

$$6) 2(a+5) = 3(1+6a) + 7$$

$$7) 6(2n+6) = -2(n-4)$$

$$2(a+5) = 3(1+6a) + 7$$

$$2a + 10 = 3 + 18a + 7$$

$$2a + 10 = 10 + 18a$$

$$2a - 18a = 10 - 10$$

$$-16a = 0$$

$$a = \frac{0}{-16} = 0$$

11) 4 kg of mixed nuts was made by combining 3 kg of walnuts which cost \$7/kg with 1 kg of peanuts which cost \$3/kg. Find the cost per kg of the mixture.

$$4 \text{ kg} = 3 \text{ kg} \times \$7/\text{kg} + 1 \text{ kg} \times \$3/\text{kg}.$$

$$= \$21 + \$3$$

$$= \$24$$

$$\therefore 1 \text{ kg} = \frac{24}{4} = \underline{\underline{\$6/\text{kg}}}$$

13) A metal alloy weighing 2 mg and containing 55% nickel is melted and mixed with 4 mg of a different alloy which contains 10% nickel. What percent of the resulting alloy is nickel?

$$\frac{\text{grams of nickel.}}{\text{Total mass Alloy}} \times 100\%$$

$$\begin{aligned} \text{Alloy 1 - Nickel} &= 55\% \text{ of } 2\text{mg} \\ &= 0.55 \times 2 = 1.1\text{mg} \end{aligned}$$

$$\begin{aligned} \text{Alloy 2 - Nickel} &= 10\% \text{ of } 4\text{mg} \\ &= 0.1 \times 4 = 0.4\text{mg} \end{aligned}$$

$$\begin{aligned} \text{Total Nickel mass} &= 1.1 + 0.4 \\ &= 1.5\text{mg} \end{aligned}$$

$$\begin{aligned} \text{Total mass} &= 2\text{mg} + 4\text{mg} \\ &= 6\text{mg} \end{aligned}$$

$$\begin{aligned} \text{Percentage Nickel} &= \frac{1.5}{6} \times 100\% \\ &= \underline{\underline{25\%}} \end{aligned}$$

14) Brand X sells 24 kg bags of mixed nuts that contain 52% peanuts. To make their product they add peanuts to Brand A's mixed nuts which contain 28% peanuts. How much of each do they combine?

$$\begin{array}{l} \text{Brand A} + \text{Peanuts} = \text{Brand X (52\%)} \\ x \text{ kg } 28\% \quad (24-x) \times 100\% \quad 24 \text{ kg} \end{array}$$

$$28\% = 0.28$$

$$\begin{array}{l} 0.28x + 24 - x = 52\% \text{ of } 24 \\ = 0.52 \times 24 \end{array}$$

$$0.28x + 24 - x = 12.48 \text{ kg}$$

$$0.28x - x = 12.48 - 24$$

$$-0.72x = -11.52$$

$$\begin{array}{l} \therefore x \\ = \frac{-11.52}{-0.72} \end{array}$$

$$= 16 \text{ kg}$$

17) Brand X sells 18 kg bags of mixed nuts that contain 40% peanuts. To make their product they combine Brand A mixed nuts which contain 60% peanuts and Brand B mixed nuts which contain 30% peanuts. How much of each do they need to use?

$$\begin{array}{l} \text{Brand A} \quad + \quad \text{Brand B} \quad = \quad \text{Brand X} \\ x \text{ kg } 60\% \quad \quad (18-x) \text{ kg } 30\% \quad \quad 18 \text{ kg } - 40\% \\ \quad \quad \quad \text{Peanuts} \quad \quad \quad \text{Peanuts} \quad \quad \quad \text{Peanuts.} \end{array}$$

$$60\% = 0.6 \quad \quad 30\% = 0.3 \quad \quad 40\% = 0.4$$

$$0.6x \quad \quad (18-x)0.3 \quad \quad = \quad 18 \times 0.4$$

$$= 7.2 \text{ kg}$$

$$0.6x \quad \quad 5.4 - 0.3x \quad \quad = \quad 7.2$$

$$0.6x - 0.3x \quad \quad = \quad 7.2 - 5.4$$

$$0.3x \quad \quad = \quad 1.8$$

$$\therefore x \quad \quad = \quad \frac{1.8}{0.3} = 6 \text{ kg}$$

6 kg of Brand A

12 kg of Brand B

# Distance, Speed and Time.

$$\text{Avg Speed} = \frac{\text{Total Distance}}{\text{Total time taken.}}$$

$$S = \frac{D}{T}$$

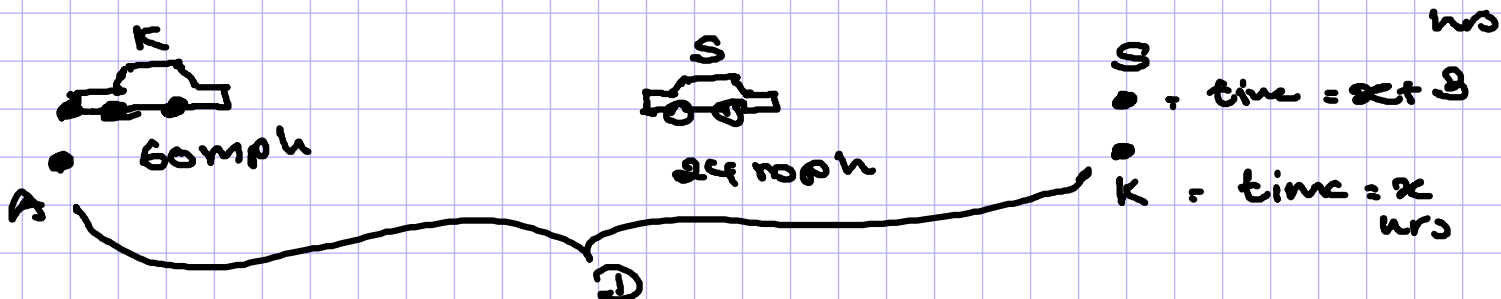
$$D = S \times T$$

$$T = \frac{D}{S}$$

18) Stefan left the mall and drove toward the desert at an average speed of 24 mph. Kathryn left three hours later and drove in the same direction but with an average speed of 60 mph. Find the number of hours Stefan drove before Kathryn caught up.

\* Same direction

\* 1st car going at a lower speed than the 2nd car



Kathryn

$$D = S \times T \\ : 60 \text{ mph} \times x$$

$$60x = 24(x+3)$$

Stefan

$$D = 24 \text{ mph} \times (x+3)$$

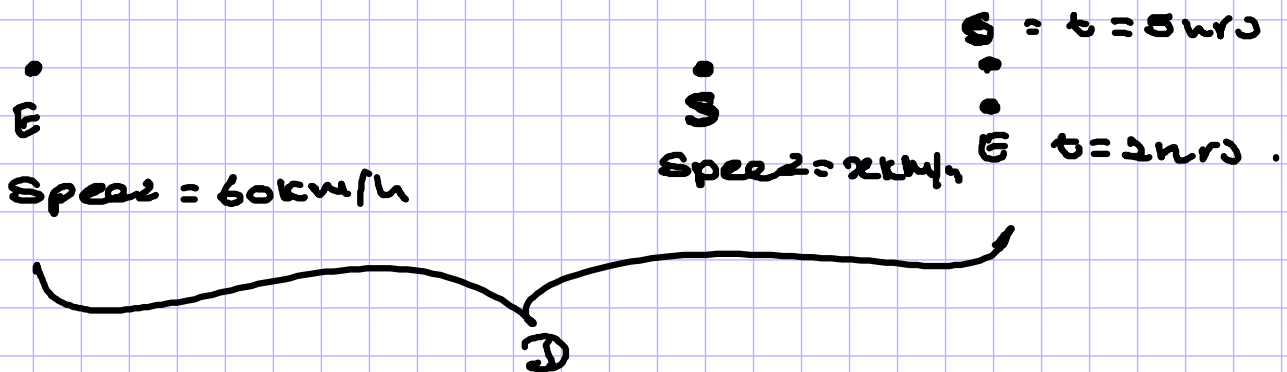
$$60x = 24x + 72$$

$$60x - 24x = 72$$

$$36x = 72$$

$$\therefore x = \frac{72}{36} = 2 \text{ hrs}$$

22) Shayna left home and traveled toward the lake. Eduardo left three hours later traveling at 60 km/h in an effort to catch up to Shayna. After traveling for two hours Eduardo finally caught up. Find Shayna's average speed.



$$D = S \times T$$

For  $E$

$$D = 60 \times 2$$

For  $S$

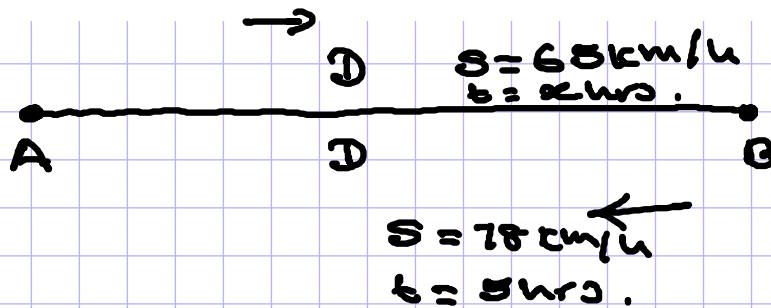
$$D = x \times 5$$

$$5x = 60 \times 2$$

$$5x = 120$$

$$\therefore x = \frac{120}{5} = \underline{\underline{24 \text{ km/h}}}$$

19) Julia traveled to the recycling plant and back. On the trip there she traveled 65 km/h and on the return trip she went 78 km/h. How long did the trip there take if the return trip took five hours?

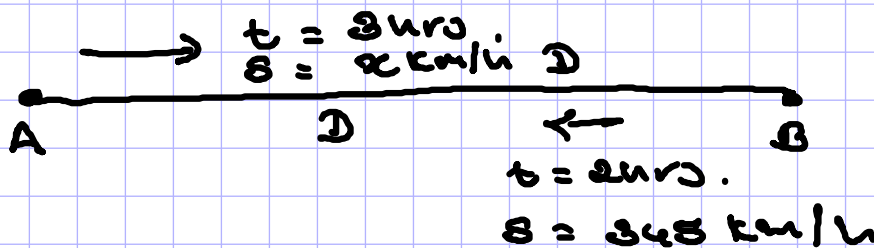


$$D = S \times T$$

$$65x = 78 \times 5$$

$$\begin{aligned} \therefore x &= \frac{78 \times 5}{65} \\ &= \underline{\underline{6 \text{ hrs}}} \end{aligned}$$

21) An Air Force plane made a trip to Jakarta and back. The trip there took three hours and the trip back took two hours. It averaged 345 km/h on the return trip. Find the average speed of the trip there.

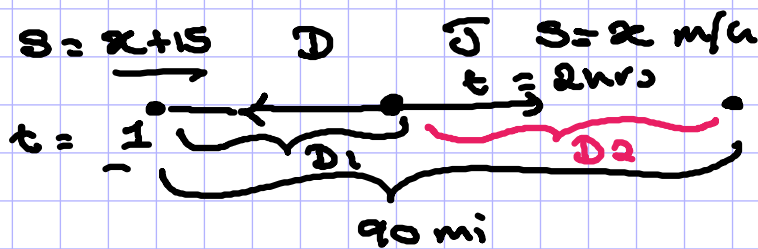


$$D = S \times T$$

$$3 \times x = 345 \times 2$$

$$\begin{aligned} 3x &= 690 \\ \therefore x &= \frac{690}{3} = \underline{\underline{230 \text{ km/h}}} \end{aligned}$$

23) Jasmine left the hospital traveling toward the desert one hour before Daniel. Daniel traveled in the opposite direction going 15 mph faster than Jasmine for one hour after which time they were 90 mi. apart. What was Jasmine's speed?



$$D_1 + D_2 = 90 \text{ mi}$$

$$D_1 = S \times T \\ = (x + 15) \times 1$$

$$D_2 = S \times T \\ = x \times 2$$

$$1(x + 15) + 2x = 90$$

$$x + 15 + 2x = 90$$

$$3x = 90 - 15$$

$$3x = 75$$

$$\therefore x = \frac{75}{3} = \underline{\underline{25 \text{ m/h}}}$$



26) Shawna can harvest a field in 14 hours. One day her friend Paul helped her and it only took 6.46 hours. Find how long it would take Paul to do it alone.

$$\frac{T_1 \times T_2}{T_1 + T_2}$$

$$T_1 = 14 \quad T_2 = ?$$

$$\frac{14 \times T_2}{14 + T_2} = 6.46$$

$$14T_2 = 6.46(14 + T_2)$$

$$14T_2 = 90.44 + 6.46T_2$$

$$14t_2 - 6.46t_2 = 90.44$$

$$7.54t_2 = 90.44$$

$$\therefore t_2 = \frac{90.44}{7.54}$$

$$= \underline{\underline{12 \text{ hrs}}}$$

27) Working alone, Perry can sweep a porch in 11 minutes. Imani can sweep the same porch in 13 minutes. Find how long it would take them if they worked together.

$$\frac{T_1 \times T_2}{T_1 + T_2}$$

$$\frac{11 \times 13}{11 + 13} = \frac{143}{24} = 5.96$$

36)  $gc = \frac{a+b}{a}$ , for  $a$

37)  $gx = \frac{x+y}{c}$ , for  $x$

$$gc = \frac{a+b}{a}$$

$$gx = \frac{x+y}{c}$$

$$agc = a+b$$

$$gxc = x+y$$

$$agc - a = b$$

$$gxc - x = y$$

$$a \left( \frac{agc}{a} - \frac{a}{a} \right) = b$$

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

$$a (gc - 1) = b$$

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

$$\therefore a = \frac{b}{gc - 1}$$

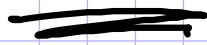
# Inequalities

$$-2a > b$$

$$a < \frac{-b}{2}$$

$$\frac{-1}{2}a > b$$

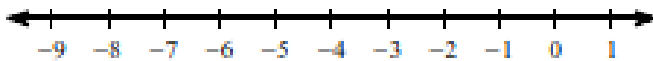
$$a < b \cdot x - 2$$



● - Inclusive

○ - Not inclusive

41)  $-84 > 6(x-7)$



$$-84 > 6(x-7)$$

$$6(x-7) < -84$$

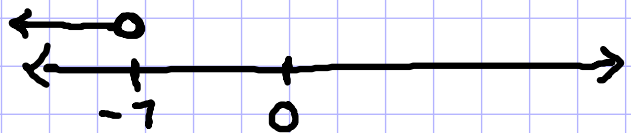
$$6x - 42 < -84$$

$$6x < -84 + 42$$

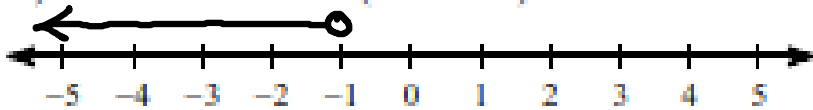
$$6x < -42$$

$$x < \frac{-42}{6}$$

$$x < -7$$



$$45) -8n + 5 > 6(6n + 7) - 7n$$



$$-8n + 5 > 6(6n + 7) - 7n$$

$$-8n + 5 > 36n + 42 - 7n$$

$$-8n + 5 > 29n + 42$$

$$-8n - 29n + 5 > 42$$

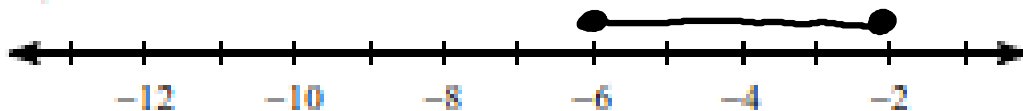
$$-37n > 42 - 5$$

$$-37n > 37$$

$$\therefore n < \frac{37}{-37}$$

$$n < -1$$

$$46) 6x - 2 \leq -14 \text{ and } -7 + 2x \geq -19$$



$$6x - 2 \leq -14$$

$$6x \leq -14 + 2$$

$$6x \leq -12$$

$$\therefore x \leq \frac{-12}{6}$$

$$x \leq -2$$

$$-7 + 2x \geq -19$$

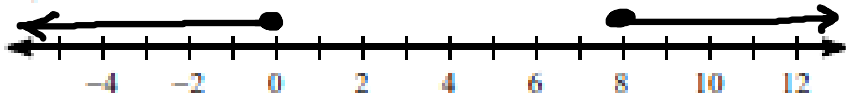
$$2x \geq -19 + 7$$

$$2x \geq -12$$

$$\therefore x \geq \frac{-12}{2}$$

$$x \geq -6$$

$$48) 5a - 10 \geq -2 + 4a \text{ or } 3 - 9a \geq 10a + 3$$



$$5a - 10 \geq -2 + 4a \quad \text{or} \quad 3 - 9a \geq 10a + 3$$

$$5a - 4a - 10 \geq -2$$

$$3 - 9a - 10a \geq 3$$

$$a - 10 \geq -2$$

$$3 - 19a \geq 3$$

$$a \geq -2 + 10$$

$$-19a \geq 3 - 3$$

$$a \geq 8$$

$$-19a \geq 0$$

$$\therefore a \leq \frac{0}{-19}$$

$$a \leq 0$$

50) 2% of what is 110?

$$2\% \text{ of } x = 110$$

$$\frac{2}{100} \times x = 110$$

$$\therefore x = 110 \div \frac{2}{100}$$

$$= \frac{110}{2} \times \frac{100}{1}$$

$$= \frac{11000}{2}$$

58) From 49 to 84.9

59) From 36 to 39

$$\frac{\text{Change}}{\text{Original}} \times 100\%$$

$$\frac{84.9 - 49}{49} \times 100\%$$

$$\frac{39 - 36}{36} \times 100\%$$

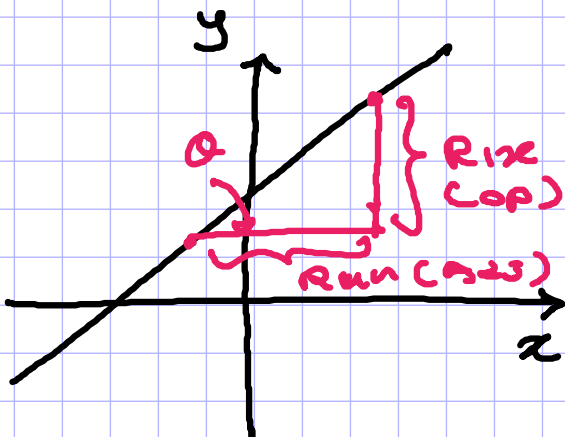
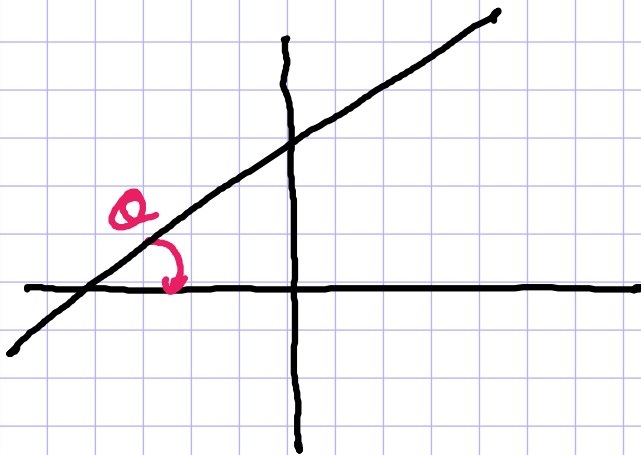
## Linear Graphs.

$y = mx + c$  - Gradient Intercept form.

$ax + by = c$  ← Standard form

$$y = mx + c$$

↑  
Slope / Gradient

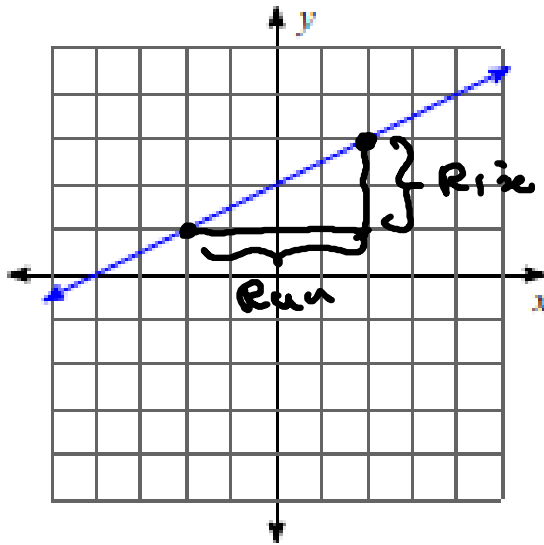


$$m = \frac{\text{Rise}}{\text{Run}} = \frac{10}{20}$$

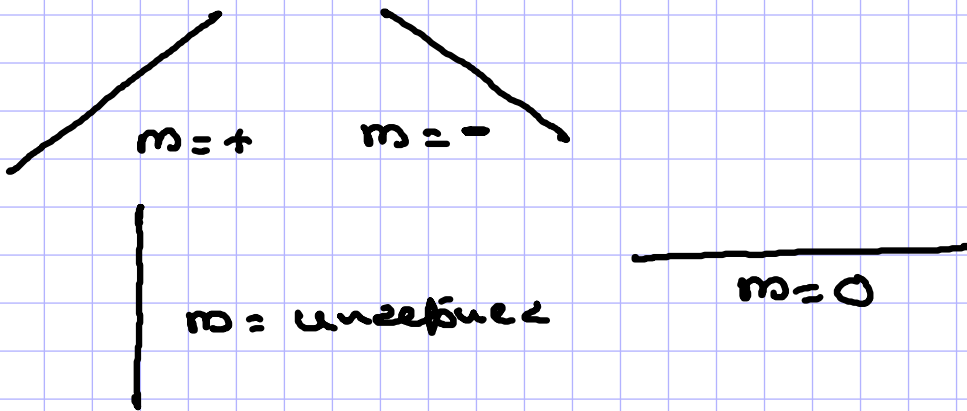
$$m = \tan \theta$$

# Linear Graphs

66)



$$m = \frac{\text{Rise}}{\text{Run}} = \frac{\Delta y}{\Delta x}$$



Find the slope of the line through each pair of points.

70)  $(-1, 11), (20, -9)$   
 $x_2, y_2 \quad x_1, y_1$

71)  $(-6, -17), (13, -15)$

72)  $(9, 17), (20, -2)$

73)  $(18, -15), (-17, -6)$

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

$$= \frac{11 - (-9)}{-1 - 20} = \frac{20}{-21}$$

Find the slope of each line.

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

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

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

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

General form .

$y = \frac{1}{c}x - c$       y Intercept

$y = mx + c$

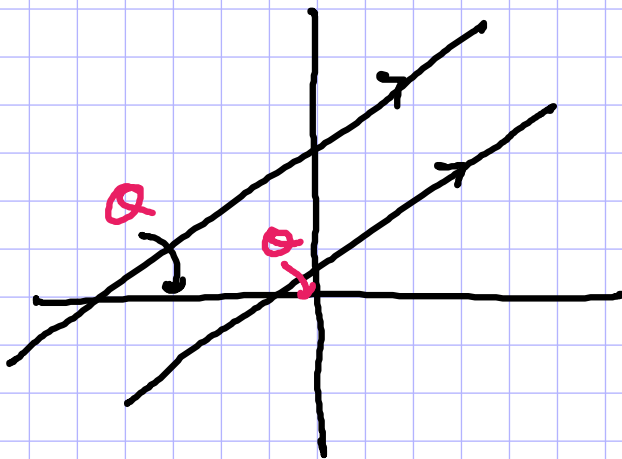
Find the slope of a line parallel to each given line.

78)  $y = 3x - 2$

79)  $y = -2x - 5$

80)  $y = \frac{7}{2}x + 2$

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





Find the slope of a line perpendicular to each given line.

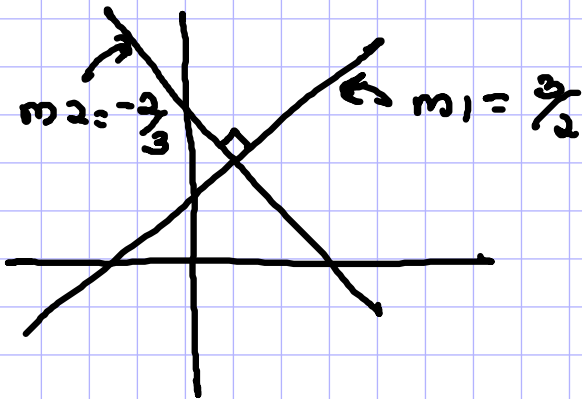
82)  $y = -\frac{5}{4}x$

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

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

85)  $y = -5x - 1$

$m_1 \times m_2 = -1$



$y = -5x - 1$

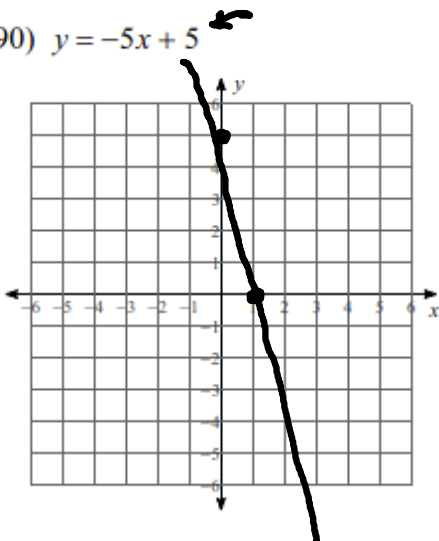
Coefficient of the line perpendicular =  $\frac{1}{5}$

$m_1 \times m_2 = -1$

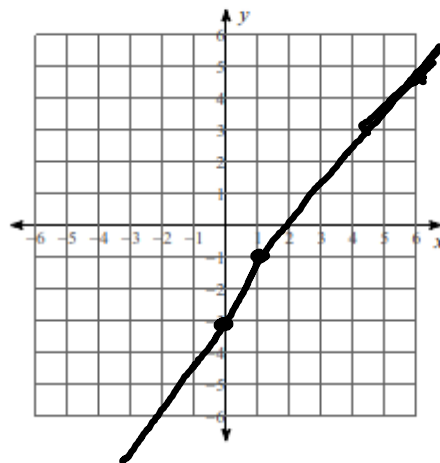
$-5 \times m_2 = -1$

$m_2 = \frac{1}{5}$  "Not"

90)  $y = -5x + 5$



91)  $y = 2x - 3$



$m = -5$

$m = -\frac{1}{5}$  ↑ Rise

" ↓ Run

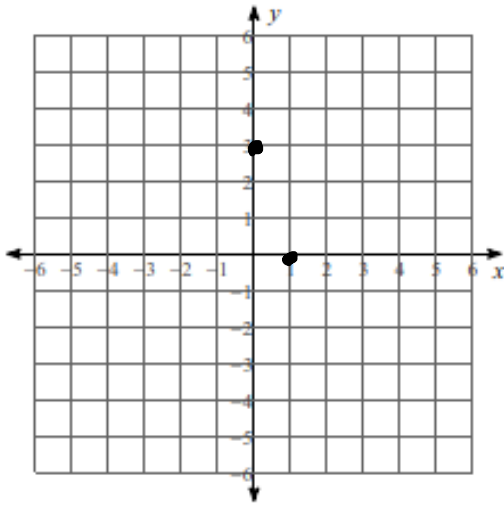
" ↓ Run

$m = 2$

" ↑ Run

" ↓ Run

95)  $3x + y = 3$



$$3x + y = 3$$

$$y = -3x + 3$$

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

$$3x + y = 3$$

x intercept  $y = 0$

$$3x + y = 3$$

$$3x + 0 = 3$$

$$3x = 3$$

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

y intercept  $x = 0$

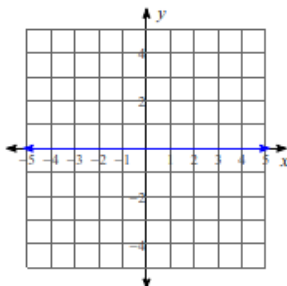
$$3x + y = 3$$

$$3 \times 0 + y = 3$$

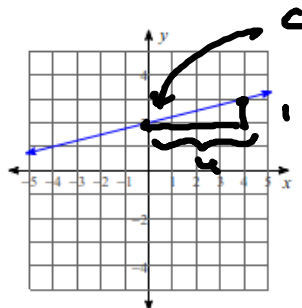
$$y = 3$$

Write the slope-intercept form of the equation of each line.

98)



99)

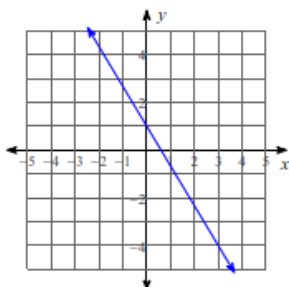


$$m = \frac{1}{2}$$

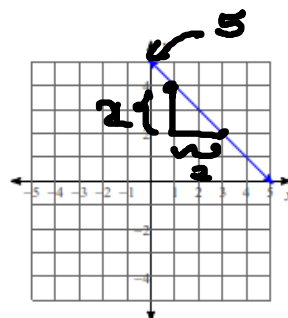
$$c = 2$$

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

100)



101)



$$c = 3$$

$$m = -1$$

$$y = -x + 3$$

$$y = -x + 3$$

104) Slope =  $-\frac{4}{5}$ , y-intercept = -4

$$m = -\frac{4}{5} \quad c = -4$$

$$y = mx + c$$

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

=====

Write the slope-intercept form of the equation of the line through the given point with the given slope.

106) through: (4, 3), slope =  $\frac{3}{4}$

107) through: (1, -2), slope =  $-\frac{2}{5}$

108) through: (-2, 3), slope = -2

109) through: (-3, -3), slope =  $\frac{4}{3}$

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

$$y = mx + c$$

$$y = \frac{3}{4}x + c$$

$$3 = \frac{3}{4} \cdot 4 + c$$

$$3 = 3 + c$$

$$\therefore c = 3 - 3$$

$$c = 0$$

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

=====

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

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

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

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

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

=====

Write the slope-intercept form of the equation of the line through the given points.

110) through:  $(4, -3)$  and  $(-1, -5)$   
 $x_1 \ y_1 \quad x_2 \ y_2$

111) through:  $(3, 1)$  and  $(5, 2)$

112) through:  $(4, 4)$  and  $(1, -1)$   
 $x \ y$

113) through:  $(-3, 2)$  and  $(2, 3)$

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

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

$$y - (-1) = \frac{y_2 - y_1}{x_2 - x_1} (x - (-1))$$

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

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

$$m = \frac{-5 + 3}{1 + 4}$$

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

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

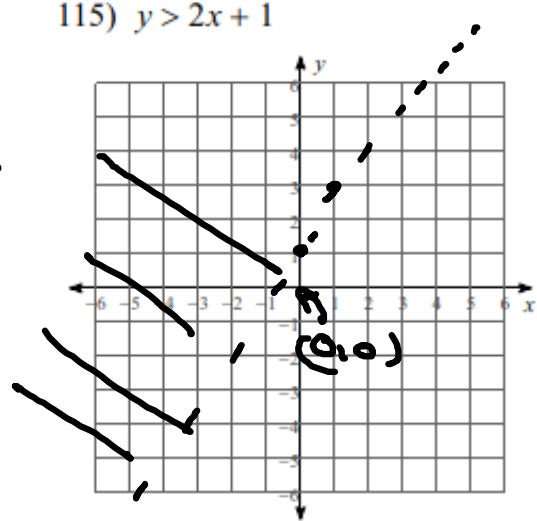
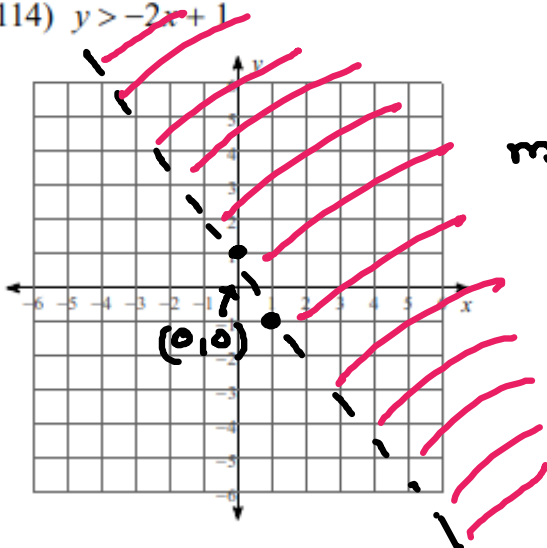
$$y - 3 = \frac{1}{5} (x + 3)$$

||

Sketch the graph of each linear inequality.

114)  $y > -2x + 1$

115)  $y > 2x + 1$



$$y = -2x + 1$$

$$y > 2x + 1$$

$$y > -2x + 1$$

$$(0, 0)$$

Reference Point  $(x_1, y_1)$

$$0 > -2 \cdot 0 + 1$$

$$0 > 2 \cdot 0 + 1$$

$$0 > 1 - \text{False}$$

$$0 > 1 - \text{False}$$