Algebra Stuff...

What is the solution set of the equation $x(x+7)\left(\frac{3x + 25}{x + 7} - 5\right) = \left(\frac{3}{x}\right)x(x+7)$?

$x \neq 0, -7$

(1) $\left\{\frac{3}{2}, 7\right\}$

(2) $\left\{\frac{7}{2}, -3\right\}$

(3) $\left\{-\frac{3}{2}, 7\right\}$

[✓ (4) $\left\{-\frac{7}{2}, -3\right\}$]

$$\cancel{x(x+7)}\left(\frac{3x+25}{\cancel{x+7}}\right) - x(x+7)5 = \cancel{x}(x+7)\left(\frac{3}{\cancel{x}}\right)$$

$$x(3x+25) - 5x(x+7) = 3(x+7)$$

$$3x^2+25x-5x^2-35x = 3x+21$$

$$-2x^2-10x = 3x+21$$

$$0 = 2x^2+13x+21$$

$$0 = \underbrace{2x^2+6x}\underbrace{+7x+21}$$

$$0 = 2x(x+3)+7(x+3)$$

$$0 = (2x+7)(x+3)$$

$2x+7=0$ $2x=-7$ $x=-7/2$	$x=-3$

The solutions to the equation $-\frac{1}{2}x^2 = -6x + 20$ are

$a = \frac{1}{2}$ $b = -6$ $c = 20$

(1) $-6 \pm 2i$

(2) $-6 \pm 2\sqrt{19}$

[✓ (3)] $6 \pm 2i$

(4) $6 \pm 2\sqrt{19}$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{6 \pm \sqrt{36 - 4(\frac{1}{2})(20)}}{\cancel{2(\frac{1}{2})}} \; 1$$

$$x = 6 \pm \sqrt{-4}$$

$$x = 6 \pm 2i$$

What is the completely factored form of $\underbrace{k^4-4k^2}+\underbrace{8k^3-32k}+\underbrace{12k^2-48}$?

(1) $(k-2)(k-2)(k+3)(k+4)$

(2) $(k-2)(k-2)(k+6)(k+2)$

(3) $(k+2)(k-2)(k+3)(k+4)$

[✓ (4)] $(k+2)(k-2)(k+6)(k+2)$

$k^2(k^2-4)+8k(k^2-4)+12(k^2-4)$

$(k^2-4)(k^2+8k+12)$

$\wedge \qquad \wedge$

$(k+2)(k-2)(k+6)(k+2)$

Store

$a=\sqrt[3]{x^3}=x$

x^3-64 $\quad b=\sqrt[3]{64}=4$

$(a-b)(a^2+ab+b^2)$

$(x-4)(x^2+4x+16)$

When factored completely, $m^5 + m^3 - 6m$ is equivalent to

(1) $(m + 3)(m - 2)$

(2) $\cancel{(m^3 + 3m)}(m^2 - 2)$

(3) $m(m^4 + m^2 - 6)$

[✓ (4)] $m(m^2 + 3)(m^2 - 2)$

$m(m^4+m^2-6)$

$m(m^2+3)(m^2-2)$

Given: $h(x) = \frac{2}{9}x^3 + \frac{8}{9}x^2 - \frac{16}{13}x + 2$

$k(x) = -|0.7x| + 5$

State the solutions to the equation $h(x) = k(x)$, rounded to the *nearest hundredth*.

$\{-5.17, -1.13, 1.75\}$

Rewrite the expression $\left(\underline{4x^2+5x}\right)^2-5\left(\underline{4x^2+5x}\right)-6$ as a product of four linear factors.

Let $u=4x^2+5x$ (not quad.)

$$u^2-5u-6$$

$$(u-6)(u+1)$$

$$(4x^2+5x-6)(4x^2+5x+1)$$

$$(x+2)(4x-3)(4x+1)(x+1)$$

Write $(5+2yi)(4-3i)-(5-2yi)(4-3i)$ in $a+bi$ form, where y is a real number.

$$\left(20-15i+8yi-\overset{+6y}{\cancel{6yi^2}}\right)-\left(20-15i-8yi+\overset{-6y}{\cancel{6yi^2}}\right)$$

$$\cancel{20}-\cancel{15i}+8yi+6y-\cancel{20}+\cancel{15i}+8yi+6y$$

$$\boxed{12y+16yi}$$

Check w/ store

Solve algebraically for all values of x:

$(7-x)(7-x)$

$49-7x-7x+x^2$

$x^2-14x+49$

CKS!

$\sqrt{x-5}+x=7$

$(\sqrt{x-5})^2=(7-x)^2$

$x-5=x^2-14x+49$

$0=x^2-15x+54$

$0=(x-6)(x-9)$

$x=6$	~~$x=9$~~ Reject
ck $\sqrt{6-5}+6=7$	$\sqrt{9-5}+9=7$
$1+6=7$	$2+9=7$
$7=7$	$11\neq 7$

$\{6\}$

Solve the following system of equations algebraically for all values of x, y, and z:

$$x + 3y + 5z = 45$$
$$6x - 3y + 2z = -10$$
$$-2x + 3y + 8z = 72$$

① $7x + 7z = 35$

② $4x + 10z = 62$

$-4① = -28x - 28z = -140$

$7② = 28x + 70z = 434$

$42z = 294$

$\boxed{z = 7}$

$7(x) + 7(7) = 35$

$7x = -14$

$\boxed{x = -2}$

$-2 + 3y + 5(7) = 45$

$3y + 33 = 45$

$3y = 12$

$\boxed{y = 4}$

If $p(x) = ab^x$ and $r(x) = cd^x$, then $p(x) \bullet r(x)$ equals

~~(1) $ac(b + d)^x$~~

~~(2) $ac(b + d)^{2x}$~~

(3) $ac(bd)^x$

(4) $ac(bd)^{x^2}$

$$ab^x \cdot cd^x$$

$$ac \cdot b^x d^x$$

$$ac(bd)^x$$

What is the solution, if any, of the equation

$-1(x-4)(x+3)$ $\quad$ $(-1)(x+3)(x-4)$

$$\frac{2}{x+3} - \frac{3}{4-x} = \frac{2x-2}{x^2-x-12}?$$

$-1(x-4)$ $\quad$ $(x+3)(x-4)$

ASK

[✓ (1) –1] (3) all real numbers

(2) –5 (4) no real solution

$-1(x-4)(2) - 3(x+3) = -1(2x-2)$

$(-x+4)2$

$-2x+8 - 3x-9 = -2x+2$

$-5x-1 = -2x+2$

$-3 = 3x$

$\boxed{x=-1}$

Algebraically determine the values of h and k to correctly complete the identity stated below.

$$2x^3 - 10x^2 + 11x - 7 = (x - 4)(2x^2 + hx + 3) + k$$

$$2x^3-10x^2+11x-7=2x^3+hx^2+3x-8x^2-4hx-12+k$$

$$\cancel{2x^3}\underline{-10x^2}+\underline{11x}\,\underline{-7}=\cancel{2x^3}+\underline{hx^2-8x^2}+\underline{3x-4hx}\,\underline{-12+k}$$

$-10x^2=hx^2-8x^2$

$-10=h-8$

$\boxed{-2=h}$

<u>or</u>

$11x=3x-4hx$

$11=3-4h$

$8=-4h$

$\boxed{-2=h}$

$-7=-12+k$

$\boxed{5=k}$

The speed of a tidal wave, s, in hundreds of miles per hour, can be modeled by the equation $s = \sqrt{t} - 2t + 6$, where t represents the time from its origin in hours. Algebraically determine the time when $s = 0$.

$0=\sqrt{t}-2t+6$

$(2t-6)^2=(\sqrt{t})^2$

$4t^2-\underline{24t}+36=t$

$4t^2-25t+36=0$

$(t-4)(4t-9)=0$

$t=4 \quad | \quad t=9/4$

does Not Check

$\{4\}$

How much faster was the tidal wave traveling after 1 hour than 3 hours, to the *nearest mile per hour*? Justify your answer.

t in hundreds

$s(1)=\sqrt{1}-2(1)+6=5$

$s(3)=\sqrt{3}-2\sqrt{3}+6=1.73$

$500-173=\boxed{327\text{mph}}$

Algebraically determine the values of x that satisfy the system of equations below.

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

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

$$2x^2-5x = 0$$

$$x(2x-5) = 0$$

$x=0$

$2x-5=0$

$x=5/2$

$\{0, 5/2\}$

Brian correctly used a method of completing the square to solve the equation $x^2 + 7x - 11 = 0$. Brian's first step was to rewrite the equation as $x^2 + 7x = 11$. He then added a number to both sides of the equation. Which number did he add?

1) $\frac{7}{2}$
2) $\frac{49}{4}$
3) $\frac{49}{2}$
4) 49

Find the exact roots of $x^2 + 10x \boxed{-8} = 0$ by completing the square.

$$x^2+10x=8$$

$$x^2+10x+\boxed{25}=8+\boxed{25}$$

$$\sqrt{(x+5)^2}=\sqrt{33}$$

$$x+5=\pm\sqrt{33}$$

$$x=\boxed{-5\pm\sqrt{33}}$$

$$\frac{-3\pm4i}{7}=\frac{-3}{7}\pm\frac{4}{7}i$$

$-$ x , $x+1$

Algebraically prove that the difference of the squares of any two consecutive integers is an odd integer.

$$(x)^2 - (x+1)^2 = \text{odd}$$

d.d.

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

$$x^2 - x^2 \cancel{+} 2x - 1$$

$$-\underset{\text{even}}{\textcircled{2x}} - 1$$

even − 1 = odd

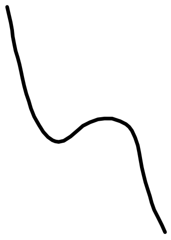
Graphing...

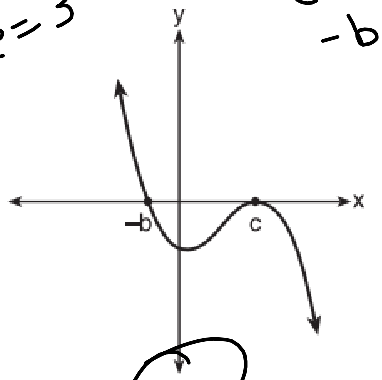
If a, b, and c are all positive real numbers, which graph could represent the sketch of the graph of $p(x)=-a(x+b)(x^2-2cx+c^2)$?

$(x-c)^2$

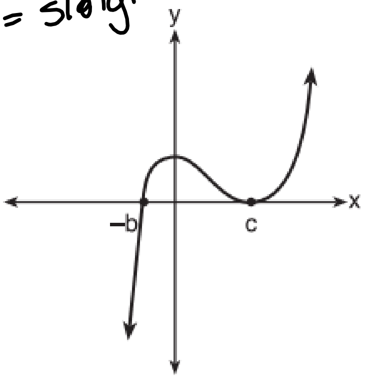
c = double root - ton
-b = single root - cross

-LC
Degree = 3

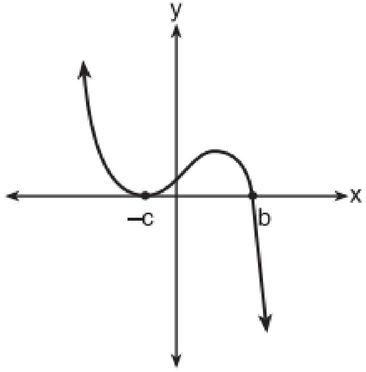




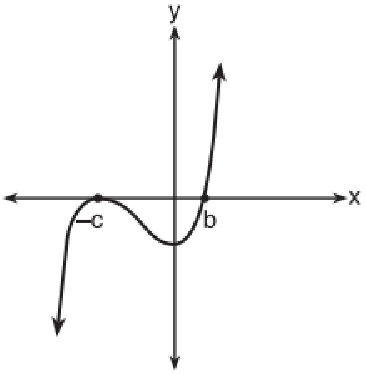
(1)



(3)



(2)

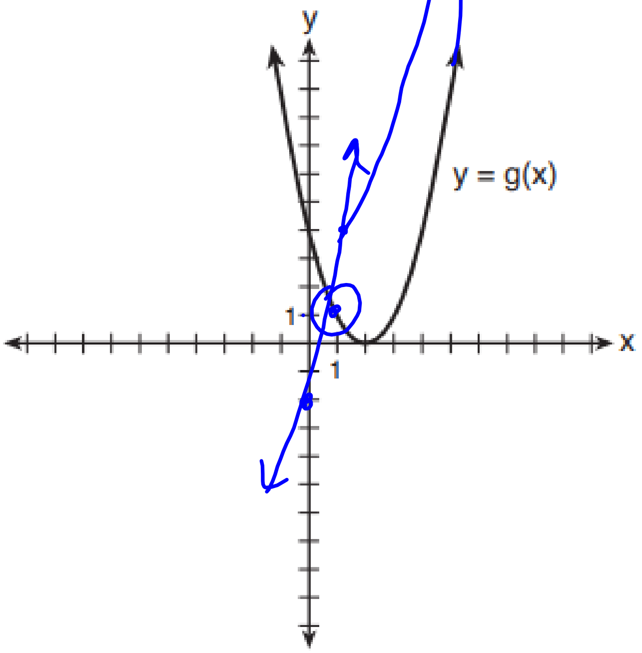


(4)

What is the solution to the system of equations $y = 3x - 2$ and $y = g(x)$ where $g(x)$ is defined by the function below?

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

$b = -2$



(1) $\{(0,-2)\}$

(2) $\{(0,-2),(1,6)\}$

(3) $\{(1,6)\}$

[✓ (4) $\{(1,1),(6,16)\}$]

When $g(x) = \frac{2}{x+2}$ and $h(x) = \log(x + 1) + 3$ are graphed on the same set of axes, which coordinates best approximate their point of intersection?

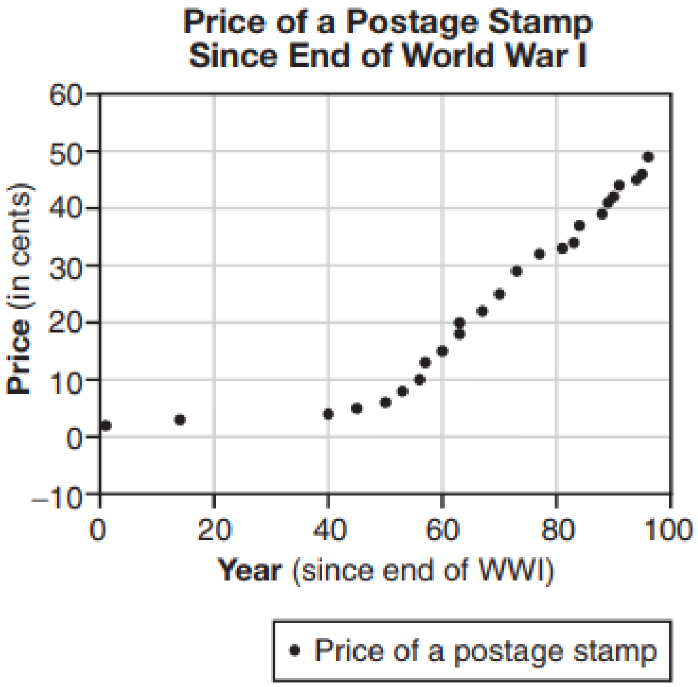
(1) $(-0.9,1.8)$

[✓ (2) $(-0.9,1.9)$]

(3) $(1.4,3.3)$

(4) $(1.4,3.4)$

The price of a postage stamp in the years since the end of World War I is shown in the scatterplot below.



match your window

x: [0, 100]

y: [-10, 60]

The equation that best models the price, in cents, of a postage stamp based on these data is

(1) $y = 0.59x - 14.82$

[✓ (3) $y = 1.43(1.04)^x$] — closest fit

(2) $y = 1.04(1.43)^x$

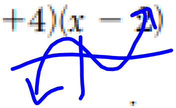
(4) $y = 24\sin(14x) + 25$

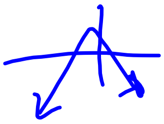
Which statement regarding the graphs of the functions below is *untrue*?

max = 3

$f(x) = 3 \sin 2x$, from $-\pi < x < \pi$ $h(x) = \log_2 x$ – No y-int

$g(x) = (x - 0.5)(x + 4)(x - 2)$ $j(x) = -|4x - 2| + 3$ max=3





(1) $f(x)$ and $j(x)$ have a maximum y-value of 3. true

[✓ (2)] $f(x)$, $h(x)$, and $j(x)$ have one y-intercept.

(3) $g(x)$ and $j(x)$ have the same end behavior as $x \to -\infty$. true

(4) $g(x)$, $h(x)$, and $j(x)$ have rational zeros. true

.5, -4, 2   x=1

Remainder Thm...

Given $z(x)=6x^3+bx^2-52x+15$, $z(2)=35$, and $\underline{z(-5)}=0$, algebraically determine all the zeros of $z(x)$.

↳ $x+5$ $\underline{\underline{\text{is}}}$ a factor

$$0=6(-5)^3+b(-5)^2-52(-5)+15$$

$$0=-475+25b$$

$$475=25b$$

$$b=19$$

$$z(x)=6x^3+19x^2-52x+15$$

$$\begin{array}{r} 6x^2-11x+3 \\ x+5\,\overline{)\,6x^3+19x^2-52x+15} \end{array}$$

or

$$\begin{array}{r|rrrr} -5 & 6x^3 & 19 & -52 & 15 \\ & \downarrow & -30 & 55 & -15 \\ \hline & 6x^2 & -11x & +3 & \boxed{0} \end{array}$$

then:

$$6x^2-11x+3=0$$

$$(3x-1)(2x-3)=0$$

$$x=1/3 \quad \Big| \quad x=3/2$$

$$\{1/3,\ 3/2,\ -5\}$$

Use an appropriate procedure to show that $x-4$ is a factor of the function $f(x)=2x^3-5x^2-11x-4$. Explain your answer.

$f(4)\overset{?}{=}0$ then yes

$2(4)^3-5(4)^2-11(4)-4=0$

or Long Div.

or Synt. Div.

$\therefore$ R=0 and $x-4$ is a factor

$g(-4)=0$

When $g(x)$ is divided by $x + 4$, the remainder is 0. Given $g(x) = x^4 + 3x^3 - 6x^2 - 6x + 8$, which conclusion about $g(x)$ is true?

(1) $g(4) = 0$

[✓ (2) $g(-4) = 0$]

(3) $x - 4$ is a factor of $g(x)$.

(4) No conclusion can be made regarding $g(x)$.

Given $f(x) = 3x^2 + 7x - 20$ and $g(x) = x - 2$, state the quotient and remainder of $\frac{f(x)}{g(x)}$, in the form $q(x) + \frac{r(x)}{g(x)}$.

$$\boxed{3x + 13 + \frac{6}{x-2}}$$

$$3x + 13$$

$$x-2 \,\big)\, 3x^2 + 7x - 20$$

$$-3x^2 \pm 6x$$

$$13x - 20$$

$$-13x + 26$$

$$6$$

Exponents & Logs

After sitting out of the refrigerator for a while, a turkey at room temperature (68°F) is placed into an oven at 8 a.m., when the oven temperature is 325°F. Newton's Law of Heating explains that the temperature of the turkey will increase proportionally to the difference between the temperature of the turkey and the temperature of the oven, as given by the formula below:

$$T = T_a + (T_o - T_a)e^{-kt}$$

T_a = the temperature surrounding the object $325°$

T_o = the initial temperature of the object $68°$

t = the time in hours 2

T = the temperature of the object after t hours $100°$

k = decay constant

$$100 = 325 + (\overset{-257}{\cancel{68 - 325}})e^{-k(2)}$$

$$-225 = -257e^{-2k}$$

$$\frac{-225}{-257} = e^{-2k}$$

$$\frac{\ln\left(\frac{225}{257}\right)}{-2} = \frac{-2k \cancel{\ln e}}{-2}$$

$$\boxed{K = .066}$$

The turkey reaches the temperature of approximately 100° F after 2 hours. Find the value of k, to the *nearest thousandth*, and write an equation to determine the temperature of the turkey after t hours.

$$\boxed{T = 325 - 257e^{-.066t}}$$

Determine the Fahrenheit temperature of the turkey, to the *nearest degree*, at 3 p.m.

$$T = 325 - 257e^{-.066(7)} \qquad t = 7$$

$$\boxed{T = 163° F}$$

Titanium-44 is a radioactive isotope such that every 63 years, its mass decreases by half. For a sample of titanium-44 with an initial mass of 100 grams, write a function that will give the mass of the sample remaining after any amount of time. Define all variables.

$$A = a_0\left(\frac{1}{2}\right)^{t/63} \leftarrow \text{half-life}$$

$$A = 100\left(\frac{1}{2}\right)^{t/63}$$

A = ending Amt.
t = time in yrs.

Scientists sometimes use the average yearly decrease in mass for estimation purposes. Use the average yearly decrease in mass of the sample between year 0 and year 10 to predict the amount of the sample remaining after 40 years. Round your answer to the *nearest tenth*.

Rate of change

$$A(0) = 100$$

$$A(10) = 100(1/2)^{10/63} = 89.581$$

$$\frac{89.581-100}{10-0} = \boxed{-10.42 \text{ g/yr.}}$$

est. using Rate of change $A(40) = 100 - 10.42(40) = 58.3$ g.

Is the actual mass of the sample or the estimated mass greater after 40 years? Justify your answer.

actual $A(40) = 100\left(\frac{1}{2}\right)^{40/63} = 64.4$ g

actual is greater

A study of the annual population of the red-winged blackbird in Ft. Mill, South Carolina, shows the population, $B(t)$, can be represented by the function $\boxed{B(t)=750(1.16)^{t}}$, where the t represents the number of years since the study began. 16%/yr.

In terms of the monthly rate of growth, the population of red-winged blackbirds can be best approximated by the function

(1) $B(t)=750(\underset{m}{1.012})^{t\,y}$

[✓ (2)] $B(t)=750(\underset{m}{1.012})^{12t\,m}$

~~(3)~~ $B(t)=750(\underset{y}{1.16})^{12t}$

~~(4)~~ $B(t)=750(\underset{y}{1.16})^{\frac{t}{12}}$

$$(1.16)^{\cancel{\frac{t}{12}}}$$

$$\left((1.16)^{1/12}\right)^{12t}$$

A rabbit population doubles every 4 weeks. There are currently five rabbits in a restricted area. If t represents the time, in weeks, and $P(t)$ is the population of rabbits with respect to time, about how many rabbits will there be in 98 days?

[✓ (1) 56]
(3) 3688
(2) 152
(4) 81,920

$5(2)^{t/4}$

$\frac{98}{7} = \boxed{14}$ wks

The loudness of sound is measured in units called decibels (dB). These units are measured by first assigning an intensity I_0 to a very soft sound that is called the threshold sound. The sound to be measured is assigned an intensity, I, and the decibel rating, d, of this sound is found using $d = 10 \log \frac{I}{I_0}$. The threshold sound audible to the average person is $\underset{I_0}{\underline{1.0 \times 10^{-12}}}$ W/m^2 (watts per square meter).

Consider the following sound level classifications:

Moderate	45-69 dB
Loud	70-89 dB
Very loud	[✓ 90-109 dB]
Deafening	>110 dB

$$d = 10 \log\left(\frac{6.3 \times 10^{-3}}{1 \times 10^{-12}}\right)$$

$$d = 98$$

How would a sound with intensity $\overset{I}{6.3 \times 10^{-3}}$ W/m^2 be classified?

(1) moderate

(2) loud

[✓ (3) very loud]

(4) deafening

The expression $\left(\frac{m^2}{m^{\frac{1}{3}}}\right)^{-\frac{1}{2}}$ is equivalent to

(1) $-\sqrt[6]{m^5}$

[✓ (2) $\frac{1}{\sqrt[6]{m^5}}$]

(3) $-m\sqrt[5]{m}$

(4) $\frac{1}{m\sqrt[5]{m}}$

$$\left(\frac{m^{1/3}}{m^2}\right)^{1/2} = \frac{m^{1/6}}{m^1} = m^{1/6-6/6} = m^{-5/6}$$

$$= \frac{1}{m^{5/6}}$$

$$= \frac{1}{\sqrt[6]{m^5}}$$

The function $M(t)$ represents the mass of radium over time, t, in years.

$$M(t) = 100\boxed{e^{\frac{\left(\ln\frac{1}{2}\right)t}{1590}}}$$

Determine if the function $M(t)$ represents growth or decay. Explain your reasoning.

$$e^{\frac{\ln\frac{1}{2}}{1590}} = .99956$$

$$< 1$$

decreasing b/c
the base is
between 0 and 1

Given the equal terms $\sqrt[3]{x^5}$ and $y^{\frac{5}{6}}$, determine and state y, in terms of x.

$$\left(x^{5/3}\right)^{6/5} = \left(y^{5/6}\right)^{6/5} \qquad y = \underline{f(x)}$$

$$x^{30/15} = y$$

$$\boxed{x^2 = y}$$

$A= a(1\pm r)^t$

Pedro and Bobby each own an ant farm. Pedro starts with 100 ants and says his farm is growing exponentially at a rate of 15% per month. Bobby starts with 350 ants and says his farm is steadily *decreasing* by 5 ants per month.

$100(1.15)^m$

$350-5m$

Assuming both boys are accurate in describing the population of their ant farms, after how many months will they both have approximately the same number of ants?

$350-5m=100(1.15)^m$

(1) 7
[✓ (2) 8]
(3) 13
(4) 36

Plug in w/ASK
or graph + INT.

Sequences...

All sequence formulas are on your reference sheet

Monthly mortgage payments can be found using the formula below:

$$M = \frac{P\left(\frac{r}{12}\right)\left(1+\frac{r}{12}\right)^n}{\left(1+\frac{r}{12}\right)^n - 1}$$

M = monthly payment
P = amount borrowed
r = annual interest rate
n = number of monthly payments

The Banks family would like to borrow $120,000 to purchase a home. They qualified for an annual interest rate of 4.8%. Algebraically determine the *fewest* number of whole years the Banks family would need to include in the mortgage agreement in order to have a monthly payment of no more than $720.

$$720 = \frac{120{,}000\left(\frac{.048}{12}\right)\left(1+\frac{.08}{12}\right)^n}{\left(1+\frac{.08}{12}\right)^n - 1}$$

$$\frac{720}{1} = \frac{480(1.004)^n}{1.004^n - 1}$$

$$720[(1.004)^n - 1] = 480(1.004)^n$$

$$720(1.004)^n - \cancel{720} = 480(\cancel{1}.004)^n$$

$$-480(1.004)^n \quad \cancel{+720} \qquad -480(\cancel{1}.004)^n \quad +720$$

$$\frac{240(1.004)^n}{240} = \frac{720}{240}$$

$$1.004^n = 3$$

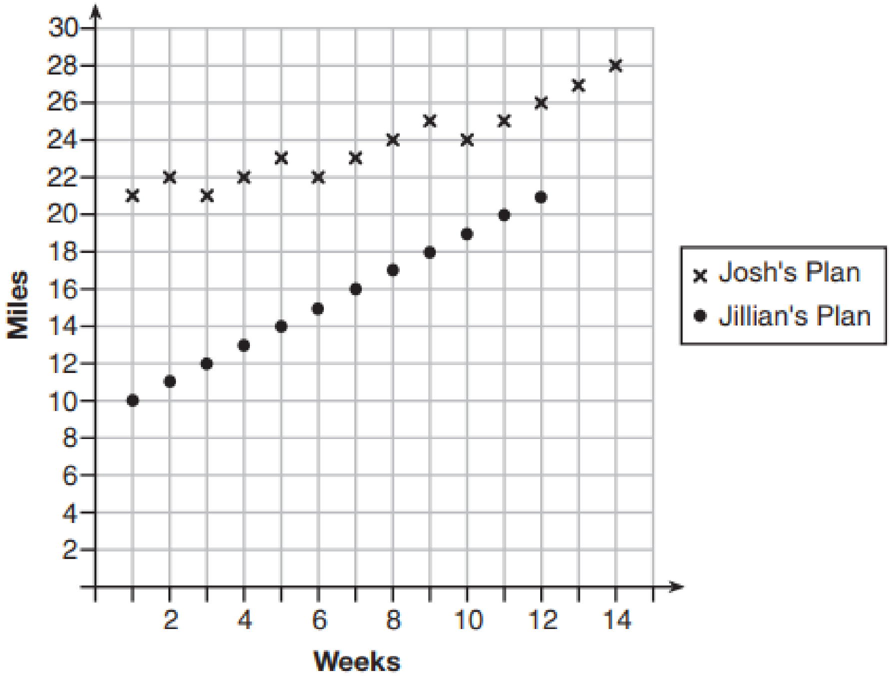
$$\frac{n \log 1.004}{\log 1.004} = \frac{\log 3}{\log 1.004}$$

$$n = 275.2 \text{ months}$$

$$\frac{275.2}{12} \approx \boxed{23 \text{ yrs}}$$

Yuck!

Elaina has decided to run the Buffalo half-marathon in May. She researched training plans on the Internet and is looking at two possible plans: Jillian's 12-week plan and Josh's 14-week plan. The number of miles run per week for each plan is plotted below.



Which one of the plans follows an arithmetic pattern? Explain how you arrived at your answer.

Jill b/c adding same amt (d=1) each week

Write a recursive definition to represent the number of miles run each week for the duration of the plan you chose.

$a_1 = 10$

$a_n = a_{n-1} + 1$

Using the formula below, determine the monthly payment on a 5-year car loan with a monthly percentage rate of 0.625% for a car with an original cost of $21,000 and a $1000 down payment, to the *nearest cent*.

$$P_n = PMT\left(\frac{1-(1+i)^{-n}}{i}\right)$$

P_n = present amount borrowed 20,000

n = number of monthly pay periods $5 \times 12 = 60$

PMT = monthly payment

i = interest rate per month .00625

$$20{,}000 = x\left(\frac{1-(1+.00625)^{-60}}{.00625}\right)$$

$$\frac{20{,}000}{49.9053} = \frac{49.9053x}{49.9053}$$

$$x = \boxed{\$400.76}$$

The affordable monthly payment is $300 for the same time period. Determine an appropriate down payment, to the *nearest dollar*.

$$21000 - x = 300(49.9053)$$

$$21000 - x = 14{,}971.59$$

$$x = \boxed{\$6{,}028}$$

Find the sum of the first five terms of the series: $\frac{32}{27} + \frac{16}{9} + \frac{8}{3} + \ldots$

$n=5$

a_1

$$r = \frac{16/9}{32/27} = 1.5$$

$$S_n = \frac{a_1 - a_1 r^n}{1-r}$$

$$S_5 = \frac{\frac{32}{27} - \frac{32}{27}(1.5)^5}{1-1.5}$$

[A] $12\frac{26}{27} \approx 12.963$ [✓ [B] $15\frac{17}{27} \approx 15.630$]

[C] $14\frac{17}{27} \approx 14.630$ [D] $19\frac{17}{27} \approx 19.630$

Evaluate the following expression:

$$\sum_{k=2}^{8}(3k-1)$$

Alpha Window

[✓ [A] 98] [B] 29 [C] 93 [D] 100

expand $3(2)-1 + 3(3)-1 + \ldots 3(8)-1$

Trigonometry...

QII

If the terminal side of angle θ, in standard position, passes through point (–4,3), what is the numerical value of sin θ?

[✓ (1) $\frac{3}{5}$]

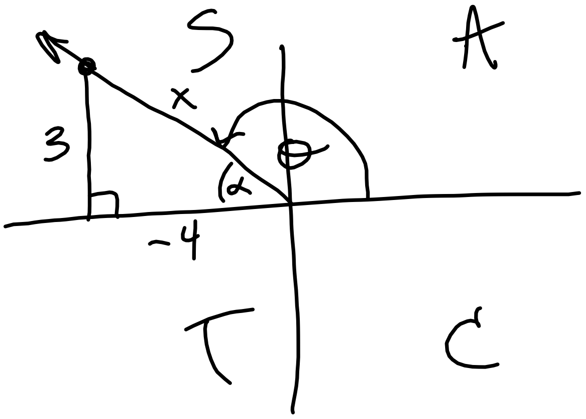
(2) $\frac{4}{5}$

~~(3) $-\frac{3}{5}$~~

~~(4) $-\frac{4}{5}$~~

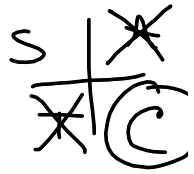
$\frac{o}{h}$

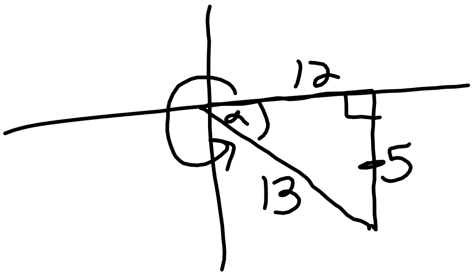
$\frac{3}{5}$



If $\tan A = \frac{-5}{12}{}^{o}_{a}$ and $\cos A > 0$, find $\sin A$.

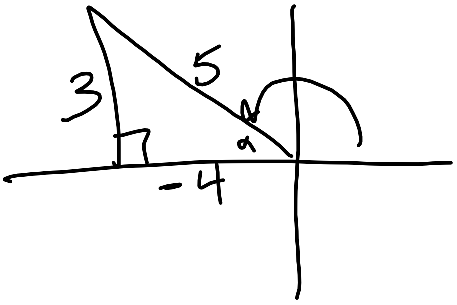
QIV





$\sin A = \boxed{\frac{-5}{13}}$

If the sine of an angle is $\frac{3}{5}{}^{o}_{h}$ and the angle is *not* in Quadrant I, what is the value of the cosine of the angle?



$\cos A = \boxed{\frac{-4}{5}}$

Relative to the graph of $y = 3\sin x$, what is the shift of the graph of $y = 3\sin\left(x + \frac{\pi}{3}\right)$?

(1) $\frac{\pi}{3}$ right

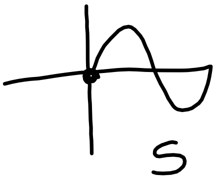
[✓ (2) $\frac{\pi}{3}$ left]

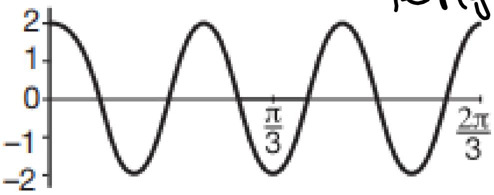
(3) $\frac{\pi}{3}$ up

(4) $\frac{\pi}{3}$ down

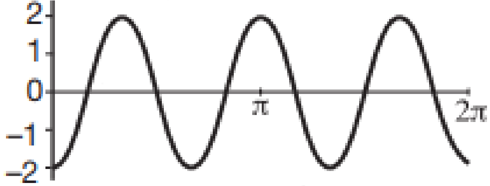
Which graph represents a cosine function with no horizontal shift, an amplitude of 2, and a period of $\frac{2\pi}{3}$?

length of 1 cycle

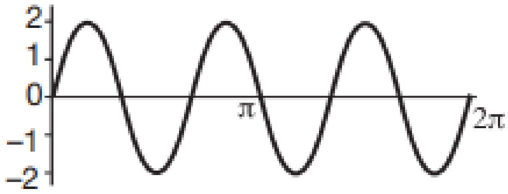




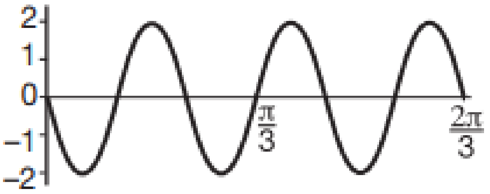
(1)



[✓ (3)]



~~(2)~~



~~(4)~~

People who fish in Carter Beach know that a certain species of fish is most plentiful when the water level is increasing. Explain whether you would recommend fishing for this species at 7:30 p.m. or 10:30 p.m. using evidence from the given context.

B/C ↑

The ocean tides near Carter Beach follow a repeating pattern over time, with the amount of time between each low and high tide remaining relatively constant. On a certain day, low tide occurred at 8:30 a.m. and high tide occurred at 3:00 p.m. At high tide, the water level was 12 inches above the average local sea level; at low tide it was 12 inches below the average local sea level. Assume that high tide and low tide are the maximum and minimum water levels each day, respectively.

½ cycle
6.5hrs

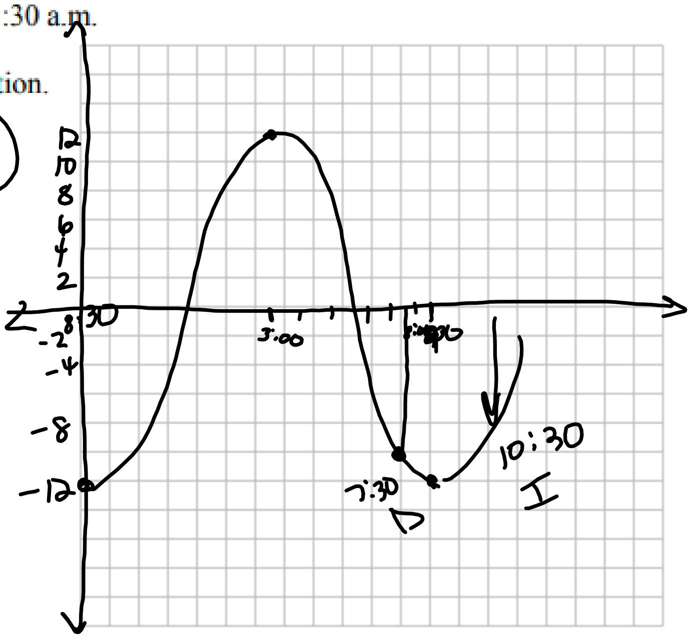
Per = 13 hrs

Amp = 12 $\quad A = -12 \quad W = \frac{2\pi}{Per} = \frac{2\pi}{13}$

Write a cosine function of the form $f(t) = A\cos(Bt)$, where A and B are real numbers, that models the water level, $f(t)$, in inches above or below the average Carter Beach sea level, as a function of the time measured in t hours since 8:30 a.m.

On the grid below, graph one cycle of this function.

$f(t) = -12\cos\left(\frac{2\pi}{13}t\right)$



Average Rate of Change...

Joelle has a credit card that has a 19.2% annual interest rate compounded monthly. She owes a total balance of B dollars after m months. Assuming she makes no payments on her account, the table below illustrates the balance she owes after m months.

m	B
0	1000.00
10	1172.00
19	1352.00
36	1770.80
60	2591.90
69	2990.00
72	3135.80
73	3186.00

Over which interval of time is her average rate of change for the balance on her credit card account the greatest?

~~2846~~ (1) month 10 to month 60

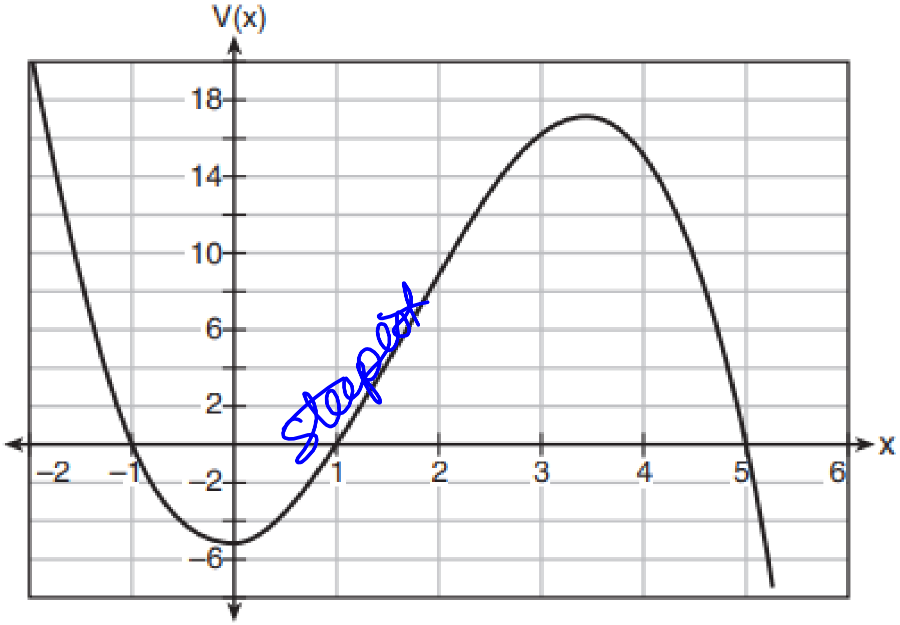
(3) month 36 to month 72 37.92

(2) month 19 to month 69 32.76

[✓ (4) month 60 to month 73] 45.7

$$\frac{3186-2591.9}{73-60}$$

A cardboard box manufacturing company is building boxes with length represented by $x + 1$, width by $5 - x$, and height by $x - 1$. The volume of the box is modeled by the function below.



Over which interval is the volume of the box changing at the fastest average rate?

[✓ (1) [1,2]] 8

(2) [1,3.5] 6.8

(3) [1,5] 0

(4) [0,3.5] 6.3

Parabolas...

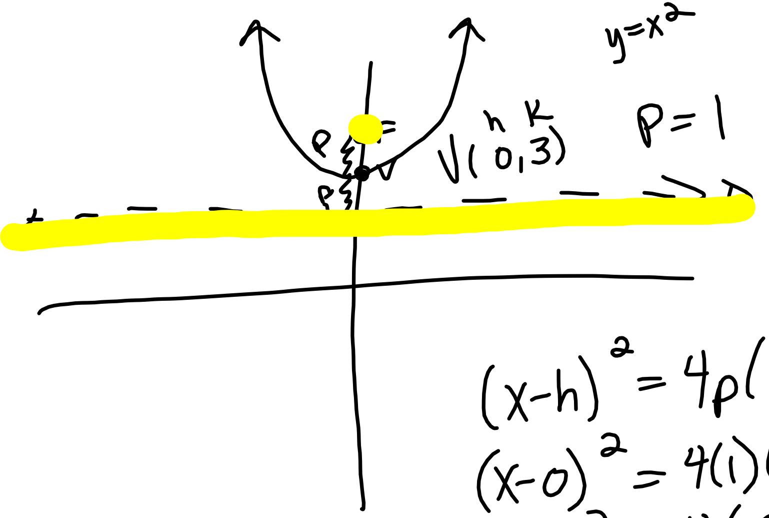
Which equation represents a parabola with a focus of (0,4) and a directrix of $y = 2$?

(1) $y = x^2 + 3$

(2) $y = -x^2 + 1$

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

[✓ (4)] $y = \frac{x^2}{4} + 3$



$y=x^2$

$V(\overset{h}{0},\overset{k}{3})$

$p=1$

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

$(x-0)^2 = 4(1)(y-3)$

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

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

$+3 \quad \cancel{+3}$

h k

Vertex: (1, −8), Focus: (1, −9)

+up

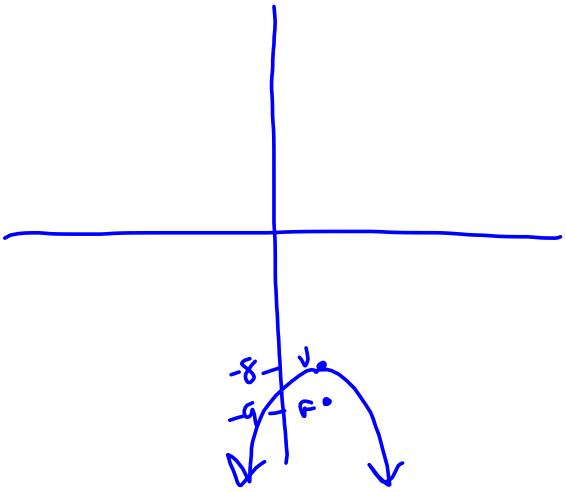
~~A)~~ $y = \frac{1}{4}(x-1)^2 + 4$

+up

~~B)~~ $y = \frac{1}{4}(x+1)^2 - 8$

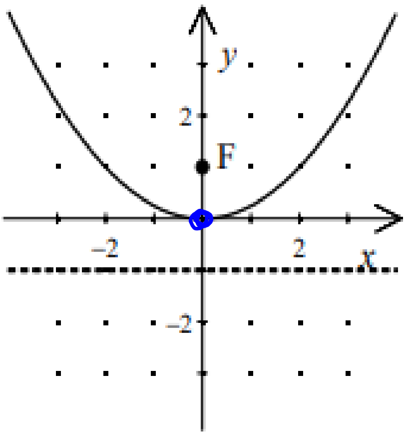
[✓ C)] $y = -\frac{1}{4}(x-1)^2 - 8$

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



$$\frac{(x-1)^2}{-4} - 8 = \frac{4(\cancel{-1})(y\cancel{+8})}{\cancel{-4}} - 8$$

Use the information in the graph to write an equation for the parabola.



$v=(0,0)$

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

$(x-0)^2=4(1)(y-0)$

$\boxed{x^2=4y}$

or $\boxed{\frac{x^2}{4}=y}$

Statistics...

Two versions of a standardized test are given, an April version and a May version. The statistics for the April version show a mean score of 480 and a standard deviation of 24. The statistics for the May version show a mean score of 510 and a standard deviation of 20. Assume the scores are normally distributed.

$z = \frac{510-480}{24} = 1.25$ $z = \frac{540-480}{24} = 2.5$

normalcdf $(1.25, 2.5) = .0994$

Joanne took the April version and scored in the interval 510-540. What is the probability, to the *nearest ten thousandth*, that a test paper selected at random from the April version scored in the same interval?

$1.25 = \frac{x-510}{20}$ $2.5 = \frac{x-510}{20}$

yuck $x = 535$ $x = 560$

$\boxed{535-560}$

Maria took the May version. In what interval must Maria score to claim she scored as well as Joanne?

In contract negotiations between a local government agency and its workers, it is estimated that there is a 50% chance that an agreement will be reached on the salaries of the workers. It is estimated that there is a 70% chance that there will be an agreement on the insurance benefits. There is a 20% chance that no agreement will be reached on either issue.

Find the probability that an agreement will be reached on *both* issues. = .4 or 40%

$P(S) = .5$

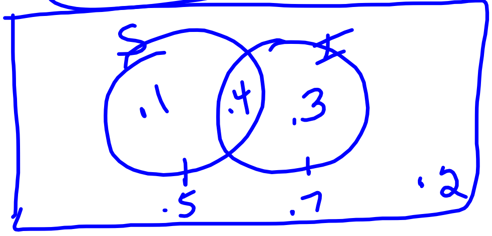
$P(I) = .7$

$P(\text{neither}) = .2$

$P(S \text{ or } I) = P(S) + P(I) - P(\text{Both})$

$.8 = .5 + .7 - P(\text{Both})$

$.4 = P(\text{Both})$



Based on this answer, determine whether the agreement on salaries and the agreement on insurance are independent events. Justify your answer.

$P(S \text{ and } I) = P(S) * P(I)$

$.4 = .5 * .7$

$.4 \neq .35$

Not indep

$P(S) = .5$

$P(S|I) = \frac{P(\text{Both})}{P(I)} = \frac{.4}{.7}$

$.5 \neq .57$

Not indep

Gabriel performed an experiment to see if planting 13 tomato plants in black plastic mulch leads to larger tomatoes than if 13 plants are planted without mulch. He observed that the average weight of the tomatoes from tomato plants grown in black plastic mulch was 5 ounces greater than those from the plants planted without mulch. To determine if the observed difference is statistically significant, he rerandomized the tomato groups 100 times to study these random differences in the mean weights. The output of his simulation is summarized in the dotplot below.

Given these results, what is an appropriate inference that can be drawn?

(1) There was no effect observed between the two groups.

[✓ (2)] There was an effect observed that could be due to the random assignment of plants to the groups.

(3) There is strong evidence to support the hypothesis that tomatoes from plants planted in black plastic mulch are larger than those planted without mulch.

(4) There is strong evidence to support the hypothesis that tomatoes from plants planted without mulch are larger than those planted in black plastic mulch.

In 2013, approximately 1.6 million students took the Critical Reading portion of the SAT exam. The mean score, the modal score, and the standard deviation were calculated to be 496, ~~430~~, and 115, respectively. Which interval reflects 95% of the Critical Reading scores?

mode

(1) 430 ± 115

(2) 430 ± 230

~~(3) 496 ± 115~~

[✓ (4) 496 ± 230]

mean SD

496 ± 2(115)

An orange-juice processing plant receives a truckload of oranges. The quality control team randomly chooses three pails of oranges, each containing 50 oranges, from the truckload. Identify the sample and the population in the given scenario.

S = 3 pails of 50 oranges
P = truckload of oranges

State *one* conclusion that the quality control team could make about the population if 5% of the sample was found to be unsatisfactory.

If 5% of the sample is unsatis.
we can assume that 5% of the
truckload is unsatisfactory

The results of a survey of the student body at Central High School about television viewing preferences are shown below.

	Comedy Series	Drama Series	Reality Series	Total
Males	95	65	70	230
Females	80	70	110	260
Total	175	135	180	490

Are the events "student is a male" and "student prefers reality series" independent of each other? Justify your answer.

$P(m) = 230/490 = .47$

one example

$P(m|RS) = 70/180 = .39$

Not = so

No indep.

The guidance department has reported that of the senior class, 2.3% are members of key club, *K*, 8.6% are enrolled in AP Physics, *P*, and 1.9% are in both.

Determine the probability of *P* given *K*, to the *nearest tenth of a percent*.

$$P(P|K) = \frac{P(P \cap K)}{P(K)} = \frac{.019}{.023} = .826 \quad \boxed{82.6\%}$$

The principal would like a basic interpretation of these results. Write a statement relating your calculated probabilities to student enrollment in the given situation.

82.6% of the students who are in Key club, are also in physics.