{3x} - y = 4$ $b = 5.$

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

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

$m = 3$

$\boxed{y} = 3x + 5$ $\longrightarrow$ General.

$0 = 3x - y + 5.$

$\boxed{3x - y + 5 = 0}$

c)   Perp. $\left(\begin{smallmatrix}\text{opp.}\\ \text{rec.}\\ \text{Slope}\end{smallmatrix}\right)$

$\boxed{2X} - y = 5.$

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

$y = \boxed{2}x - 5.$

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

$m = -\dfrac{1}{2}$ Point $(-3, 0)$ $^{x_1 \; y_1}$

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

$y - 0 = -\dfrac{1}{2}(x + 3)$

$y^{\times 2} = -\dfrac{1}{2}^{\times 2}(x + 3)$

$2y = -1(x + 3)$

$2y = \boxed{-1x} \boxed{-3}.$

$$\boxed{1X + 2y + 3 = 0}$$

$x_1 \; y_1$

d) Point $(-2, 1)$ $\overset{x_1 \, y_1}{}$ Parallel $\left(\begin{array}{c}\text{Same} \\ \text{Slope}\end{array}\right)$

$$x\text{-axis} \; = \; 0$$

$$m = 0$$

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

$$y - 1 = 0(x + 2) \quad \rightarrow \; \text{General.}$$

$$\boxed{y - 1 = 0}$$

9) Perp. $y = ②x - 1$ Point $\overset{x_1 \ y_1}{(2, -3)}$

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

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

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

$$2y + 6 = -1(x - 2)$$

$$2y + 6 = -1x + 2$$

$$1x + 2y + 6 - 2 = 0$$

$$\boxed{1x + 2y + 4 = 0}$$

3.

a) $A(-4,-3)$ $B(-2,3)$
with $x_1\ y_1$ over $A(-4,-3)$ and $x_2\ y_2$ over $B(-2,3)$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{3+3}{-2+4}$$

$$m = \frac{6}{2}$$

$$m = 3$$

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

$$\boxed{y + 3 = 3(x+4)}$$

b)   Perp to AB

Slope of AB = 3 $m = -\frac{1}{3}$

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

$$y - 0 = -\frac{1}{3}(x-3)$$

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

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

$$3y = -1x + 3$$

$$1x + 3y - 3 = 0$$

4. a)   Point $P(\overset{x_1 \ y_1}{-4,5})$ Para$\left(\overset{\text{Same}}{\text{slope}}\right)$ $R(\overset{x_1 \ y_1}{0,-4})$ $Q(\overset{x_2 \ y_2}{3,7})$

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

$$\boxed{y - 5 = \frac{11}{3}(x+4)}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{7+4}{3-0}$$

$$m = \frac{11}{3}$$

b)   Point $P(\overset{x_1 \ y_1}{-4,5})$ Per$\left(\overset{\text{opp}}{\text{rec}}\right)$ R Q

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

$$\boxed{y - 5 = \frac{-3}{11}(x+4)}$$

Slope of RQ = $\frac{11}{3}$.

Perpendicular = $\frac{-3}{11}$