# SAT # 10 -

# SAT # 10 - 1,2

$$\begin{aligned} 2z + 1 &= z \\ -2z \quad &\quad -2z \\ 1 &= -z \\ \frac{1}{-1} &= \frac{-z}{-1} \\ -1 &= z \end{aligned}$$

OR

$$\begin{aligned} 2z + 1 &= z \\ -z \quad &\quad -z \\ z + 1 &= 0 \\ -1 \quad &\quad -1 \\ z &= -1 \end{aligned}$$

Algebra

$$\begin{aligned} 2z + 1 &= z \\ 2(-2) + 1 &= (-2) \\ -4 + 1 &= -2 \\ -3 &\neq -2 \end{aligned}$$

OR

$$\begin{aligned} 2z + 1 &= z \\ 2(-1) + 1 &= (-1) \\ -2 + 1 &= -1 \\ -1 &= -1 \end{aligned}$$

Substitution

Circle/Underline/Summarize important information

$let\ w = \#\ of\ weeks$

$Price = \$300$

$Payments = \frac{\$30}{week}$

$Initial\ Payment = \$60$

$60 + 30w = 300$

| $weeks$ | $paid$ |
|---|---|
| 0 | 60 |
| 1 | 90 |
| 2 | 120 |
| … | |
| 7 | 270 |
| 8 | 300 |

Table of values

Check your answer

Arbitrary numbers

# SAT # 10 - 3

| | |
|---|---|
| 0 | 11.99 |
| $Weight$ | $Charge$ |
| 5 | 16.94 |
| 10 | 21.89 |
| 20 | 31.79 |
| 40 | 51.59 |

$-5$ ; $\Delta x = +5$ ; $-4.95$ ; $+4.95 = \Delta y$

Estimate/Rounding

| | |
|---|---|
| 0 | 12 |
| $Weight$ | Charge |
| 5 | 17 |
| 10 | 22 |
| 20 | 32 |
| 40 | 52 |

$-5$ ; $\Delta x = +5$ ; $-5$ ; $+5 = \Delta y$

$21.89 - 16.94 = 4.95$   $16.94 - 4.95 = 11.99$

$y = mx + b$

$y = \frac{\Delta x}{\Delta y} x + b$

$y = \frac{4.95}{5} x + 11.99$

$y = 0.99x + 11.99$

$y = mx + b$   $m = \frac{rise}{run} = \frac{\Delta y}{\Delta x}$

$b : y - intercept\ (0, b)$

The b value is the value of the dependent variable when the independent variable is 0.

Y depends on X

$f(x) = 0.99x + 11.99$

$22 - 17 = 5$   $17 - 5 = 12$

$y = mx + b$

$y = \frac{\Delta x}{\Delta y} x + b$

$y = \frac{5}{5} x + 12$

$y = 1x + 12$

$\frac{16.94}{5} = 3.39$   $\frac{21.89}{10} = 2.18$   $\frac{17}{5} = 3\frac{3}{5}$   $\frac{22}{5} = 4\frac{2}{5}$   $\frac{32}{20} = 1\frac{12}{20}$

$2.28 \neq 3.39$   $3\frac{3}{5} \neq 4\frac{2}{5} \ldots$

These would be equal if the subtractions above zero for the dependent variable when the independent variable was zero. Therefor answers A&C are wrong.

$(x_2, y_2)$ $(10,21.89)$   $(x_1, y_1)$ $(5,16.94)$

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

$m = \frac{(21.89) - (16.94)}{(10) - (5)}$

$m = \frac{4.95}{5} = \frac{0.99}{1} = \frac{rise}{run}$

$4.95 \div 5 = 0.99$ (5 ) 4.95; − 45; 45; − 45; 0)

$y = mx + b$

$y = (\frac{0.99}{1})x + b$

$(21.89) = 0.99(10) + b$

$21.89 = 9.9 + b$

$-9.9 \quad -9.9$

$11.99 = b$   $y - int = (0,11.99)$

$(x_2, y_2)$ $(5,17)$   $(x_1, y_1)$ $(10,22)$

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

$m = \frac{(22) - (17)}{(10) - (5)}$

$m = \frac{5}{5} = \frac{1}{1} = \frac{rise}{run}$

$y = mx + b$

$y = (\frac{1}{1})x + b$

$(22) = 1(10) + b$

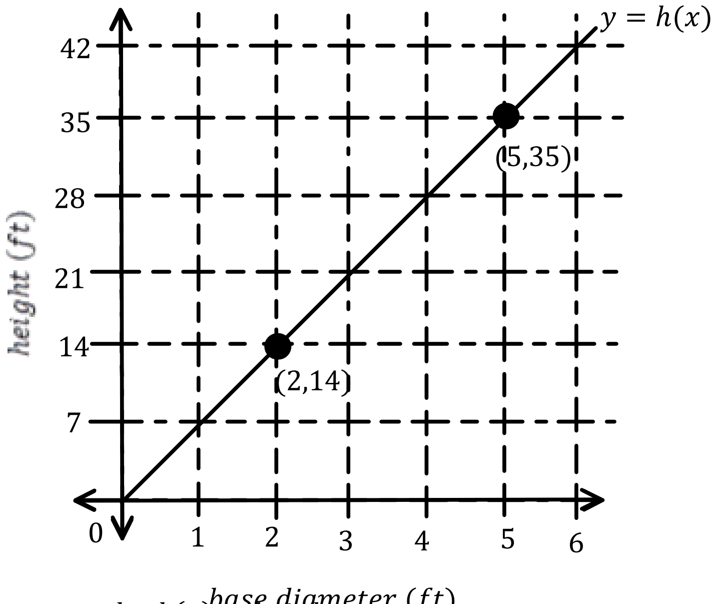
$22 = 10 + b$

$-10 \quad -10$

$12 = b$   $y - int = (0,12)$

$y = 0.99x + 11.99$   $f(x) = 0.99x + 11.99$   $y = 1x + 12$

# SAT # 10 - 4,5




let $h(x) = height$

let $x = base\ diameter\ (ft)$

(5,35)

$height = 35\ ft$
$base\ diameter = 5ft$

(2,14)

$height = 14\ ft$
$base\ diameter = 2ft$

$35 - 14 = 21\ ft$

| |
|---|
| How much Greater $= \pm$<br>How many times Greater $= \times \div$ |

$\sqrt{9x^2}\ ; x > 0$

$\sqrt{9x^2} = 3|x| = 3x$

| |
|---|
| $\sqrt{x^2} = \lvert x\rvert = \pm x$ |

| |
|---|
| $x = 3^*$ |

$\sqrt{9x^2}$
$\sqrt{9(3)^2}$
$\sqrt{9(9)}$
$\sqrt{81}$
9

$3x$
$3(3)$
9

$3x^2$
$3(3)^2$
$3(9)$
27

# SAT # 10 - 6

$\frac{x^2-1}{x-1}=-2$

Factor differences of squares

$\frac{x^2-1}{(x+1)(x-1)}$

Do your side work off to the right

$\frac{(x+1)(x-1)}{(x-1)}=-2$

$\frac{(x+1)\cancel{(x-1)}}{\cancel{(x-1)}}=-2$

| | | |
|---|---|---|
| Divide the top and bottom by $(x-1)$ | $\frac{x-1}{x-1}=1$ | Cross it off |

$x+1=-2$

$-1\quad -1$

$x=-3$

| | |
|---|---|
| $x-1\neq 0$ | Restrictions : |
| $+1\quad +1$ | Denominator cannot equal 0 |
| $x\neq 1$ | Set denominator can't equal to zero and solve |

$\frac{x^2-1}{x-1}=-2$

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

$x^2-1=-2x+2$

$+2x\quad +2x$

$x^2+2x-1=+2$

$-2\quad -2$

$x^2+2x-3=0$

$(x+3)(x-1)=0$

$x+3=0$ $\quad x-1=0$

$-3\quad -3$ $\quad +1\quad +1$

$x=-3$ $\quad \cancel{x=1}$

$\frac{x^2-1}{x-1}=-2$

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

$\frac{9-1}{-3-1}=-2$

$\frac{8}{-4}=-2$

$-2=-2$

$\frac{x^2-1}{x-1}=-2$

$\frac{(0)^2-1}{(0)-1}=-2$

$\frac{0-1}{0-1}=-2$

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

$1\neq -2$

$\frac{x^2-1}{x-1}=-2$

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

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

$\frac{0}{0}\neq -2$

$\frac{x^2-1}{x-1}=-2$

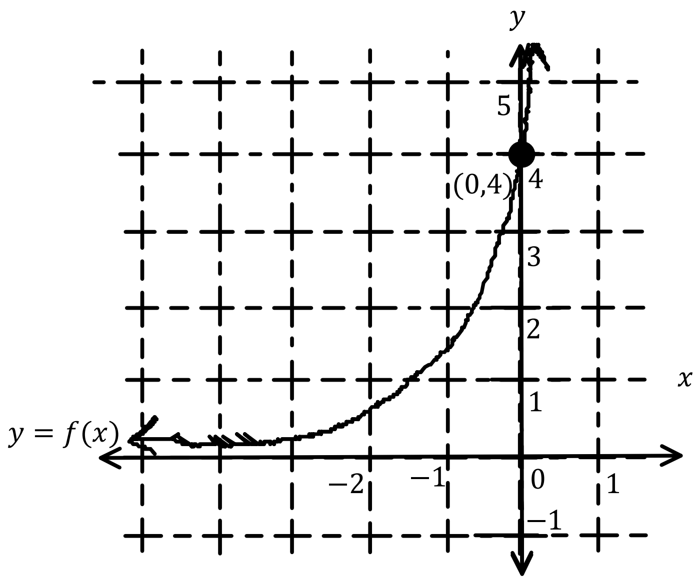
$\frac{(-1)^2-1}{(-1)-1}=-2$

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

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

$0\neq -2$

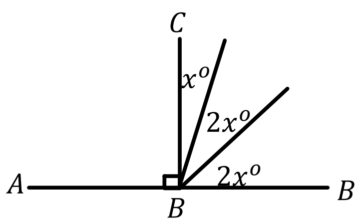
# SAT # 10 - 7,8




$f(x)$

$f(0) = 4$

| $x$ | $y = f(x)$ |
|---|---|
| 0 | 4 |
| 1 | |
| 2 | |

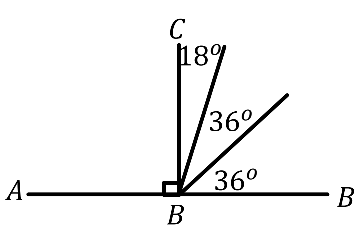



$$x + 2x + 2x = 90^o$$
$$5x = 90$$
$$\frac{5x}{5} = \frac{90}{5}$$
$$x = 18^o$$

$3x =$

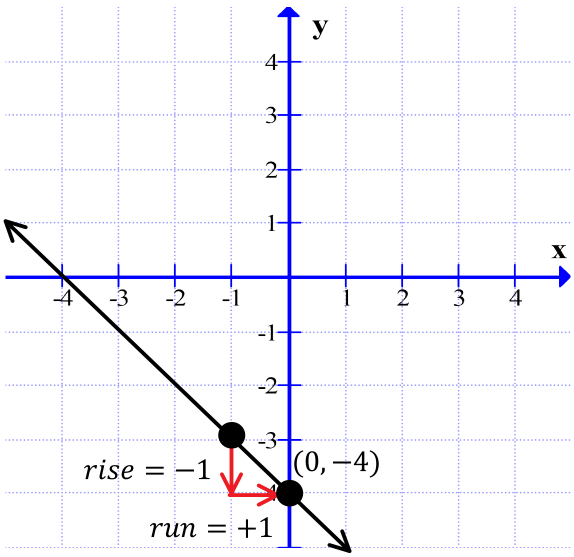
$3(18)$

$54$




$$18^o + 36^o + 36^o = 90^o$$

# SAT # 10 - 9,10




$\boxed{y = mx + b}$

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

$y = -x - 4$

$m = \frac{rise}{run} = -\frac{1}{1}$

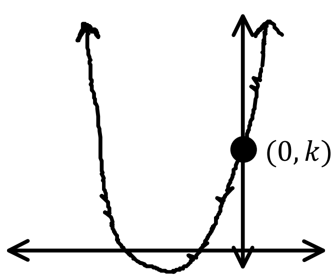
$b = y - int\ (0, -4)$

$y = -x - 4$

$+x \quad +x$

$y + x = -4$

$x + y = -4$




$y = 2x^2 + 10x + 12$

$y = 2(0)^2 + 10(0) + 12$

$y = 0 + 0 + 11$

$y = 12$

$(0,12)$

$k = 12$

| $x$ | $y$ |
|---|---|
| 0 | 12 |
| | |

# SAT # 10 - 11,12,13

Circle

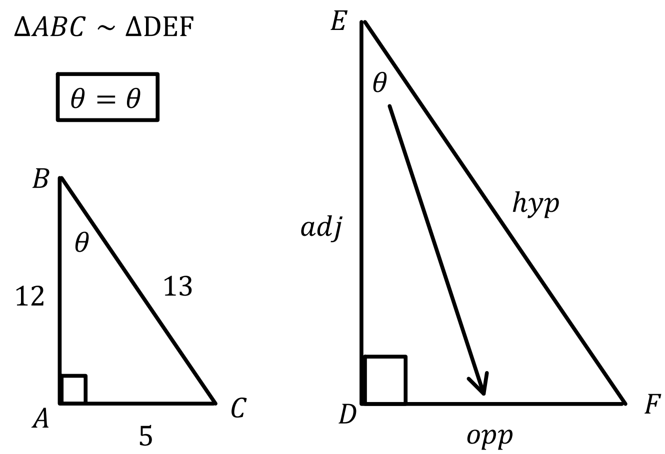
$$(x-h)^2+(y-k)^2=r^2 \qquad Center:\ (h,k) \qquad r: radius$$

$(x-(5))^2+(y-(7))^2=2^2$ $\qquad$ $Center:\ (5,7)$ $\qquad$ $r=2$ $\qquad$ Substitute with brackets

$(x-5)^2+(y-7)^2=4$

$\Delta ABC \sim \Delta DEF$

$\theta=\theta$




$cos\theta=\dfrac{adj}{hyp}$

$cosE=\dfrac{DE}{EF}=\dfrac{AB}{BC}=\dfrac{12}{13}$

Similar triangles

$\dfrac{DE}{EF}=\dfrac{AB}{BC}$

$\dfrac{Big\ Vertical\ Side}{Big\ diagonal\ Side}=\dfrac{Small\ Vertical\ Side}{Small\ Diagonal\ Side}=$

$f(x)=x^2+5x+4$

$f(x)=(x+4)(x+1)$

$0=(x+4)(x+1)$

$x+4=0$ $\qquad$ $x+1=0$

$-4\quad -4$ $\qquad$ $-1\quad -1$

$x=-4$ $\qquad$ $x=-1$

$Factor$

$x-int\ ;y=f(x)=0$

$(a)(b)=0$

$a=0 \qquad b=0$

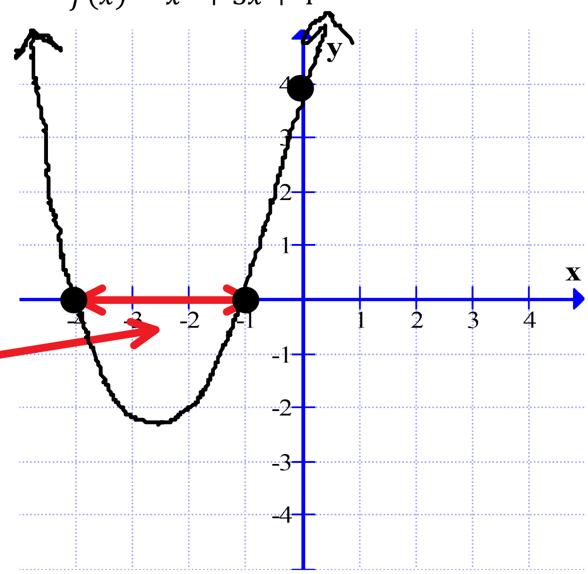
$Distance=Bigger\ \#-Smaller\#$

$=(-1)-(-4)$

$=-1+4$

$=3$

$f(x)=x^2+5x+4$



# SAT # 10 - 14

$\sqrt{4x} = x - 3$

$\boxed{x = 9}$ $\boxed{x = 1}$

$\sqrt{4x} = x - 3$
$\sqrt{4(9)} = (9) - 3$
$\sqrt{36} = 9 - 3$
$6 = 6$

$\sqrt{4x} = x - 3$
$\sqrt{4(1)} = (1) - 3$
$\sqrt{4} = 1 - 3$
$2 \neq -2$

$\sqrt{4x} = x - 3$
$\left(\sqrt{4x}\right)^2 = (x-3)^2$
$4x = x^2 - 6x + 9$
$-4x \qquad -4x$
$0 = x^2 - 10x + 9$
$0 = (x-9)(x-1)$

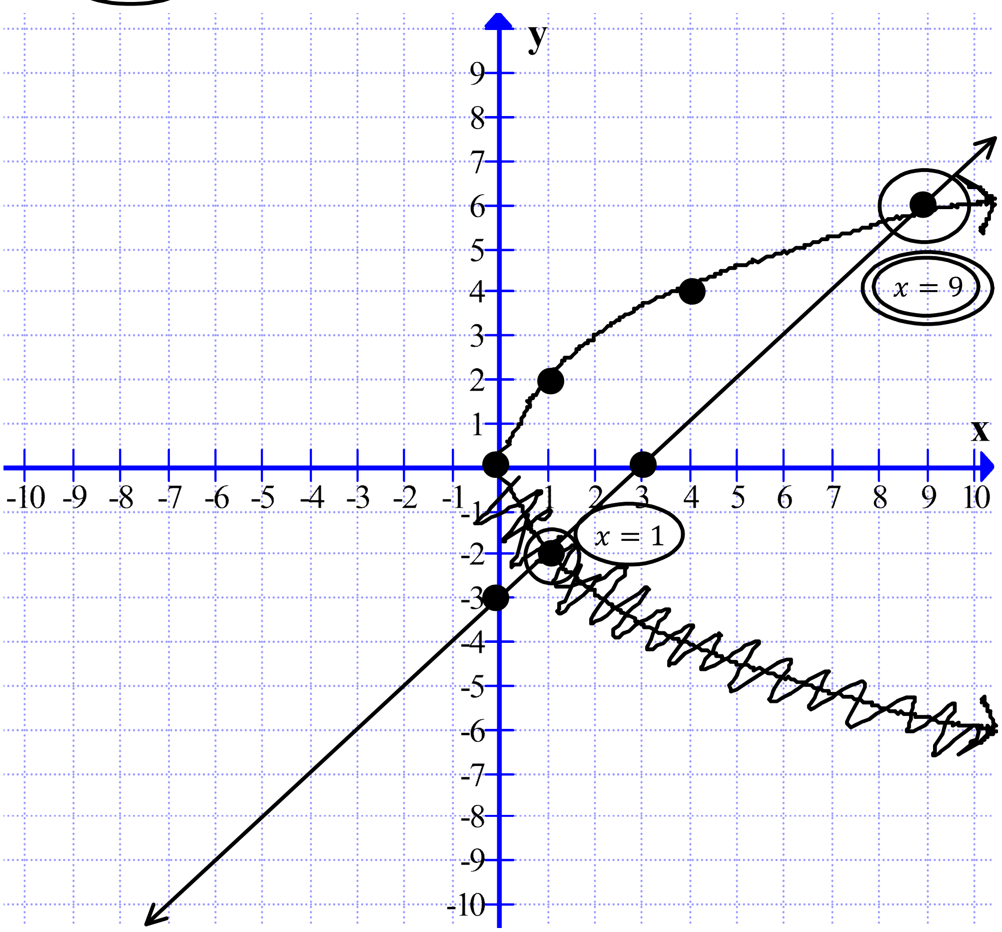
$(x-3)^2$
$(x-3)(x-3)$
$x^2 - 3x - 3x + 9$
$x^2 - 6x + 9$

$\boxed{\sqrt{x}^2 = x^* \quad \sqrt{x^2} = |x| = \pm x}$

$x - 9 = 0$
$+9 \quad +9$
$x = 9$

$x - 1 = 0$
$+1 \quad +1$
~~$x = 1$~~

When you square both sides during the algebra artificial solution as seen in the graph below.




$\boxed{y = RHS}$

$y = x - 3$ $\boxed{y = mx + b}$

$y = \sqrt{4x}$

$\boxed{y = LHS}$

| $x$ | $\sqrt{4x}$ |
|---|---|
| $-1$ | $DNE$ |
| 0 | 0 |
| 1 | 2 |
| 4 | 4 |
| 9 | 6 |

$y = -\sqrt{4x}$

Choose x values that square root nicely when multiplied by 4

$y = \sqrt{4x}$
$y = \sqrt{4(-1)}$
$y = \sqrt{-4} = DNE$
Square root of negative

$y = \sqrt{4x}$
$y = \sqrt{4(0)}$
$y = \sqrt{0}$
$y = 0$

$y = \sqrt{4x}$
$y = \sqrt{4(1)}$
$y = \sqrt{4}$
$y = 2$

$y = \sqrt{4x}$
$y = \sqrt{4(4)}$
$y = \sqrt{16}$
$y = 4$

$y = \sqrt{4x}$
$y = \sqrt{4(9)}$
$y = \sqrt{36}$
$y = 6$

# SAT # 10 - 15,16

$-3x + y = 6$ $\quad ax + 2y = 4$ $\quad \boxed{y = mx + b}$

$$-3x + y = 6$$
$$+3x \quad\quad + 3x$$
$$y = 3x + 6$$

$$ax + 2y = 4$$
$$-ax \quad\quad - ax$$
$$2y = -ax + 4$$
$$\frac{2y}{2} = -\frac{ax}{2} + \frac{4}{2}$$
$$y = -\frac{a}{2}x + 2$$

No solution means parallel with the same slope and a different one intercept.

$$m = 3 \quad m_{||} = m_{||} \quad m = -\frac{a}{2}$$
$$3 = -\frac{a}{2}$$
$$2 \times 3 = -\frac{a}{2} \times 2$$
$$6 = -a$$
$$\frac{6}{-1} = \frac{-a}{-1}$$
$$-6 = a$$

$$Ax + By = C$$
$$y = -\frac{A}{B}x + \frac{C}{B}$$
$$m = -\frac{A}{B} \quad y - int : \left(0, \frac{C}{B}\right)$$

$$\boxed{T = 5c + 12f}$$

$let\ T = Total\ Cost$
$let\ c = \#\ Closer\ Units$
$let\ f = \#\ Farther\ Units$

$T = \$47{,}000 \quad f = 3000\ units$

$$T = 5c + 12f$$
$$47000 = 5c + 12(3000)$$
$$47000 = 5c + 36000$$
$$-36000 - 360000$$
$$11000 = 5c$$
$$\frac{11000}{5} = \frac{5c}{5}$$
$$c = 2300\ units$$

Don't forget your units.

$$\begin{array}{r} 2300 \\ 5\,\overline{)\,11500} \\ -\ 10\phantom{00} \\ 15\phantom{00} \\ -\ 15\phantom{00} \\ 0 \end{array}$$

2300 units were shipped to the closer location.

Answer the question in English.

# SAT # 10 - 17,18

$|2x+1| = 5$

**Positive Case**

Distributed a positive into the absolute value.

$$+(2x+1) = 5$$
$$+2x+1 = 5$$
$$-1 \quad -1$$
$$2x = 4$$
$$\frac{2x}{2} = \frac{4}{2}$$
$$x = 2$$

$$|2x+1| = 5$$
$$|2(2)+1| = 5$$
$$|4+1| = 5$$
$$|5| = 5$$
$$5 = 5$$

**Negative Case**

Distribute a negative into the absolute value.

$$-(2x+1) = 5$$
$$-2x-1 = 5$$
$$+1 \quad +1$$
$$-2x = 6$$
$$\frac{-2x}{-2} = \frac{6}{-2}$$
$$x = -3$$

$$|2x+1| = 5$$
$$|2(-3)+1| = 5$$
$$|-6+1| = 5$$
$$|-5| = 5$$
$$5 = 5$$

$a = 2, b = -3$ OR $a = -3, b = 2$

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

OR

$$|a-b|$$
$$|(-3)-(2)|$$
$$|-3-2|$$
$$|-5| = 5$$

$$|a-b| = 5$$

$let\ t = time\ (years)$
$let\ F = Future\ Value$
$let\ P = Present\ Value$
$let\ I = Interest$
$let\ r = Interest\ Rate$

$Price = \$200$

$Increase = \frac{10\%}{year}$ 

$10\% = 0.1$

$let\ 200a = Value\ after\ 2\ years$

$$200 \times 0.1 = 20$$
$$200 + 20 = 220$$ Value after one year

$$220 \times 0.1 = 22$$
$$220 + 22 = 242$$ Value after two year

$F = P + I$ Simple Interest*

| $t$ | $Value$ |
|---|---|
| 0 | 200 |
| 1 | 220 |
| 2 | 242 |

$$200a = 242$$
$$\frac{200a}{200} = \frac{242}{200}$$
$$a = \frac{121}{100}$$
$$a = 1.21$$

$$F = P(1+r)^t$$ Compound Interest
$$F = 200(1+0.1)^2$$
$$F = 200(1.1)^2$$
$$F = 200(1.21)$$
$$F = 200a$$
$$a = 1.21$$

Multiplier
$1 \pm r$
$110\% = 1.1$

$$\begin{array}{r} 1.1 \\ \times\ 1.1 \\ \hline 1.21 \end{array}$$

Instead of multiplying by the decimal and then adding simply multiply by the decimal you want to be.

# SAT # 10 - 19,20

$$2x + 3y = 1200$$
$$3 \times (2x + 3y = 1200)$$
$$6x + 9y = 3600$$

$$3x + 2y = 1300$$
$$2 \times (3x + 2y = 1300)$$
$$6x + 4y = 2600$$

Elimination

$$6x + 9y = 3600$$
$$-(6x + 4y = 2600)$$
$$0 + 5y = 1200$$
$$0 + \frac{5y}{5} = \frac{1200}{5}$$
$$y = 220$$

$$5 \overline{)1200} = 220$$
$$-10,\ 10,\ -10,\ 0$$

You could have multiplied the first equation by 2 and the second equation by 3 to eliminate Y and solve for X and substitute X into either equation to solve for Y.

$$2x + 3y = 1200$$
$$2x + 3(220) = 1200$$
$$2x + 660 = 1200$$
$$-660 \quad -660$$
$$2x = 540$$
$$\frac{2x}{2} = \frac{540}{2}$$
$$x = 270$$

$$2 \overline{)540} = 270$$
$$-4,\ 14,\ -14,\ 0$$

$$5x + 5y$$
$$5(270) + 5(220)$$
$$1350 + 1100$$
$$2450$$

$$5x + 5y = 2450$$

$$u + t = 5 \qquad u - t = 2$$

$$(u - t)(u^2 - t^2) =$$
$$(u - t)(u - t)(u + t) =$$
$$(2)(2)(5) = 20$$

$$(u^2 - t^2)$$
$$(u - t)(u + t)$$

Factor differences of squares

$$u + t = 5$$
$$-t \quad -t$$
$$u = (5 - t) \rightarrow (5 - t) - t = 2$$

$$u - t = 2$$

$$5 - 2t = 2$$
$$-5 \qquad -5$$
$$-2t = -3$$
$$\frac{-2t}{-2} = \frac{-3}{-2}$$
$$t = \frac{3}{2} = 1.5$$

$$u = \left(5 - \left(\frac{3}{2}\right)\right)$$
$$u = 3.5$$

$$(u - t)(u^2 - t^2) =$$
$$((3.5) - (1.5))\left((3.5)^2 - (1.5)^2\right) =$$
$$(2)(12.25 - 2.25) =$$
$$(2)(10) = 20$$

# SAT # 10 - 1,2,3

$Initial\ Height = 40ft$

$Rising = \frac{21ft}{1sec}$

$let\ t = time\ (sec)$
$let\ y = height\ after\ t\ (sec)$

$y = mx + b$

$y = 40 + \frac{21}{1}t$

$y = 40 + 21t$

$\frac{5\$}{Month} \leq 100\ \ Texts$

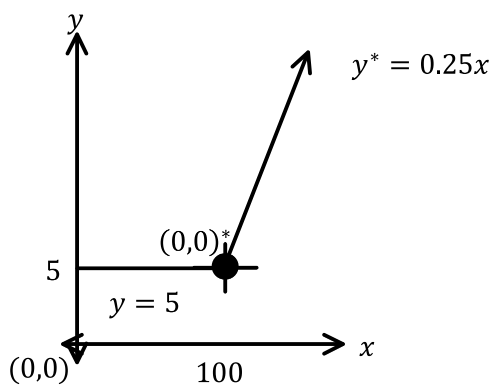
$\frac{\$0.25}{Text} \geq 100\ Texts$

$let\ x = \#\ of\ Text\ Messages\ per\ month$
$let\ y = Total\ Cost$

$y = mx + b^*$

$y = 5$ , $Domain: \ 0 \leq x \leq 100$

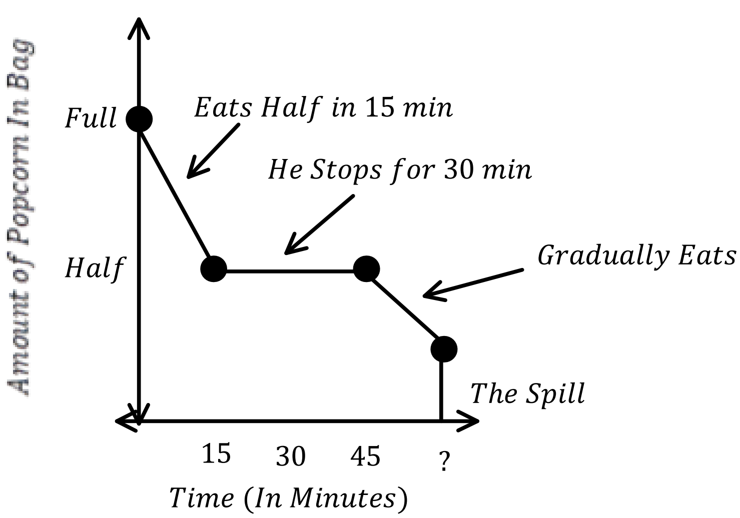
$y = 0.25x$ $Domain: \ x \geq 100$




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

$y - 5 = \frac{1}{4}(x - 100)$

$y = \frac{1}{4}x - 20$



# SAT # 10 - 4,5,6,7

$$\boxed{20 - x = 15}$$

$$\begin{aligned} 20 - x &= 15 \\ 20 - (5) &= 15 \\ 15 &= 15 \end{aligned}$$

$$x = 5$$

$$\begin{aligned} 20 - x &= 15 \\ 20 - (10) &= 15 \\ 10 &\neq 15 \end{aligned}$$

$$x \neq 10$$

$$\begin{aligned} 20 - x &= 15 \\ -20 \quad &\quad - 20 \\ -x &= -5 \\ \frac{-x}{-1} &= \frac{-5}{-1} \\ x &= 5 \end{aligned}$$

OR

$$\begin{aligned} 20 - x &= 15 \\ +x \quad &\quad + x \\ 20 &= 15 + x \\ -15 \quad &\quad - 15 \\ 5 &= x \end{aligned}$$

$$f(x) = \frac{x + 3}{2}$$

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

$$f(-1) = \frac{2}{2}$$

$$f(-1) = 1$$

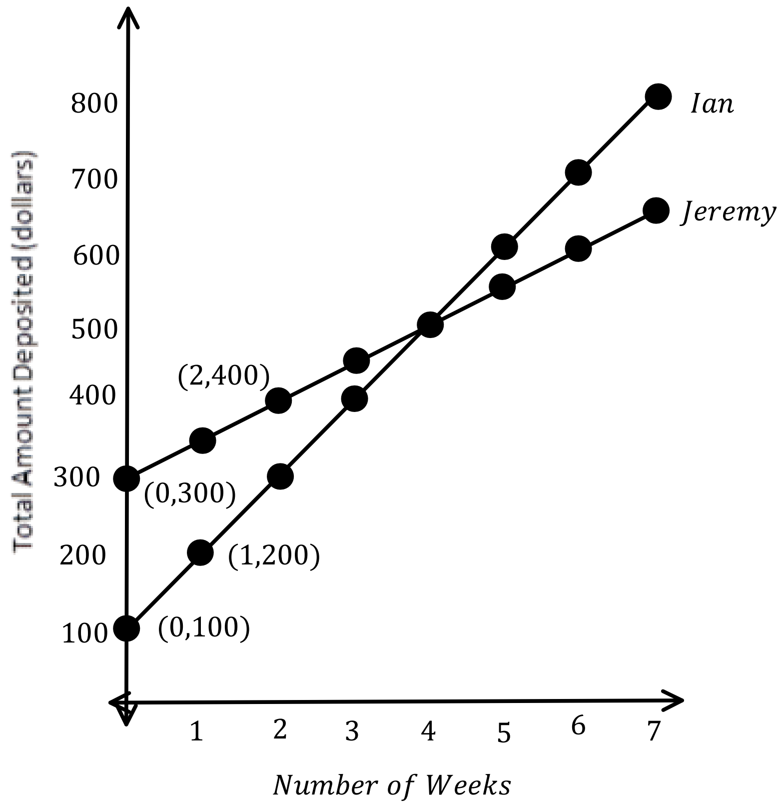
$$2x^1(x^2 - 3x)$$

$$2x^3$$

$$2x^3 - 6x^2$$

BIAS

# SAT # 10 - 8,9




*Jeremy*

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

$m = \frac{400 - 300}{2 - 0}$

$m = \frac{\$100}{2\ weeks}$

$m = \frac{\$50}{1\ week}$

*Ian*

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

$m = \frac{200 - 100}{1 - 0}$

$m = \frac{\$100}{1\ week}$

$\$100 - \$50 = \$50$

$h(x) = 2^x$

$h(5) - h(3) =$

$h(x) = 2^x$
$h(5) = 2^5$
$h(5) = 32$

$h(x) = 2^x$
$h(3) = 2^3$
$h(3) = 8$

$h(5) - h(3) =$
$32 - 8 = 24$

# SAT # 10 - 10,11,12

$23\%\ student\ ; > \frac{1 movie}{month}$
$error = 4\%$

$$23 \pm 4$$
$$23 - 4 \geq x \geq 23 + 4$$
$$19 \geq x \geq 27$$

$Plausible$

| | | | | | | |
|---|---|---|---|---|---|---|
| $List\ A$ | 1 | 2 | 3 | 4 | 5 | 6 |
| $List\ B$ | 2 | 3 | 3 | 4 | 4 | 5 |

$\underline{List\ A}$

$$mean = \frac{1+2+3+4+5+6}{6}$$
$$mean = \frac{21}{6} = 6.5$$

$\underline{List\ B}$

$$mean = \frac{2+3+3+4+4+5}{6}$$
$$mean = \frac{21}{6} = 6.5$$

$$\sigma_s = \sqrt{\frac{sum\ of\ the\ squares\ of\ the\ differences\ from\ the\ mean}{number\ of\ values}}$$
$$\sigma_s = \sqrt{\frac{(x_1 - \mu)^2 + (x_2 - \mu)^2 + \cdots + (x_n - \mu)^2}{n}}$$

$\cdots$

Standard deviation is the spread of the data from the mean. List a is more spread out so it has a larger standard deviation. Therefore the means are the same and the standard deviations are different.

$40\% = 0.4$ $\qquad 1 - 0.4 = 0.6$

Multiplier
$1 \pm r$

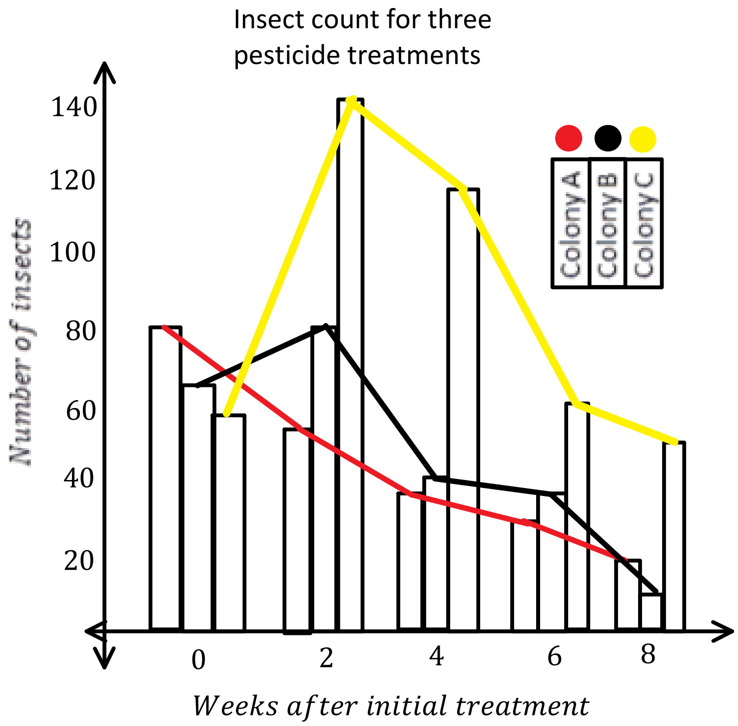
$$P \times (0.6) = 18$$
$$0.6P = 18$$
$$\frac{0.6P}{0.6} = \frac{18}{0.6}$$
$$P = 30$$

$$P - 0.4P = 18$$
$$0.6P = 18$$
$$\frac{0.6P}{0.6} = \frac{18}{0.6}$$
$$P = 30$$

$30 \times 0.4 = 12$
$30 - 12 = 18$

$30 \times 0.6 = 18$

# SAT # 10 - 13,14,15




Colony A   Decrease Every! Two Weeks.

<u>Start</u>

$\sim 80 + 64 + 58 = 202$

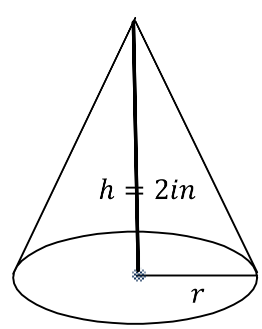
<u>At 8 Weeks</u>

$\sim 18 + 10 + 52 = 80$

$\sim 80 : 200$

$\sim \; 2 : 5$

**Cone**




$$V = \frac{1}{3} \times (area\ of\ base) \times h$$

$$V = \frac{1}{3} \times (\pi r^2) \times h$$

$$24\pi = \frac{1}{3} \times (\pi r^2) \times 2$$

$$24\pi = \frac{2}{3} \pi r^2$$

$$24 = \frac{2}{3} r^2$$

$$3 \times 24 = \frac{2}{3} r^2 \times 3$$

$$72 = 2r^2$$

$$\frac{72}{2} = \frac{2r^2}{2}$$

$$36 = r^2$$

$$\pm\sqrt{36} = \sqrt{r^2}$$

$$6 = r$$

# SAT # 10 - 16,17,18

$let\ y = Population\ Size\ of\ City\ Y\ in\ 2010$

Create variables for exactly what you're looking for usually at the end of the sentence.

$\underline{City\ X}$ | $\underline{City\ Y}$

$20\% = 0.2$ $\quad$ $10\% = 0.1$

$120{,}000\ ;2010$

$1 + 0.2 = 1.2$ $\quad$ $1 - 0.1 = 0.9$

Increase $\quad$ Decrease

Multiplier

$1 \pm r$

$$120000(1.2) = y(0.9)$$
$$144{,}000 = 0.9y$$
$$\frac{144{,}000}{0.9} = \frac{0.9y}{0.9}$$
$$160{,}000 = y$$

$$V = \frac{4}{3}\pi r^3$$
$$3 \times V = \frac{4}{3}\pi r^3 \times 3$$
$$3V = 4\pi r^3$$
$$\frac{3V}{4\pi} = \frac{4\pi r^3}{4\pi}$$
$$\frac{3V}{4\pi} = r^3$$
$$\sqrt[3]{\frac{3V}{4\pi}} = \sqrt[3]{r^3}$$
$$\sqrt[3]{\frac{3V}{4\pi}} = r$$

0.45

Survey Results

| Answer | % |
|---|---|
| Never | 31.3 |
| Rarely | 24.3 |
| Often | 13.5 |
| Always | 30.9 |

$$P(A|B) = \frac{P(B \cap A)}{P(B)}$$

$$P(B \cap A) = P(A)P(B)$$

$$P(Always|Never) = \frac{P(Always \cap Never)}{P(Never)}$$
$$= \frac{P(Always \cap Never)}{P(Never)} = 0.31$$

$$P(Always \cap Never) = P(Always) \times P(Never)$$

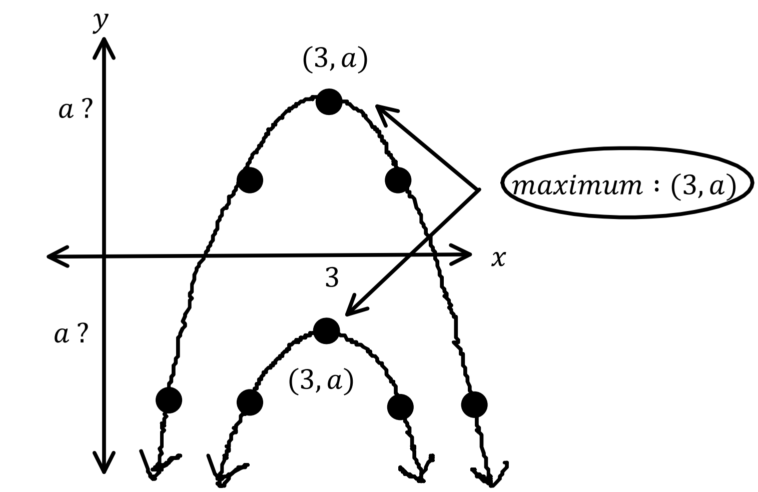
# SAT # 10 - 19,20

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

$y = a(x-p)^2 + q$ $\quad$ $Vertex : (p, q)$

$Vertex : (3, a)$

$a = -1$ $\quad$ $Opens\ Downward$ $\quad$ $Maximum$




$Data\ List\ \#1 :$
$25\ integers > 0$
$Max\ Value = 84$

$Data\ List\ \#2:$
$26\ integers > 0$
$Max\ Value = 96$

$let\ x = lowest\ \#$

$Range : 84 - x$ $\quad$ $Range : 96 - x$

$Range\ 12\ Greater$

# SAT # 10 - 21,22,23

$\boxed{0.10x + 0.20y = 0.18(x + y)}$

$let\ x = ml\ of\ 10\%$
$let\ y = ml\ of\ 20\%$

$\boxed{y = 100}$

$$0.10x + 0.20y = 0.18(x + y)$$
$$0.10x + 0.20(100) = 0.18(x + (100))$$
$$0.10x + 20 = 0.18x + 18$$
$$-0.10x \qquad -0.10x$$
$$20 = 0.00x + 18$$
$$-18 \qquad -18$$
$$2 = 0.08x$$
$$\frac{2}{0.08} = \frac{0.08x}{0.08}$$
$$25 = x$$

$$0.10x + 0.20y = 0.18(x + y)$$
$$0.10(25) + 0.2(100) = 0.18(25 + 100)$$
$$2.5 + 20 = 0.18(125)$$
$$22.5 = 22.5$$

$\boxed{F = Pr^t}$ Increasing Exponential

$f(n) = 30(2)^5$

| | | | |
|---|---|---|---|
| $x$ | $a$ | $3a$ | $5a$ |
| $y$ | $0$ | $-a$ | $-2a$ |

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m = \frac{(-2a) - (-a)}{(5a) - (3a)}$$
$$m = \frac{-2a + a}{2a}$$
$$m = \frac{-a}{2a}$$
$$m = -\frac{1}{2}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m = \frac{(-a) - (0)}{(3a) - (a)}$$
$$m = \frac{-a}{2a}$$
$$m = \frac{-a}{2a}$$
$$m = -\frac{1}{2}$$

$$y = mx + b$$
$$y = (-\frac{1}{2})x + b$$
$$0 = -\frac{1}{2}(a) + b$$

$\boxed{(a, 0)}$

$$0 = -\frac{1}{2}a + b$$
$$\left(0 = -\frac{1}{2}a + b\right) \times 2$$
$$0 = -a + 2b$$
$$+a \qquad +a$$
$$a = 2b$$
$$\frac{a}{2} = \frac{2b}{2}$$
$$\frac{a}{2} = b$$

$$m = \frac{rise}{run} = \frac{-a}{2a} = -\frac{1}{2}$$

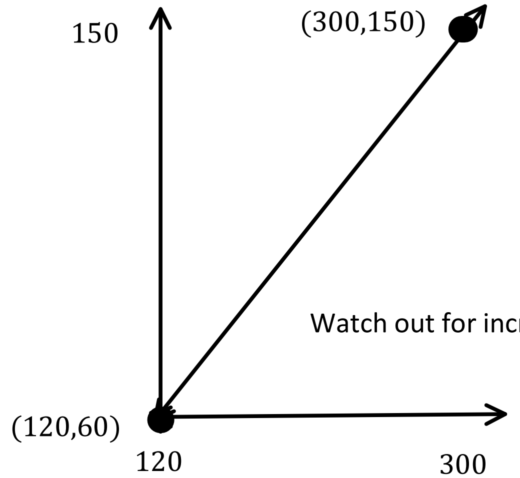
$$y = mx + b$$
$$y = -\frac{1}{2}x + \frac{a}{2}$$
$$\left(y = -\frac{1}{2}x + \frac{a}{2}\right) \times 2$$
$$2y = -x + a$$
$$+x \qquad +x$$
$$x + 2y = a$$

| | |
|---|---|
| $x + 2y = a$ | $x + 2y = 5a$ |
| $(a) + 2(0) = a$ | $(a) + 2(0) = 5a$ |
| $a + 0 = a$ | $a + 0 = 5a$ |
| $a = a$ | $a \neq 5a$ |

# SAT # 10 - 24,25

(120,60)   (300,150)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m = \frac{(150) - (60)}{(300) - (120)}$$
$$m = \frac{90}{180}$$
$$m = \frac{1}{2}$$




$$y = mx + b$$
$$y = \frac{1}{2}x + b$$
$$60 = \frac{1}{2}(120) + b$$
$$60 = 60 + b$$
$$-60 \quad -60$$
$$0 = b$$

$$y = \frac{1}{2}x$$
$$y = 0.5x$$

$2.4x - 1.5y = 0.3$   $1.6x + 0.5y = -1.3$

$$2.4x - 1.5y = 0.3$$
$$2.4(-0.5) - 1.5y = 0.3$$
$$-1.2 - 1.5y = 0.3$$
$$+1.2 \qquad + 1.2$$
$$-1.5y = 1.5$$
$$\frac{-1.5y}{-1.5} = \frac{1.5}{-1.5}$$
$$y = -1$$

$$1.6x + 0.5y = -1.3$$
$$1.6(-0.5) + 0.5(-1) = -1.3$$
$$-0.8 - 0.5 = -1.3$$
$$-1.3 = -1.3$$

$2.4x - 1.5y = 0.3$

$$1.6x + 0.5y = -1.3$$
$$(1.6x + 0.5y = -1.3) \times 3$$
$$4.8x + 1.5y = -3.9$$

$$2.4x - 1.5y = 0.3$$
$$+(4.8x + 1.5y = -3.9)$$
$$7.2x = -3.6$$
$$\frac{7.2x}{7.2} = \frac{-3.6}{7.2}$$
$$x = -0.5$$

We could have doubled the first equation and tripled the second equation to eliminate X.

$$1.6x + 0.5y = -1.3$$
$$1.6(-0.5) + 0.5y = -1.3$$
$$-0.8 + 0.5y = -1.3$$
$$+0.8 \qquad + 0.8$$
$$0.5y = -0.5$$
$$\frac{0.5y}{0.5} = \frac{-0.5}{0.5}$$
$$y = -1$$

# SAT # 10 - 26,27,28

$$F = P(1 \pm r)^t$$
$$P(t) = 310(1 + 0.10)^t$$
$$P(t) = 310(1.1)^t$$

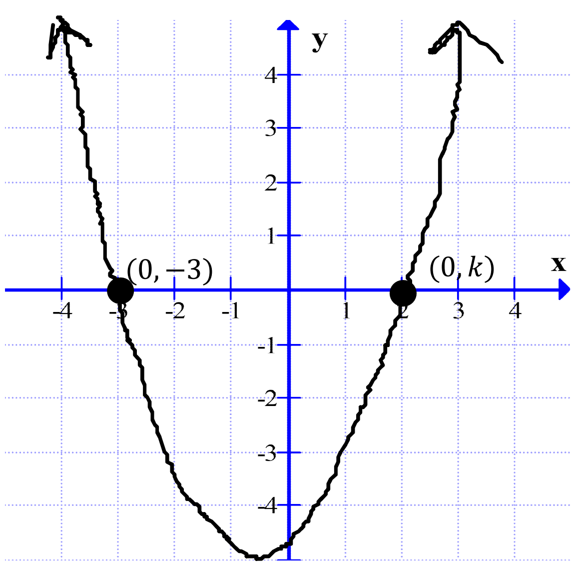
$$\frac{2}{3}(9x - 6) - 4 = 9x - 6$$
$$6x - 4 - 4 = 9x - 6$$
$$6x - 8 = 9x - 6$$
$$-6x \qquad - 6x$$
$$-8 = 3x - 6$$
$$+6 \qquad + 6$$
$$-2 = 3x$$
$$\frac{-2}{3} = \frac{3x}{3}$$
$$\frac{-2}{3} = x$$

$$\frac{2}{3}(9x - 6) - 4 = 9x - 6$$
$$\frac{2}{3}(9(-4) - 6) - 4 = 9(-4) - 6$$
$$\frac{2}{3}(-36 - 6) - 4 = -36 - 6$$
$$\frac{2}{3}(-24) - 4 = -42$$
$$-16 - 4 = -42$$
$$-20 \neq -42$$

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

$$f(x) = (x + 3)(x - k) \qquad \boxed{k \geq 0}$$

$$x + 3 = 0 \qquad x - k = 0$$
$$-3 \quad -3 \qquad +k \quad +k$$
$$x = -3 \qquad x = k$$




$$(x + 3)(x - k)$$
$$+1x^2 \ldots$$

*Opens Upwards*

# SAT # 10 - 29,30

$H = 1.88L + 32.01$

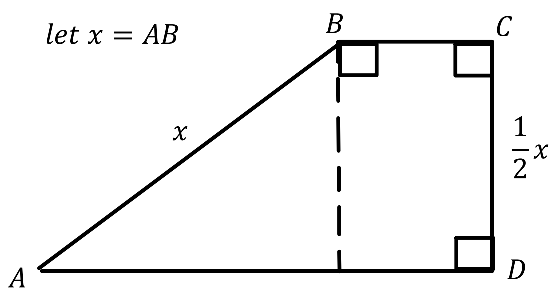
$let\ H = height\ (in)$
$let\ L = femur\ length\ (in)$

$y = mx + b$

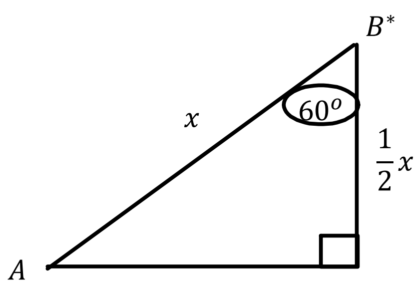
$$m = \frac{rise}{run} = \frac{\Delta y}{\Delta x} = \frac{1.88\ in\ height}{1\ in\ femur\ length}$$

$b = 32.01\ inches$ is constant value as a height to make the equation true and is only valid in a certain range.

$let\ x = AB$




$AD||BC$ $\quad$ $||\ Parallel$ $\quad$ $CD = \frac{1}{2}AB$ $\quad$ $\angle B =$




$$cos\theta = \frac{adj}{hyp}$$

$$cosB = \frac{\frac{1}{2}x}{x}$$

$$cosB = \frac{1}{2}x \div \frac{x}{1}$$

$$cosB = \frac{1}{2}x \times \frac{1}{x}$$

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

$$B = \cos^{-1}\left(\frac{1}{2}\right)$$

$$B^* = 60^o$$

$$B = 60^o + 90^o$$

$$B = 150^o$$

# SAT # 10 - 31,32

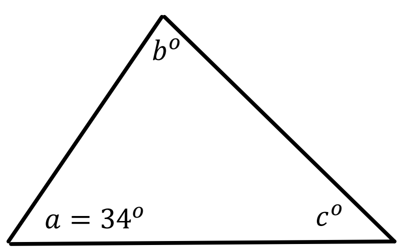
$Apples = \$0.65$
$Oranges = \$0.75$ $\quad \$12\ to\ Spend \quad 5\ Apples$

$5 \times 0.65 = 3.25$
$12 - 3.25 = 8.75$
$\frac{8.75}{0.75} = 11.66..$

$let\ a = \#\ of\ aples$
$let\ r = \#\ of\ oranges$

$$0.65a + 0.75r = 12$$
$$0.65(5) + 0.75r = 12$$
$$3.25 + 0.75r = 12$$
$$-3.25 \qquad\qquad -3.25$$
$$0.75r = 8.75$$
$$\frac{0.75r}{0.75} = \frac{8.75}{0.75}$$
$$r = 11.66..$$

We could buy 11 Oranges Not 12.




$$180^o - 34^o = 146^o$$

$$b + c = 146^o$$

$$146 + 34 = 180$$

# SAT # 10 - 33,34

$700, 1200, 1600, 2000, x$

$$mean = \frac{700 + 1200 + 1600 + 2000 + x}{5} = 1600$$

$$5 \times \left( \frac{700 + 1200 + 1600 + 2000 + x}{5} = 1600 \right) \times 5$$

$$700 + 1200 + 1600 + 2000 + x = 8000$$
$$5500 + x = 8000$$
$$-5500 \qquad -5500$$
$$x = 2500$$

$$mean = \frac{700 + 1200 + 1600 + 2000 + (2500)}{5} = 1600$$

$\times 2$ $\quad$ $\times 2$

$y = mx$ $\quad$ $y = 17$ $\quad$ $x = a$ $\quad$ $y =$ $\quad$ $x = 2a$

$(a, 17)$ $\quad$ $(2a, y)$

| $x$ | $y$ |
|---|---|
| 0 | 0 |
| $a$ | 17 |
| $2a$ | 34 |
| | |

$y = mx + b, b = 0$

$y = 34$

$$y = mx$$
$$(17) = m(a)$$
$$17 = ma$$
$$\frac{17}{a} = \frac{ma}{a}$$
$$\frac{17}{a} = m$$

$$y = mx$$
$$y = \frac{17}{a}x$$
$$y = \frac{17}{a}(2a)$$
$$y = 34$$

# SAT # 10 - 35,36

$a(x+b) = 4x + 10$ Infinite Solutions $b =$

$\# = \#$

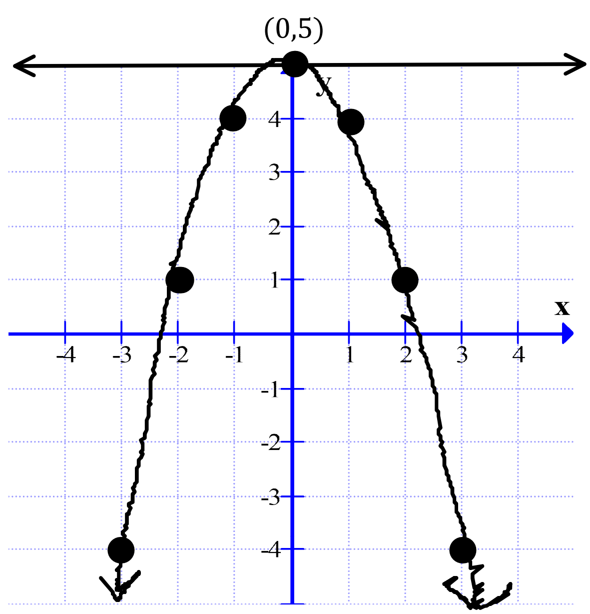
$a(x+b) = 4x + 10$
$ax + ab = 4x + 10$

$a = 4$

$ab = 10$
$(4)b = 10$
$4b = 10$
$\frac{4b}{4} = \frac{10}{4}$
$b = \frac{5}{2} = 2.5$

$a(x+b) = 4x + 10$
$(4)\left(x + \left(\frac{5}{2}\right)\right) = 4x + 10$
$4x + 10 = 4x + 10$
$-4x \quad -4x$
$10 = 10$

| | | | |
|---|---|---|---|
| $y = c$ | 1 *Intersection* | $y = -x^2 + 5$ | $c =$ |




$y = c$ $y = 5$

$y = -x^2 + 5$

# SAT # 10 - 37,38

| | | |
|---|---|---|
| $\frac{200\ miles}{hr}$ | $1\ mile = 5280\ ft$ | $1hr = 60\ min = 60 \times 60sec$ |

$$1hr \times \frac{60min}{hr} \times \frac{60s}{min} = 3600\ s$$

$$\frac{200\ miles}{hr} \times \frac{\quad}{\quad}$$

$$\frac{200\ miles}{hr} \times \frac{\quad}{1\ mile}$$

$$\frac{200\ miles}{hr} \times \frac{5280\ ft}{1\ mile} = \frac{1056000ft}{hr}$$

$$Speed = \frac{1056000\ ft}{3600\ s} = \frac{293.33\ ft}{s} = \frac{293\ ft}{s}$$

$$\frac{200\ miles}{hr} \times \frac{5280\ ft}{1\ mile} \times \frac{1\ hr}{30\ min} \times \frac{1\ min}{60\ s} = \frac{293\ ft}{s}$$

$$0.5\ mile \times \frac{5280ft}{mile} = 2640\ ft$$

$$speed = \frac{distance}{time}$$

$$293.333 = \frac{2640}{t}$$

$$t = \frac{2640}{293.333}$$

$$t = 9\ s$$