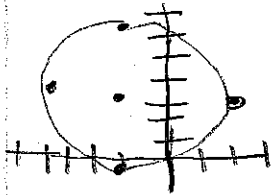
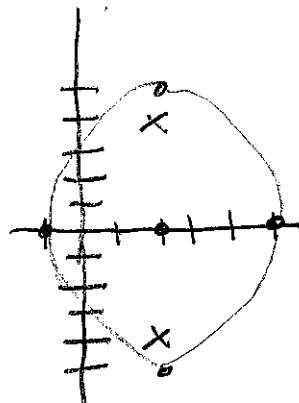


# Conics

1. a)  $C: (-1, 3)$   
 $r: \sqrt{10} \approx 3.16$



b)  $C^2 = a^2 + b^2$   
 $C^2 = 25 + 9$   
 $C^2 = 34$   
 $C = \sqrt{34}$



$C: (2, 0)$

$V: (2, 5) (2, -5)$

$CV: (-1, 0) (5, 0)$

$F: (2, 4) (2, -4)$

$ma: 10 \quad mi: 6$

c)  $16x^2 - 9y^2 = 144$

144

$\frac{x^2}{9} - \frac{y^2}{16} = 1$

$C^2 = a^2 + b^2$

$C^2 = 9 + 16$

$C^2 = 25$

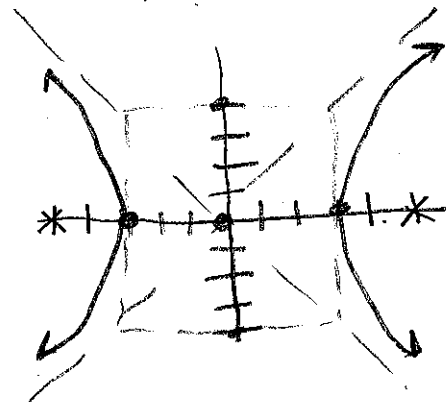
$C = 5$

$C: (0, 0)$

$V: (\pm 3, 0)$

$F: (\pm 5, 0)$

$a: y = \pm \frac{4}{3}x$



d)  $C^2 = a^2 + b^2$

$C: (-3, 2)$

$C^2 = 25 + 4$

$V: (-3, -3) (-3, 7)$

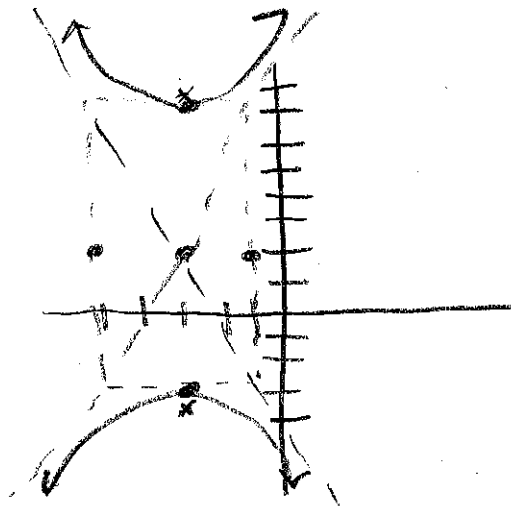
$C^2 = 29$

$F: (-3, 2 \pm \sqrt{29})$

$C = \sqrt{29}$

$a: y - 2 = \pm \frac{5}{2}(x + 3)$

$\approx 5.39$



$$e) (y-2)^2 = -(x+4)$$

$$4p = -1$$

$$p = -\frac{1}{4}$$

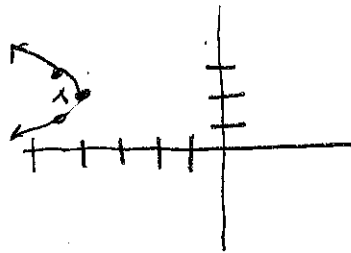
$$LR = |-1| = 1$$

$$V: (-4, 2)$$

$$f: (-4\frac{1}{4}, 2)$$

$$d: x = -3\frac{3}{4}$$

$$\text{Ends: } (-4\frac{1}{4}, 1\frac{1}{2}) (-4\frac{1}{4}, 2\frac{1}{2})$$



$$f) (y-1)^2 = 4(x-5)$$

$$4p = 4 \rightarrow LR = 4$$

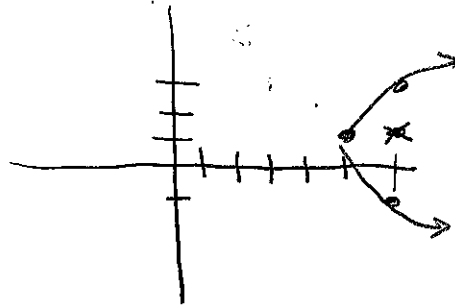
$$p = 1$$

$$V: (5, 1)$$

$$f: (6, 1)$$

$$d: x = 4$$

$$\text{Ends: } (6, 3) (6, -1)$$



2. a.) Circle

$$x^2 - 6x + 9 + y^2 - 2y + 1 = -1 + 9 + 1$$

$$\boxed{(x-3)^2 + (y-1)^2 = 9}$$

b.)  $6x^2 - 6y^2 = 12$

$$12$$

$$\boxed{\frac{x^2}{2} - \frac{y^2}{2} = 1} \text{ hyperbola}$$

c.) ellipse

$$9x^2 + 54x + 4y^2 - 16y = -61$$

$$9(x^2 + 6x + 9) + 4(y^2 - 4y + 4) = -61 + 81 + 16$$

$$9(x+3)^2 + 4(y-2)^2 = 36$$

$$36$$

$$\boxed{\frac{(x+3)^2}{4} + \frac{(y-2)^2}{9} = 1}$$

d.) **Hyperbola**

$$9x^2 + 36x - 4y^2 - 8y = 40$$

$$9(x^2 + 4x + 4) - 4(y^2 + 2y + 1) = 40 + 36 - 4$$

$$9(x+2)^2 - 4(y+1)^2 = 72$$

72

$$\boxed{\frac{(x-2)^2}{8} - \frac{(y+1)^2}{18} = 1}$$

e.) **Parabola**

$$x^2 + x + \frac{1}{4} = y + 5 + \frac{1}{4}$$

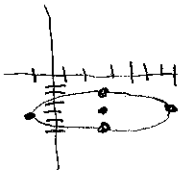
$$\boxed{\left(x + \frac{1}{2}\right)^2 = y + \frac{21}{4}}$$

3. a.)  $(x-h)^2 + (y-k)^2 = r^2$

$$(x+2)^2 + (y-3)^2 = 4^2$$

$$\boxed{(x+2)^2 + (y-3)^2 = 16}$$

b.)



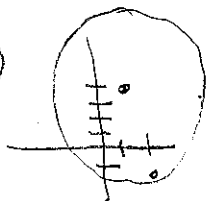
$$a=4$$

$$b=2$$

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$

$$\boxed{\frac{(x-3)^2}{16} + \frac{(y+4)^2}{4} = 1}$$

c.)



$$(x-h)^2 + (y-k)^2 = r^2$$

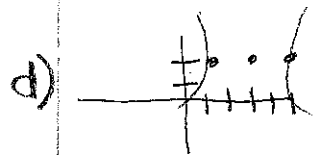
$$(2-1)^2 + (-1-4)^2 = r^2$$

$$1^2 + (-5)^2 = r^2$$

$$1 + 25 = r^2$$

$$26 = r^2$$

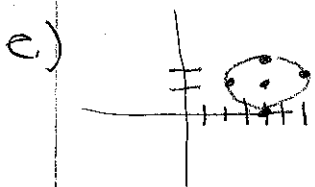
$$\boxed{(x-1)^2 + (y-4)^2 = 26}$$



d)  $c: (3, 2)$   $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$

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

$$\boxed{\frac{(x-3)^2}{4} - \frac{(y-2)^2}{9} = 1}$$



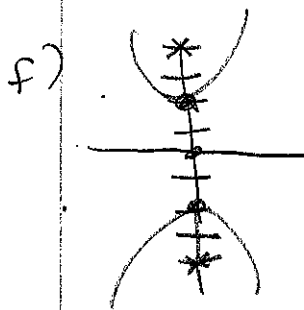
e)  $c: (4, 1)$

$a = 2$

$b = 1$

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$

$$\boxed{\frac{(x-4)^2}{4} + (y-1)^2 = 1}$$



f)  $c: (0, 0)$

$a = 2$

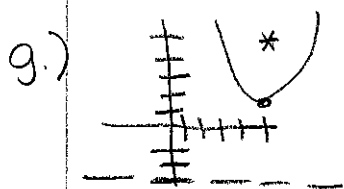
$c^2 = a^2 + b^2$

$16 = 4 + b^2$

$12 = b^2$

$$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$$

$$\boxed{\frac{y^2}{4} - \frac{x^2}{12} = 1}$$



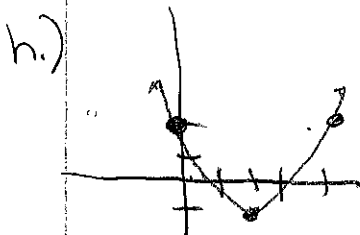
g)  $V: (5, 1)$

$p: 4$

$$(x-h)^2 = 4p(y-k)$$

$$(x-5)^2 = 4(4)(y-1)$$

$$\boxed{(x-5)^2 = 16(y-1)}$$



h)  $(x-h)^2 = 4p(y-k)$

$$(4-2)^2 = 4p(2-(-1))$$

$$2^2 = 4p(3)$$

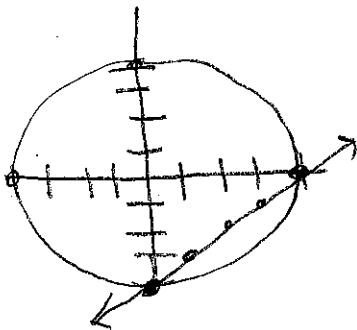
$$4 = 12p$$

$$\frac{1}{3} = p$$

$$(x-2)^2 = 4\left(\frac{1}{3}\right)(y-(-1))$$

$$\boxed{(x-2)^2 = \frac{4}{3}(y+1)}$$

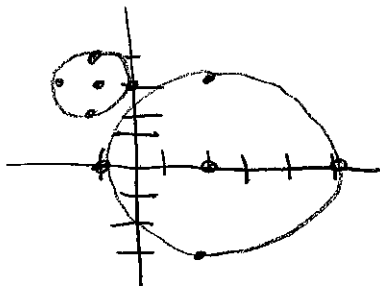
4. a.)



$$\begin{aligned} x - y &= 4 \\ -y &= -x + 4 \\ y &= x - 4 \end{aligned}$$

$$\boxed{\begin{matrix} (0, -4) \\ (4, 0) \end{matrix}}$$

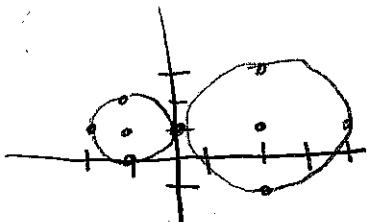
b.)



$$\begin{aligned} x^2 - 4x + 4 + y^2 &= 5 + 4 \\ (x - 2)^2 + y^2 &= 9 \end{aligned}$$

$$\boxed{\emptyset}$$

c.)



$$\boxed{(0, 1)}$$

5. a.)

$$\begin{aligned} x^2 + (-x + 3)^2 &= 5 \\ x^2 + (-x + 3)(-x + 3) &= 5 \\ x^2 + x^2 - 6x + 9 &= 5 \\ 2x^2 - 6x + 4 &= 0 \\ 2(x^2 - 3x + 2) &= 0 \\ 2(x - 2)(x - 1) &= 0 \end{aligned}$$

$x = 2$	$x = 1$
$y = -2 + 3$	$y = -1 + 3$
$y = 1$	$y = 2$

$$\boxed{(2, 1) \quad (1, 2)}$$



# Matrices

\* Remember, you can put these in your graphing calculators!

1.  $3 \begin{bmatrix} -9 & 6 \\ -3 & 7 \end{bmatrix} = \begin{bmatrix} -27 & 18 \\ -9 & 21 \end{bmatrix}$

2.  $\begin{vmatrix} -1 & 4 & 0 \\ 3 & -5 & 2 \\ -4 & 3 & -2 \end{vmatrix} = (-10 - 32 + 0) - (0 - 6 - 24) = -42 - (-30) = \boxed{-12}$

3.  $-\frac{1}{2} \begin{bmatrix} 1 & 6 & -3 \\ 2 & -4 & -1 \end{bmatrix} \begin{bmatrix} -1 & 4 & 0 \\ 3 & -5 & 2 \\ -4 & 3 & -2 \end{bmatrix}$

$$\begin{bmatrix} -1+18+12 & 4-30-9 & 0+12+6 \\ -2-12+4 & 8+20-3 & 6-8+2 \end{bmatrix}$$

$$-\frac{1}{2} \begin{bmatrix} 29 & -35 & 18 \\ -10 & 25 & -6 \end{bmatrix}$$

$$= \begin{bmatrix} -29/2 & 35/2 & -9 \\ 5 & -25/2 & 3 \end{bmatrix}$$

4.  $\begin{bmatrix} 6 & -4 \\ 3 & -2 \end{bmatrix} = \frac{1}{\det} \begin{bmatrix} \swarrow & - \\ - & \searrow \end{bmatrix} = \frac{1}{-12 - (-12)} \begin{bmatrix} -2 & 4 \\ -3 & 6 \end{bmatrix} = \frac{1}{0} \begin{bmatrix} -2 & 4 \\ -3 & 6 \end{bmatrix} = \boxed{\emptyset}$

5.  $\begin{bmatrix} 2 & -3 \\ 4 & -1 \end{bmatrix} \begin{bmatrix} 2 & -3 \\ 4 & -1 \end{bmatrix}$

$$\begin{bmatrix} 4-12 & -6+3 \\ 8-4 & -12+1 \end{bmatrix}$$

$$\boxed{\begin{bmatrix} -8 & -3 \\ 4 & -11 \end{bmatrix}}$$

6.  $\begin{vmatrix} 2 & -3 \\ 4 & -1 \end{vmatrix} = -2 - (-12) = \boxed{10}$

7.  $2 \begin{bmatrix} -3 & 2 \\ 0 & 5 \end{bmatrix} - 3 \begin{bmatrix} 2 & -3 \\ 4 & -1 \end{bmatrix} + \begin{bmatrix} 6 & -4 \\ 3 & -2 \end{bmatrix}$

$$\begin{bmatrix} -6 & 4 \\ 0 & 10 \end{bmatrix} + \begin{bmatrix} -6 & 9 \\ -12 & 3 \end{bmatrix} + \begin{bmatrix} 6 & -4 \\ 3 & -2 \end{bmatrix}$$

$$\boxed{\begin{bmatrix} -6 & 9 \\ -9 & 11 \end{bmatrix}}$$

8. 
$$\begin{vmatrix} 3 & 4 & -1 \\ -2 & 3 & 0 \\ 1 & 2 & 0 \end{vmatrix} = -1 \begin{vmatrix} -2 & 3 \\ 1 & 2 \end{vmatrix} - 0 \begin{vmatrix} 3 & 4 \\ 1 & 2 \end{vmatrix} + 0 \begin{vmatrix} 3 & 4 \\ -2 & 3 \end{vmatrix}$$

↓ PICK this column

$-1(-4-3)$   
 $-1(-7)$   
 $\boxed{7}$

9. 
$$\begin{vmatrix} 5 & -7x \\ -x & -6 \end{vmatrix} = -2$$

$-30 - (-7x^2) = -2$   
 $-30 + 7x^2 = -2$   
 $7x^2 = 28$   
 $x^2 = 4$   
 $\boxed{x = \pm 2}$

10. 
$$\begin{bmatrix} 2x+4 \\ 2y-6 \end{bmatrix} + \begin{bmatrix} 5 \\ -4 \end{bmatrix} = \begin{bmatrix} 7 \\ 1 \end{bmatrix}$$

$$\begin{bmatrix} 2x+9 \\ 2y-10 \end{bmatrix} = \begin{bmatrix} 7 \\ 1 \end{bmatrix}$$

$2x+9=7 \quad 2y-10=1$   
 $2x=-2 \quad 2y=11$   
 $\boxed{x=-1 \quad y=11/2}$

11. 
$$\begin{bmatrix} 2 & 4 \\ 3 & -7 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -5 \\ 4 \end{bmatrix}$$

$\frac{1}{-14-12} \begin{bmatrix} -7 & -4 \\ -3 & 2 \end{bmatrix} \begin{bmatrix} -5 \\ 4 \end{bmatrix}$

$-\frac{1}{26} \begin{bmatrix} -7 & -4 \\ -3 & 2 \end{bmatrix} \begin{bmatrix} -5 \\ 4 \end{bmatrix}$

$-\frac{1}{26} \begin{bmatrix} 35 & -16 \\ 15 & 8 \end{bmatrix}$

$-\frac{1}{26} \begin{bmatrix} 19 \\ 23 \end{bmatrix}$

$\begin{bmatrix} -19/26 \\ -23/26 \end{bmatrix}$

$\boxed{\left(-\frac{19}{26}, -\frac{23}{26}\right)}$



$$12. \begin{bmatrix} x & -7 \\ 3 & y \end{bmatrix} \begin{bmatrix} 2 \\ 5 \end{bmatrix} = \begin{bmatrix} 10 \\ 1 \end{bmatrix}$$

$$\begin{bmatrix} 2x-35 \\ 6+5y \end{bmatrix} = \begin{bmatrix} 10 \\ 1 \end{bmatrix}$$

$$2x-35=10 \quad 6+5y=1$$

$$2x=45$$

$$5y=-5$$

$$\boxed{x = \frac{45}{2} \quad y = -1}$$

$$13. \begin{bmatrix} 3 & -1 \\ 0 & 2 \end{bmatrix} \begin{bmatrix} 1 & 6 \\ 2 & -1 \end{bmatrix}$$

$$\begin{bmatrix} 3-2 & 18+1 \\ 0+4 & 0-2 \end{bmatrix} = \boxed{\begin{bmatrix} 1 & 19 \\ 4 & -2 \end{bmatrix}}$$

$$14. \begin{bmatrix} 1 & 5 & -4 \\ 6 & 0 & -1 \end{bmatrix} \begin{bmatrix} 2 & -1 \\ 3 & -3 \\ 1 & 1 \end{bmatrix}$$

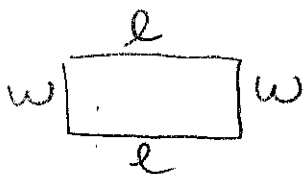
$$\begin{bmatrix} 2+15-4 & -1-15-4 \\ 12+0-1 & -6+0-1 \end{bmatrix} = \boxed{\begin{bmatrix} 13 & -20 \\ 11 & -7 \end{bmatrix}}$$

$$15.a) \begin{bmatrix} 3 & -4 \\ 4 & -2 \end{bmatrix} = \frac{1}{-6-16} \begin{bmatrix} -2 & 4 \\ -4 & 3 \end{bmatrix} = \frac{1}{10} \begin{bmatrix} -2 & 4 \\ -4 & 3 \end{bmatrix} = \boxed{\begin{bmatrix} -1/5 & 2/5 \\ -2/5 & 3/10 \end{bmatrix}}$$

$$b) \begin{bmatrix} 2 \times 4 \\ -6 \times -12 \end{bmatrix} = \frac{1}{-24-24} \begin{bmatrix} -12 & -4 \\ 6 & 2 \end{bmatrix} = \frac{1}{0} \begin{bmatrix} -12 & -4 \\ 6 & 2 \end{bmatrix} = \boxed{\phi}$$

16. Square (2x2, 3x3, etc.)

$$17. \begin{matrix} 2 \times 3 & 3 \times 1 \\ \boxed{2 \times 1} \end{matrix}$$



18 a.)  $l = \text{Length}$   
 $w = \text{width}$

b.)  $2l + 2w = 86$   
 $2w = l + 2$

$\rightarrow 2l + 2w = 86$   
 $-l + 2w = 2$

c.)  $\begin{bmatrix} 2 & 2 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} l \\ w \end{bmatrix} = \begin{bmatrix} 86 \\ 2 \end{bmatrix}$

The length is 28  
 and the width  
 is 15.

d.)  $\frac{1}{4-2} \begin{bmatrix} 2 & -2 \\ 1 & 2 \end{bmatrix} \begin{bmatrix} 86 \\ 2 \end{bmatrix}$

$\frac{1}{6} \begin{bmatrix} 2 & -2 \\ 1 & 2 \end{bmatrix} \begin{bmatrix} 86 \\ 2 \end{bmatrix}$

$\frac{1}{6} \begin{bmatrix} 172 & -4 \\ 86 & 4 \end{bmatrix}$

$\frac{1}{6} \begin{bmatrix} 168 \\ 90 \end{bmatrix}$

$\begin{bmatrix} 28 \\ 15 \end{bmatrix} = \begin{bmatrix} l \\ w \end{bmatrix}$

19. a.)  $g = \text{granola bars}$   
 $c = \text{coffee}$

b.)  $2g + 3c = 21.83$   
 $5g + c = 15.95$

c.)  $\begin{bmatrix} 2 & 3 \\ 5 & 1 \end{bmatrix} \begin{bmatrix} g \\ c \end{bmatrix} = \begin{bmatrix} 21.83 \\ 15.95 \end{bmatrix}$

d.)  $\frac{1}{2-15} \begin{bmatrix} 1 & -3 \\ -5 & 2 \end{bmatrix} \begin{bmatrix} 21.83 \\ 15.95 \end{bmatrix}$

$\frac{1}{-13} \begin{bmatrix} 21.83 & -47.7 \\ -109.15 & 31.8 \end{bmatrix}$

$\frac{-1}{13} \begin{bmatrix} -25.87 \\ -77.35 \end{bmatrix}$

$\begin{bmatrix} 1.99 \\ 5.95 \end{bmatrix} = \begin{bmatrix} g \\ c \end{bmatrix}$

Granola costs \$1.99  
 and  
 coffee costs \$5.95

20. a.)  $B = \text{buffet}$   
 $S = \text{steak}$

b.)  $12.99b + 15.95s = 364.38$   
 $b + s = 26$

c.)  $\begin{bmatrix} 12.99 & 15.95 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} b \\ s \end{bmatrix} = \begin{bmatrix} 364.38 \\ 26 \end{bmatrix}$

d.)  $\frac{1}{12.99-15.95} \begin{bmatrix} 1 & -15.95 \\ -1 & 12.99 \end{bmatrix} \begin{bmatrix} 364.38 \\ 26 \end{bmatrix}$

$\frac{-1}{2.96} \begin{bmatrix} 1 & -15.95 \\ -1 & 12.99 \end{bmatrix} \begin{bmatrix} 364.38 \\ 26 \end{bmatrix}$

$\frac{-1}{2.96} \begin{bmatrix} 364.38 - 414.7 \\ 364.38 + 337.74 \end{bmatrix}$

$\frac{-1}{2.96} \begin{bmatrix} -50.32 \\ -26.64 \end{bmatrix}$

$\begin{bmatrix} 17 \\ 9 \end{bmatrix} = \begin{bmatrix} b \\ s \end{bmatrix}$

17 people ordered the buffet and 9 people ordered steak.

21. a.)  $X = \text{Lollipop 1}$   
 $Y = \text{Lollipop 2}$

b.)  $.5x + .35y = 17$   
 $x + y = 40$

c.)  $\begin{bmatrix} .5 & .35 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 17 \\ 40 \end{bmatrix}$

$\begin{bmatrix} 20 \\ 20 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$

d.)  $\frac{1}{.35-.5} \begin{bmatrix} 1 & -.35 \\ -1 & .5 \end{bmatrix} \begin{bmatrix} 17 \\ 40 \end{bmatrix}$

$\frac{1}{.15} \begin{bmatrix} 17 - 14 \\ -17 + 20 \end{bmatrix}$

$\frac{1}{.15} \begin{bmatrix} 3 \\ 3 \end{bmatrix}$

Ramona bought 20 of each kind of lollipops

22. a.)  $X = \$6 \text{ book}$   
 $y = \$7 \text{ book}$

b.)  $6x + 7y = 177$   
 $x + y = 27$

c.)  $\begin{bmatrix} 6 & 7 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 177 \\ 27 \end{bmatrix}$

d.)  $\frac{1}{6-7} \begin{bmatrix} 1 & -7 \\ -1 & 6 \end{bmatrix} \begin{bmatrix} 177 \\ 27 \end{bmatrix}$   
 $-1 \begin{bmatrix} 1 & -7 \\ -1 & 6 \end{bmatrix} \begin{bmatrix} 177 \\ 27 \end{bmatrix}$   
 $\begin{bmatrix} -1 & 7 \\ 1 & -6 \end{bmatrix} \begin{bmatrix} 177 \\ 27 \end{bmatrix}$   
 $\begin{bmatrix} -177 + 189 \\ 177 - 162 \end{bmatrix}$

They sold  
 12 of the \$6 books  
 and 15 of the  
 \$7 books.

$\begin{bmatrix} 12 \\ 15 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$

23. a.)  $a = \text{adult fix}$   
 $s = \text{student fix}$

b.)  $4a + 2.5s = 413$   
 $a + s = 125$

c.)  $\begin{bmatrix} 4 & 2.5 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} a \\ s \end{bmatrix} = \begin{bmatrix} 413 \\ 125 \end{bmatrix}$

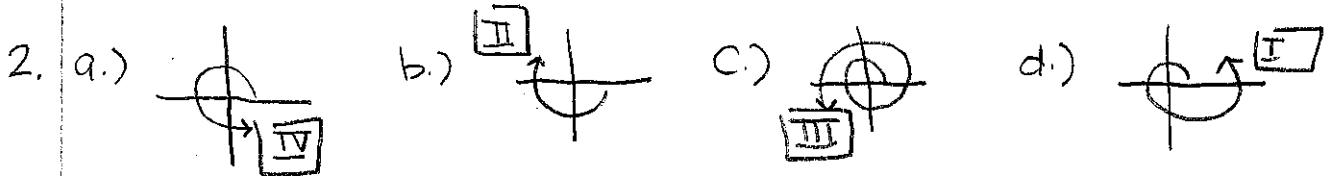
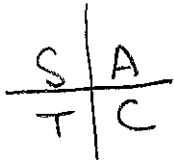
$\frac{1}{4-2.5} \begin{bmatrix} 1 & -2.5 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} 413 \\ 125 \end{bmatrix}$   
 $\frac{1}{1.5} \begin{bmatrix} 1 & -2.5 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} 413 \\ 125 \end{bmatrix}$   
 $\frac{1}{1.5} \begin{bmatrix} 413 - 312.5 \\ -413 + 500 \end{bmatrix}$   
 $\frac{1}{1.5} \begin{bmatrix} 100.5 \\ 87 \end{bmatrix}$

$\begin{bmatrix} 67 \\ 58 \end{bmatrix} = \begin{bmatrix} a \\ s \end{bmatrix}$

67 adult tickets and  
 58 student tickets  
 were purchased.

# Intro to Trig - Angles & Sohcahtoa

1. a.) IV  
 b.) II  
 c.) IV



3. a.)  $73 + 360 = \boxed{433^\circ}$   
 $73 - 360 = \boxed{-287^\circ}$

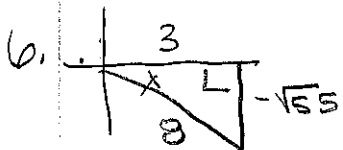
b.)  $4\pi/7 + 2\pi = \boxed{18\pi/7}$   
 $4\pi/7 - 2\pi = \boxed{-10\pi/7}$

4. a.)  $\frac{8\pi}{3} \cdot \frac{180}{\pi} = \boxed{480^\circ}$

b.)  $-\frac{4\pi}{15} \cdot \frac{180}{\pi} = \boxed{-48^\circ}$

5. a.)  $125 \cdot \frac{\pi}{180} = \boxed{\frac{25\pi}{36}}$

b.)  $-540 \cdot \frac{\pi}{180} = \boxed{-3\pi}$



$\cos x = \frac{3}{8}$

$3^2 + b^2 = 8^2$

$9 + b^2 = 64$

$b^2 = 55$

$b = \sqrt{55}$

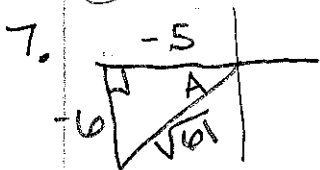
a.)  $\frac{o}{h} = \boxed{\frac{-\sqrt{55}}{8}}$

b.)  $\frac{a}{h} = \boxed{\frac{3}{8}}$

c.)  $\frac{o}{a} = \boxed{\frac{-\sqrt{55}}{3}}$

d.)  $\frac{h}{o} = \frac{8}{-\sqrt{55}} \cdot \frac{\sqrt{55}}{\sqrt{55}} = \boxed{\frac{-8\sqrt{55}}{55}}$

e.)  $\frac{a}{o} = \frac{-3}{\sqrt{55}} \cdot \frac{\sqrt{55}}{\sqrt{55}} = \boxed{\frac{-3\sqrt{55}}{55}}$



$(-5)^2 + (-6)^2 = c^2$

$25 + 36 = c^2$

$61 = c^2$

$\sqrt{61} = c$


c.)  $\frac{o}{a} = \frac{-6}{-5} = \boxed{\frac{6}{5}}$

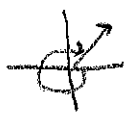
d.)  $\frac{h}{o} = \boxed{\frac{-\sqrt{61}}{6}}$

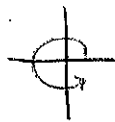
a.)  $\frac{o}{h} = \frac{-6 \cdot \sqrt{61}}{\sqrt{61} \cdot \sqrt{61}} = \boxed{\frac{-6\sqrt{61}}{61}}$


b.)  $\frac{a}{h} = \frac{-5 \cdot \sqrt{61}}{\sqrt{61} \cdot \sqrt{61}} = \boxed{\frac{-5\sqrt{61}}{61}}$

e.)  $\frac{h}{a} = \boxed{\frac{-\sqrt{61}}{5}}$  f.)  $\frac{a}{o} = \frac{-5}{-6} = \boxed{\frac{5}{6}}$

8. a.)   $180 - 117 = \boxed{63^\circ}$

c.   $360 - 290 = \boxed{70^\circ}$

b.)   $2\pi - 15\frac{\pi}{8} = \boxed{\frac{\pi}{8}}$

d.)   $3\pi - \frac{29\pi}{11} = \boxed{\frac{4\pi}{11}}$

9.  $\boxed{\frac{\pi}{2}, \frac{3\pi}{2}}$  \* where  $\cos = 0$

10. (use unit circle!)

a.)  $\boxed{1}$

g.)  $\left(\frac{8\pi}{3} = \frac{2\pi}{3}\right) \boxed{\frac{1}{2}}$

b.)  $\frac{-2 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \boxed{\frac{-2\sqrt{3}}{3}}$

h.)  $\boxed{\emptyset}$

c.)  $\boxed{\frac{-\sqrt{3}}{2}}$

i.)  $\boxed{-2}$

d.)  $\boxed{1}$

j.)  $\boxed{\frac{1}{2}}$

e.)  $\boxed{\emptyset}$

k.)  $\frac{2 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \boxed{\frac{2\sqrt{3}}{3}}$

f.)  $\boxed{\frac{\sqrt{3}}{3}}$

l.)  $\boxed{\emptyset}$

11.  $\begin{array}{c|c} \text{II} & \\ \hline \text{S} & \text{A} \\ \hline \text{X} & \text{X} \end{array}$   $\begin{array}{l} \text{CSC} \rightarrow \text{Pos (sin)} \\ \text{cot} \rightarrow \text{Neg (Tan)} \end{array}$

12.  $360 - 10 = \boxed{350^\circ}$

13.  $2\pi + 2\pi + \pi - \frac{5\pi}{12} = \boxed{\frac{55\pi}{12}}$

14.  $-\frac{5\pi}{2} + \frac{\pi}{3} = \boxed{\frac{-13\pi}{6}}$

15.  $-435 + 360 + 360 = \boxed{285^\circ}$

16.  $\frac{11\pi}{3} - 2\pi = \boxed{\frac{5\pi}{3}}$

17

$$17. \quad -\frac{7\pi}{6} + 2\pi = \boxed{\frac{5\pi}{6}}$$

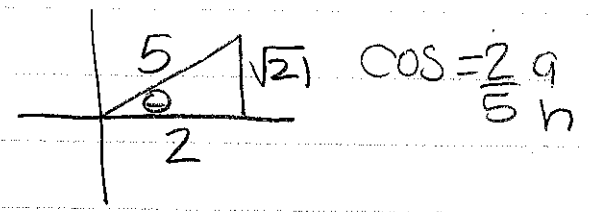
$$-\frac{7\pi}{6} - 2\pi = \boxed{-\frac{19\pi}{6}}$$

$$18. \quad 640 - 360 = \boxed{280^\circ}$$

$$280 - 360 = \boxed{-80^\circ}$$

19.

$\begin{array}{c|c} S/A & \\ \hline T/C & \end{array}$ 
 sin  $\rightarrow$  POS  
 tan  $\rightarrow$  POS



$$\sin \theta = \frac{b}{h} = \frac{\sqrt{21}}{5}$$

$$\tan \theta = \frac{b}{a} = \frac{\sqrt{21}}{2}$$

$$\csc \theta = \frac{5 \sqrt{21}}{\sqrt{21} \cdot \sqrt{21}} = \frac{5\sqrt{21}}{21}$$

$$\sec \theta = \frac{5}{2}$$

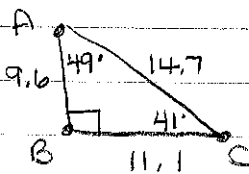
$$\cot \theta = \frac{2 \sqrt{21}}{\sqrt{21} \sqrt{21}} = \frac{2\sqrt{21}}{21}$$

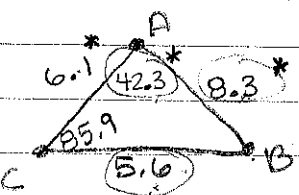
$$2^2 + b^2 = 5^2$$

$$4 + b^2 = 25$$

$$b^2 = 21$$

$$b = \sqrt{21}$$

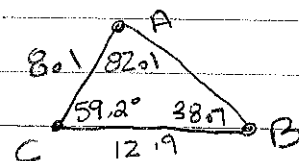
1.   $\cos C = \frac{11.1}{14.7}$   $\angle A = 90 - 41 = 49^\circ$   
 $C = \cos^{-1}\left(\frac{11.1}{14.7}\right)$   $\sin 41^\circ = \frac{c}{14.7}$   
 $C = 41^\circ$   $c = 9.6$

2.   $a^2 = b^2 + c^2 - 2bc \cos A$   
 $a^2 = (6.1)^2 + (8.3)^2 - 2(6.1)(8.3) \cos 42.3^\circ$   
 $a^2 = 31.2$   
 $a = 5.6$

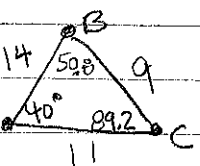
$\frac{5.6}{\sin 42.3^\circ} = \frac{8.3}{\sin C}$   $B = 180 - 42.3 - 85.9$   
 $\frac{5.6 \sin C}{5.6} = \frac{8.3 \sin 42.3}{5.6}$   $B = 51.8^\circ$

$C = \sin^{-1}\left(\frac{8.3 \sin 42.3}{5.6}\right)$   
 $C = 85.9^\circ$

3.  $A = \frac{1}{2} ab \sin C$   
 $= \frac{1}{2} (5.6)(6.1) \sin 85.9^\circ$   
 $= 17.04^2$

4.   $C = 180 - 82.1 - 38.7$   
 $C = 59.2^\circ$

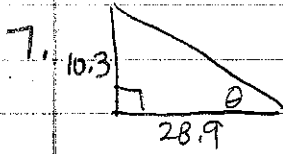
$\frac{12.9}{\sin 82.1} = \frac{b}{\sin 38.7}$   $\frac{12.9}{\sin 82.1} = \frac{c}{\sin 59.2}$   
 $b = 8.1$   $c = 11.2$

5.   $9^2 = 14^2 + 11^2 - 2(14)(11) \cos A$   
 $-112 = 196 + 121 - 308 \cos A$   
 $-236 = -308 \cos A$   
 $236 = 308 \cos A$   
 $A = \cos^{-1}\left(\frac{236}{308}\right)$   $\frac{9}{\sin 40} = \frac{14}{\sin C}$   
 $9 \sin C = 14 \sin 40$   
 $C = \sin^{-1}\left(\frac{14 \sin 40}{9}\right)$   
 $C = 89.2^\circ$   
 $B = 180 - 40 - 89.2 = 50.8^\circ$



6.  $A = \frac{1}{2}(9)(11)\sin 89.2$

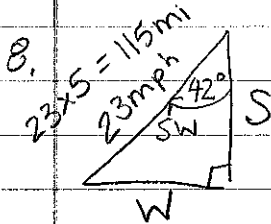
$A = 49.5 \text{ u}^2$



$\tan \theta = \frac{10.3}{28.9}$

$\theta = \tan^{-1}\left(\frac{10.3}{28.9}\right)$

$\theta = 19.6^\circ$

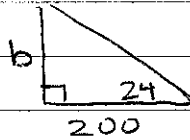
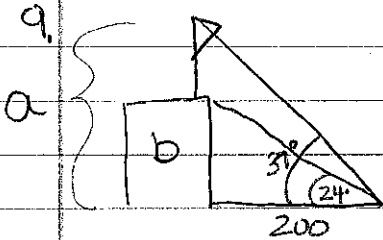


$\sin 42^\circ = \frac{W}{115}$

$W = 77 \text{ mi}$

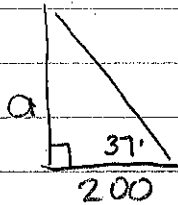
$\cos 42^\circ = \frac{S}{115}$

$S = 85.5 \text{ mi}$



$\tan 24 = \frac{b}{200}$

$b = 89.0$



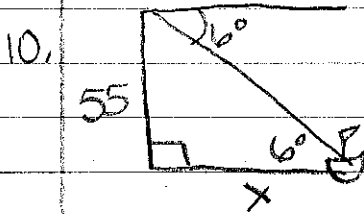
$\tan 37 = \frac{a}{200}$

$a = 150.7$

$a - b$

$150.7 - 89$

$61.7 \text{ ft}$

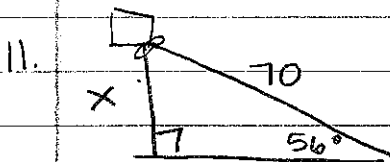


$\tan 6 = \frac{55}{x}$

$x \tan 6 = 55$

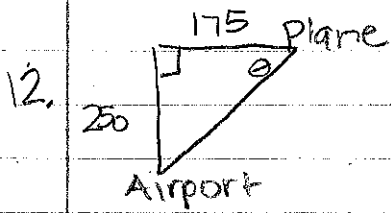
$x = \frac{55}{\tan 6}$

$x = 523.3 \text{ ft}$



$\sin 56 = \frac{x}{70}$

$x = 58 \text{ ft}$

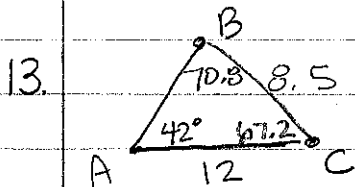


$$\tan \theta = \frac{250}{175}$$

$$\theta = \tan^{-1} \left( \frac{250}{175} \right)$$

$$\theta = \boxed{W 55^\circ S}$$

$$\text{or } 90 - 55 = \boxed{S 35^\circ W}$$



$$\frac{8.5}{\sin 42} = \frac{12}{\sin B}$$

$$8.5 \sin B = 12 \sin 42$$

$$\sin B = \frac{12 \sin 42}{8.5}$$

$$B = \sin^{-1} \left( \frac{12 \sin 42}{8.5} \right)$$

$$\boxed{B = 70.8^\circ}$$

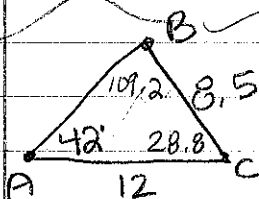
$$C = 180 - 42 - 70.8$$

$$\boxed{C = 67.2^\circ}$$

$\Delta 1 =$

$$\frac{8.5}{\sin 42} = \frac{c}{\sin 67.2}$$

$$\boxed{C = 11.7}$$



A \$\$\$

$$B = 180 - 70.8$$

$$\boxed{B = 109.2^\circ}$$

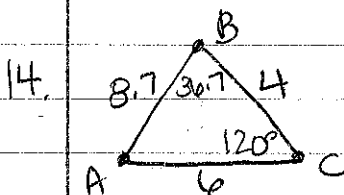
$$C = 180 - 109.2 - 42$$

$$\boxed{C = 28.8^\circ}$$

$\Delta 2 =$

$$\frac{8.5}{\sin 42} = \frac{c}{\sin 28.8}$$

$$\boxed{C = 6.1}$$



$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$c^2 = 4^2 + 8.7^2 - 2(4)(8.7) \cos 120^\circ$$

$$c^2 = 74$$

$$\boxed{c = 8.7}$$

$$\frac{8.7}{\sin 120} = \frac{b}{\sin B}$$

$$8.7 \sin B = 6 \sin 120$$

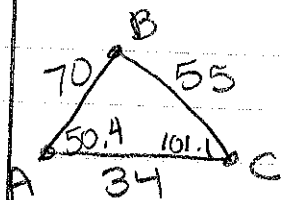
$$\sin B = \frac{6 \sin 120}{8.7}$$

$$B = \sin^{-1} \left( \frac{6 \sin 120}{8.7} \right) \Rightarrow \boxed{B = 36.7}$$

$$A = 180 - 36.7 - 120$$

$$\boxed{A = 23.3^\circ}$$

15.



$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$70^2 = 55^2 + 34^2 - 2(55)(34) \cos C$$

$$\frac{-55^2 - 34^2}{-34^2 - 55^2 - 34^2}$$

$$719 = -3740 \cos C$$

$$\frac{-719}{3740} = \cos C$$

$$C = \cos^{-1}\left(\frac{-719}{3740}\right)$$

$$\boxed{C = 101.1^\circ}$$

$$\frac{70}{\sin 101.1} = \frac{55}{\sin A}$$

$$70 \sin A = 55 \sin 101.1$$

$$\sin A = \frac{55 \sin 101.1}{70}$$

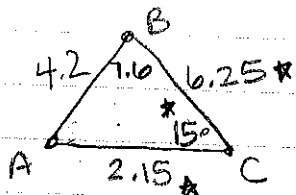
$$A = \sin^{-1}\left(\frac{55 \sin 101.1}{70}\right)$$

$$\boxed{A = 50.4^\circ}$$

$$B = 180 - 101.1 - 50.4$$

$$\boxed{B = 28.5^\circ}$$

16.



$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$c^2 = 6.25^2 + 2.15^2 - 2(6.25)(2.15) \cos 15^\circ$$

$$c^2 = 17.7$$

$$\boxed{c = 4.2}$$

$$\frac{2.15}{\sin B} = \frac{4.2}{\sin 15}$$

$$2.15 \sin 15 = 4.2 \sin B$$

$$2.15 \sin 15 = 4.2 \sin B$$

$$\frac{2.15 \sin 15}{4.2} = \sin B$$

$$B = \sin^{-1}\left(\frac{2.15 \sin 15}{4.2}\right)$$

$$\boxed{B = 7.6^\circ}$$

$$A = 180 - 7.6 - 15$$

$$\boxed{A = 157.4^\circ}$$

$$17. .4226$$

$$18. .4226$$

$$19. .3346$$

$$20. 1.3499$$

$$21. .9881$$

$$22. .1989$$

$$23. 1.0538$$

$$24. \emptyset$$

$$25. 54.99^\circ$$

$$26. 10.00^\circ$$

$$27. 50.01^\circ$$

$$10 \quad 28. \frac{1}{\cos \theta} = 1.4123$$

$$1.4123 \cos \theta = 1$$

$$\cos \theta = \frac{1}{1.4123}$$

$$\theta = 44.92^\circ$$

$$29. 65.62011851$$

$$65^\circ 11'$$

$$30. 56.31345804$$

$$56^\circ 19'$$

$$31. \frac{1}{\sin \theta} = 1.5555$$

$$1.5555 \sin \theta = 1$$

$$\sin \theta = \frac{1}{1.5555}$$

$$\theta = 40.00691832$$

$$40^\circ 0'$$

$$32. \frac{1}{\tan \theta} = 2.1234$$

$$2.1234 \tan \theta = 1$$

$$\tan \theta = \frac{1}{2.1234}$$

$$\theta = 25.21775454$$

$$25^\circ 13'$$

# Graphs of Trig Fcns.

1. a.)  $\boxed{-82^\circ}$  b.)  $998 - 82 = \boxed{1080^\circ}$

2. a.)  $\frac{-7 - -24}{2} = \boxed{8.5}$  b.)  $\frac{-7 + -24}{2} = \boxed{-15.5}$

3.  $y = 3 \sin \frac{1}{4} (x + \frac{\pi}{3}) - 1$

$A = \boxed{3}$

$VS = \boxed{-1}$

$Pd = \frac{2\pi}{b} = \frac{2\pi}{\frac{1}{4}} = 2\pi \cdot 4 = \boxed{8\pi}$

$PS = x + \frac{\pi}{3} = 0$

$x = \boxed{-\frac{\pi}{3}}$

4.  $y = -2 \cos (3\theta - 120^\circ) + 2$

$A = \boxed{2}$

$VS = \boxed{2}$

$Pd = \frac{360}{b} = \frac{360}{3} = \boxed{120^\circ}$

$PS = 3\theta - 120 = 0$

$3\theta = 120$

$\theta = \boxed{40^\circ}$

5.  $y = -2 \sin (\frac{1}{3}x + \frac{\pi}{6}) + 1$

$A = 2$

Ref. x-axis

Sin

$PS \Rightarrow \frac{1}{3}x + \frac{\pi}{6} = 0$

$3 \cdot \frac{1}{3}x = -\frac{\pi}{6} \cdot 3$

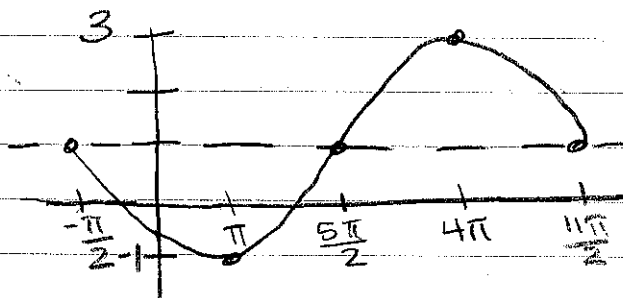
$x = -\frac{\pi}{2}$

$\frac{1}{3}x + \frac{\pi}{6} = 2\pi$

$3 \cdot \frac{1}{3}x = \frac{11\pi}{6} \cdot 3$

$x = \frac{11\pi}{2}$

$VS = 1$



6.  $y = 3 \cos 2(\theta - 60^\circ) - 2$   
 $A = 3$        $Pd = \frac{360}{1} = 360^\circ$   
 COS

PS  $\Rightarrow 2(\theta - 60) = 0$

$\theta - 60 = 0$

$\theta = 60^\circ$

$2(\theta - 60) = 360$

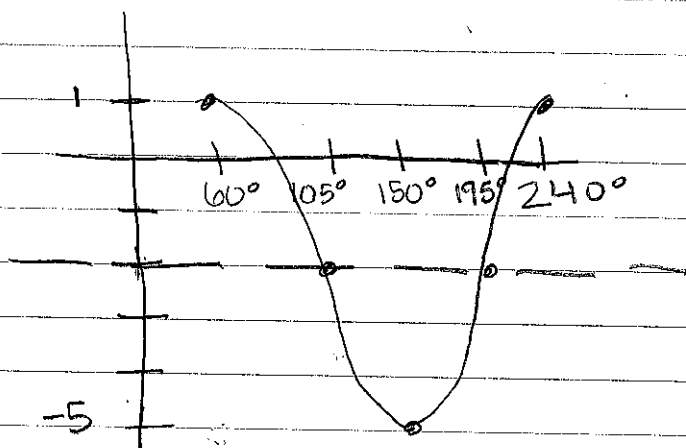
$\theta - 60 = 180$

$\theta = 240^\circ$

VS = -2

D:  $[60^\circ, 240^\circ]$

R:  $[-5, 1]$



7.  $y = 4 \cos 2\theta$

$A = 4$        $Pd = \frac{360}{2} = 180^\circ$

COS

PS  $\Rightarrow 2\theta = 0$

$\theta = 0^\circ$

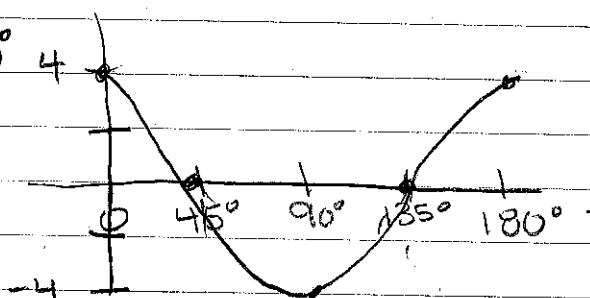
$2\theta = 360$

$\theta = 180$

D:  $[0^\circ, 180^\circ]$

R:  $[-4, 4]$

VS: 0



8.  $y = \sin(3x - \frac{3\pi}{2})$

$A = 1$        $Pd = \frac{2\pi}{3}$

SIN

PS =  $3x - \frac{3\pi}{2} = 0$

$\frac{1}{3} \cdot 3x = \frac{3\pi}{2} \cdot \frac{1}{3}$

$x = \frac{\pi}{2}$

$3x - \frac{3\pi}{2} = 2\pi$

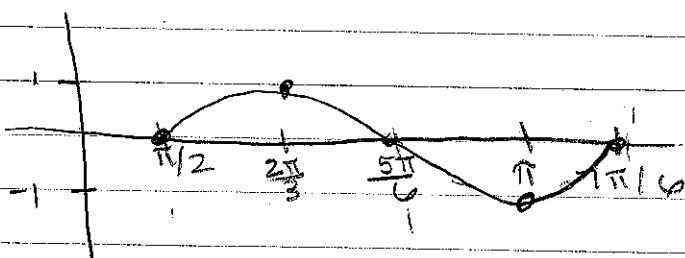
$\frac{1}{3} \cdot 3x = \frac{2\pi}{2} \cdot \frac{1}{3}$

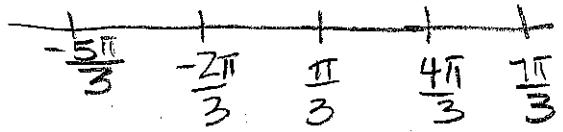
$x = \frac{7\pi}{6}$

D:  $[\frac{\pi}{2}, \frac{7\pi}{6}]$

R:  $[-1, 1]$

VS: 0

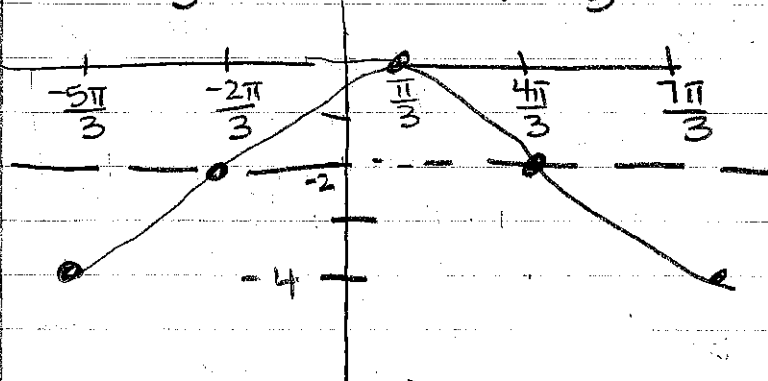




9.  $y = 2 \cos\left(\frac{1}{2}x + \frac{5\pi}{6}\right) - 2$

$A = 2$   
 $Pd = \frac{2\pi}{1/2} = 2\pi \cdot 2 = 4\pi$   
 $VS = -2$   
 $PS = -5\pi/3$   
 $D = \left[-5\pi/3, \frac{7\pi}{3}\right]$   
 $R = [-4, 0]$

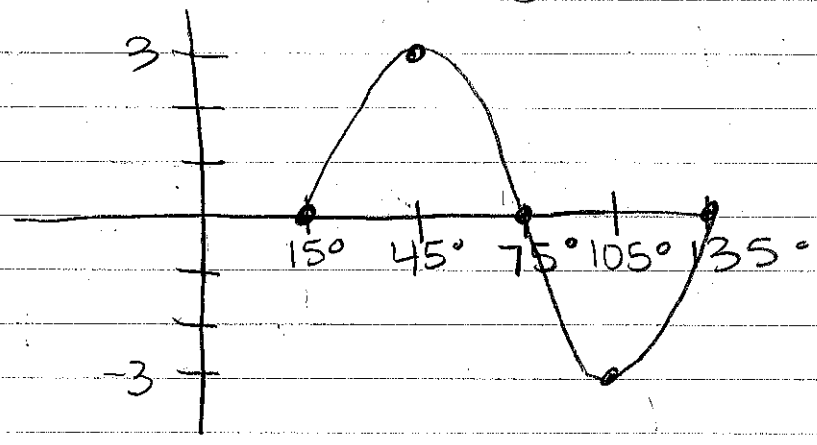
$\frac{1}{2}x + \frac{5\pi}{6} = 0$        $\frac{1}{2}x + \frac{5\pi}{6} = 2\pi$   
 $2 \cdot \frac{1}{2}x = -\frac{5\pi}{6} \cdot 2$        $2 \cdot \frac{1}{2}x = \frac{7\pi}{6} \cdot 2$   
 $x = -\frac{5\pi}{3}$        $x = \frac{7\pi}{3}$



10.  $y = 3 \sin(3\theta - 45^\circ)$

$A = 3$   
 $Pd = \frac{360}{3} = 120^\circ$   
 $VS = 0$   
 $PS = 15^\circ$   
 $D = [15^\circ, 135^\circ]$   
 $R = [-3, 3]$

$3\theta - 45 = 0$        $3\theta - 45 = 360$   
 $3\theta = 45$        $3\theta = 405$   
 $\theta = 15^\circ$        $\theta = 135^\circ$



$$11. \quad y = a \cos b(\theta - c) + d$$

$$y = 5 \cos \frac{4}{3} (\theta - 60^\circ) + 3$$

$$Pd = \frac{360}{b}$$

$$270 = \frac{360}{\frac{4}{3}}$$

$$270b = 360$$

$$b = 4/3$$

$$12. \quad y = a \cos b(x - c) + d$$

$$y = 2 \cos 2(x + \frac{\pi}{4}) - 4$$

$$Pd = \frac{2\pi}{b}$$

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

$$\pi b = 2\pi$$

$$b = 2$$

$$13. \quad y = a \sin b(\theta - c) + d$$

$$y = 1.5 \sin 6(\theta - 8^\circ) + 5.5$$

$$\text{Range: } [4, 7]$$

$$A = \frac{7-4}{2} = \frac{3}{2} = 1.5$$

$$Vs = \frac{7+4}{2} = \frac{11}{2} = 5.5$$

$$\text{Domain: } [8^\circ, 68^\circ]$$

$$Pd = 68 - 8 = 60^\circ$$

$$Pd = \frac{360}{b}$$

$$60 = \frac{360}{b}$$

$$60b = 360$$

$$b = 6$$