

ANSWERS.

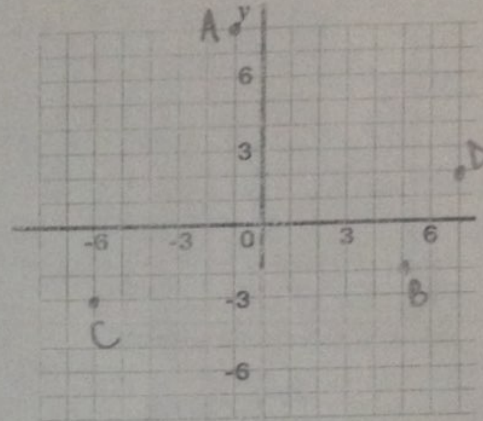
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1. Fill in the blanks.

- a) The line defined by $y = -4$ is parallel to the X-axis.
- b) The line $y = \frac{1}{3}x - 5$ crosses the y-axis at -5.
- c) The equation of a vertical line through point $(3, -1)$ is $y = -1$.
- d) The equation of a line with slope $= \frac{2}{5}$ and y-intercept $= -\frac{1}{5}$ is $y = \frac{2}{5}x - \frac{1}{5}$.

- 2. a) Plot the points $A(-1, 8)$, $B(5, -2)$, $C(-6, -3)$ and $D(7, 2)$.
- b) Using the graph, determine the slope of the line through AB. $m_{AB} = \frac{-2-8}{5-(-1)} = \frac{-10}{6} = -\frac{5}{3}$
- c) Using the formula, determine the slope of the line through CD. $m_{CD} = \frac{2+3}{7-(-6)} = \frac{5}{13}$
- d) Determine the slope of the line perpendicular to CD.

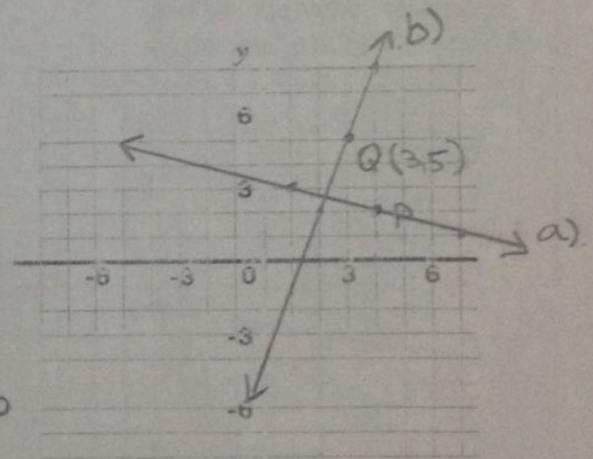
$m \perp m_{CD} \Rightarrow -\frac{13}{5}$



- 3. a) Graph a line through the point $P(4, -2)$ that has a slope of $-\frac{1}{3}$.
- b) Graph a perpendicular line to the line drawn in part a) through point $Q(3, 5)$.
- c) State the equation of the line in (b).

$y = 3x - 4$

$$\left. \begin{aligned} y &= 3x + b, \\ Q(3, 5) \\ 5 &= 3(3) + b \\ 5 - 9 &= b \\ -4 &= b \end{aligned} \right\}$$



4. Complete each table of values.

a) $y = 2x + 5$

x	y
-2	1
-1	3
0	5
10	25
$-\frac{13}{2}$	-8

$$\left. \begin{aligned} -8 &= 2x + 5 \\ -8 - 5 &= 2x \\ -13 &= 2x \\ \frac{-13}{2} &= x \end{aligned} \right\}$$

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

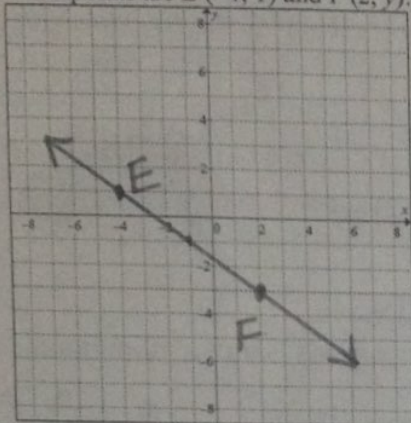
x	y
2	-4
0	-3
-8	1
-10	2
-20	7

$$\left. \begin{aligned} 7 &= -\frac{1}{2}x - 3 \\ 10 &= -\frac{1}{2}x \\ -2 \times 10 &= x \end{aligned} \right\}$$

$$\left. \begin{aligned} 2 &= -\frac{1}{2}x - 3 \\ 2 + 3 &= -\frac{1}{2}x \\ 5 &= -\frac{1}{2}x \\ -2 \times 5 &= x \\ -10 &= x \end{aligned} \right\}$$

5. Follow the clues to graph each line, then write the answer in the space below the graph.

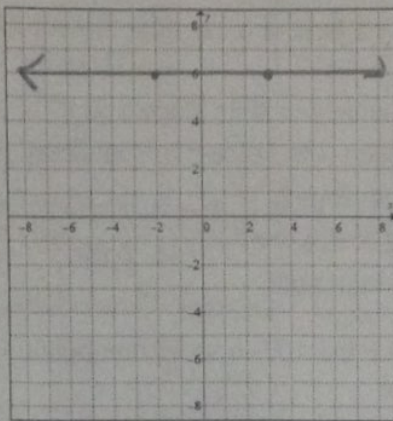
- a) The slope of line segment EF is $-\frac{2}{3}$. The coordinates of the endpoints are E (-4, 1) and F (2, y).



Determine the value of y.

$$y = -3$$

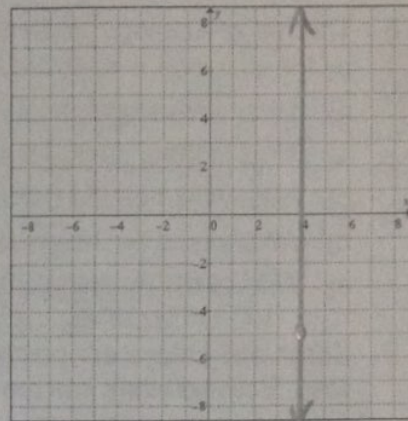
- b) Drawn through point (3,6) and point (-2,6)



Determine the equation of the line.

$$y = 6$$

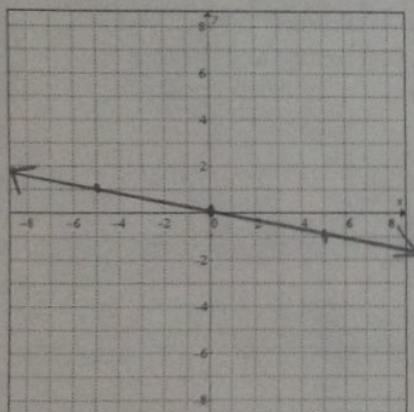
- c) Has a slope that is undefined and point (4,-5) is on the line



Determine the equation of the line.

$$x = 4$$

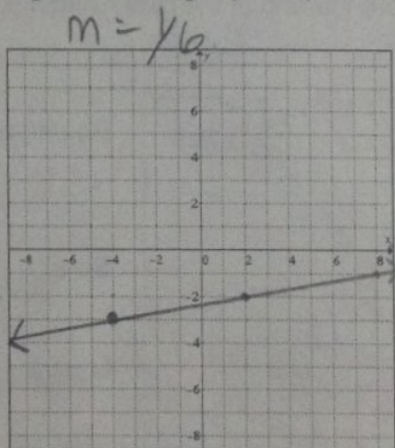
- d) Parallel to $y = -\frac{1}{5}x + 2$ and passes through the origin.



Determine the equation of the line.

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

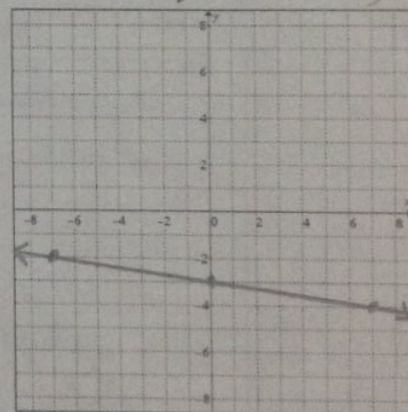
- e) Perpendicular to $x = -6$ and passes through $(-4, -3)$.



Determine the equation of the line.

$$y = +\frac{1}{6}x - \frac{7}{3}$$

- f) Perpendicular to $y = 7x - 5 \rightarrow m = -\frac{1}{7}$ and has the same y-intercept as the line $y = 2x - 3 \rightarrow b = -3$



Determine the equation of the line.

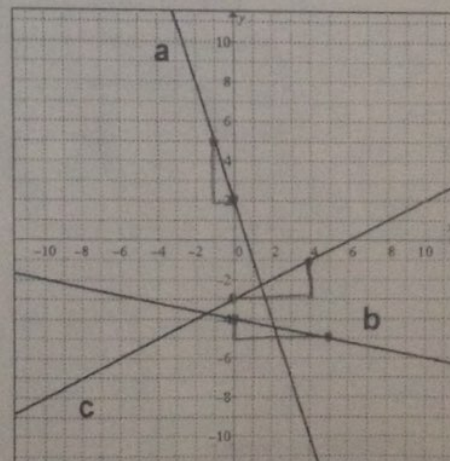
$$y = -\frac{1}{7}x - 3$$

6. Determine the equation of each line given at right.

a) $y = -3x + 2$

b) $y = -\frac{1}{5}x - 4$

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



7. Oliver ran 120 m in 35 s at the provincial track meet. Suppose the point (35, 120) was plotted on a distance-time graph and connected to the origin with a line segment.

- a) What would the value of the slope of this line segment be? $m = 24/7$ or 3.43 m/s
- b) What would the slope represent? 24 m every 7 sec

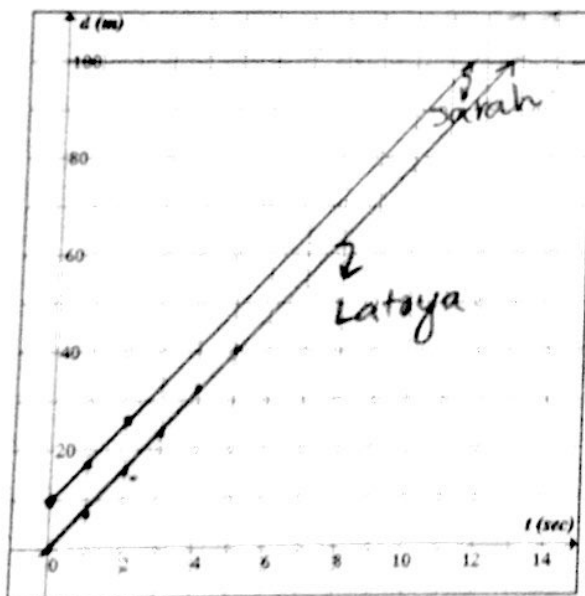
8. The fuel remaining ('n' liters) in the tank of a car after the car has been driven 'd' kilometers is given by the equation $n = -0.09d + 72$

- a) If you were to graph this line, what would its slope equal? $m = -0.09 = -9/100$
- b) What is the meaning of this slope with respect to this situation? fuel consumption rate
- c) What would be the units for the slope? Litres/km or L/km
- d) What would be the y-intercept of this line? 72 km
- e) What is the meaning of the y-intercept? It means the car was driven 72 km.



9. Sarah and Latoya are practicing for the 100-m sprint competition. Latoya gives Sarah a 10-m head start. Both sprinters can run 8 m/s.

- a) Write the equations that model each sprinter's distance in terms of time.
- b) Determine from the equations whether these lines are parallel, perpendicular, or neither? parallel
- c) Which line represents direct variation? partial variation? Sarah
- d) Graph both equations on the same set of axes to verify your answer to part (b). Latoya
- e) Can Latoya catch Sarah before the end of the race? Explain. No, Sarah reaches the 100 m first



Equations for:

Sarah: $y = 8x + 10$

Latoya: $y = 8x$

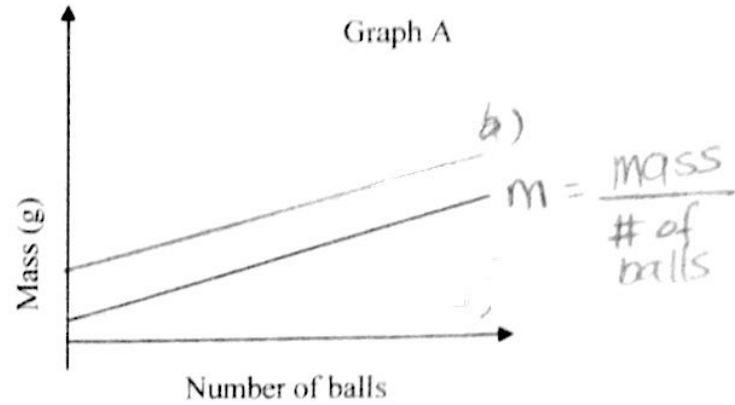
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10. A cardboard box is placed on a scale and ping-pong balls are put into the box one by one. The mass of the box and the ping-pong balls is recorded at various intervals. Suppose that a graph of the data looked like Graph A.

- a) Suppose that a heavy plastic box was the container instead of the cardboard box. How would the graph be different?

b will be higher

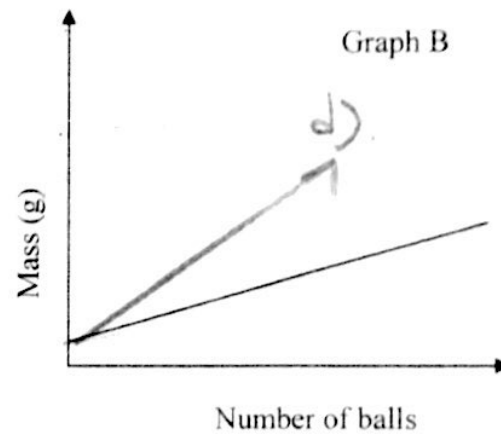
- b) On Graph A, make a new line that would represent the use of a heavier box.



- c) Suppose that the cardboard box was used again. How would the graph be different if golf balls were used instead of ping-pong balls?

m will be steeper

- d) On Graph B, make a new line that would represent the use of golf balls instead of ping-pong balls.



11. State the equations of the given lines

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

Equation: $y = -3x - 1$

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

12.

Equation of Given Line	Slope of given line	y-intercept of given line	Slope of any line parallel to given line	Slope of any line perpendicular to given line
$y = \frac{2}{3}x - 7$	$\frac{2}{3}$	-7	$\frac{2}{3}$	$-\frac{3}{2}$
$y = \frac{3}{4}x - 4$	$\frac{3}{4}$	4	$\frac{3}{4}$	$-\frac{4}{3}$
$y = -3x - 1$	-3	1	-3	$\frac{1}{3}$
$y = \frac{1}{2}x - 2$	$\frac{1}{2}$	-2	$\frac{1}{2}$	$-\frac{2}{1}$ or -2

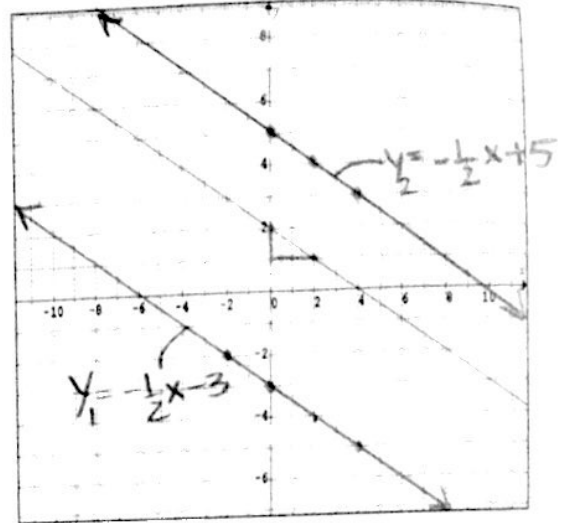
13. State the equation of the line shown on the Cartesian Plane given:

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

a) Draw 2 lines that are parallel to the given line

having y-intercepts of -3 and 5.
 $y_1 = -\frac{1}{2}x - 3$
 $y_2 = -\frac{1}{2}x + 5$

b) Label each of the lines you have drawn.



14. State the equation of the line shown on the Cartesian Plane given:

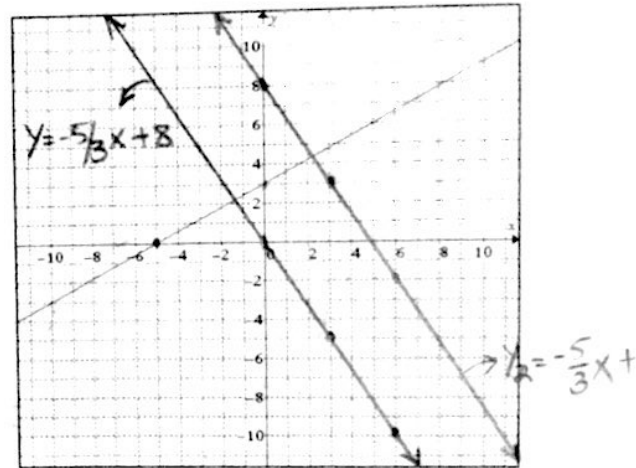
$y = \frac{3}{5}x + 3$

a) Draw 2 lines that are perpendicular to the given line

having y-intercepts of 0 and 8.

b) Label each of the lines you have drawn

$y_1 = -\frac{5}{3}x$
 $y_2 = -\frac{5}{3}x + 8$



15. Given the equations below, check whether the given point is or is not the point of intersection for the lines.

$(-14, -14)$ $\begin{cases} y = -\frac{3}{7}x - 20 & \textcircled{1} \\ y = \frac{7}{2}x - 16 & \textcircled{2} \end{cases}$

$\textcircled{1} = \textcircled{2}$
 $-\frac{3}{7}x - 20 = \frac{7}{2}x - 16$
 $-20 + 16 = \frac{7x}{2} + \frac{3x}{7}$
 $-4 = \frac{49x}{14} + \frac{6x}{14}$
 $-4 = \frac{55x}{14}$

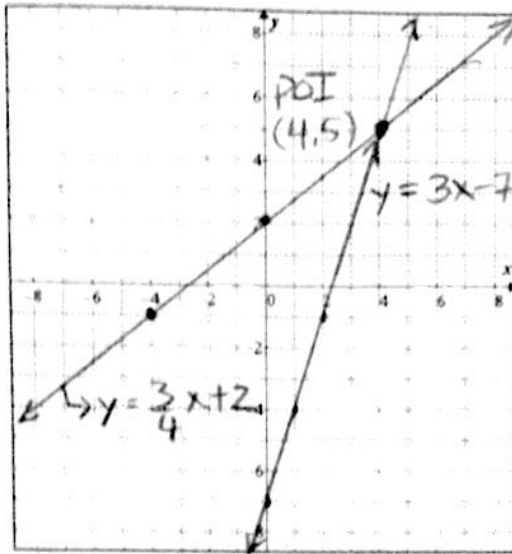
$-4 \times 14 = 55x$
 $-56 = 55x$
 $-\frac{56}{55} = x$

$y = \frac{7}{2} \left(-\frac{56}{55} \right) - 16$
 $y = -\frac{392}{110} - \frac{16}{1}$
 $y = -\frac{2152}{110}$
 $y = -\frac{1076}{55}$

\therefore POI is $\left(-\frac{56}{55}, -\frac{1076}{55} \right)$
 $\therefore (-14, -14)$ is not the POI

16. Given the following linear system, determine the point of intersection graphically **and** check.

① $y = 3x - 7$
② $y = \frac{3}{4}x + 2$



Check: (4, 5)

① $\frac{LS}{5} = \frac{RS}{3(4) - 7}$
 $= 12 - 7$
 $= 5$
 $\therefore LS = RS$

② $5 = \frac{3}{4}(4) + 2$
 $= 3 + 2$
 $= 5$
 $\therefore LS = RS$

17. Determine the point of intersection for each linear system algebraically.

a) $y = x + 1$
 $y = -2x + 4$

$x + 1 = -2x + 4$
 $3x = 4 - 1$
 $3x = 3$
 $x = 1$
 $y = 1 + 1 = 2$
 \therefore POI is (1, 2)

b) $y = 2x - 1$
 $y = 3x - 3$

$2x - 1 = 3x - 3$
 $-1 + 3 = 3x - 2x$
 $2 = x$
 $y = 2(2) - 1 = 3$
 \therefore POI is (2, 3)

c) $y = -2x - 5$
 $y = 3x + 5$

$-2x - 5 = 3x + 5$
 $-5 - 5 = 3x + 2x$
 $\frac{-10}{5} = \frac{5x}{5}$
 $-2 = x$
 $y = 3(-2) + 5 = -1$
 \therefore POI is (-2, -1)

18. Convert from slope-y-intercept form to standard form.

a) $y = -\frac{2}{3}x + 10$, LCD = 3
 $3y = -2x + 30$
 $2x + 3y - 30 = 0$

b) $y = 3x + \frac{5}{8}$, LCD = 8
 $8y = 24x + 5$
 $24x - 8y + 5 = 0$

c) $y = 2x - 8$
 $2x - y - 8 = 0$

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

19. Convert from standard form to slope-intercept form.

a) $5x + 2y - 8 = 0$
 $2y = -5x + 8$
 $y = -\frac{5}{2}x + 4$

b) $2x - y + 2 = 0$
 $2x + 2 = y$

c) $x - y = 0$
 $x = y$
 $y = x$

d) $16x - 4y + 1 = 0$
 $\frac{16x}{4} + \frac{1}{4} = \frac{4y}{4}$
 $4x + \frac{1}{4} = y$

20. Two car rental agencies offer the following deals, Rent-A-Car charges 75 cents per kilometre and no administration fee, whereas Good-Rent charges an administration fee of \$30 but only charges 50 cents per kilometre.

a) Determine the point of intersection.

Rent-A-Car: $y = 0.75x$
 Good-Rent: $y = 0.50x + 30$
 $0.75x = 0.50x + 30$
 $0.75x - 0.50x = 30$
 $0.25x = 30$
 $x = 120$
 $y = 0.75(120)$
 $y = 90$

where x is distance travelled and y is the total cost

b) When is Rent-A-Car a cheaper choice? When is Good-Rent cheaper?

↳ plot the equations, then analyze!

21. A car leaves Toronto travelling 80 kilometres per hour heading true north. Another car leaves a small town 100 kilometres north of Toronto and travels true north at a speed of 60 kilometres per hour. Both cars begin travelling at the same time.

- a) How long will both cars be traveling before their distance from Toronto is the same?
- b) How far north from Toronto will both cars be when their distances from Toronto are equal?

22. Determine the equation of the line in slope-y-intercept form given the following information.

- a) goes through $(-5, 3)$ and $(7, 7)$
- b) has the slope $-\frac{1}{2}$ and goes through $(3, 4)$
- c) is parallel to $y = -\frac{2}{3}x - \frac{1}{6}$ and goes through $(3, 4)$
- d) is parallel to $y = -3x + \frac{5}{2}$ and goes through $(5, -2)$
- e) is perpendicular to $2x + 4y - 3 = 0$ and goes through $(2, 2)$
- f) goes through $(1, 1)$ and $(-5, -9)$
- g) has the slope -3 and goes through the x-intercept of 6
- h) has the y-intercept of 5 and the x-intercept of -2
- i) goes through the x-intercept of -2 and $(-5, 8)$
- j) is perpendicular to $x + y + 3 = 0$ and has an x-intercept of 5
- k) goes through the origin and point $(8, 2)$

↳ Car 1: $d = 80t$ ①

Car 2: $d = 60t + 100$ ②

a) let ① = ②
 $80t = 60t + 100$
 $80t - 60t = 100$
 $20t = 100$
 $t = 5$

b) $\therefore t = 5 \text{ hrs.}$
 $\therefore d = 80 \frac{\text{km}}{\text{hr}} (5 \text{ hr}) = 400 \text{ km}$
 \therefore distance will be 400 km.

$\therefore t = 5 \text{ hours}$

2a) $(-5, 3), (7, 7)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 3}{7 - (-5)} = \frac{4}{12} = \frac{1}{3}$$

$$y = mx + b$$

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

$$3 = \frac{1}{3}(5) + b$$

$$3 = \frac{5}{3} + b$$

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

$$3 \times \frac{9}{3} - \frac{5}{3} = b$$

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

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

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

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

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

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

$$2 \times 4 + \frac{3}{2} = b$$

$$2 \times \frac{8}{2} + \frac{3}{2} = b$$

$$\frac{11}{2} = b$$

$$\therefore y = -\frac{1}{2}x + \frac{11}{2}$$

c) \perp to $y = -\frac{2}{3}x - \frac{1}{6}$ goes through $(3, 4)$

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

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

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

$$4 = -2 + b$$

$$6 = b$$

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

d) \perp to $y = -3x + \frac{5}{2}, (5, -2)$

$$m = -3$$

$$y = -3x + b$$

$$-2 = -3(5) + b$$

$$-2 = -15 + b$$

$$-2 + 15 = b$$

$$13 = b$$

$$\therefore y = -3x + 13$$

e) \perp to $2x + 4y - 3 = 0, (2, 2)$

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

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

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

$$y = 2x + b$$

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

$$2 - 4 = b$$

$$\therefore y = 2x - 2$$

$$(1, 1), (-5, -9)$$

$$m = \frac{-9-1}{-5-1} = \frac{-10}{-6} = \frac{5}{3}$$

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

$$1 = \frac{5}{3}(1) + b$$

$$1 = \frac{5}{3} + b$$

$$1 - \frac{5}{3} = b$$

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

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

$$g) m = -3, (6, 0)$$

$$y = -3x + b$$

$$0 = -3(6) + b$$

$$0 = -18 + b$$

$$18 = b$$

$$\therefore y = -3x + 18$$

$$h) y\text{-int of } 5 \Rightarrow (0, 5)$$

$$x\text{-int of } -2 \Rightarrow (-2, 0)$$

$$m = \frac{0-5}{-2-0} = \frac{-5}{-2} = \frac{5}{2}$$

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

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

$$0 = -5 + b$$

$$5 = b$$

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

$$i) x\text{-int: } (-2, 0), (-5, 8)$$

$$m = \frac{8-0}{-5-(-2)} = \frac{8}{-3} = -\frac{8}{3}$$

$$y = -\frac{8}{3}x + b, (-2, 0)$$

$$0 = -\frac{8}{3}(-2) + b$$

$$0 = \frac{16}{3} + b$$

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

$$\therefore y = -\frac{8}{3}x - \frac{16}{3}$$

$$j) \perp \text{ to } x + y + 3 = 0$$

$$x\text{-int} \rightarrow (5, 0)$$

$$y = -3 - x$$

$$\therefore m = 1$$

$$y = x + b, (5, 0)$$

$$0 = 5 + b$$

$$-5 = b$$

$$\therefore y = x - 5$$

$$k) (0, 0), (8, 2)$$

$$m = \frac{2-0}{8-0} = \frac{2}{8} = \frac{1}{4}$$

$$y = \frac{1}{4}x + b$$

$$0 = \frac{1}{4}(0) + b$$

$$0 = 0 + b$$

$$0 = b$$

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