TYPE 1: SLOPE & POINT

1) Determine the equation of a line in y = mx + b form that has a slope of -1/3 and goes through the point (-2, 6).

$y = mx + b$

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

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

$-\frac{2}{3} \quad -\frac{2}{3}$

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

$\frac{3 \cdot 6}{3 \cdot 1} - \frac{2}{3} = b$

$\frac{18}{3} - \frac{2}{3} = b$

$\frac{16}{3} = b$

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

x y

$\therefore y = \frac{-1}{3}x + \frac{16}{3}$

2) Determine the equation of a line in y = mx + b form that has a slope -2 and goes through the point (-3, 4).

$y = mx + b$

$4 = -2(-3) + b$

$4 = 6 + b$

$-2 = b$

$m = -2$

x y

$\therefore y = -2x - 2$

3) Determine the equation of a line in y = mx + b form that is perpendicular to the line $y = -2x + 3$ and goes through the point (-4, 3).

Step1: Finding "m"

Two lines are perpendicular.

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

Step2: Finding "b"

$y = mx + b \quad m = \frac{1}{2} \quad (-4, 3)$

$3 = \frac{1}{2}(-4) + b$

$3 = -2 + b$

$b = 5$

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

4) Determine the equation of a line (A) in y = mx +b form that is parallel to the line (B) y = -2x + 1 and has the same y-intercept as line (C) 2x + 3y – 15 = 0.

Step1: Finding "m" from Line B

$m = -2$

Step2: Finding "b" from Line C

We need a point to find "b".

Line C gives us that.

y-int is a point when x = 0

$2(0) + 3y - 15 = 0$

$3y = 15$

$y = 5$

↳ y-int (b)

$\therefore y = -2x + 5$

TYPE 2: POINT & POINT

5) Determine the equation of a line in y = mx + b form that goes through the points (-4, 2) and (5, 29).

Step1: Finding slope (m)

$m = \frac{29-2}{5-(-4)}$

$= \frac{27}{9}$

$= 3$

Step2: Finding y-int (b)

$y = mx + b \quad m = 3 \quad (-4, 2)$

$2 = 3(-4) + b$

$2 = -12 + b$

$\boxed{b = 14}$

$\therefore y = 3x + 14$

6) Determine the equation of a line in y = mx + b form with an *x*-intercept of –4 and passing through (3, -7).

Step1 $(-4, 0) \quad (3, -7)$

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

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

$\boxed{m = -1}$

Step2 $y = mx + b \quad (-4, 0)$

$0 = -1(-4) + b$

$0 = 4 + b$

$\boxed{b = -4}$

$\therefore y = -x - 4$

7) Determine the equation of a line in y = mx + b form with an *x*-intercept of 3 and a *y*-intercept of 5.

Step1 $(3, 0) \quad (0, 5)$

$m = \frac{5-0}{0-3}$

$= \frac{5}{-3}$

$\boxed{m = -3/5}$

Step2 Question gives us the "b" value $b = 5$

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

8) Determine the equation of a line (A) in y = mx + b form with the same *y*-intercept as line (B) $y = 3x - 4$ and goes through the same point when x is -12 on line (C) –x + 3y – 12 = 0.

$b = -4$

Step1 $(0, -4)$ y-int

Step2 Finding another point on line C

$-(-12) + 3y - 12 = 0$

$12 + 3y - 12 = 0$

$3y = 0$

$\boxed{y = 0}$

$(-12, 0)$

Step3 $(0, -4)$ and $(-12, 0)$

$m = \frac{0-(-4)}{-12-0}$

$= \frac{4}{-12}$

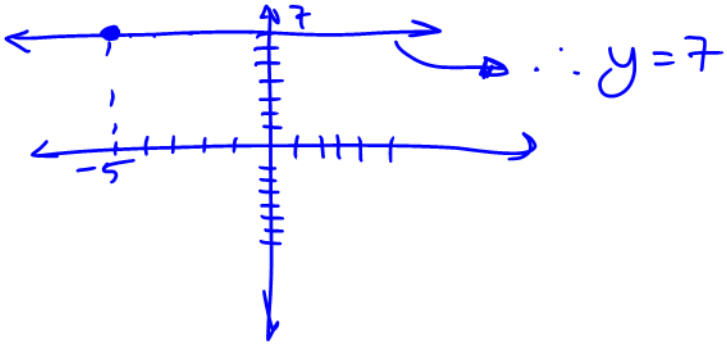
$\boxed{m = -1/3}$

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

TYPE 3: EQUATIONS THAT DO NOT NEED CALCULATIONS

These types of equation are rather easy to work with. Just sketch the situation.

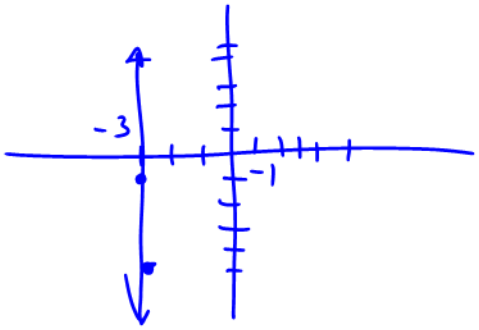
9) Determine the equation of **horizontal** a line in y = mx + b form that goes through (-5, 7).



$\therefore y = 7$

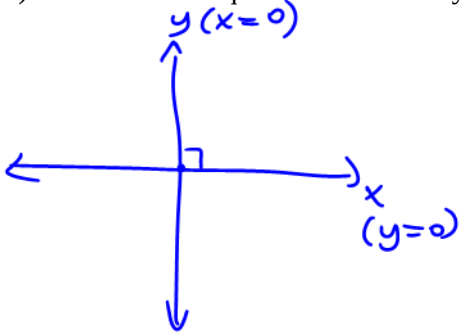
10) Determine the equation of a line in y = mx + b form that goes through the points (–3, –1) and (–3,–5).

notice x is always -3



$\therefore x = -3$

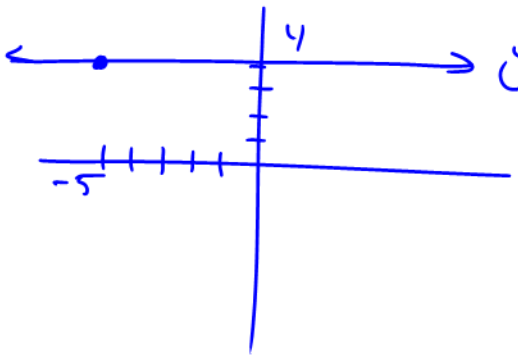
11) Determine the equation of a line in y = mx + b form that is perpendicular to x = 0 line and goes through origin.



y axis is x = 0 line

$\therefore y = 0$

12) Determine the equation of a line in y = mx + b form that is parallel to the *x*-axis and through (–5, 4).



$y = 4$

$\therefore y = 4$

TYPE 4: LOOKS CHALLENGING BUT PIECE OF CAKE

13) Determine the equation of a line (A) in y = mx + b form that is perpendicular to line (B) 3x – 2y – 12 = 0 and has the same x-intercept as line (C) -3x + 4y -15 = 0.

1) Finding "m" from Line B

Rearrange

$3x - 12 = 2y$

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

$\frac{3}{2}x - 6 = y$

$y = \frac{3}{2}x - 6$

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

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

2) Finding a point from Line C

$-3x + 4(0) - 15 = 0$

$-3x = 15$

$x = -5$

$(-5, 0)$

3) Finding b

$y = mx + b \quad m = -\frac{2}{3} \quad (-5, 0)$

$0 = \frac{-2}{3}(-5) + b$

$0 = \frac{10}{3} + b$

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

$\therefore y = -\frac{2}{3}x - \frac{10}{3}$

14) Determine the equation of a line (A) in y = mx + b form with *x*-intercept –4 and intersecting the line (B) $x - 3y + 2 = 0$ when $x = -5$.

$(-4, 0)$

Step1: Finding another point on Line B

$-5 - 3y + 2 = 0$

$-3 - 3y = 0$

$-3 = 3y$

$y = -1$

$(-5, -1)$

Step2: Finding b

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

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

$m = 1$

Step3: Finding b

$y = mx + b \quad m = 1 \quad (-4, 0)$

$0 = 1(-4) + b$

$0 = -4 + b$

$b = 4$

$\therefore y = x + 4$

15) Determine the equation of a line (A) in y = mx + b form that is parallel to line (B) 4x + 2y – 15 = 0 has the same y-intercept as line (C) x – 3y + 15 = 0.

1) Finding "m"

$4x + 2y - 15 = 0$

$2y = -4x + 15$

$y = -2x + 7.5$

$m_A = -2$

2) Finding b from Line C

$x - 3y + 15 = 0$

$x + 15 = 3y$

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

$b = 5$

$\therefore y = -2x + 5$

16) Determine the equation of a line (A) in y = mx + b form that intersects with line (B) y = 2x + 3 when x is -4 and intersects with line (C) y = -3x + 1 when y is -8.

1) Finding one point from Line B

$y = 2(-4) + 3$

$= -8 + 3$

$y = -5$

$(-4, -5)$

2) Finding another point from Line C

$-8 = -3x + 1$

$-9 = -3x$

$x = 3$

$(3, -8)$

3) Finding slope

$m = \frac{-8 - -5}{3 - -4}$

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

$m = -\frac{3}{7}$

4) Finding b

$y = mx + b \quad m = -\frac{3}{7} \quad (-4, -5)$

$-5 = \frac{-3}{7}(-4) + b$

$-5 = \frac{12}{7} + b$

$-5 - \frac{12}{7} = b$

$-\frac{47}{7} = b$

$\therefore y = -\frac{3}{7}x - \frac{47}{7}$