

## Section 1.1

3.) a.)  $|2x-4|=6 \rightarrow 2x-4=6$  or  $2x-4=-6 \rightarrow$   
 $2x=10$  or  $2x=-2 \rightarrow$   $x=5$  or  $x=-1$

b.)  $|x-3|=2 \rightarrow x-3=2$  or  $x-3=-2 \rightarrow$   
 $x=5$  or  $x=1$

4.) a.)  $|2x+4|=|5x-2| \rightarrow |2(x+2)|=|5(x-\frac{2}{5})|:$   
 (Separate:  $x \leq -2$ ,  $-2 < x < \frac{2}{5}$ ,  $x \geq \frac{2}{5}$ )

for  $x \leq -2$ :  $-2(x+2) = -5(x-\frac{2}{5}) \rightarrow$   
 $-2x-4 = -5x+2 \rightarrow 3x=6 \rightarrow x=2$  ;

for  $-2 < x < \frac{2}{5}$ :  $2(x+2) = -5(x-\frac{2}{5}) \rightarrow$   
 $2x+4 = -5x+2 \rightarrow 7x = -2 \rightarrow x = -\frac{2}{7}$

for  $x \geq \frac{2}{5}$ :  $2(x+2) = 5(x-\frac{2}{5}) \rightarrow$   
 $2x+4 = 5x-2 \rightarrow 6 = 3x \rightarrow x=2$

5.) a.)  $|5x-2| \leq 4 \rightarrow -4 \leq 5x-2 \leq 4 \rightarrow$   
 $-2 \leq 5x \leq 6 \rightarrow -\frac{2}{5} \leq x \leq \frac{6}{5}$

b.)  $|1-3x| > 8 \rightarrow 1-3x > 8$  or  $1-3x < -8 \rightarrow$   
 $-7 > 3x$  or  $9 < 3x \rightarrow x < -\frac{7}{3}$  or  $x > 3$

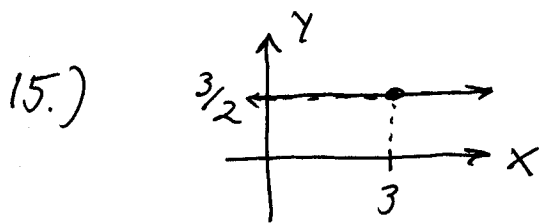
8.)  $y - (-2) = 2(x-1) \rightarrow y+2 = 2x-2 \rightarrow$   
 $y = 2x-4$

12.) pts.  $(-1, 4)$  and  $(2, -\frac{1}{2})$  : slope

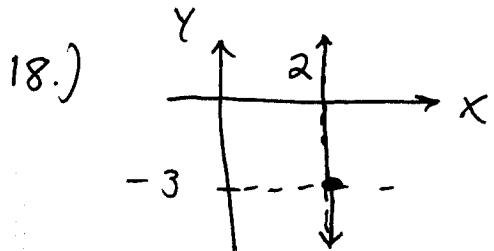
$$m = \frac{4 - (-\frac{1}{2})}{-1 - 2} = \frac{\frac{9}{2}}{-3} = \frac{9}{2} \cdot \frac{-1}{3} = -\frac{3}{2}$$

$$y - 4 = -\frac{3}{2}(x - (-1)) \rightarrow y - 4 = -\frac{3}{2}x - \frac{3}{2} \rightarrow$$

$$Y = -\frac{3}{2}X + \frac{5}{2}$$



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



$$x = 2$$

20.) slope  $m = -1$ ,  $Y$ -int.  $-3$  so  
 $Y = mx + b \rightarrow Y = -x - 3$

25.) slope  $m = -\frac{1}{4}$ ,  $x$ -int:  $3$  so  
 $Y - 0 = -\frac{1}{4}(X - 3) \rightarrow Y = -\frac{1}{4}X + \frac{3}{4}$

28.)  $x - 3y - 6 = 0 \rightarrow 3y = x - 6 \rightarrow y = \frac{1}{3}x - 2$   
 $\rightarrow$  slope  $m = \frac{1}{3}$  and pt.  $(1, 2) \rightarrow$   
 $Y - 2 = \frac{1}{3}(X - 1) \rightarrow Y - 2 = \frac{1}{3}X - \frac{1}{3} \rightarrow$   
 $Y = \frac{1}{3}X + \frac{5}{3}$

30.) slope through  $(0, -1)$  and  $(2, 1)$  is  
 $m = \frac{-1 - 1}{0 - 2} = \frac{-2}{-2} = 1$  and pt.  $(2, -3) \rightarrow$   
 $Y - (-3) = 1 \cdot (X - 2) \rightarrow Y + 3 = X - 2 \rightarrow$   
 $Y = X - 5$

31.)  $2Y - 5X + 7 = 0 \rightarrow 2Y = 5X + 7 \rightarrow$   
 $Y = \frac{5}{2}X + \frac{7}{2}$  so  $\perp$  slope  $m = -\frac{2}{5}$

and pt.  $(1, 4)$  so  $Y - 4 = -\frac{2}{5}(X - 1) \rightarrow$   
 $Y - 4 = -\frac{2}{5}X + \frac{2}{5} \rightarrow Y = -\frac{2}{5}X + \frac{22}{5}$

44.) a.)  $Y$ : kgs.,  $X$ : lbs. and  $Y = kX$  with  
 $X = 2.2$  lbs.,  $Y = 1$  kg  $\rightarrow 1 = k(2.2) \rightarrow$   
 $k = \frac{1}{2.2} = \frac{10}{22} = \frac{5}{11} \rightarrow \boxed{Y = \frac{5}{11}X}$  or  $\boxed{X = \frac{11}{5}Y}$  ;

b.) i.)  $X = 63$  lbs.  $\rightarrow Y = \frac{5}{11}(63) \approx 28.64$  kg.

ii.)  $X = 150$  lbs.  $\rightarrow Y = \frac{5}{11}(150) \approx 68.18$  kg.

iii.)  $Y = 2.5$  kg.  $\rightarrow X = \frac{11}{5}(2.5) = 5.5$  lbs.

iv.)  $Y = 140$  kg.  $\rightarrow X = \frac{11}{5}(140) = 308$  lbs.

46.)  $N$ : # of seeds,  $X$ : biomass in g. and  
 $N = kX$  with  $N = 17$ ,  $X = 217$  g.  $\rightarrow$   
 $17 = k(217) \rightarrow k = \frac{17}{217} \rightarrow \boxed{N = \frac{17}{217}X}$

47.)  $M$ : length in meters,  $F$ : length in feet  
with  $F = kM$  and  $F = 1$  ft.,  $M = 0.305$  m  
 $\rightarrow 1 = k(0.305) \rightarrow k = \frac{1}{0.305} = \frac{1000}{305} = \frac{200}{61}$

$\rightarrow F = \frac{200}{61}M$  ; a square plot of  
length 1 meter has length  $F = \frac{200}{61}$  ft.  
and area  $A = \left(\frac{200}{61}\right)^2 \text{ ft.}^2 = \frac{40,000}{3721} \text{ ft.}^2$   
 $\approx 10.75 \text{ ft.}^2$

51.) a.)  $\frac{55 \text{ mi.}}{1 \text{ hr.}} \times \frac{1.609 \text{ km.}}{1 \text{ mi.}} = 88.495 \text{ km./hr.}$

$$b.) \frac{130 \text{ km.}}{1 \text{ hr}} \times \frac{1 \text{ mi.}}{1.609 \text{ km.}} \approx 80.8 \text{ mph.}$$

52.) a.) F: degrees Fahrenheit,  
C: degrees Celsius, and assume  
 $C = mF + b$  (a line); pts.

$$C = 0^\circ, F = 32^\circ \quad \text{and} \quad C = 100^\circ, F = 212^\circ \rightarrow$$

$$\text{slope } m = \frac{\Delta C}{\Delta F} = \frac{100 - 0}{212 - 32} = \frac{100}{180} = \frac{5}{9} \rightarrow$$

$$C = \frac{5}{9}F + b \quad \text{and} \quad C = 0^\circ, F = 32^\circ \rightarrow$$

$$0 = \frac{5}{9}(32) + b \rightarrow b = -\frac{160}{9} \rightarrow \boxed{C = \frac{5}{9}F - \frac{160}{9}}$$

$$b.) \text{ if } F = 97.6^\circ \rightarrow C \approx 36.4^\circ$$

$$\text{if } F = 99.6^\circ \rightarrow C \approx 37.6^\circ ;$$

55.) center:  $(-1, 4)$ , radius  $r = 3 \rightarrow$

$$(x - (-1))^2 + (y - 4)^2 = 3^2 \rightarrow (x + 1)^2 + (y - 4)^2 = 9$$

$$59.) (x - 2)^2 + y^2 = 16 \rightarrow (x - 2)^2 + (y - 0)^2 = 4^2 \rightarrow$$

center:  $(2, 0)$ , radius  $r = 4$

$$62.) x^2 + y^2 + 2x - 4y + 1 = 0 \rightarrow$$

$$(x^2 + 2x + 1) + (y^2 - 4y + 4) = -1 + 1 + 4 \rightarrow$$

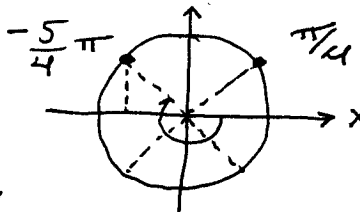
$$(x + 1)^2 + (y - 2)^2 = 4 \rightarrow (x - (-1))^2 + (y - 2)^2 = 2^2 \rightarrow$$

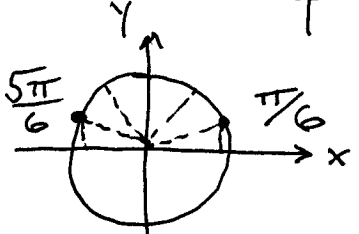
center:  $(-1, 2)$ , radius  $r = 2$

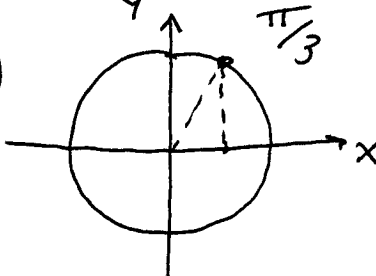
$$63.) 180^\circ = \pi \text{ rad.} \rightarrow 1^\circ = \frac{\pi}{180} \text{ rad.} \rightarrow$$

$$75^\circ = 75 \left( \frac{\pi}{180} \right) \text{ rad} = \frac{5}{12} \pi \text{ rad}$$

$$b.) \pi \text{ rad} = 180^\circ \rightarrow \frac{17}{12} \pi \text{ rad} = \frac{17}{12} (180^\circ) = 255^\circ$$

65.) a.)   $\sin\left(-\frac{5}{4}\pi\right) = \sin\frac{\pi}{4} = \frac{\sqrt{2}}{2}$

b.)   $\cos\frac{5\pi}{6} = -\cos\frac{\pi}{6} = -\frac{\sqrt{3}}{2}$

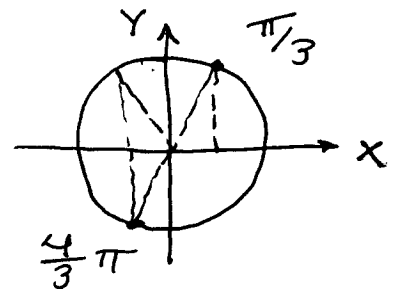
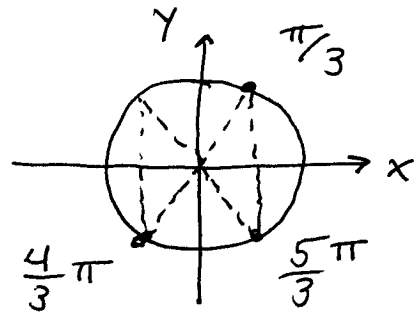
c.)   $\tan\frac{\pi}{3} = \frac{\sin\frac{\pi}{3}}{\cos\frac{\pi}{3}} = \frac{\sqrt{3}/2}{1/2} = \sqrt{3}$

67.) a.)  $\sin \alpha = -\frac{\sqrt{3}}{2} \rightarrow$

$$\alpha = \frac{4}{3}\pi \text{ or } \alpha = \frac{5}{3}\pi$$

b.)  $\tan \alpha = \sqrt{3} =$   
 $= \frac{\sqrt{3}/2}{1/2} = \frac{-\sqrt{3}/2}{-1/2}$

$$= \frac{\sin \alpha}{\cos \alpha} \rightarrow \alpha = \frac{\pi}{3} \text{ or } \alpha = \frac{4}{3}\pi$$



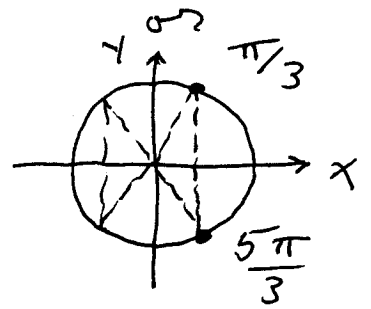
71.)  $2 \cos \theta \sin \theta = \sin \theta \rightarrow$

$$2 \cos \theta \sin \theta - \sin \theta = 0 \rightarrow$$

$$\sin \theta (2 \cos \theta - 1) = 0 \rightarrow$$

$$\sin \theta = 0 \rightarrow \theta = 0 \text{ or } \theta = \pi$$

$$\cos \theta = \frac{1}{2} \rightarrow \theta = \frac{\pi}{3} \text{ or } \theta = \frac{5\pi}{3}$$



$$74.) \text{ a.) } (2^4 2^{-3/2})^2 = 2^8 \cdot 2^{-3} \\ = 2^5 = 32$$

$$\text{b.) } \left( \frac{6^{5/2} \cdot 6^{2/3}}{6^{1/3}} \right)^3 = (6^{5/2} \cdot 6^{1/3})^3 = 6^{15/2} \cdot 6^1 = 6^{17/2}$$

$$75.) \text{ a.) } \log_{24} x = -2 \rightarrow x = 24^{-2} = \frac{1}{42} = \frac{1}{16}$$

$$\text{b.) } \log_{2^{1/3}} x = -3 \rightarrow x = \left( \frac{1}{3} \right)^{-3} = \frac{1}{3^{-3}} = 3^3 = 27$$

$$77.) \text{ a.) } \log_{2^{1/2}} 32 = x \rightarrow 32 = \left( \frac{1}{2} \right)^x \rightarrow$$

$$2^5 = 2^{-x} \rightarrow 5 = -x \rightarrow x = -5$$

$$\text{b.) } \log_{2^{1/3}} 81 = x \rightarrow 81 = \left( \frac{1}{3} \right)^x \rightarrow 3^4 = 3^{-x} \rightarrow$$

$$4 = -x \rightarrow x = -4$$

$$\text{c.) } \log_{10} 0.001 = x \rightarrow 0.001 = 10^x \rightarrow$$

$$10^{-3} = 10^x \rightarrow x = -3$$

$$81.) \text{ a.) } e^{3x-1} = 2 \rightarrow \ln e^{3x-1} = \ln 2 \rightarrow$$

$$3x-1 = \ln 2 \rightarrow 3x = 1 + \ln 2 \rightarrow$$

$$x = \frac{1}{3} + \frac{1}{3} \ln 2$$

$$82.) b.) 9^{2x+1} = 27 \rightarrow (3^2)^{2x+1} = 3^3 \rightarrow$$

$$3^{4x+2} = 3^3 \rightarrow 4x+2 = 3 \rightarrow 4x = 1 \rightarrow$$

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

$$84.) c.) \ln x^3 - 2 \ln x = 1 \rightarrow$$

$$3 \ln x - 2 \ln x = 1 \rightarrow \ln x = 1 \rightarrow$$

$$\log_e x = 1 \rightarrow x = e^1 = e$$

$$87.) (4-2i) + (9+4i) = 13+2i$$

$$90.) (2-3i)(5+2i) = 10-15i+4i-6i^2$$

$$= 10-11i-6(-1) = 16-11i$$

$$102.) 3x^2 - 2x + 1 = 0 \rightarrow$$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(1)}}{2(3)}$$

$$= \frac{2 \pm \sqrt{-8}}{6} = \frac{2 \pm \sqrt{(-1)(4)(2)}}{6}$$

$$= \frac{2 \pm 2\sqrt{2}i}{6} = \frac{1}{3} \pm \frac{\sqrt{2}}{3}i$$