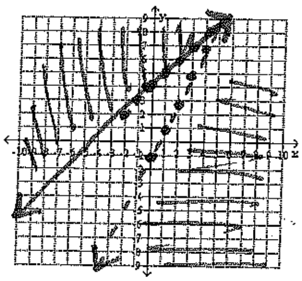
Name Key. Teacher: ______________ Period: ____ Date: ________

$\leq \geq$ Solid
$< >$ dashed

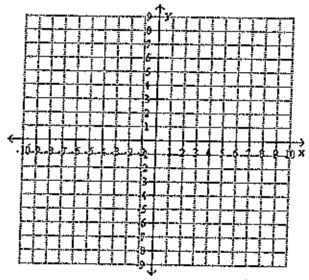
ALGEBRA I FINAL REVIEW SPRING 2016

Solve each system of inequalities by graphing. (*Book sections 4-5and 4-6*)

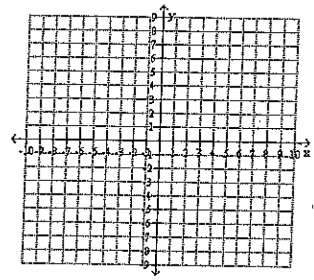
1.) $y \geq x+4$
$y \cancel{\geq} < 2x-1$



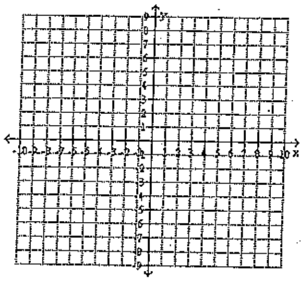
2.) $y < -\frac{3}{4}x$
$4y < -3x$



3.) $3x+2y \leq -14$
$2x-y > 0$

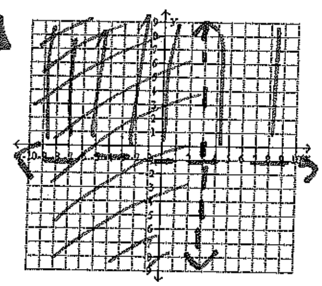


4.) $2x+y > 2$
$-4x-2y > 10$

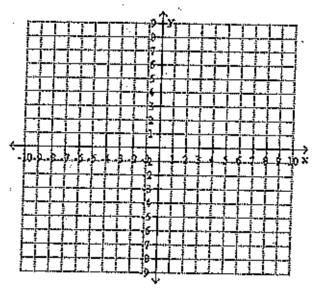


5.) $x < 3$ vux
$y > -1$ tloy

solution



6.) $y \leq -\frac{1}{3}x+7$
$y \geq -x+1$

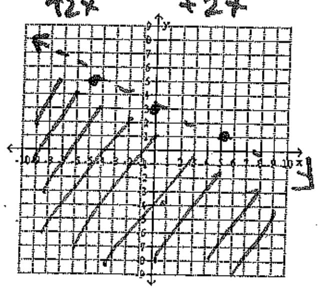


Graph each linear inequality. (4-5)

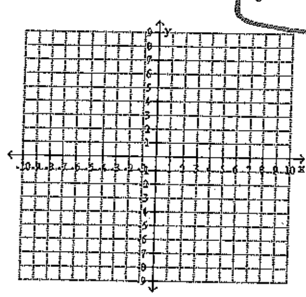
7.) $-2x-5y > -15$
$+2x \quad +2x$

$\frac{-5y}{-5} > \frac{2x}{-5} - \frac{15}{-5}$

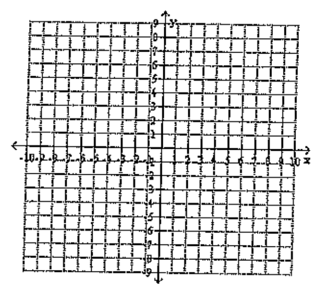
$\boxed{y < -\frac{2}{5}x + 3}$



8.) $y < -2x-6$



9.) $x \geq -3$



10) A gardener wants to plant petunias and hydrangeas in the flower garden. 6" Petunias cost \$3.50 each and 6" Hydrangeas cost \$9.50 each. The gardener plans to spend no more than \$100 on plants.

a) Write an inequality to represent this situation.
b) Graph the inequality.
c) Use the graph to determine if the gardener can buy 15 petunias and 6 hydrangeas. Explain.

11) Jaylin is planning his after school schedule for finals week. He can spend at most 6 hours daily playing basketball and studying all together. He wants to spend less than 2 hours a day playing basketball. He must spend at least 1.5 hours a day on homework. Use a graph to help him plan the amount of time he can spend on each task. What are two options for his time according to the graph?

Simplify using the indicated operations, then name (classify) the polynomial by its degree and number of terms. (*Book sections 7-1 to 7-4*)

12.) $(4x - 5) + (9x + 14)$

$\boxed{13x + 9}$

13.) $(3x^2 + 7x + 9) + (3x^2 - 7x)$

$\boxed{6x^2 + 9}$

14.) $(9n + 7) - (4n - 5)$

$9n + 7 - 4n + 5$

$\boxed{5n + 12}$

15.) $(12p^3 - p^2) - (-10p^3 + p^2)$

$12p^3 - p^2 + 10p^3 - p^2$

$= \boxed{22p^3 - 2p^2}$

16.) $(-4w)(w^3 + 8w^2 + 3w + 1)$

$-4w^4 - 32w^3 - 12w^2 - 4w$

17.) $(d - 3)(d - 25)$

	d	-25
d	d^2	$-25d$
-3	$-3d$	75

$\boxed{d^2 - 28d + 75}$

18.) $(y + 3)(y^2 + 5y - 4)$

	y^2	$+5y$	-4
y	y^3	$5y^2$	$-4y$
$+3$	$3y^2$	$15y$	-12

$\boxed{y^3 + 8y^2 + 11y - 12}$

19.) $(a - 2)(a^2 + 3a - 8)$

	a^2	$3a$	-8
a	a^3	$3a^2$	$-8a$
-2	$-2a^2$	$6a$	$+16$

$\boxed{a^3 + a^2 - 2a + 16}$

20.) $(3x - 4)^2$

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

	$3x$	-4
$3x$	$9x^2$	$-12x$
-4	$-12x$	16

$\boxed{9x^2 - 24x + 16}$

21.) $(2x - 5)(2x + 5)$

	$2x$	-5
$2x$	$4x^2$	$-10x$
-5	$-10x$	$+10$

$\boxed{4x^2 - 20x + 10}$

22.) $(3x^2 - 3)(4x^3 - x^2 + 7)$

	$4x^3$	$-x^2$	7
$3x^2$	$12x^6$	$-3x^4$	$21x^2$
-3	$-12x^3$	$-3x^2$	-21

$= \boxed{12x^6 - 3x^4 - 12x^3 + 18x^2 - 21}$

23.) $(x + 1)^2 = (x+1)(x+1)$

	x	$+1$
x	x^2	x
$+1$	x	1

$\boxed{x^2 + 2x + 1}$

24.) $(a + b)(a - b)(b - a)$

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

$= (a^2 - b^2)(b - a)$

	a^2	$-b^2$
b	a^2b	$-b^3$
$-a$	$-a^3$	ab^2

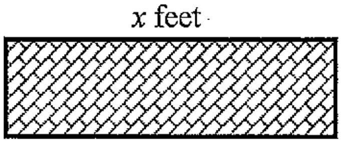
$= \boxed{a^2b - b^3 - a^3 + ab^2}$

25.) $(7x - 1)^2 = (7x-1)(7x-1)$

	$7x$	-1
$7x$	$49x^2$	$-7x$
-1	$-7x$	$+1$

$49x^2 + 14x + 1$

26.) A developer is planning a sidewalk for a new development. The sidewalk can be installed in rectangular sections that have a fixed width of three feet and a length that can vary. Assuming that each section is the same length, express the area of a 4-section sidewalk as a monomial.



each section Area = $3x$

4 sections: $4(3x) = \boxed{12x}\ ft^2$

Multiplication → add exponents
Division → Subtract exponents.

Simplify (*Book sections 5-1 through 5-4*)

27.) 5^3 $= \boxed{125}$

28.) 3^{-5} $\frac{3^{-5}}{1} = \frac{1}{3^5} = \frac{1}{243}$

29.) $x^2x^1 = x^3$

30.) r^3r^{-7} $\frac{r^3r^{-7}}{1} = \frac{r^3}{r^7} = \boxed{\frac{1}{r^4}}$

31.) $(3x^2y)(2x^2y^3)^2$
$(3x^2y)(2^2x^4y^6)$
$\boxed{6x^4y^7}$

32.) $(a^9b^{-4})^0(b^3)^{-1}$
$1 \cdot b^{-3} = b^{-3} = \boxed{\frac{1}{b^3}}$

33.) $a^{-1}a^0b^3a^2b^{-5}$
1
$\frac{b^3a^2}{b^5a} = \boxed{\frac{a}{b^2}}$

34.) $(x^2)^4 = \boxed{x^8}$

35.) $(6w^2y^4)^2$
$6^2w^4y^8$
$\boxed{36w^4y^8}$

36.) $(km^3n^0)^{-2} = k^{-2}m^{-6}n^0$
$= \boxed{\frac{1}{k^2m^6}}$

37.) $(w^{-2}x^2y)^{-4}$
$w^8x^{-8}y^{-4} = \boxed{\frac{w^8}{x^8y^4}}$

38.) $\frac{3^4}{3^{-3}} = 3^4 \cdot 3^3 = 3^7$
$= \boxed{2187}$

39.) $\frac{d^{11}}{d^{-13}} = d^{11} \cdot d^{13}$
$= \boxed{d^{24}}$

40.) $\frac{k^7n^3r^3}{k^2n^2r^3} = \boxed{k^5n}$

41.) $\left(\frac{a}{3b}\right)^3 = \frac{a^3}{3^3b^3}$
$= \boxed{\frac{a^3}{27b^3}}$

42.) $\left(\frac{4x^2}{y^2}\right)^{\frac{1}{2}} = \frac{4^{\frac{1}{2}}x^{2\cdot\frac{1}{2}}}{y^{2\cdot\frac{1}{2}}}$
$= \boxed{\frac{2x}{y}}$

43.) $(a^2b^4)^2(a^{-2}b^3)^{-1}$
$= a^4b^8 \cdot a^2b^{-3}$
$= \frac{a^6b^8}{b^3} = \boxed{a^6b^5}$

44.) $\left(\frac{x^3y}{x^2y^2}\right)^3 = \frac{x^9y^3}{x^6y^6} = \boxed{\frac{x^3}{y^3}}$

45.) $\left(\frac{x^2y^2}{x^2y}\right)^{-3} = \frac{x^{-6}y^{-6}}{x^{-6}y^{-3}}$
$= \frac{x^6y^3}{x^6y^6} = \boxed{\frac{1}{y^3}}$

46.) $\frac{(-x^2)^4}{-(x^2)^4}$
$= \frac{-x^8}{-(x^8)} = \frac{-x^8}{-x^8} = \boxed{1}$

47.) $\frac{x^5y^{-7}z^0}{z^3y^{-9}x^5} = \frac{x^5y^9z^0}{x^5y^7z^3}$
$= \boxed{\frac{y^2}{z^2}}$

48.) $\frac{18y^7a^2}{-9y^{-7}a^{-2}}$
$= -2y^7y^7a^2a^2$
$= \boxed{-2y^{14}y^4}$

Factoring and Dividing Polynomials (Book Sections 7-5 to 7-10)

For problems 49-66 factor completely.

49.) $5a - 35$ 5 | $a-7$ $\boxed{5(a-7)}$	50.) $4x^2 - 7x^3$ x^2 | $4-7x$ $\boxed{x^2(4-7x)}$	51.) $15ab^3c - 35ac^4$ 5 | $3ab^3c - 7ac^4$ a | $3b^3c - 7c^4$ c | $3b^3 - 7c^3$ $\boxed{5ac(3b^3-7c^3)}$
ac b 52.) $y^2 - 10y + 24$ $y-4$ y | y^2 | $-4y$ -6 | $-6y$ | 24 $\boxed{(y-4)(y-6)}$	53.) $x^2 + x - 30$ a·c b −30 1 6·−5 6+−5 x^2+6x | $-5x-30$ $x(x+6)$ | $-5(x+6)$ $\boxed{(x-5)(x+6)}$	54.) $5y^2 - 4y - 1$ a·c b −5 −4 1·−5 1+−5 $5y^2-5y$ | $+y-1$ $5y(y-1)$ | $1(y-1)$ $\boxed{(5y+1)(y-1)}$
55.) $3x^2 - 10x + 8$ $3x^2-4x$ | $-6x+8$ $x(3x-4)$ | $-2(3x-4)$	56.) $x^2 - 36$ $\boxed{(x+6)(x-6)}$	57.) $x^2 + 2x + 1$ a·c b 1 2 1·1 1+1 x 1 x | x^2 | x 1 | x | 1

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

a·c b
24 −10
−4·−6 −4+−6

$\boxed{(x+1)(x+1)}$

58.) $9x^2 - 36$

$(3x-6)(3x+6)$

59.) $x \,\big|\, 2x^3 - 10x^2 + 8x$

$2x^2 - 10x + 8$

$2x^2 - 8x \mid -2x + 8$

$2x(x-4) \mid -2(x-4)$

a·c | b: 16 | -10; -8·-2 | -8+-2

$\boxed{x(2x-2)(x-4)}$

60.) $3 \,\big|\, 3x^4 - 75x^2$

$x^2 \,\big|\, x^4 - 25x^2$

$x^2 - 25 \leftarrow (x+5)(x-5)$

$\boxed{3x^2(x+5)(x-5)}$

61.) $5 \,\big|\, 5x^2 - 125$

$x^2 - 25$

$\boxed{5(x+5)(x-5)}$

62.) $4x^2 - 4 - 12$

$4x^2 - 16$

$\boxed{(2x+4)(2x-4)}$

63.) $x^2 + 4 - 8$

$x^2 - 4$

$\boxed{(x+2)(x-2)}$

64.) $3x^2 - 12x + 12$

a·c | b: 36 | -12

$3x^2 - 6x \mid -6x + 12$

$3x(x-2) \mid -6(x-2)$

$\boxed{(3x-6)(x-2)}$

65.) $x^2 + 2x + 1$

a·c | b: 1 | 2; 1·1 | 1+1

$x^2 + x \mid +x + 1$

$x(x+1) \mid 1(x+1)$

$\boxed{(x+1)(x+1)}$

66.) $4x^2 + 20x + 25$

a·c | b: 100 | 20; 10·10 | 10+10

	$2x$	5
$2x$	$4x^2$	$10x$
5	$10x$	25

$\boxed{(2x+5)(2x+5)}$

67.) $(9x^3 - 6x^2 + 15x) \div 3x^2$

$\frac{9x^3}{3x^2} - \frac{6x^2}{3x^2} + \frac{15x}{3x^2}$

$\boxed{3x - 2 + \frac{5}{x}}$

68.) $(15x - 6) \div 3x$

$\frac{15x}{3x} - \frac{6}{3x} = \boxed{5 - \frac{2}{x}}$

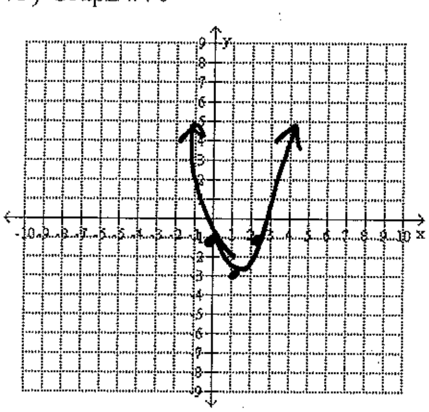
69.) $(x^6 - x^5 + x^4) \div x^2$

$\frac{x^6}{x^2} - \frac{x^5}{x^2} + \frac{x^4}{x^2} = \boxed{x^4 - x^3 + x^2}$

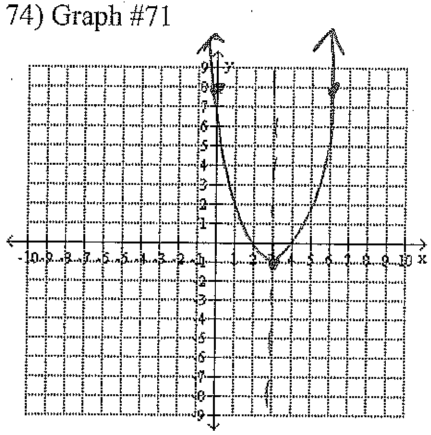
Quadratic Functions (Textbook Chapter 8)

Function	Axis of Symmetry	Vertex	Max/Min ?	Max/Min Value	y-intercept
70) $y = 2x^2 - 4x - 1$	$x=1$	$(1,-3)$	Min	-3	$(0,-1)$
71) $y = x^2 - 6x + 8$	$x=3$	$(3,-1)$	Min	-1	$(0,8)$
72) $y = -3x^2 + 6x + 2$	$x=1$	$(1,5)$	Max	5	$(0,2)$

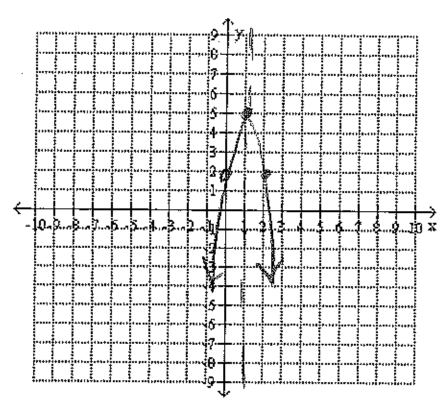
73) Graph #70



74) Graph #71



75) Graph #72



76) Johnna drops a ball off a bridge from a height of 75 feet. The function $h = -16t^2 + 75$ gives the ball's height h above the ground (in feet) after t seconds.

a) Graph the function. Estimate how many seconds it takes for the golf ball to hit the ground.

about 2.17 seconds

b) Use inequalities to describe a reasonable domain and range for the function.

D: $x \geq 2.17$
R: $y \leq 75$

77) A rollercoaster at the amusement park has a downhill section that is approximately parabolic in shape. It can be modeled by the quadratic function $y = x^2 - 6x + 9$. At what point is the roller coaster at the lowest part of the track?

after 3 seconds

Describe the effects on the graph of the parent function $f(x) = x^2$ when $f(x)$ is replaced. (Textbook section 8-3)

78) $f(x)$ is replaced by $f(x) + d$ where $d = -5$ — $f(x) = x^2 - 5$

79) $f(x)$ is replaced by $f(x - c)$ where $c = 3$ — $f(x) = (x-3)^2$

80) $f(x)$ is replaced by $af(x)$ where $a = 0.5$ — $f(x) = .5x^2$

81) $f(x)$ is replaced by $f(bx)$ where $b = 2$ — $f(x) = (2x)^2$

Solve the quadratic equations below using one of the methods you learned: (be sure to do a little of each method!)

- Graphing
- Factoring
- Quadratic Formula ← $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- Completing the square

82.) $x^2 + 4x = 5$ $x^2 + 4x + 4 = 5 + 4$ $\sqrt{(x+2)^2} = \sqrt{9}$ $x + 2 = \pm 3$ $\boxed{x = 1 \quad x = -5}$	83.) $6x^2 - 5 = -7x$ $6x^2 + 7x - 5 = 0$ a·c: -30, b: 7; $+10 \cdot -3$, $10 + -3$ $6x^2 + 10x - 3x - 5 = 0$ $2x(3x+5) - 1(3x+5) = 0$ $2x - 1 = 0 \quad 3x + 5 = 0$ $\{-\frac{5}{3}, \frac{1}{2}\}$	$3w^2 - 13w - 10 = 0$ 84.) $3w^2 - 13w = 10$ $x = \frac{13 \pm \sqrt{169 - 4(3)(-10)}}{2(3)}$ $x = \frac{13 \pm \sqrt{289}}{6}$ $\boxed{x = 5 \quad x = -\frac{2}{3}}$
85.) $y = 2x^2 + 7x + 5$ a·c: 10, b: 7; $2 \cdot 5$, $2 + 5$ $(x+1)$, $(2x+5)$: $2x^2$, $2x$, $5x$, 5 $x + 1 = 0$, $\boxed{x = -1}$ $2x + 5 = 0$, $\boxed{x = -\frac{5}{2}}$	86.) $y = x^2 - 6x + 9$ a·c: 9, b: -6; $-3 \cdot 3$ $x^2 - 3x - 3x + 9$ $x(x-3) - 3(x-3) = 0$ $(x-3)(x-3) = 0$ $\{3\}$	87.) $y = x^3 + 8x^2 + 7x$ $y = x(x^2 + 8x + 7)$ $y = x(x+1)(x+7)$ $\{-1, 0, 7\}$ $\boxed{x = 0 \quad x = -1 \quad x = -7}$
88.) $y = x^2 - 144$ $\sqrt{144} = \sqrt{x^2}$ $\pm 12 = x$ $\boxed{\{-12, 12\}}$	89.) $y = 3x^2 - 4x - 15$ $x = \frac{4 \pm \sqrt{16 - 4(3)(-15)}}{6}$ $x = \frac{4 \pm \sqrt{196}}{6}$ $\boxed{x = 3 \quad x = -5/3}$	90.) $y = 2x^2 - 32$ $\frac{32}{2} = \frac{2x^2}{2}$ $\sqrt{16} = \sqrt{x^2}$ $x = \pm 4$ $\boxed{\{4, -4\}}$
91.) $y = x^3 - 6x^2 + 5x$ $y = x(x^2 - 6x + 5)$ $y = x(x-1)(x-5)$ $\boxed{x = 0 \quad x = 1 \quad x = 5}$ $\{0, 1, 5\}$	92.) $y = x^2 - 8x + 16$ $y = (x-4)(x-4)$ $x - 4 = 0 \quad x - 4 = 0$ $\{4\}$ $x = 4 \quad x = 4$	93.) $y = 2x^2 + 9x + 9$ a·c: 18, b: 9; $6 \cdot 3$, $6 + 3$ $(x+3)$, $(2x+3)$: $2x^2$, $6x$, $3x$, 9 $2x + 3 = 0 \quad x + 3 = 0$ $\boxed{x = -\frac{3}{2}} \quad \boxed{x = -3}$ $\{-3, -\frac{3}{2}\}$

94.) The museum where Julia works plans to have a large replica of Vincent van Gogh's *The Starry Night* painted in its lobby. First Julia wants to paint a large frame around where the replica will be. The replica's length will be five feet longer than its width. The painted frame will be 2-feet wide on all sides. Julia has only enough paint to cover 100 square feet of wall surface. What are the dimensions of the maximum size of the replica? Write and solve an equation to find the dimensions of the replica.

$w(w+5)$ area of mural

$(w+9)(w+4)-[w(w+5)]$

$w^2+9w+4w+36-(w^2+5w)=100$

$w^2+13w+36-w^2-5w=100$

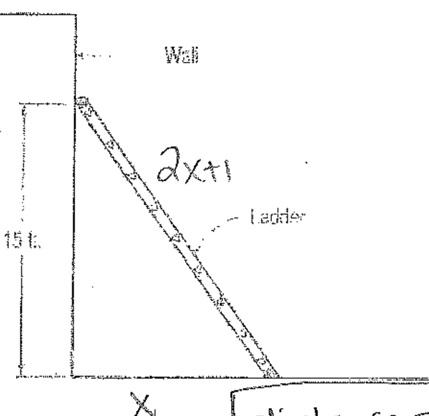
$8w+36=100$

$\frac{8w}{8}=\frac{64}{8}$ $w=8$

$\boxed{\text{width} = 8 \quad \text{length} = 8+5=13}$

95.) A ladder is resting against a wall. The top of the ladder touches the wall at a height of fifteen feet, and the length of the ladder is one foot more than twice its distance from the wall. Find the distance from the wall to the bottom of the ladder.

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



$x^2+15^2=(2x+1)^2$

$x^2+225=(2x+1)(2x+1)$

$x^2+225=4x^2+2x+2x+1$

$x^2+225=4x^2+4x+1$

$-x^2-225 \qquad -x^2 \quad -225$

$0=3x^2+4x-224$

$a=3 \quad b=4 \quad c=-224$

$x=\frac{-4\pm\sqrt{16-4(3)(-224)}}{2(3)}$

$x=\frac{-4\pm\sqrt{2704}}{6}$

$x=\frac{-4+\sqrt{2704}}{6}=8$

$x=\frac{-4-\sqrt{2704}}{6}=-\frac{28}{3}$

$\boxed{\text{distance} = 8\text{ft}}$

96.) A box is shaped like a rectangular prism. It has a volume of 280 in^3. Its dimensions are 4 in. by $(n+2)$ in. by $(n+5)$ in. Find the n then find the dimensions of the prism.

$V=l\cdot w\cdot h$

$280=4\cdot(n+2)(n+5)$

$280=4(n^2+7n+10)$

$280=4n^2+28n+40$

$-280 \qquad\qquad -280$

$0=4n^2+28n-240$

$0=4(n^2+7n-60)$

$0=4(n+12)(n-5)$

$n=-12 \quad n=5$

97.) A rectangle has a length of x + 11 meters and a width of x – 4 meters. The area of the rectangle is 34 square meters. Find the dimensions (length and width) in meters of the rectangle.

$a\cdot c \quad b$

$-78 \quad 7$

$13\cdot -6 \quad 13+-6$

$(x+11)(x-4)=34$

$x^2-4x+11x-44=34$

$x^2+7x-78=0$

$x^2+13x-6x-78=0$

$x(x+13)-6(x+13)=0$

$(x-6)(x+13)=0$

$x=6 \quad x=-13$

$\boxed{\text{Length: } 6+11=17m \quad \text{Width: } 6-4=2m}$

Simplify. Write your answers in simplest radical form. (*Book section 5-6*)

98.) $\sqrt{-9}$ No real solution.

99.) $\sqrt{\frac{1}{16}}=\frac{\sqrt{1}}{\sqrt{16}}=\boxed{\frac{1}{4}}$

100.) $\left(2-\sqrt{2}\right)^2$

$(2-\sqrt{2})(2-\sqrt{2})$

$4-2\sqrt{2}-2\sqrt{2}+2=\boxed{6-4\sqrt{2}}$

101.) $2\sqrt{18}$

$\sqrt{9}\sqrt{2}$

$2\cdot 3\sqrt{2}$

$\boxed{6\sqrt{2}}$

102.) $-\frac{\sqrt{20}}{\sqrt{4}}=\frac{2\sqrt{5}}{2}=\boxed{-\sqrt{5}}$

$\sqrt{20}$

$\sqrt{4}\sqrt{5}$

$2\sqrt{5}$

103.) $\sqrt{3}\cdot\sqrt{21}=\sqrt{63}$

$\sqrt{9}\sqrt{7}$

$\boxed{3\sqrt{7}}$

104.) $\frac{\sqrt{5}}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}=\boxed{\frac{\sqrt{10}}{2}}$

105.) $-(\sqrt{10})^4$

$-\sqrt{10}\cdot\sqrt{10}\cdot\sqrt{10}\cdot\sqrt{10}$

$10 \cdot 10$

$=\boxed{-100}$

106.) $\sqrt{12}+\sqrt{24}-\sqrt{36}$

$\sqrt{4}\sqrt{3} \quad \sqrt{4}\sqrt{6}$

$\boxed{2\sqrt{3}+2\sqrt{6}-6}$

107.) $3\sqrt{2}(2+\sqrt{6})$

$\sqrt{12}$

$\sqrt{4}\sqrt{3}$

$6\sqrt{2}+3\sqrt{12}$

$6\sqrt{2}+3\cdot2\sqrt{3}=\boxed{6\sqrt{2}+6\sqrt{3}}$

108.) $\sqrt{18}-2\sqrt{2}$

$\sqrt{9}\sqrt{2}$

$3\sqrt{2}-2\sqrt{2}=\boxed{\sqrt{2}}$

109.) $2\sqrt{25x^4y^3}$

$2\cdot5x^2y\sqrt{y}$

$\boxed{10x^2y\sqrt{y}}$

110.) $\sqrt{72x^3y^4}$

$\sqrt{72}$

$\sqrt{36}\sqrt{2}$

$6\sqrt{2}$

$\boxed{6xy^2\sqrt{2x}}$

111.) $\sqrt{5}(3\sqrt{2}+7\sqrt{5})$

$3\sqrt{10}+7\sqrt{25}$

$3\sqrt{10}+7\cdot5=\boxed{3\sqrt{10}+35}$

112.) $\sqrt{5}(3\sqrt{8}-7\sqrt{5})$

$3\sqrt{40}-7\sqrt{25}$

$3\cdot2\sqrt{10}-35=\boxed{6\sqrt{10}-35}$

113.) $\sqrt{40x^5y^8}$

$\boxed{2x^2y^4\sqrt{10x}}$

$\sqrt{40}$

$\sqrt{4}\sqrt{10}$

$2\sqrt{10}$

114.) When a substance such as water vapor is in its gaseous state, the volume and the velocity of its molecules increase as temperature increases. The average velocity V of a molecule with mass m at temperature T is given by the formula $V = \sqrt{\frac{3kT}{m}}$. Solve the equation for k.

$V^2 = \left(\sqrt{\frac{3KT}{m}}\right)^2$ $\quad$ $m \cdot V^2 = \cancel{m} \cdot \frac{3KT}{\cancel{m}}$ $\quad$ $\frac{mv^2}{3T} = \frac{\cancel{3}K\cancel{T}}{\cancel{3T}}$

$V^2 = \frac{3KT}{m}$ $\quad$ $mv^2 = 3KT$ $\quad$ $\frac{mv^2}{3T} = K$ $\quad$ $K = \frac{mv^2}{3T}$

115.) Suppose Emeryville Hospital wants to build a new helipad on which medic rescue helicopters can land. The helipad will be circular and made of fire resistant rubber. Write an expression in simplified radical form for the radius of a helipad with an area of 288 square meters.

r

$A = \pi r^2$ $\quad$ $\frac{288}{\pi} = r^2$ $\quad$ $\sqrt{\frac{288}{\pi}} = \sqrt{r^2}$ $\quad$ $r = \sqrt{\frac{2 \cdot 144}{\pi}} = \sqrt{144} \cdot \sqrt{\frac{2}{\pi}}$

$\frac{288}{\pi} = \frac{\pi r^2}{\pi}$

$= 12\sqrt{\frac{2}{\pi}}$

116.) A rocket was shot upward with an initial velocity of 100 feet per second. The height of the rocket is a function of t, the time in seconds since the rocket left the ground. The height can be expressed by the equation $h(t) = 100t - 16t^2$. How many seconds will it take for the rocket to return to the ground?

At the ground $h(t) = 0$ $\quad$ either $\frac{4t}{4} = \frac{0}{4}$ or $25 - 4t = 0$

$0 = 100t - 16t^2$ $\quad$ $t = 0$ $\quad$ $\frac{25}{4} = \frac{4t}{4}$

$0 = 4t(25 - 4t)$ $\quad$ $t = 6.25$ seconds.

117.) A rocket was shot upward with an initial velocity of 132 feet per second. The height of the rocket is a function of t, the time in seconds since the rocket left the ground. The height can be expressed by the equation $h(t) = 132t - 16t^2$. How many seconds will it take for the rocket to return to the ground?

$0 = 132t - 16t^2$ $\quad$ either $4t = 0$ $\quad$ $33 - 4t = 0$

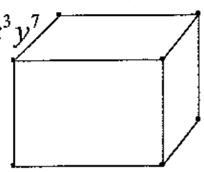
$0 = 4t(33 - 4t)$ $\quad$ $t = 0$ $\quad$ $4t = 33$

$t = 33/4$ seconds

118.) Write and simplify an expression for the **VOLUME** of the following rectangular prism?

$7x^3y^3$

$4x^3y^7$



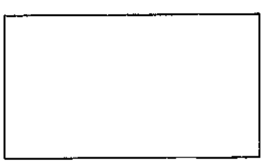
x^5y^6

$V = LWH$

$= 4x^3y^7 \cdot 7x^3y^3 \cdot x^5y^6$

$= 28x^{11}y^{16}$

119.) Write and simplify an expression for the **WIDTH** of the following rectangle if its **AREA** is $90x^7y^{13}$.



?

$15xy^{10}$

$\frac{A}{L} = \frac{Lw}{L}$ $\quad$ $\frac{A}{L} = w$

$w = \frac{90x^7y^{13}}{15xy^{10}} = 6x^6y^3$

Write the polynomials in descending exponential order and give the degree and leading coefficient of the polynomial:

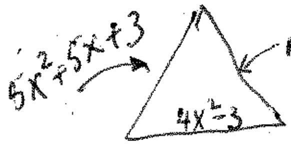
120.) $7x^3 - 3x^2 + 9x + 16$ (in order)

degree = 3

Leading Coeff = 7

121.) $3x^3 + x^2 - 1$

122.) The lengths of two sides of a triangle are given by the expressions $5x^2+5x+3$ and $4x^2-3$. The perimeter of the triangle is $13x^2+2x+2$. Find a polynomial expression that represents the length of the missing side.



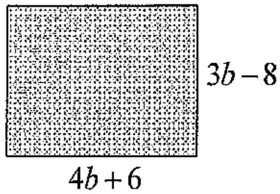
missing $= (13x^2+2x+2)-(5x^2+5x+3)-(4x^2-3)$

$13x^2+2x+2-5x^2-5x-3-4x^2+3$

$4x^2-3x+2$

Find the area of the shaded region in terms of the given variable.

123).



$A = (4b+b)(3b-8)$

$4b(3b-8)+b(3b-8)$

$12b^2-32b+3b^2-8b$

$15b^2-40b$

124).

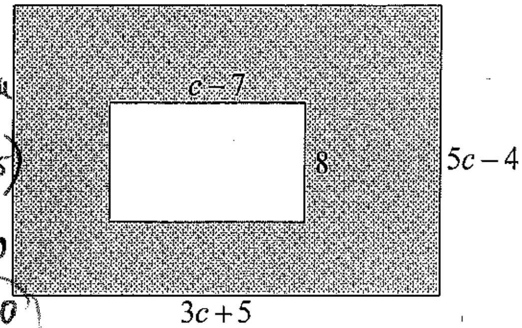
Shaded = Big Area − Small Area

$=(3c+5)(5c-4)-8(3c+5)$

$15c^2-12c+25c-20$

$-24c-40$

$=15c^2-11c-60$



125) An investment of \$5000 doubles in value every 10 years. The function $f(x)=5000\bullet 2^x$, where x is the number of decades, models the growth of the value of the investment. How much is the investment worth after 30 years ?

$5000\cdot 2^3 = \$\ 5000\times 8 = \$40{,}000$

126) A certain insect reproduces in water. They can double in number every two days in the laboratory tank. Suppose one tank has an initial population of 60 insects. When will there be more than 5000 insects ? $y=60\cdot 2^x$

$\frac{5000}{60} = \frac{60\cdot 2^x}{60}$ $\quad 2^x = \frac{500}{6}$ $\quad x \simeq 6\frac{1}{2}$ years.

127) Evaluate each function over the domain { −3, −2, −1, 0, 1, 2, 3}. As the values of the domain increase, do the values of the range increase or decrease ?

a) $f(x)=5^x$ b) $f(x)=2.5^x$ c) $f(x)=\left(\frac{1}{10}\right)^x$

Range $\{0.008, 0.04, 0.2, 1, 5, 25, 125\}$ $\{0.064, 0.16, 0.4, 1, 2.5, 6.25, 15.625\}$ $\{1000, 100, 10, 1, 0.1, 0.01, 0.001\}$

128) A population of 150 sunflowers is growing in a field. A scientist predicts that the population will increase by a factor of 1.2 every week. $y=150(1.2)^x$

a) Write an equation to show the population as a function of time x, in which x is the number of weeks.

b) What will be the approximate population after 4 weeks ? $y=150(1.2)^4 = 311$ Sunflowers

129) Since 2005, the amount of money spent at restaurants in the United States has increased about 7% each year. In 2005, about \$360 billion was spent at restaurants. If the trend continues, how much will be spent at restaurants in 2015 ?

$b=r+1=0.07+1=1.07$ $\quad y=360(1.07)^x$ $\quad y=360(1.07)^{10} = \$708$ Billion

130) The bacteria in the science experiment doubles every 30 minutes. $y=500\cdot 2^x$

a) Assuming you begin with 500 bacteria, write an exponential growth function to model the population, where x is the number of 30-minute periods since you began observing.

b) What is the meaning of the y-intecept of this situation ? y-intercept is when $X=0$ and is beginning number of bacteria $=500$