1. Graph the following lines on the same set of axes. Then state the equation of each line.

   a) through the point $A(-6,1)$ with a slope of $\frac{1}{2}$

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

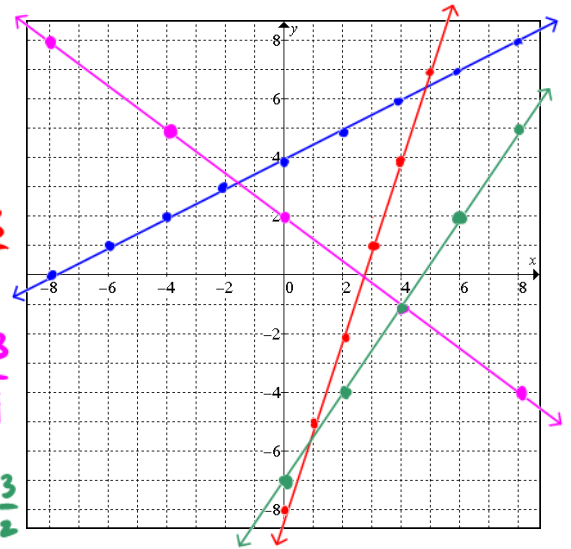   b) through the point $B(3,1)$ with a slope of 3 $\longrightarrow$ slope $= \frac{3}{1}$

      Answer: $y = 3x - 8$

   c) through the point $C(-8,8)$ and parallel to the $\longrightarrow$ slope $= \frac{-3}{4}$

      line $y = -\frac{3}{4}x + 20$ *Answer:* $y = -\frac{3}{4}x + 2$

   d) through the point $D(6,2)$ and perpendicular to the $\longrightarrow$ slope $= \frac{3}{2}$

      line $y = -\frac{2}{3}x - 91$ *Answer:* $y = \frac{3}{2}x - 7$

2. Graph the following lines on the same set of axes. Then state the equation of each line.
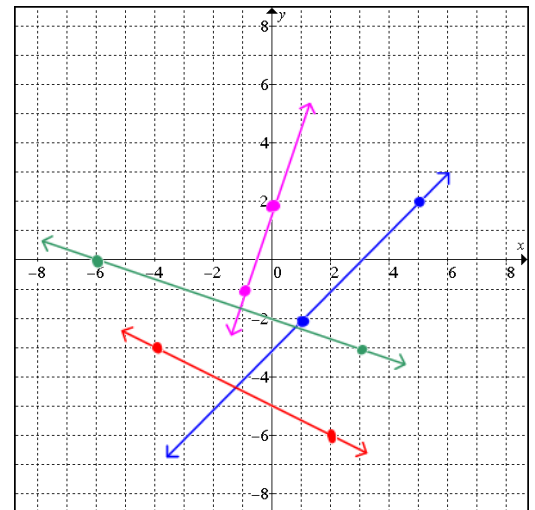
   a) through the points $A(5,2)$ and $B(1,-2)$

      Answer: $y = \frac{4}{4}x - 3 \longrightarrow y = x - 3$

   b) through the points $C(-4,-3)$ and $D(2,-6)$

      Answer: $y = \frac{-3}{6}x - 5 \longrightarrow y = -\frac{1}{2}x - 5$

   c) with a y-intercept of 2 and passing through the

      point $E(-1,-1)$ *Answer:* $y = \frac{3}{1}x + 2 \longrightarrow y = 3x + 2$

   d) with an x-intercept of -6 and passing through the

      point $F(3,-3)$ *Answer:* $y = \frac{-3}{9}x - 2 \longrightarrow y = -\frac{1}{3}x - 2$

3. Graph the following lines on the same set of axes. Then state the equation of each line.
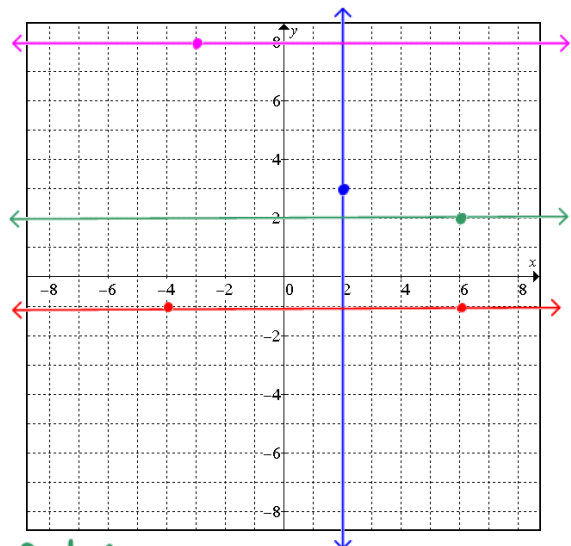
   a) a vertical line through the point $A(2,3)$

      Answer: $x = 2$

   b) a line through the points $B(-4,-1)$; $C(6,-1)$

      Answer: $y = -1$

   c) through the point $C(-3,8)$ and parallel

      to the line $y = 5$ *Answer:* $y = 8$

   d) through the point $D(6,2)$ and perpendicular

      to the line $x = 0$ *Answer:* $y = 2$

   $\downarrow$ $\leftarrow$ this is x=0, since the line has
   to be perpendicular (90°),
   the new line has to be
   horizontal or y=2 since it has to pass through (6,2)

   y-value $\downarrow$

4)

a) $K(15,3)$ $\quad m=-\frac{4}{3}$

$x_1 \quad y_1$

Method 2

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

$$y = -\frac{4}{3}(x-15) + 3$$

$$y = -\frac{4}{3}x + \frac{4}{3}\cdot\frac{15}{1} + 3$$

$$y = -\frac{4}{3}x + \frac{4\cdot15}{3} + 3$$

$$\Downarrow$$

$$y = -\frac{4}{3}x + 20 + 3$$

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

b) $P(-6,2)$ $\quad m = -\frac{1}{3}$

$$y = mx + b$$

$$2 = -\frac{1}{3}(-6) + b$$

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

$$2 \overset{-2}{=} 2 + b - 2$$

$$\boxed{0 = b}$$

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

c) $T(3,2)$ $\quad y = 2x - 7$

Since the 2nd line is parallel, it has the same slope. $\boxed{m = 2}$ $\quad T(3,2)$

$$y = mx + b$$

$$2 = 2(3) + b$$

$$2 \overset{-6}{=} 6 + b - 6$$

$$\boxed{-4 = b}$$

$$\boxed{\therefore y = 2x - 4}$$

---

d) $S(-1,-5)$ $\perp$ to $y = -2x + 3$

Since the 2nd line is $\perp$ (perpendicular) its slope is $\frac{1}{2}$

$$m = \frac{1}{2} \qquad S(-1,-5)$$

$$\qquad\qquad\quad x_1 \quad y_1$$

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

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

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

$$\qquad\quad 0.5$$

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

$$\boxed{y = 0.5x - 4.5}$$

or

$$\boxed{y = \frac{1}{2}x - \frac{9}{2}}$$

e) $P(1,1)$ $\quad y = -\frac{4}{3}x + 9$

$m_1 = -\frac{4}{3}$, other slope is $m_2 = \frac{3}{4}$

$$y = mx + b$$

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

$$1 \overset{-3/4}{=} \frac{3}{4} + b - \frac{3}{4}$$

$$\boxed{\frac{1}{4} = b}$$

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

f) $m = \frac{5}{3}$ $\quad (2,-1)$

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

$$y = \frac{5}{3}(x - 2) - 1$$

$$y = \frac{5}{3}x - \frac{10}{3} - \frac{1\cdot3}{1\cdot3}$$

$$y = \frac{5}{3}x - \frac{13}{3}$$

g) x-int $(4,0)$

$$m = -1$$

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

$$y = -1(x - 4) + 0$$

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

5) a) $(2,-4)$ $(7,-19)$

Step 1 $\quad x_1 \quad y_1 \quad x_2 \quad y_2$

$$m = \frac{-19-(-4)}{7-2} = \frac{-19+4}{5} = \frac{-15}{5} = -3$$

$$\boxed{m = -3}$$

Step 2 · Using either point find the equation

$m = -3 \quad (2,-4)$

$$y = m(x-x_1)+y_1$$
$$y = -3(x-2)-4$$
$$y = -3x+6-4$$
$$\boxed{y = -3x+2}$$

ⓑ $(-3,4)$ $(-7,-10)$

$$m = \frac{-10-4}{-7-(-3)} = \frac{-14}{-7+3} = \frac{-14}{-4} = \frac{7}{2}$$

$$m = \frac{7}{2} \quad (-3,4)$$

$$y = mx+b$$

$$4 = \frac{7}{2}(-3)+b$$

$$4 = \frac{-21}{2}+b+\frac{21}{2}$$

$$\frac{4}{1}+\frac{21}{2} = b$$

$$\frac{8}{2}+\frac{21}{2} = b$$

$$\boxed{b = \frac{29}{2}}$$

$$\therefore y = \frac{7}{2}x+\frac{29}{2}$$

ⓒ $(-2,0)$ $(2,7)$

$$m = \frac{7-0}{2-(-2)} = \frac{7}{4}$$

$$m = 7/4$$

$$y = mx+b \qquad (-2,0)$$

$$0 = \frac{7}{4}(-2)+b$$

$$0 = \frac{-7}{2}+b$$

$$\boxed{b = 7/2}$$

$$\therefore y = \frac{7}{4}x+\frac{7}{2}$$

---

f) $y = 3x-4 \longrightarrow (0,-4)$ and $(9,0)$

$$m = \frac{0-(-4)}{9-0} = \frac{4}{9} \qquad m = \frac{4}{9}$$

$$y = mx+b \qquad (0,-4)$$

$$-4 = \frac{4}{9}(0)+b$$

$$\boxed{-4 = b}$$

$$\boxed{y = \frac{4}{9}x-4}$$

6) a) $(-2, -5)$

Convert to $y = mx + b$ b/c you need to determine the slope.

$2x + y - 5 - 2x + 5 = 0 - 2x + 5$

$y = 2x + 5$

Slope will be the same SINCE the lines are parallel.

$m = -2$ $(-2, -5)$

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

$y = -2(x - (-2)) - 5$

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

$y = -2x - 4 - 5$

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

---

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

$3x + 1 = y$

$\downarrow$

$y = 3x + 1$

$m_1 = 3$ $\boxed{m_2 = -\frac{1}{3}}$

$(7, -1)$

$y = mx + b$

$-1 = -\frac{1}{3}(7) + b$

$-1 + \frac{7}{3} = -\frac{7}{3} + b + \frac{7}{3}$

$\boxed{\frac{4}{3} = b}$

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

---

1 c) $5x + 3y - 2^{-5x+2} = 0 - 5x + 2$

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

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

$m_1 = -\frac{5}{3}$ || $m_2 = -\frac{5}{3}$

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

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

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

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

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

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7) a) We'll use the equation below to determine the x-int.

$3x - 7y + 12 = 0$

To find the x-int   sub "0" for "y"

$3x - 7(0) + 12 = 0$

$3x + 12^{-12} = 0 - 12$

$\frac{3x}{3} = \frac{-12}{3}$

$\boxed{x = -4}$ $\boxed{(-4, 0)}$

Step 2: Finding the slope

$6x + 8y - 5 - 6x + 5 = 0 - 6x + 5$

$\frac{8y}{8} = \frac{-6x}{8} + \frac{5}{8}$

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

$m_1 = -\frac{3}{4}$ || $m_2 = -\frac{3}{4}$

Step 3 $m_2 = -3/4$ $(-4, 0)$

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

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

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

8) a)

8

7

$y = 8$

b)

8

-6

$x = 5$

c)

-2 -1

3

$y = -3$

d)

7

$x = 7$

e)

-5

-4

$y = 5$

f)

-2

7

-9

$y = -9$

$x = 7$

g)

17

-1

12

$x = -1$

$x = 12$

h)

$x = 0$

$y = 0$

i)

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

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