Wed/Thurs 2/11 and 2/12 6.1.1 (6-8 → 6-15)

(6-8)

	on x-axis	on y-axis	on z-axis	Not on x, y or z axis
1st Pt	(1,0,0)	(0,1,0)	(0,0,1)	(1,1,1)
2nd Pt	(2,0,0)	(0,2,0)	(0,0,2)	(2,2,2)
3rd Pt	(3,0,0)	(0,3,0)	(0,0,3)	(3,3,3)
4th Pt	(4,0,0)	(0,4,0)	(0,0,4)	(4,4,4)

a) Their y & z coordinates are zero
b) If a point lies on an axes, then values for the other 2 axes must be zero

(6-9)
$3x+8=2$
$7x+3y=1$
$7(-2)+3y=1$
$-14+3y=1$
$\frac{3y}{3}=\frac{15}{3}$ $y=5$

$3x=2-8$ $x=-2$
$\frac{3x}{3}=\frac{-6}{3}$

$\boxed{(-2,5)}$

(6-10) a) I 1 block
II 5 blocks
III $4(3)-3=12-3=$ $\boxed{9 \text{ cubic units}}$
IV 13 blocks

rule $t(n)=4n-3$

b) Arithmetic $\boxed{t(n)=4n-3}$

(6-11) a) $10^x=16$
$\log_{10}16=x=1.204$

b) $10^x=41$ $x=1.613$
$\log_{10}41=x$

c) $3^x=729$.
$\log_3 729=x=\frac{\log 729}{\log 3}=6$

d) $10^x=101$
$\log_{10}101=x=2.004$

6-12) a) $\frac{1}{25}$ b) $\frac{x}{y^2}$ c) $\frac{1}{x^2y^2}$ d) $a^{-1}b^{10} = \boxed{\frac{b^{10}}{a}}$

6-13) a) $\frac{3x}{x^2+2x+1} \div \frac{3}{x^2+2x+1} = \frac{\cancel{3}x}{\cancel{(x+1)}\cancel{(x+1)}} \cdot \frac{\cancel{(x+1)}\cancel{(x+1)}}{\cancel{3}} = \boxed{x}$

b) $\frac{3}{(x-1)} \cdot \frac{2}{(x-2)} = \boxed{\frac{6}{(x-1)(x-2)}} = \frac{6}{x^2-3x+2}$

6-14) a) $\frac{1-0}{0-(-2)} = \frac{1}{2} =$ slope

b) $m_\perp = \frac{-2}{1}$ c) The slopes of $\perp$ lines are opposite reciprocals

6-15) $t(n) = a(1.04)^n$

so let $n = -15$ $= a(1.04)^{-15} = \boxed{\frac{a}{(1.04)^{15}}}$ divide

Heather is correct.
a 4% decrease does not "undo" a 4% increase

Monday 2/23 6.1.2 (6-21 → 6-29)

6-21) a) $(0,10,0)$ $(0,0,4)$

$6\cancel{(0)} + \frac{15z}{15} = \frac{60}{15}$ $z=4$

$\frac{6y}{6} + 15\cancel{(0)} = \frac{60}{6}$ $y=10$

b) $\frac{2z}{2}=\frac{24}{2} \rightarrow 12=z$

$\frac{4y}{4}=\frac{24}{4}$ $y=6$

$\frac{3x}{3}=\frac{24}{3}$ $x=8$

$(8,0,0)$
$(0,6,0)$
$(0,0,12)$

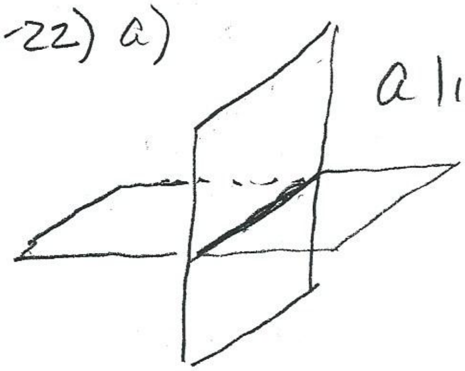
c) $(0+3)^2+z^2=25$
$9+z^2=25$
$-9 \quad -9$
$\sqrt{z^2}=\pm\sqrt{16}$
$z=\pm4$

$\sqrt{(x+3)^2}=\sqrt{25}$
$x+3=\pm5$
$x=2$
$x=-8$

$(0,0,4)(0,0,-4)$
$(2,0,0)(-8,0,0)$

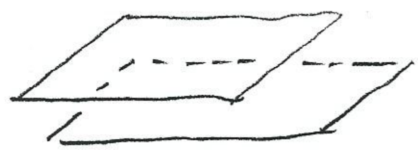
d) $(0,0,6)$

6-22) a)



a line

b)



They do not intersect

c)

they do not intersect

6-23) a) vertex $(-4,2)$
$(-3,0)$

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

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

b) asymptote $x=2$

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

c) cubic shifted up 3

$\boxed{y=-x^3+3}$

6-24) No, the second equation $\frac{1}{x^2+7}$ does not have a vertical asymptote and it has a max. value while $\frac{1}{x}$ does not.

6-25) a) $2x + x = b$ $\boxed{x = b/3}$

$\frac{3x}{3} = \frac{b}{3}$

b) $2ax + 3ax = b$ $\boxed{x = \frac{b}{5a}}$

$\frac{5ax}{5a} = \frac{b}{5a}$

c) $x + ax = b$ $\boxed{x = \frac{b}{1+a}}$

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

6-26) a) try $x = 2$

$2+2=4$

$(4)^2 - 4(4) = 0$

$\sqrt{0+4} = 2$

try $x = -2$

$-2+2=0$

$(0)^2 - 4(0) = 0$

$\sqrt{0+4} = \sqrt{4} = \pm 2$

No input equals output only if $x \geq 0$

b) The output is the absolute value of the input

c) $n+2$

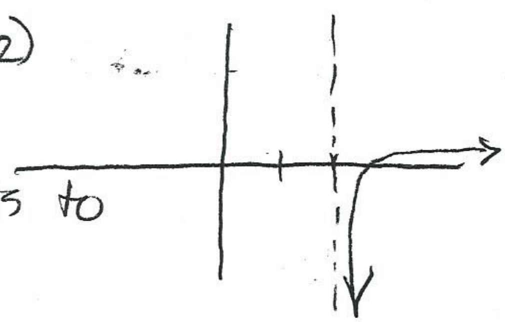
$n^2 - 4n$

$|n|$

d) Because $\sqrt{x^2} = |x|$

6-27) $y = \log_5(x-2)$

the graph is shifted 2 units to the right



6-28) a) $\frac{26.3-13.6}{50} = \frac{12,700,000}{50} = 254,000 \frac{\text{people}}{\text{year}}$

b) $\frac{113,700,000-35,000,000}{50} = 1,574,000$ people/yr

c) from 1960 + 2010

6-29) $f(x) = -2x^2-4$ $g(x)=5x+3$

a) $g(-2) = 5(-2)+3 = -10+3 = \boxed{-7}$

b) $f(-7) = -2(-7)^2-4 = -2(49)-4 = -98-4 = \boxed{-102}$

c) $f(-7) = \boxed{-102}$

d) $g(1) = 5(1)+3 = 8$
$f(8) = -2(8)^2-4 = -2(64)-4 = -128-4 = \boxed{-132}$

(6-28) a) $\frac{26.3-13.6}{50} = \frac{12,700,000}{50} = 254,000 \frac{\text{people}}{\text{year}}$

b) $\frac{113,700,000 - 35,000,000}{50} = 1,574,000$ people/yr

c) from 1960 + 2010

(6-29) $f(x) = -2x^2 - 4$ $g(x) = 5x+3$

a) $g(-2) = 5(-2) + 3 = -10 + 3 = \boxed{-7}$

b) $f(-7) = -2(-7)^2 - 4 = -2(49) - 4 = -98 - 4 = \boxed{-102}$

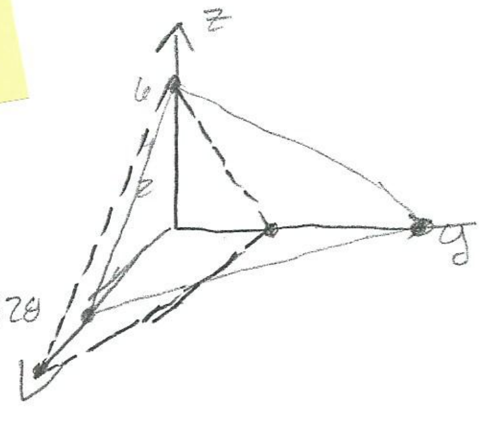
c) ...

d) ... $2(64) - 4 = -128 - 4 = \boxed{-132}$

6·35 to 6·87

Tues/W... 35 → 6-43)
... 51 → 6-59)

(6-35) (3, ...
(0, ...
(0, ... (0,0,6)



(6-36) $2^7 = 128$ $2\cdot2\cdot2\cdot2\cdot2\cdot2\cdot2 = 128$

$7 = \log_2 128$

$\log 2 \cdot 7 = \frac{\log 128}{\log 2} \cdot \log 2$ ... Change of Base

$7 \log 2 = \log 128$ Quotion Property

$\log 2^7 = \log 128$

6-37) $24 = y$ $\qquad \log 24 = \log y$

yes, because if the numbers are the same, the exponent you would use to get them should be the same given the same base

6-38) $b = 4$ $\qquad b = 0$

$m = -2/2 = -1$ $\qquad m = 1/3$

$y \leq -1x + 4$ $\qquad y \geq \frac{1}{3}x$

6-39) a) $\frac{2x^3 + 5x^2 - 3x}{4x^3 - 4x^2 + x} = \frac{x(2x^2 + 5x - 3)}{x(4x^2 - 4x + 1)}$

$AC = 2(-3) = -6$
$6 \quad -1$

$\frac{x(2x^2 + 6x - 1x - 3)}{x(4x^2 - 2x - 2x + 1)} = \frac{x(2x(x+3) - 1(x+3))}{x(2x(2x-1) - 1(2x-1))}$

$AC = 4(1) = 4$
$-2 \quad -2$

$\frac{\cancel{x}\cancel{(2x-1)}(x+3)}{\cancel{x}\cancel{(2x-1)}(2x-1)} = \boxed{\frac{x+3}{2x-1}}$

b) $\frac{3x^2 - 5x - 2}{2x^2 - 11x + 15} \cdot \frac{2x^2 - 5x}{3x^3 - 5x^2 - 2x}$ $\qquad AC = 3(-2) = -6$
$-6 \quad 1$

$AC = 3(-2) = -6$
$-6 \quad 1$

$\frac{3x^2 - 6x + 1x - 2}{2x^2 - 6x - 5x + 15} \cdot \frac{x(2x-5)}{x(3x^2 - 6x + 1x - 2)}$

$AC = 2(15) = 30$
$-6 \quad -5$

$\frac{3x(x-2) + 1(x-2)}{2x(x-3) - 5(x-3)} \cdot \frac{x(2x-5)}{x(3x(x-2) + 1(x-2))}$

$\frac{\cancel{(3x+1)}\cancel{(x-2)}}{\cancel{(2x-5)}(x-3)} \cdot \frac{\cancel{x}\cancel{(2x-5)}}{\cancel{x}\cancel{(3x+1)}\cancel{(x-2)}} = \boxed{\frac{1}{x-3}}$

6-40) a) $\sqrt{3x+1} - x = -3$
$+x \qquad +x$

$(\sqrt{3x+1})^2 = (x-3)^2$
$3x+1 = x^2-6x+9$
$-3x \qquad -3x$
$1 = x^2-9x+9$
$-1 \qquad -1$

$x^2-9x+8=0$
$(x-8)(x-1)=0$
$\boxed{x=8 \quad x=1}$

b) $\sqrt{3(1)+1} - 1 = -3$
$\sqrt{5} - 1 \neq -3$ extraneous

$\sqrt{3(8)+1} - 0 = -3$
$\sqrt{25} - 0 = -3$
$5 - 8 = -3$
$-3 = -3$ ✓

6-41) a) $(x+4)(2x-5)=0$
$\boxed{x=-4}$ $\boxed{x=\frac{5}{2}}$

b) $(x+4)(x-3)(x-2)=0$ $\quad x=-4, 3, 2$

c) $3x(x+1)(2x-7)(3x+4)^2(x-13)(x+7)=0$
$x=0 \quad x=-1 \quad x=7/2 \quad x=-4/3 \quad x=13 \quad x=-7$

d) Set each of the factors equal to zero and solve the corresponding equations

6-42) a) Neither
b) Even

6-43) $2^x 3^y 5^z = 2^3 3^{x-2} 5^{2x-3y}$

$x=3$
$y=x-2$
$z=2x-3y$

$y=3-2=1$
$z=2(3)-3(1)= 6-3=3$

$\boxed{x=3 \quad y=1 \quad z=3}$

$(6\text{-}51 \rightarrow 6\text{-}59)$

6-51)

$$2x + \cancel{y} - 3z = -12$$
$$5x - \cancel{y} + z = 11$$
$$7x - 2z = -1$$

$$3(5x - y + z = 11)$$
$$x + 3y - 2z = -13$$

$$15x - \cancel{3y} + 3z = 33$$
$$x + \cancel{3y} - 2z = -13$$
$$16x + z = 20$$

$$(16x + z = 20)\,2$$
$$7x - 2z = -1$$

$$32x + 2z = 40$$
$$7x - 2z = -1$$
$$\frac{39x}{39} = \frac{39}{39}$$

$$x = 1 \qquad 7(1) - 2z = -1$$
$$7 - 2z = -1$$
$$-2z = -8$$
$$z = 4$$

$$2(1) + y - 3(4) = -12$$
$$2 + y - 12 = -12$$
$$y - 10 = -12$$
$$y = -2$$

$$\boxed{(1, -2, 4)}$$

6-52) a) $t(n) = 110{,}000(1.025)^{10}$

$\$140{,}809.20$

b)

$$\frac{200{,}000}{110{,}000} = \frac{110{,}000(1.025)^t}{110{,}000}$$

$$1.8 = 1.025^t$$

$$\log_{1.025} 1.8 = t$$

$$\frac{\log 1.8}{\log 1.025} = t = \frac{.2553}{.0107} \approx 24 \text{ yrs}$$

c) $182{,}500(.95)^2 = \$164{,}706.25$

6-53) $\left(\sqrt{5x-1}\right)^2 = \left(\sqrt{6+4x}\right)^2$

$5x-1 = 6+4x$

$-4x \qquad -4x$

$x-1=6$

$\boxed{x=7}$

6-54) a) They both equal 16 but this is a special case

Ex: $5^3 \neq 3^5$

b) Yes because Log 16 = Log 16

c) yes; they have the same solutions

d) yes; they have the same solutions

6-55) a) $\log 10 = \log(2x-3)$

$10 = 2x-3$

$13 = 2x$

$\boxed{x = 6.5}$

b) $25 = 4x^2-5x-50$

$-25 \qquad -25$

$4x^2-5x-75$

$AC = 300$

$15 \quad -20$

$4x^2-20x+15x-75$

$4x(x-5)+15(x-5)$

$(x-5)(4x+15)$

$\boxed{x=5}$ $\boxed{x=-15/4}$

6-56) a) $y=\frac{1}{3}x+b$ $(0,5)$

$5=\frac{1}{3}(0)+b$

$b=5$

$\boxed{y=1/3x+5}$

b) $m=2$ $y=2x+b$ $(1,7)$ $\boxed{y=2x+5}$

$7=2(1)+b$

$5=b$

c) $m=-1/2$ $y=-1/2x+b$ $(1,7)$ $\boxed{y=-\frac{1}{2}x+\frac{15}{2}}$

$7=-\frac{1}{2}(1)+b$

$15/2 = b$

d) $m=\frac{2}{1}$

$\boxed{y=2x+0}$

6-57) a) $x^2 = 2x^2 - 4x + y$

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

b) $x = 3 + (y-5)^2$

$-3 \quad -3$

$\sqrt{(y-5)^2} = \sqrt{x-3}$

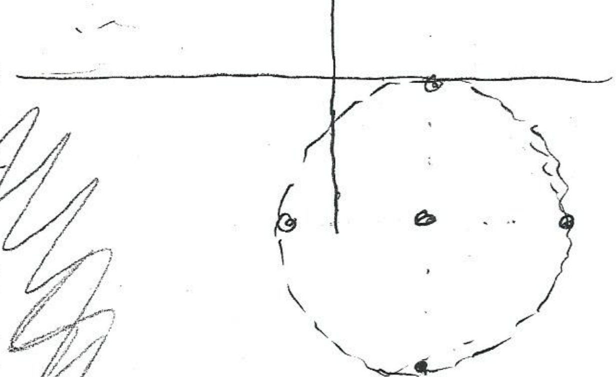
$y - 5 = \pm\sqrt{x-3}$

$$\boxed{y = \pm\sqrt{x-3} + 5}$$

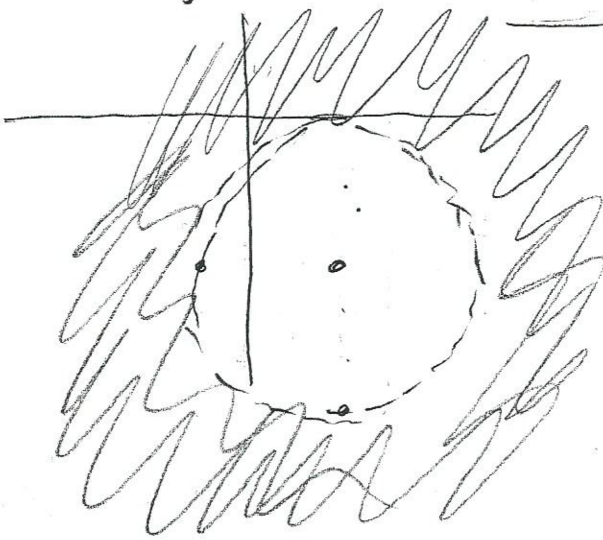
6-58) $(x-2)^2 + (y+3)^2 = 9$

center $(2, -3)$
radius (3)

a)



b)



6-59) use similar triangles

$\frac{50}{60} = \frac{320}{x}$

$50x = 320(60)$

$x = \frac{320(60)}{50}$

$$\boxed{x = 384 \text{ feet}}$$