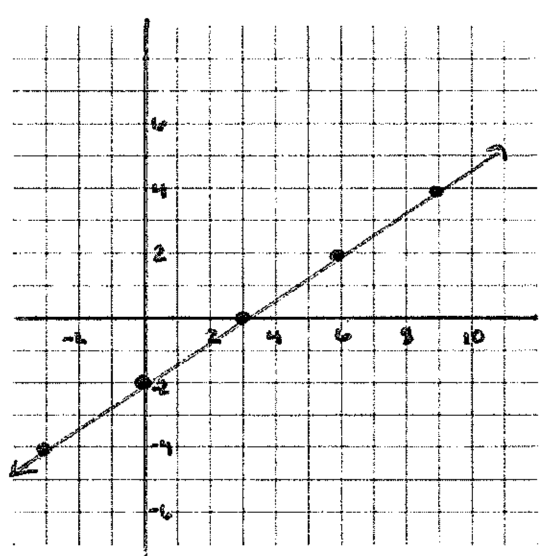
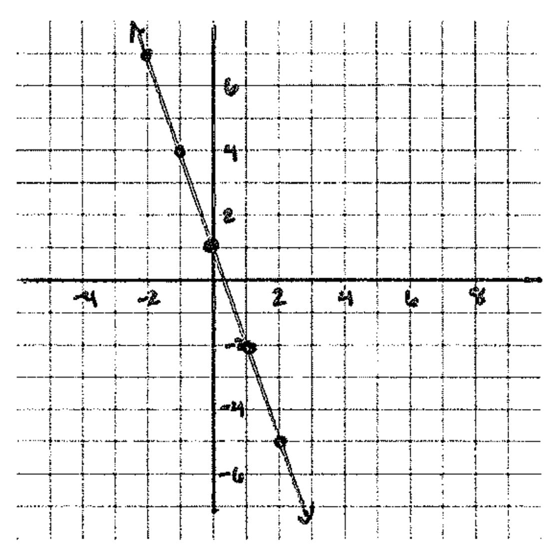
1. A line passes through (7,4) and (3,-4). Find an equation for the line in all three forms for linear equations.

2 Slope-intercept Form	1 Point-slope Form	3 Standard Form
$y = mx + b$ $y - 4 = 2(x - 7)$ $y - 4 = 2x - 14$ $y = 2x - 10$	$m = \frac{4 - -4}{7 - 3} = \frac{8}{4} = 2$ $y - y_1 = m(x - x_1)$ $y - 4 = 2(x - 7)$ $\boxed{\text{OR}}$ $y + 4 = 2(x - 3)$	$Ax + By = C$ $y = 2x - 10$ $-2x + y = -10$

2. Sketch the graph of each line.

a. $y = \frac{2}{3}x - 2$	b. $y = -3x + 1$
	

Start at the y-intercept and use slope $\left(\frac{\text{rise}}{\text{run}}\right)$ to find additional points

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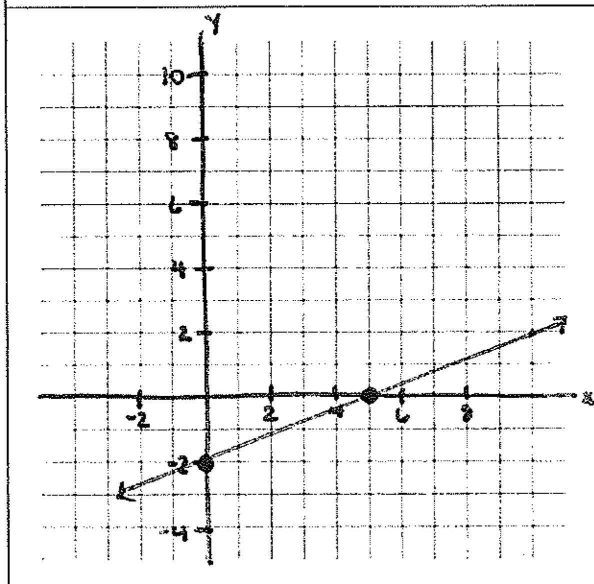
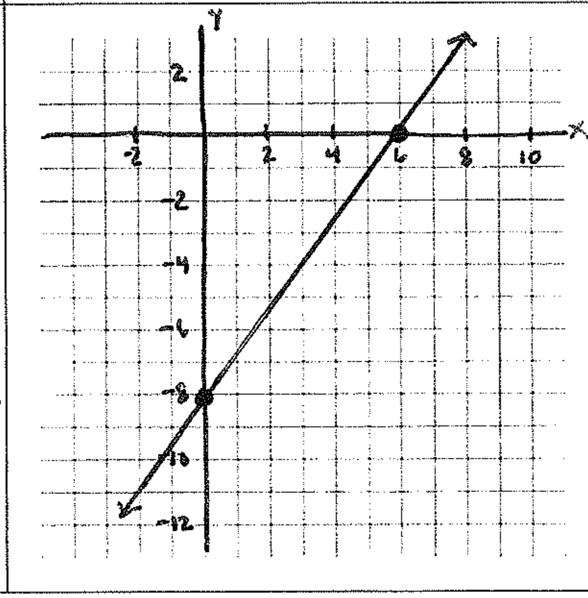
3. Sketch the graph of each line.

x-int
$2x = 10$
$x = 5$
$(5, 0)$

y-int
$-5y = 10$
$y = -2$
$(0, -2)$

a. $2x - 5y = 10$	b. $-4x + 3y = -24$
	

x-int
$-4x = -2$
$x = 6$
$(6, 0)$

y-int
$3y = -2$
$y = -8$
$(0, -8$

4. A recording studio charges a base fee for use of their facility plus a constant fee per hour of use. The table compares the number of hours the studio is used with the total cost, c, for use of the studio. Use the table to answer each of the questions below.

Hours of studio use (h)	2	4	6	8
Total cost to use the studio(C)	\$450	\$600	\$750	\$900

a. What is the fee charged per hour for use of the studio?	b. What is the base fee for rental of the studio?
$4 - 2 = 2$ hours $\$600 - \$450 = \$150$ $\frac{150}{2} = \$75$ per hour	cost for 2 hours = 450 base fee + 2(75) = 450 base fee + 150 = 450 base fee = \$300

c. Write a linear equation to model this situation.	d. Identify the domain and range for this function.
$C = 75h + 300$	Domain: $h > 0$ hours Range: $C > \$300$

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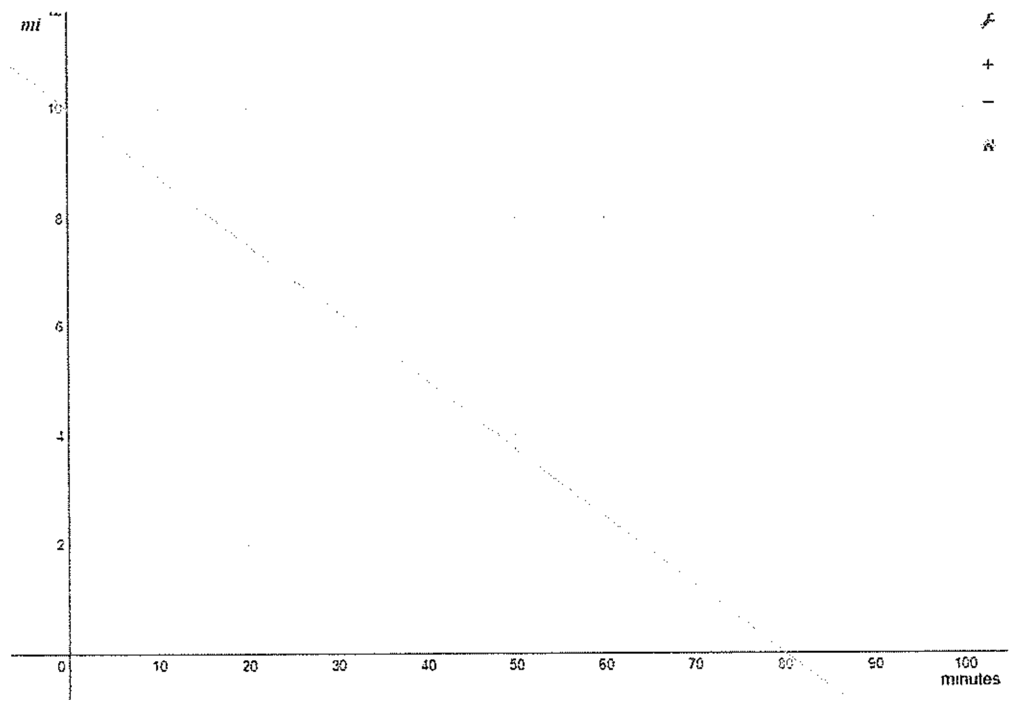
5. Jaden competes in a race, running at a constant pace from start to finish. The distance remaining in the race (in miles) as a function of time (in minutes) is shown in the graph. Use the graph to answer the following questions.



a. How long did it take Jaden to reach the finish line? Explain.	b. How long (distance) was the race? Explain your reasoning.
Jaden finished the race in 80 minutes (when there were zero miles remaining)	The race was 10 miles long, which is the distance remaining when no time has passed.

c. Write a linear equation to model this situation.	d. Identify the domain and range for this function.
y = miles remaining x = minutes $y = -\frac{1}{8}x + 10$	Domain: 0 minutes $\leq x \leq$ 80 minutes Range: 0 miles $\leq y \leq$ 10 miles

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1. Solve 4x – 9 < 7x + 15

$$4x - 9 < 7x + 15$$
$$-7x + 9 \quad -7x + 9$$
$$\frac{-3x}{-3} < \frac{24}{-3}$$
$$x > -8$$

2. Solve 6(3x – 2) = -4(2x – 9)

$$6(3x-2) = -4(2x-9)$$
$$18x - 12 = -8x + 36$$
$$+8x + 12 \quad +8x + 12$$
$$\frac{26x}{26} = \frac{48}{26}$$
$$x = \frac{24}{13}$$

3. Solve $\frac{2}{3}x + 4 = \frac{4}{5}x - 3$

$$15\left(\frac{2}{3}x + 4\right) = \left(\frac{4}{5}x - 3\right)15$$
$$10x + 60 = 12x - 45$$
$$-12x - 60 \quad -12x - 60$$
$$\frac{-2x}{-2} = \frac{-105}{-2}$$
$$x = 52.5$$

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AP Precalculus

Prerequisites Review #3 – Polynomial Addition and Multiplication

1. Simplify the expression to a polynomial in standard form: $(4x^3 - 5x^2 - 3x + 7)(2x - 5)$.

Distribute: $4x^3(2x) + 4x^3(-5) - 5x^2(2x) - 5x^2(-5) - 3x(2x) - 3x(-5) + 7(2x) + 7(-5)$

Multiply: $8x^4 - 20x^3 - 10x^3 + 25x^2 - 6x^2 + 15x + 14x - 35$

Combine like terms: $8x^4 - 30x^3 + 19x^2 + 29x - 35$

2. Simplify the expression to a polynomial in standard form: $3(2x - 5)(x^2 - 4x + 2)$.

Multiply the first two expressions

$3(2x - 5) = 6x - 15$

Multiply that answer by the third expression

$(6x - 15)(x^2 - 4x + 2)$

Distribute: $6x(x^2) + 6x(-4x) + 6x(2) - 15(x^2) - 15(-4x) - 15(2)$

Multiply: $6x^3 - 24x^2 + 12x - 15x^2 + 60x - 30$

Combine like terms: $6x^3 - 39x^2 + 72x - 30$

3. Simplify the expression to a polynomial in standard form: $(3x - 1)(-2x^2 + 4x - 7)$.

Distribute: $3x(-2x^2) + 3x(4x) + 3x(-7) - 1(-2x^2) - 1(4x) - 1(-7)$

Multiply: $-6x^3 + 12x^2 - 21x + 2x^2 - 4x + 7$

Combine like terms: $-6x^3 + 14x^2 - 25x + 7$

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AP Precalculus

Prerequisites Review #4 – Factoring Quadratic Trinomials

Factor each quadratic trinomial.

1. $x^2 + 10x + 9$

1,9   3,3

$(x+1)(x+9)$

2. $x^2 - 6x + 9$

-1,-9   -3,-3

$(x-3)(x-3)$

or

$(x-3)^2$

3. $x^2 - 11x + 24$

-1,-24   -2,-12

-3,-8   -4,-6

$(x-3)(x-8)$

4. $3x^2 - 5x - 12$

$a \cdot c = -36$

1,-36   -1,36

2,-18   -2,18

3,-12   -3,12

4,-9   -4,9

-6,6

$3x^2 + 4x - 9x - 12$

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

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

5. $4x^2 + 28x + 49$

$a \cdot c = 196$

1,196   2,98

4,49   8,26

14,14

$4x^2 + 14x + 14x + 49$

$2x(2x+7) + 7(2x+7)$

$(2x+7)(2x+7)$

6. $15x^2 - 11x - 12$

$a \cdot c = -180$

-1,180   1,-180

-2,90   2,-90

-3,60   3,-60

-4,45   4,-45

-5,36   5,-36

-6,30   6,-30

-8,25   8,-25

-9,20   9,-20

-10,18   10,-18

-12,15   12,-15

$15x^2 + 9x - 20x - 12$

$3x(5x+3) - 4(5x+3)$

$(5x+3)(3x-4)$

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Solve each problem by factoring or using the quadratic formula. Round answers to the nearest hundredth as needed.

1. $x^2 + 4x + 3 = 0$

$a \cdot c = 3$ 1, 3

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

$x+1=0$ $x+3=0$

$x=-1$ or $x=-3$

2. $x^2 - 5x = 6$

$x^2 - 5x - 6 = 0$

$a \cdot c = -6$ $\boxed{1, -6}$ $-1, 6$

$2, -3$ $-2, 3$

$(x+1)(x-6) = 0$

$x+1=0$ $x-6=0$

$x=-1$ or $x=6$

3. $3x^2 - 5x - 9 = x^2 + 3$

$2x^2 - 5x - 12 = 0$

$a \cdot c = -24$ $1, -24$ $-1, 24$

$2, -12$ $-2, 12$

$3, -8$ $-3, 8$

$4, -6$ $-4, 6$

$2x^2 + \underline{3x} - \underline{8x} - 12 = 0$

$x(2x+3) - 4(2x+3) = 0$

$(2x+3)(x-4) = 0$

$2x+3=0$ $x-4=0$

$x = -\frac{3}{2}$ or $x = 4$

4. $4x^2 - 12x + 1 < 0$

$a=4$ $b=-12$ $c=1$

$$\frac{12 \pm \sqrt{(-12)^2 - 4(4)(1)}}{2(4)}$$

$$\frac{12 \pm \sqrt{144 - 16}}{8}$$

$$\frac{12 \pm \sqrt{128}}{8}$$

$$\frac{12 + \sqrt{128}}{8} \text{ or } \frac{12 - \sqrt{128}}{8}$$

$$\frac{23.31}{8} \text{ or } \frac{.69}{8}$$

2.91 $.09$

After using the quadratic formula to find these values, I tested a number in between them to see if it made the original inequality true and it did.

$.09 < x < 2.91$

x is a value between the two solutions.

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5. $2x^2 + 8x = -7$

$2x + 8x + 7 = 0$

$a = 2 \quad b = 8 \quad c = 7$

$x = \dfrac{-8 \pm \sqrt{(8)^2 - 4(2)(7)}}{2(2)}$

$x = \dfrac{-8 \pm \sqrt{64 - 56}}{4}$

$x = \dfrac{-8 \pm \sqrt{8}}{4}$

$x = \dfrac{-8 + \sqrt{8}}{4}$ or $\dfrac{-8 - \sqrt{8}}{4}$

$x = \dfrac{-5.17}{4}$ or $\dfrac{-10.83}{4}$

$x = -1.29$ or -2.71

6. A ball is catapulted upward from the top of a building at a speed of 30 feet per second. The ball's height above the ground can be modeled as $H(t) = -16t^2 + 30t + 40$. How long does it take for the ball to reach a height of 50 feet?

$50 = -16t^2 + 30t + 40$

$0 = -16t^2 + 30t - 10$

$a = -16 \quad b = 30 \quad c = -10$

$t = \dfrac{-30 \pm \sqrt{(30)^2 - 4(-16)(-10)}}{2(-16)}$

$t = \dfrac{-30 \pm \sqrt{900 - 640}}{-32}$

$t = \dfrac{-30 \pm \sqrt{260}}{-32}$

$t = \dfrac{-30 + \sqrt{260}}{-32}$ or $\dfrac{-30 - \sqrt{260}}{-32}$

$t = \dfrac{-13.87}{-32}$ or $\dfrac{-46.12}{-32}$

$t = 0.43$ sec or 1.44 sec.

The ball reaches 50 ft on its way up at 0.43 seconds and on its way down at 1.44 seconds.

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AP Precalculus
Prerequisites Review #6 – Quadratic Functions: Algebraic Manipulation

1. A ball is launched straight up with a velocity of 40 feet per second. The ball's height above the ground can be modeled by $H(t) = -16t^2 + 40t + 5$. Use this information to answer the following questions.

a. How high is the ball when it is released? Explain your answer. At the time the ball is released, no time has passed. $-16(0)^2 + 40(0) + 5 = 5$ The ball is 5 feet high when it is released.	b. How long does it take the ball to reach its maximum height? Explain your answer. Maximum indicates vertex How long indicates seconds seconds is the x-coordinate $\frac{-b}{2a} = \frac{-40}{2(-16)} = \frac{-40}{-32} = 1.25$ sec.
c. What is the maximum height the ball reaches? Explain your answer. Maximum indicates vertex Height is the y-coordinate Substitute the x-coordinate to find the height. $-16(1.25)^2 + 40(1.25) + 5 =$ $-25 + 50 + 5 =$ 30 feet	d. How long is the ball in the air? Explain your answer. When the ball is no longer in the air, it is on the ground which means the height is zero. Substitute 0 for height and solve. $0 = -16t^2 + 40t + 5$ $a = -16,\ b = 40,\ c = 5$ $t = \frac{-40 \pm \sqrt{(40)^2 - 4(-16)(5)}}{2(-16)}$ $t = \frac{-40 \pm \sqrt{1920}}{-32}$ $t = \frac{3.82}{-32}$ or $\frac{-83.82}{-32} = 2.62$ Ignore this answer because time cannot be negative. $t = 2.62$ seconds

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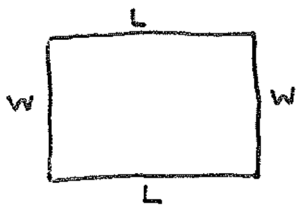
2. A child uses 36 legos to build the rectangular frame for the base of her lego castle. Write a quadratic function to model this situation and determine the length of the side of the castle and the largest possible area covered by the castle's base.



$2L + 2W = 36$

$L + W = 18$

If $L = x$, then $W = 18 - x$.

Quadratic model for area is

$A = x(18 - x)$

x-intercepts are at $x = 0$ and $x = 18$
Vertex must be at $x = 9$, so this is the maximized area.

$L = 9$

$W = 18 - 9 = 9$

Area $= 9 \cdot 9 = 81$

3. Does the table of values below represent a quadratic equation? Justify your decision.

x	f(x)
-1	4
0	6
1	11
2	19
3	32

$\frac{6-4}{0-{-1}} = \frac{2}{1} = 2$

$\frac{11-6}{1-0} = \frac{5}{1} = 5$

$\frac{19-11}{2-1} = \frac{8}{1} = 8$

$\frac{32-19}{3-2} = \frac{13}{1} = 13$

When calculating the rate of change, the relationship initially appears linear because the differences vary by 3. However the difference in the last two rates of change is 5 so the rate of change is not linear and this is not a quadratic model.

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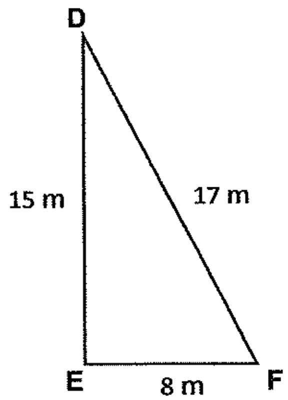
AP Precalculus
Prerequisites Review #7 – Solving Right Triangle Problems Using Trigonometry

1. Use the diagram to identify each ratio.



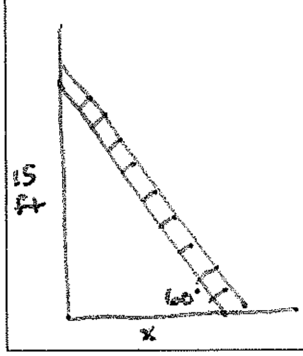
a. sin F° = $\frac{15}{17}$	b. sin D° = $\frac{8}{17}$
c. cos F° = $\frac{8}{17}$	d. cos D° = $\frac{15}{17}$
e. tan F° = $\frac{15}{8}$	f. tan D° = $\frac{8}{15}$

2. Using the diagram from #1 above, calculate the measure in degrees of $\angle F$.

$\sin F^\circ = \frac{15}{17}$

$\sin^{-1}\left(\frac{15}{17}\right) = F^\circ = 62^\circ$

3. When a ladder leans against a wall, it reaches a height of 15 feet. The angle of incline is 60°. How far away from the wall is the base of the ladder?



$\tan 60^\circ = \frac{15}{x}$

$1.73 = \frac{15}{x}$

$1.73x = 15$

$x = 8.66$ ft.

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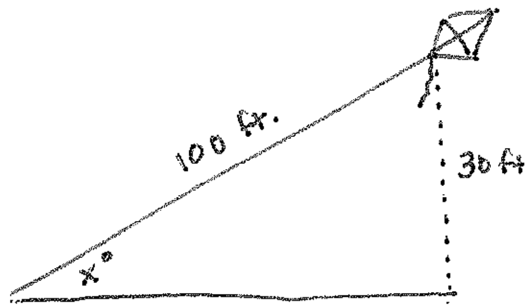
3. A kite is flying extended on 100 feet of string and is 30 feet high. What is the angle of elevation of the kite?



$\sin x^\circ = \frac{30}{100}$

$\sin x^\circ = .3$

$\sin^{-1} .3 = x$

$x = 17.5^\circ$

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1. Solve $\begin{cases} x + 2y = 10 \\ y = 2x - 5 \end{cases}$

Solve using Substitution

$x + 2(2x - 5) = 10$
$x + 4x - 10 = 10$
$5x - 10 = 10$
$5x = 20$
$x = 4$

$y = 2(4) - 5$
$y = 8 - 5$
$y = 3$

Solution: $(4, 3)$

2. Solve $\begin{cases} 5x + 7y = 6 \\ 10x - 3y = 46 \end{cases}$

Solve using elimination

$-2(5x + 7y = 6) \rightarrow -10x - 14y = -12$
$10x - 3y = 46 \rightarrow 10x - 3y = 46$
$-17y = 34$
$y = -2$
$5x + 7(-2) = 6$
$5x - 14 = 6$
$5x = 20$
$x = 4$

Solution: $(4, -2)$

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3. Solve $\begin{cases} 3x + y - 2z = -12 & ① \\ 2x + 2y - 3z = -12 & ② \\ 5x + 3y + 2z = 4 & ③ \end{cases}$

Pair ① and ③ to eliminate z.

$$\begin{aligned} 3x + y - 2z &= -12 \\ 5x + 3y + 2z &= 4 \\ \hline 8x + 4y &= -8 \end{aligned}$$

Pair ① and ② to eliminate z.

$$3(3x + y - 2z = -12)$$
$$-2(2x + 2y - 3z = -12)$$

$$\begin{aligned} 9x + 3y - 6z &= -36 \\ -4x - 4y + 6z &= 24 \\ \hline 5x - y &= -12 \end{aligned}$$

Pair the two smaller equations to eliminate y, solve for x.

$$8x + 4y = -8 \longrightarrow 8x + 4y = -8$$
$$4(5x - y = -12) \longrightarrow 20x - 4y = -48$$

$$28x = -56$$
$$x = -2$$

Substitute solution for x into one of the smaller equations, solve for y.

$$\begin{aligned} 8(-2) + 4y &= -8 \\ -16 + 4y &= -8 \\ 4y &= 8 \\ y &= 2 \end{aligned}$$

OR

$$\begin{aligned} 5(-2) - y &= -12 \\ -10 - y &= -12 \\ -y &= -2 \\ y &= 2 \end{aligned}$$

Substitute x and y into one of the original equations, solve for z.

$$\begin{aligned} 3x + y - 2z &= -12 \\ 3(-2) + 2 - 2z &= -12 \\ -6 + 2 - 2z &= -12 \\ -4 - 2z &= -12 \\ -2z &= -8 \\ z &= 4 \end{aligned}$$

OR

$$\begin{aligned} 2x + 2y - 3z &= -12 \\ 2(-2) + 2(2) - 3z &= -12 \\ -4 + 4 - 3z &= -12 \\ -3z &= -12 \\ z &= 4 \end{aligned}$$

OR

$$\begin{aligned} 5x + 3y + 2z &= 4 \\ 5(-2) + 3(2) + 2z &= 4 \\ -10 + 6 + 2z &= 4 \\ -4 + 2z &= 4 \\ 2z &= 8 \\ z &= 4 \end{aligned}$$

Write answer as an ordered triple $(x, y, z) = (-2, 2, 4)$

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4. Solve $\begin{cases} y = x^2 + 4x - 2 \\ y = 3x + 5 \end{cases}$

Use substitution to write an equation with one variable.

$3x + 5 = x^2 + 4x - 2$

$0 = x^2 + x - 7$ (standard form)

$a = 1 \quad b = 1 \quad c = -7$

$x = \dfrac{-1 \pm \sqrt{(1)^2 - 4(1)(-7)}}{2(1)}$

$x = \dfrac{-1 \pm \sqrt{1+28}}{2}$

$x = \dfrac{-1 \pm \sqrt{29}}{2}$

$x = \dfrac{4.39}{2}$ or $\dfrac{-6.39}{2}$

$x = 2.195$ or -3.195

Substitute x in an original equation to find y.

$y = 3(2.195) + 5 = 6.585 + 5 = 11.585$

$y = 3(-3.195) + 5 = -9.585 + 5 = -4.585$

Write solutions as ordered pairs to show points of intersection.

$(2.195, 11.585)$ and $(-3.195, -4.585)$

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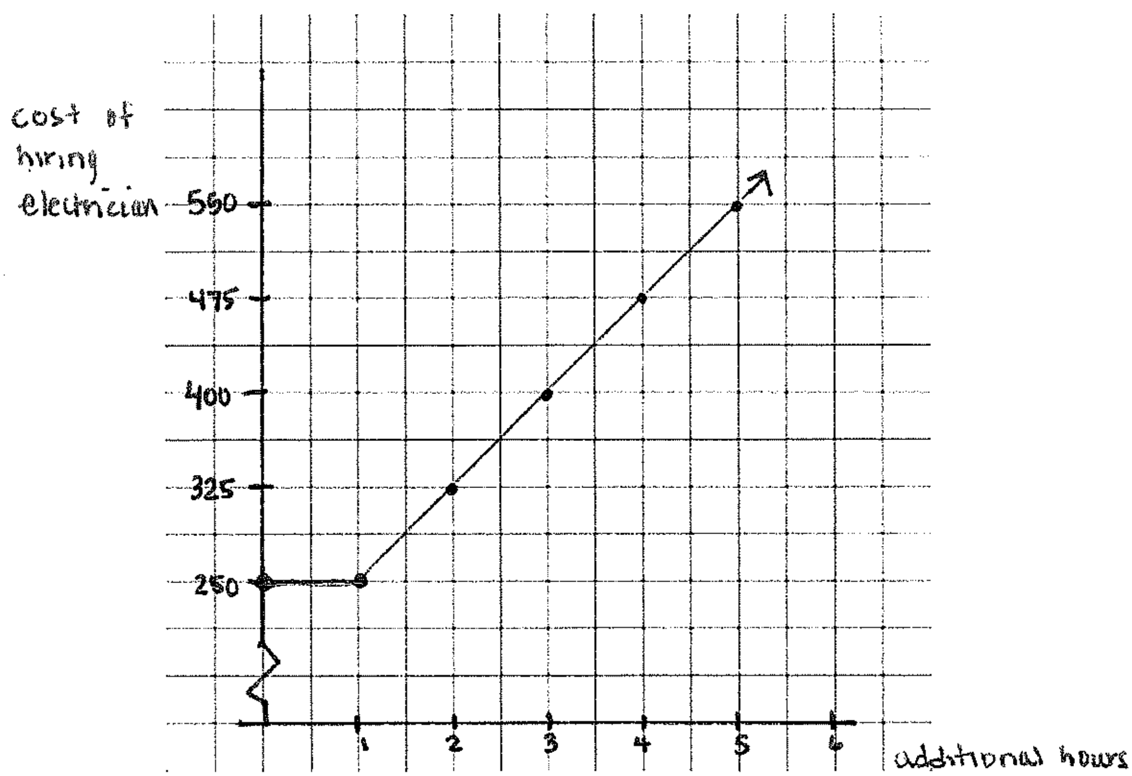
1. An electrician charges $250 for the first hour of work and $75 for each additional hour.

a. Generate the piecewise function to define the cost of hiring this electrician.

h = additional hours
c = cost of hiring the electrician

$$\begin{cases} c = 250 & 0 \le h \le 1 \\ c = 250 + 75h & h > 1 \end{cases}$$

b. Graph the piecewise function that would illustrate this situation.



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2. Find each of the following values given that f(x) = $\begin{cases} x^3 - 4 & when \ \ x < -6 \\ 2x + 7 & when \ \ -6 \le x < 1 \\ \frac{x}{x^2+2} & when \ \ x \ge 1 \end{cases}$

a. f(-6)	b. f(1)	c. f(6)	d. f(0)
$2(-6)+7 =$ $-12+7 =$ -5 $f(-6) = -5$	$\frac{1}{1^2+2} =$ $\frac{1}{1+2} =$ $\frac{1}{3}$ $f(1) = \frac{1}{3}$	$\frac{6}{6^2+2} =$ $\frac{6}{36+2} =$ $\frac{6}{38} =$ $\frac{3}{19}$ $f(6) = \frac{3}{19}$	$2(0)+7 =$ $0+7 =$ 7 $f(0) = 7$

3. Rewrite the function g(x) = |3x| + 2 as a piecewise function.

$$g(x) = \begin{cases} 3x + 2 & when \ \ x \ge 0 \\ -3x + 2 & when \ \ x < 0 \end{cases}$$

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1. A certain bacteria population sample contains 500 bacteria and is known to grow by 20% every hour when left untreated.

a. Write an equation to model the untreated bacteria population (y) after x hours.

$y = 500\,(1+.20)^x$

$y = 500(1.2)^x$

b. How many bacteria are in the sample after 5 hours? 7.5 hours?

$500\,(1.2)^5$

$500\,(2.48832)$

1,244 bacteria after 5 hours

$500\,(1.2)^{7.5}$

$500\,(3.925177)$

1962 bacteria after 7.5 hours

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AP Precalculus
Prerequisites Review #11 – Rules for Exponents

Simplify the following expressions. Write your answers with positive exponents only.

1. $(w^0x^5)^{-1}$

$w^{0\cdot -1}\, x^{5\cdot -1} =$

$w^0\, x^{-5} =$

$\frac{w^0}{x^5} =$

$\boxed{\frac{1}{x^5}}$

2. $c^{-3}(c^7)^4$

$c^{-3}\cdot c^{7\cdot 4} =$

$c^{-3}\cdot c^{28} =$

$c^{-3+28} =$

$\boxed{c^{25}}$

3. $(u^3v^5)^2(u^{-7}v^{-10})$

$(u^{3\cdot 2}\, v^{5\cdot 2})(u^{-7}\, v^{-10}) =$

$(u^6\, v^{10})(u^{-7}\, v^{-10}) =$

$u^{6+-7}\, v^{10+-10} =$

$u^{-1}\, v^0 =$

$\frac{v^0}{u^1} =$

$\boxed{\frac{1}{u}}$

4. $\frac{x^3y^4}{w^7z^{-2}} * \frac{w^4y^{-3}}{x^5z^2}$

$\frac{x^{3-5}\, y^{4+-3}\, w^{4-7}}{z^{-2+2}} =$

$\frac{x^{-2}\, y\, w^{-3}}{z^0} =$

$\frac{y}{w^3x^2z^0} =$

$\boxed{\frac{y}{w^3x^2}}$

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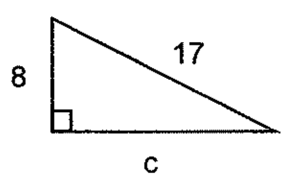
AP Precalculus
Prerequisites Review #12 – Radicals (square roots and cube roots)

1. Evaluate each of the following. Round to the nearest hundredth as needed.

a. $\sqrt{121}$ 11	b. $\sqrt{175}$ 13.23
c. $\sqrt[3]{125}$ 5	d. $\sqrt[3]{8}$ 2
e. $\sqrt[3]{36}$ 3.30	

2. Solve for c.



Pythagorean Theorem $a^2+b^2=c^2$
a and b are legs
c is the hypotenuse

$8^2+c^2=17^2$

$64+c^2=289$

$c^2=225$

$c=\sqrt{225}$

$c=15$

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3. Simplify each of the following expressions. Rationalize denominators as needed.

a. $\sqrt{50}$ $\sqrt{5\cdot 5\cdot 2}$ $5\sqrt{2}$	b. $\frac{3\sqrt{6}}{4\sqrt{5}}$ $\frac{3\sqrt{6}}{4\sqrt{5}}\cdot\frac{\sqrt{5}}{\sqrt{5}} = \frac{3\sqrt{30}}{4\cdot 5} =$ $\frac{3\sqrt{30}}{20}$
c. $\sqrt{72a^5b^6}$ $\sqrt{2\cdot 2\cdot 2\cdot 3\cdot 3\cdot a^2\cdot a^2\cdot a\cdot b^2\cdot b^2\cdot b^2}$ $2\cdot 3\cdot a\cdot a\cdot b\cdot b\cdot b\sqrt{2a}$ $6a^2b^3\sqrt{2a}$	d. $3\sqrt{5} + 6\sqrt{20}$ $6\sqrt{20} = 6\sqrt{2\cdot 2\cdot 5} =$ $6\cdot 2\sqrt{5} =$ $12\sqrt{5}$ $3\sqrt{5} + 12\sqrt{5} =$ $15\sqrt{5}$

e. $\frac{\sqrt{200x^{17}y^6}}{\sqrt{45x^{15}y^9}}$ Reduce the fraction then simplify the root

$$\sqrt{\frac{40x^2}{9y^3}} = \frac{\sqrt{2\cdot 2\cdot 2\cdot 5\cdot x^2}}{\sqrt{3\cdot 3\cdot y^2\cdot y}} = \frac{2x\sqrt{10}}{3y\sqrt{y}}$$

Rationalize the denominator.

$$\frac{2x\sqrt{10}}{3y\sqrt{y}}\cdot\frac{\sqrt{y}}{\sqrt{y}} = \frac{2x\sqrt{10y}}{3y^2}$$

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AP

AP Precalculus

Prerequisites Review #13 – Complex Numbers

Simplify the following expressions and rationalize denominators as needed.

1. $(3 + 7i) + (4 - 9i)$

$3 + 7i + 4 - 9i$

$\boxed{7 - 2i}$

2. $(3 + 7i) - (4 - 9i)$

$3 + 7i - 4 + 9i$

$\boxed{-1 + 16i}$

3. $(3 + 7i)(4 - 9i)$

$3(4) + 3(-9i) + 7i(4) + 7i(-9i)$

$12 - 27i + 28i - 63i^2$

$12 + i - 63(-1)$

$12 + i + 63$

$\boxed{75 + i}$

4. $\dfrac{10-2i}{3+4i}$

$\dfrac{(10-2i)}{(3+4i)}\dfrac{(3-4i)}{(3-4i)} =$

$\dfrac{30 - 40i - 6i + 8i^2}{9 - 12i + 12i - 16i^2} =$

$\dfrac{30 - 46i + 8(-1)}{9 - 16(-1)} =$

$\boxed{\dfrac{22 - 46i}{25}}$

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