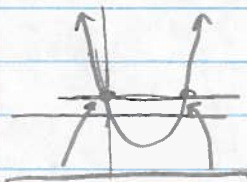
Lesson 4.1.1 p. 171-172: 7 - 14 (omit 13a, c)

7. $(x-2)^2-3=1$



$x=0, \quad x=4$

Algebraically

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

$\sqrt{(x-2)^2}=\sqrt{4}$

$x-2=\pm 2$

$x=2\pm 2$

$x=4$

$x=0$

by undoing

or

	x	-2
x	x^2	$2x$
-2	$-2x$	4

$x^2-4x+4-3=1$

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

$x^2-4x=0$

$x(x-4)=0$

$x=0 \quad x=4$

by rewriting

8. a. $2(x-1)^2+1=39$

$2(x-1)^2=32$

$\sqrt{(x-1)^2}=\sqrt{16}$

$x-1=\pm 4$

$x=1\pm 4$

$x=5, \; x=-3$

b. $7(\sqrt{m+1}-3)=21$

$\sqrt{m+1}-3=3$

$(\sqrt{m+1})^2=(6)^2$

$m+1=36$

$m=35$

c. $6\cdot\left(\frac{x}{2}+\frac{x}{3}\right)=\left(\frac{5x+2}{6}\right)\cdot 6$

$3x+2x=5x+2$

$5x=5x+2$

$0=2$

False means NO Solution

d. $-7+\left(\frac{4x+2}{2}\right)=8$

$-7+(2x+1)=8$

$2x-6=8$

$2x=14$

$x=7$

9. $(0,2)$ and $(5,2)$

$m=\frac{2-2}{0-5}=\frac{0}{-5}=0$

Eqn: $y=2$

a. x-axis eqn is $y=0$

b. y-axis eqn is $x=0$

10. $2x+6y=10$ $\quad x=8-3y$

$2(8-3y)+6y=10$

$16-6y+6y=10$

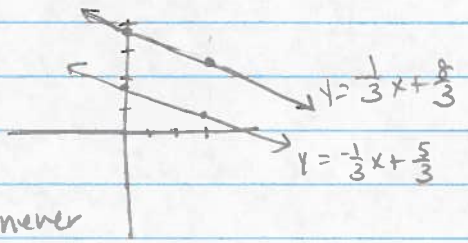
$16=10$

a. The variables cancel and I get a false statement.

b. $2x+6y=10$ $\quad x=8-3y$

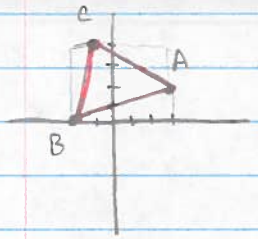
$6y=-2x+10$ $\quad 3y=-x+8$

$y=\frac{1}{3}x+\frac{5}{3}$ $\quad y=-\frac{1}{3}x+\frac{8}{3}$



c. The lines are parallel, so they will never cross, which means there is no solution.

11. A(3,2), B(-2,0), C(-1,4)



$\overline{AB}$: $\sqrt{5^2+2^2}=\sqrt{25+4}=\sqrt{29}$

$\overline{AC}$: $\sqrt{4^2+2^2}=\sqrt{16+4}=\sqrt{20}$

$\overline{BC}$: $\sqrt{4^2+1^2}=\sqrt{16+1}=\sqrt{17}$

Since all sides have different lengths, the triangle is **scalene**

12.

n	t(n)	
2	7	+19
3	26	+37
4	63	

48
15
63

a. Figure 4 has **63 cubes**

base = 16 x 3 layers = 48 + 15 for top = 63

b. Figure 1 has **0 cubes**

c. $n^2(n-1)+(n^2-1)$

$n^3-n^2+n^2-1$

$\boxed{n^3-1}$

d. **Neither** b/c the difference & ratio between terms is not the same

13. b. $\frac{6x+3}{2x-3} \div \frac{3x^2-12x-15}{2x^2-x-3} = \frac{3(2x+1)}{2x-3} \cdot \frac{(2x-3)(x+1)}{(3x+5)(x-5)}$

-3	-3x	-3
2x	$2x^2$	2x
	x	1

$-6x^2$, $-3x$, $2x$, $-1x$

-15	-15x	-15
5x	$3x^2$	3x
	x	1

$-45x^2$, $-15x$, $3x$, $-12x$

$= \boxed{\frac{2x+1}{x-5}}$

d. $\frac{3a^2+a-1}{a^2-2a+1} - \frac{2a^2-a+2}{a^2-2a+1} = \frac{3a^2+a-1-2a^2+a-2}{a^2-2a+1} = \frac{a^2+2a+3}{a^2-2a+1}$

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

$= \boxed{\frac{a+3}{a-1}}$

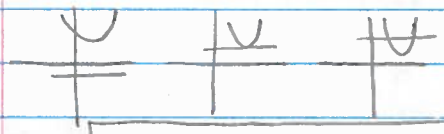
3	3a	-3
a	a^2	-1a
	a	-1

$-3a^2$, $3a$, $-1a$, $2a$

-1	-1a	1
a	a^2	-1a
	a	-1

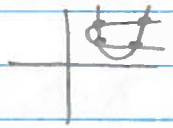
a^2, $-1a$, $-1a$, $-2a$

14. a. line and Parabola



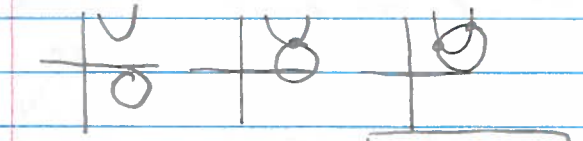
0, 1 or 2 intersections

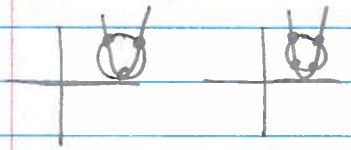
b. 2 different parabolas



0, 1, 2, 3 or 4 Intersections

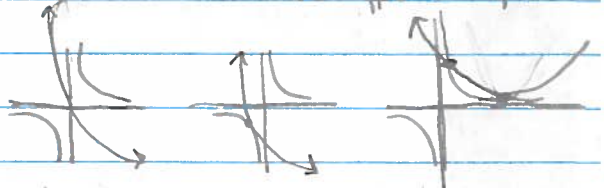
c. Parabola and circle

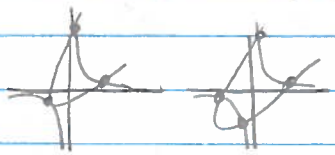




0, 1, 2, 3 or 4 Intersections

d. Parabola and the hyperbola $y = \frac{1}{x}$





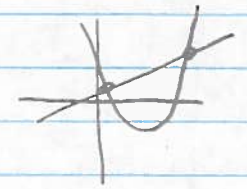
0, 1, 2, 3 or 4 Intersections

Lesson 4.1.2 (day 1) p.176: 22–28

22. $(x-3)^2-2=x+1$

$y_1=(x-3)^2-2$

$y_2=x+1$



$x=1$

$x=6$

I could also set eqn $=0$, graph it, then find the x-intercepts.

23. $2|x-4|-3=\frac{2}{3}x-3$

$y_1=2|x-4|-3$

$y_2=\frac{2}{3}x-3$

$x=3$

$x=6$

24. a. $-3\sqrt{2x-5}+7=-8$

Looking inside, $2x-5=25$

$2x=30$

$x=15$

There are other ways to solve this eqn

Check: $-3\sqrt{2(15)-5}+7=-8$

$-3\sqrt{30-5}+7=-8$

$-3\sqrt{25}+7=-8$

$-3(5)+7=-8$

$-15+7=-8$

$-8=-8$ ✓

b. $2|3x+4|-10=12$ undo first, then look inside

$2|3x+4|=22$

$|3x+4|=11$

$3x+4=11$ or $3x+4=-11$

$3x=7$ $3x=-15$

$x=\frac{7}{3}$ $x=-5$

check $x=\frac{7}{3}$

$2|3(\frac{7}{3})+4|-10=12$

$2|11|-10=12$

$22-10=12$

$12=12$ ✓

check $x=-5$

$2|3(-5)+4|-10=12$

$2|-11|-10=12$

$22-10=12$

$12=12$ ✓

25. $y = 18x - 30$ and $y = -22x + 50$

use equal values to solve

$18x - 30 = -22x + 50$

$40x = 80$

$x = 2$

$y = 18(2) - 30$

$y = 36 - 30$

$y = 6$

$\boxed{(2, 6)}$

26. $2, a-b, a+b, 35, \ldots$

0	-9	+11
1	2	+11
2	—	+11
3	—	+11
4	35	

$3d = 35 - 2$

$3d = 33$

$d = 11$

$a - b = 13$

$+ \quad a + b = 24$

$2a = 37$

$\boxed{a = 18.5}$

$18.5 + b = 24$

$b = 24 - 18.5$

$\boxed{b = 5.5}$

27. a. $\sqrt{2x-1} - x = -8$

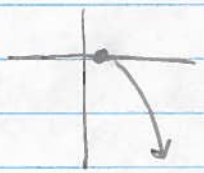
$y_1 = \sqrt{2x-1} - x$

$y_2 = -8$

$\boxed{x = 13}$

$x = 5$ is an extraneous answer that you will get only if you solve the eqn algebraically. The extraneous answer does not show up graphically

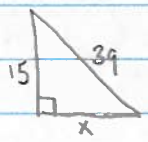
b. $\sqrt{2x-1} - x = 0$



$x = .9999996.5$ rounded means

$\boxed{x = 1}$

28. a.



$x^2 + 15^2 = 39^2$

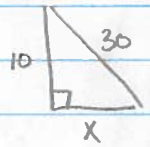
$x^2 + 225 = 1521$

$\sqrt{x^2} = \sqrt{1296}$

$x = \pm 36$

$\boxed{x = 36}$

b.



$x^2 + 10^2 = 30^2$

$x^2 + 100 = 900$

$\sqrt{x^2} = \sqrt{800}$

$x = \pm 28.28$

$\boxed{x = 28.28}$

Lesson 4.1.2 (day 2) p. 177-178: 29-35

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

$x=1$
$x=3$

No, we don't have an algebraic way to solve this eq'n yet.

30. $f(x)=\frac{1}{2}(x-2)^3+1$ and $g(x)=2x^2-6x-3$

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

use $x=0$ from pt. A, $x=4$ from pt. B

$\frac{1}{2}(0-2)^3+1=2(0)^2-6(0)-3$

$\frac{1}{2}(-8)+1=-3$

$-4+1=-3$

$-3=-3$ ✓

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

$\frac{1}{2}(2)^3+1=2(16)-24-3$

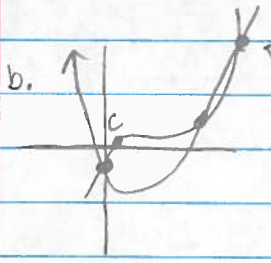
$\frac{1}{2}(8)+1=32-24-3$

$4+1=5$

$5=5$ ✓

$x=0,\ x=4$

b.



← This solution is not shown in the graph unless you change the window to see it.

$x=6$

c. $\frac{1}{2}(x-2)^3+1=0$

$x\approx .75$

pt. C has an x-value at .74

d. Domain of $f(x)$: $\mathbb{R}$

Range of $f(x)$: $\mathbb{R}$

Domain of $g(x)$: $\mathbb{R}$

Range of $g(x)$: $y\geq -.75$

(Find the min. of $g(x)$)

31 a. $2(x+3)^2-5=-5$

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

$(x+3)^2=0$

$x+3=0$ looking inside

$x=-3$

b. $3(x-2)^2+6=9$

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

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

$x-2=\pm 1$

$x=2\pm 1$

$x=3$
$x=1$

31 c. $|2x-5|-6=15$

$|2x-5|=21$

$2x-5=21$ or $2x-5=-21$

$2x=26$ $\quad 2x=-16$

$\boxed{x=13 \text{ or } x=-8}$

d. $3\sqrt{5x-2}+1=7$

$5x-2=4$ looking inside

$5x=6$

$\boxed{x=\frac{6}{5} \text{ or } 1.2}$

32. a. $5x-3y=12$ for y

$-3y=-5x+12$

$\boxed{y=\frac{5}{3}x-4}$

b. $F=\frac{Gm_1m_2}{r^2}$ for m_2

$\frac{r^2F}{Gm_1}=\frac{Gm_1m_2}{Gm_1}$

$\boxed{m_2=\frac{r^2F}{Gm_1}}$

c. $E=\frac{1}{2}mv^2$ for m

$\frac{2E}{v^2}=\frac{mv^2}{v^2}$

$\boxed{m=\frac{2E}{v^2}}$

d. $(x-4)^2+(y-1)^2=10$ for y

$\sqrt{(y-1)^2}=\sqrt{10-(x-4)^2}$

$y-1=\pm\sqrt{10-(x-4)^2}$

$\boxed{y=1\pm\sqrt{10-(x-4)^2}}$

33. Does $(a+b)^2=a^2+b^2$

b	ab	b^2
a	a^2	ab
	a	b

$=a^2+2ab+b^2$ Not equal

$(a+b)(a+b)=a^2+ab+ba+b^2$

$=a^2+2ab+b^2$ Not equal

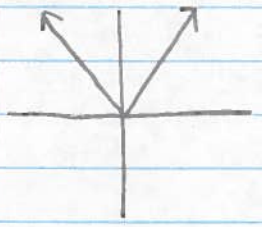
let $a=2$, $b=3$

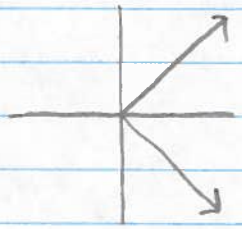
$(2+3)^2=2^2+3^2$

$5^2=4+9$ Not equal

$25\neq 13$

34. a. $y = |x|$ b. $x = |y|$

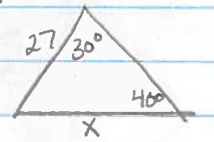




c. Similar: Both are V-shaped graphs, both have a vertex at (0,0)
Different: One opens up, the other opens right

d. $D: \mathbb{R}$ $R: y \geq 0$ $D: x \geq 0$ $R: \mathbb{R}$

35 a.



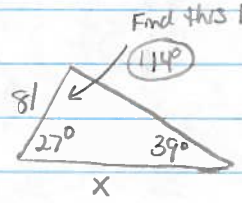
$$\frac{\sin 40^\circ}{27} = \frac{\sin 30^\circ}{x}$$

$$x \sin 40^\circ = 27 \sin 30^\circ$$

$$x = \frac{27 \sin 30}{\sin 40}$$

$$\boxed{x = 21}$$

b.



Find this 1st (114°)

$27 + 39 = 66$ $180 - 66 = 114$

$$\frac{\sin 114}{x} = \frac{\sin 39}{81}$$

$$x = \frac{81 \sin 114}{\sin 39}$$

$$\boxed{x = 117.58}$$

Lesson 4.1.3 p. 180-181: 40-46

40 a. $y = 3x - 5$ $\quad 3x - 5 = -2x - 15$ $\quad y = 3(-2) - 5$

$y = -2x - 15$ $\quad 5x = -10$ $\quad y = -6 - 5$

$x = -2$ $\quad y = -11$

$(-2, -11)$

lines intersect at 1 point!

b. $y - 7 = -2x \rightarrow y = -2x + 7$ $\quad 4x + 2(-2x + 7) = 14$

$4x + 2y = 14$ $\quad 4x - 4x + 14 = 14$

$14 = 14$

true means All pts

lines are coinciding lines!

c. $y = 2(x+3)^2 - 5$ $\quad 2(x+3)^2 - 5 = 14x + 17$

$y = 14x + 17$ $\quad 2(x+3)^2 = 14x + 22$

$(x+3)^2 = 7x + 11$

$x^2 + 6x + 9 = 7x + 11$

$x^2 - x - 2 = 0 \Rightarrow (x-2)(x+1) = 0$

$x = 2$ $\quad x = -1$

3	$3x$	9
x	x^2	$3x$

x 3

-2	$-2x$	-2
x	x^2	$1x$

x 1

$-2x^2$, $-2x$, $1x$, $-1x$

$y = 14(2) + 17$ $\quad y = 14(-1) + 17$

$y = 45$ $\quad y = 3$

$(2, 45)$ $\quad (-1, 3)$

Parabola & line intersect at 2 pts

d. $y = 3(x-2)^2 + 3$ $\quad 3(x-2)^2 + 3 = 6x - 12$

$y = 6x - 12$ $\quad 3(x-2)^2 = 6x - 15$

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

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

$x^2 - 6x + 9 = 0 \Rightarrow (x-3)(x-3) = 0$

$x = 3$ $\quad x = 3$

-2	$-2x$	4
x	x^2	$-2x$

x -2

-3	$-3x$	9
x	x^2	$-3x$

x -3

$9x^2$, $-3x$, $-3x$, $-6x$

$y = 6(3) - 12$

$y = 6$

$(3, 6)$

The line and parabola intersect at 1 point, so the line is tangent to the parabola.

41 a. $3(y+1)^2 - 5 = 43$

$3(y+1)^2 = 48$

$\sqrt{(y+1)^2} = \sqrt{16}$

$y+1 = \pm 4$

$y = -1 \pm 4$

$\boxed{y = 3, \; y = -5}$

undoing

b. $\sqrt{1-4x} = 10$

Looking inside $1 - 4x = 100$

$-4x = 99$

$\boxed{x = \frac{-4}{99}}$

c. $\frac{6y-1}{y} - 3 = 2$

$\frac{6y-1}{y} = \frac{5}{1}$

$5y = 6y - 1$

$-1y = -1$

$\boxed{y = 1}$

d. $\sqrt[3]{1-2x} = 3$

Looking inside $1 - 2x = 27$

$-2x = 26$

$\boxed{x = -13}$

42 a. $t(n) = 1, 4, 7, 10$

n	t(n)	
0	-2	↑ +3
1	1	↓ +3
2	4	
3	7	
4	10	

Explicit: $t(n) = -2 + 3n$

Recursive: $t(n+1) = t(n) + 3$

$t(0) = -2$

b. $t(n) = 3, \frac{3}{2}, \frac{3}{4}, \frac{3}{8}$

0	6	↑ ÷ 1/2
1	3	↓ × 1/2
2	3/2	
3	3/4	
4	3/8	

Explicit: $t(n) = 6\left(\frac{1}{2}\right)^n$

Recursive: $t(n+1) = t(n) \cdot \frac{1}{2}$

$t(0) = 6$

Arithmetic

c.

0	24	+7
1	17	-7
2	10	-7
3	3	
4		

$2d = 14$

$d = 7$

$\boxed{t(n) = 24 - 7n}$

Geometric

d.

0	5	
1	6	↑ ÷ 1.2
2	7.2	↓ × 1.2
3	8.64	
4		

$b = \frac{8.64}{7.2} = 1.2$

$\boxed{t(n) = 5(1.2)^n}$

e. Arithmetic

$t(7) = 1056$

$t(12) = 116$

0	2372	
⋮		↑ -188
7	1056	-188
8	—	
⋮	—	
12	116	

$5d = 116 - 1056$

$5d = -940$

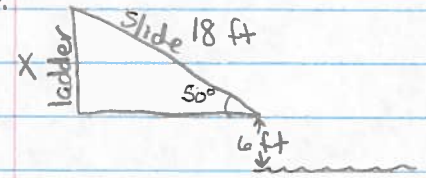
$d = -188$

$t(n) = 2372 - 188n$

So, $t(4) = 2372 - 188(4)$

$\boxed{t(4) = 1620}$

43.



$\sin 50° = \frac{x}{18}$

$x = 18 \sin 50$

$x = 13.79$ ft

$+ \quad 6 \quad$ ft

19.79 ft

44. a. $y = \frac{-6}{5}x - 7$

$m = \frac{-6}{5}$

$b = (0, -7)$

b. $3x - 2y = 10$

$-2y = -3x + 10$

$y = \frac{3}{2}x - 5$

$m = \frac{3}{2}$

$b = (0, -5)$

c. $(5, -2)$ and $(8, 4)$

$m = \frac{-2-4}{5-8} = \frac{-6}{-3} = 2$

$y = mx + b$

$4 = 2(8) + b$

$4 = 16 + b$

$b = -12$

$m = 2$

$b = (0, -12)$

45. a. Not a function

Domain: $-3 \le x \le 3$

Range: $-3 \le y \le 3$

b. Function

Domain: $-2 \le x \le 3$

Range: $-2 \le y \le 2$

46. $2^{(x+y)} = 16$

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

Look inside to write the system!

$x + y = 4$ b/c $2^4 = 16$

$\times -1$ $2x + y = -3$ b/c $2^{-3} = \frac{1}{8}$

$-x - y = -4$

$x = -7$

$-7 + y = 4$

$y = 11$

(-7, 11)

Lesson 4.1.1 p. 184: 51-57

51. x = weight of cylinders (oz)
y = weight of prisms (oz)

$4x + 5y = 32$
$1x + 8y = 35$
$x = 35 - 8y$

$4(35-8y) + 5y = 32$
$140 - 32y + 5y = 32$
$-27y = -108$
$y = 4$ oz

$x = 35 - 8(4)$
$x = 35 - 32$
$x = 3$ oz

Cylinders = 3 oz
Prisms = 4 oz

52. $2x^2 + 5x - 3 \leq x^2 + 4x + 3$

$2(-1)^2 + 5(-1) - 3 \leq (-1)^2 + 4(-1) + 3$?
$2 - 5 - 3 \leq 1 - 4 + 3$
$-6 \leq 0$ is True
Yes, $x = -1$ is a solution

$2(5)^2 + 5(5) - 3 \leq (5)^2 + 4(5) + 3$
$50 + 25 - 3 \leq 25 + 20 + 3$
$72 \leq 48$ is False
NO, $x = 5$ is not a solution

other solutions are: $x^2 + x - 6 \leq 0$

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

$-6x$
$3x$ $-2x$
$1x$

$(x+3)(x-2) \leq 0$
$x = -3$ $x = 2$

This is where the inequality is equal

NO yes NO
-3 0 2

$-3 \leq x \leq 2$

53. a. $5 - 3\left(\frac{1}{2}x + 2\right) = -7$ (12)
Looking inside
$\frac{1}{2}x + 2 = 4$
$\frac{1}{2}x = 2$
$x = 4$

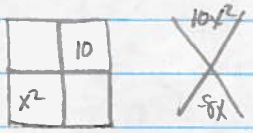
b. $5\left(\sqrt{x-2} + 1\right) = 15$
$\sqrt{x-2} + 1 = 3$
$(\sqrt{x-2})^2 = (2)^2$
$x - 2 = 4$
$x = 6$

c. $12 - \left(\frac{2x}{3} + x\right) = 2$
Looking inside
$3 \cdot \left(\frac{2x}{3} + x\right) = 10 \cdot 3$
$2x + 3x = 30$
$5x = 30$
$x = 6$

d. $-3(2x+1)^3 = -192$
$(2x+1)^3 = 64$
Looking inside → $2x + 1 = 4$
$2x = 3$
$x = \frac{3}{2}$

54. $y = x^2 - 8x + 10$

a.



doesn't factor

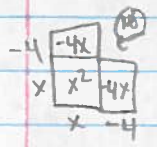
Use QF $x = \frac{8 \pm \sqrt{64 - 4 \cdot 1 \cdot 10}}{2 \cdot 1}$

$x = 6.45 \quad x = 1.55$

Vertex: $x = \frac{6.45 + 1.55}{2} = \frac{8}{2} = 4$ $\boxed{V(4, -6)}$

$y = (4)^2 - 8(4) + 10 = -6$

b. $y - 10 = x^2 - 8x + 16$
$+16$



$y + 6 = (x-4)^2$

$y = (x-4)^2 - 6$

$\boxed{V(4, -6)}$

c. $y = x^2 - 3x$

$y = x(x-3)$

$x = 0 \quad x = 3$

vertex: $x = \frac{0+3}{2} = 1.5$

$y = (1.5)^2 - 3(1.5) = -2.25$

$\boxed{V(1.5, -2.25)}$

55. From #34: $y = |x|$ and $|y| = x$

a. $y \leq |x|$

b. $|y| \geq x$

56. $y < |x-3|$

a. $(2,1)$ $1 < |2-3|$ NO

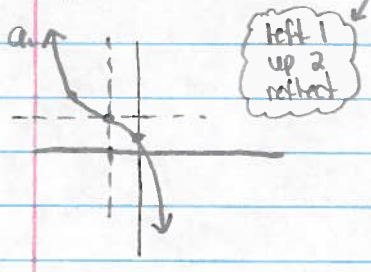
b. $(-4,5)$ $5 < |-4-3|$ Yes

c. $(-2,8)$ $8 < |-2-3|$ NO

d. $(0,3)$ $3 < |0-3|$ NO

57. $y = -(x+1)^3 + 2$

a.



b. use calc. to estimate $-3 = -(x+1)^3 + 2$

TblSet = .1

ΔTbl = .1

$\boxed{x \approx .7}$

Lesson 4.2.1 (Day 1) p. 188-189: 65-71

65. a. $3x+2 \geq x-6$

$3x+2 = x-6$

$2x = -8$

$x = -4$ boundary

b. $2x^2 - 5x < 12$

$2x^2 - 5x = 12$

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

-4	$-8x$	-12
x	$2x^2$	$3x$
	$2x$	3

$-2x+3x$

$-8x$ $\quad$ $-5x$

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

$x = 4, \quad x = -\frac{3}{2}$ ← boundary pts

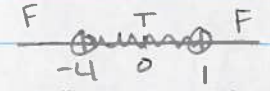
66. a. $|2x+3| < 5$

$|2x+3| = 5$

$2x+3 = 5$ or $2x+3 = -5$

$2x = 2$ $\quad$ $2x = -8$

$x = 1$ $\quad$ $x = -4$



$-4 < x < 1$

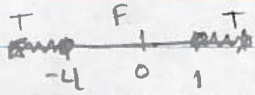
b. $|2x+3| \geq 5$

$|2x+3| = 5$

$2x+3 = 5$ or $2x+3 = -5$

$2x = 2$ $\quad$ $2x = -8$

$x = 1$ $\quad$ $x = -4$



$x \leq -4$ or $x \geq 1$

c. $|2x-3| < 5$

$|2x-3| = 5$

$2x-3 = 5$ or $2x-3 = -5$

$2x = 8$ $\quad$ $2x = -2$

$x = 4$ $\quad$ $x = -1$

$-1 < x < 4$

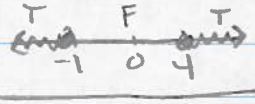
d. $|2x-3| \geq 5$

$|2x-3| = 5$

$2x-3 = 5$ or $2x-3 = -5$

$2x = 8$ $\quad$ $2x = -2$

$x = 4$ $\quad$ $x = -1$



$x \leq -1$ or $x \geq 4$

66. e. $|3-2x| < 5$

$|3-2x| = 5$

$3-2x=5$ or $3-2x=-5$

$-2x=2$ $\quad -2x=-8$

$x=-1$ $\quad x=4$

F T F

−1 0 4

$-1 < x < 4$

f. $|3-2x| \geq 5$

$|3-2x| = 5$

$3-2x=5$ or $3-2x=-5$

$-2x=2$ $\quad -2x=-8$

$x=-1$ $\quad x=4$

T F T

−1 0 4

$x \leq -1$ or $x \geq 4$

g. Each pair has same boundary pts, but the graphs are either between them or on the "outside" of them. Each pair had 1 problem with solid boundary pts. and 1 problem with open boundary pts.

67. a. $5-(y-3)=3x$

$5-y+3=3x$

$8-y=3x$

$-y=3x-8$

$y=-3x+8$

b. $4(x+y)=-2$

$4x+4y=-2$

$4y=-4x-2$

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

68. a. $(y-3)^2=2y-10$

-3	$-3y$	9
y	y^2	$-3y$
	y	-3

$y^2-6y+9=2y-10$

$y^2-8y+19=0$

use QF $y=\frac{8\pm\sqrt{64-4\cdot1\cdot19}}{2}$

Error means

NO Solution

	19
y^2	

doesn't factor

19 ↔ 2

$-8y$

68 b. $|y-3| = 2y-10$

$y-3 = (2y-10)$ or $y-3 = -(2y-10)$

$y-3 = 2y-10$ $\quad$ $y-3 = -2y+10$

$-3 = y-10$ $\quad$ $3y-3 = 10$

$\boxed{y = 7}$ $\quad$ $3y = 13$

$y = \frac{13}{3}$

Extraneous

the only solution is $y=7$

Check $y=7$

$|7-3| = 2(7)-10$

$4 = 14-10$ ✓

$\left|\frac{13}{3} - \frac{9}{3}\right| = 2\left(\frac{13}{3}\right) - \frac{30}{3}$

$\frac{4}{3} = \frac{26}{3} - \frac{30}{3}$

$\frac{4}{3} \neq \frac{-4}{3}$

69. a. $\frac{x-4}{2x^2+9x-5} + \frac{x+3}{x^2+5x} = \frac{x}{x} \cdot \frac{x-4}{(x+5)(2x-1)} + \frac{x+3}{x(x+5)} \cdot \frac{2x-1}{2x-1}$

5	$10x$	-5
x	$2x^2$	$-1x$
	$2x$	-1

$-10x^2$, $10x$, $+1x$, $-9x$

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

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

	-3
$3x^2$	

$-9x^2$, $1x$

doesn't factor

b. $\frac{4x^2-11x+6}{2x^2-x-6} - \frac{x+2}{2x+3} = \frac{(x-2)(4x-3)}{(x-2)(2x+3)} - \frac{x+2}{2x+3}$

-2	$-8x$	6
x	$4x^2$	$-3x$
	$4x$	-3

$24x^2$, $-8x$, $-3x$, $-11x$

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

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

-2	$-4x$	-6
x	$2x^2$	$3x$
	$2x$	3

$-12x^2$, $-4x$, $3x$, $-1x$

69. c. $\frac{(x+4)(2x-1)(x-7)}{(x+8)(2x-1)(3x-4)} \div \frac{(4x-3)(x-7)}{(x+8)(3x-4)}$

$$\frac{(x+4)\cancel{(2x-1)}\cancel{(x-7)}}{\cancel{(x+8)}\cancel{(2x-1)}\cancel{(3x-4)}} \cdot \frac{\cancel{(x+8)}\cancel{(3x-4)}}{(4x-3)\cancel{(x-7)}} = \boxed{\frac{x+4}{4x-3}}$$

70. $x^2+12x+18=75$ for x by completing the square

$x^2+12x=60$ (+36)

$x^2+12x+36=96$

$\sqrt{(x+6)^2}=\sqrt{96}$

$x+6=\pm\sqrt{96}$

$\boxed{x=-6\pm\sqrt{96}}$ or $\boxed{x=3.80,\ x=-15.80}$

	x	6
x	x^2	6x

(36)

71. a. $bx+ax$

$\boxed{x(b+a)}$

b. $x+ax$

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

c. $\frac{ax+a}{x^2+2x+1} = \frac{a(x+1)}{(x+1)(x+1)} = \boxed{\frac{a}{x+1}}$

	x	1
x	x^2	1x
1	1x	1

1x2

1x 1x

2x

d. $\frac{x^2-b^2}{ax+ab} = \frac{(x+b)(x-b)}{a(x+b)} = \boxed{\frac{x-b}{a}}$

Lesson 4.2.1 (day 2) p.189-190: 72-78

72. i $2y \geq x - 3$

$y \geq \frac{1}{2}x - \frac{3}{2}$

ii $x - 2y \geq -7$

$-2y \geq -x - 7$

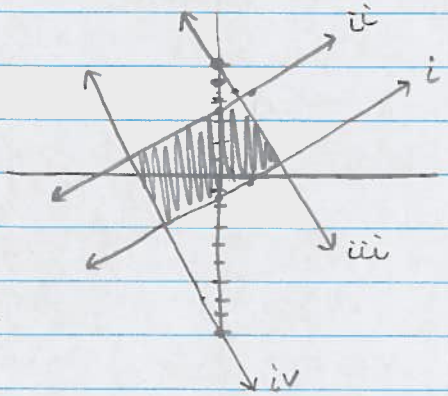
$y \leq \frac{1}{2}x + \frac{7}{2}$

iii $y \leq -2x + 6$

iv. $-9 \leq 2x + y$

$-2x - 9 \leq y$

$y \geq -2x - 9$



a. Rectangle b/c opposite sides are parallel and consecutive side are perpendicular

b. (1,4) (-3,-3) (-5,1) (3,0)

73. a. $|x-4| < 9$

$|x-4| = 9$

$x - 4 = 9$ or $x - 4 = -9$

$x = 13$ $x = -5$

F T F

-5 0 13

$-5 < x < 13$

b. $|\frac{1}{2}x - 45| \geq 80$

$|\frac{1}{2}x - 45| = 80$

$\frac{1}{2}x - 45 = 80$ or $\frac{1}{2}x - 45 = -80$

$\frac{1}{2}x = 125$ $\frac{1}{2}x = -35$

$x = 250$ $x = -70$

T F T

-70 0 250

$x \leq -70$ or $x \geq 250$

c. $|2x - 5| \leq 2$

$|2x - 5| = 2$

$2x - 5 = 2$ or $2x - 5 = -2$

$2x = 7$ $2x = 3$

$x = 3.5$ $x = 1.5$

F T F

0 1.5 3.5

$1.5 \leq x \leq 3.5$

74. C = Cost to operate
m = Time (months)

a. $C = 800 + 60m$

b. $C = 1200 + 40m$

c. $800 + 60m = 1200 + 40m$

$20m = 400$

$m = 20$ months

d. $\frac{20 \text{ months}}{4} = 5$ years

75. a. let $x = 2$ $\quad 2 \to -3 \to -5 \to 2$

let $x = -4$ $\quad -4 \to -9 \to -23 \to -4$

let $x = 0$ $\quad 0 \to -5 \to -11 \to 0$

The number I start with is always the number I end with.

b. let $x = c$ $\quad c - 5 \to \frac{6(c-5)+8}{2} \to$

$= \frac{6c - 30 + 8}{2}$

$= \frac{6c - 22}{2}$

$= 3c - 11 \to \frac{3c - 11 + 11}{3}$

$= \frac{3c}{3}$

$= c$ ← this is what I started with

76. a. $\frac{(x-3)}{(2x-1)} \cdot \frac{(x-3)}{(3x-14)(x+6)} \cdot \frac{x+6}{x-3} = \frac{x-3}{3x-14}$

b. $\frac{4x^2+5x-6}{3x^2+5x-2} \div \frac{4x^2+x-3}{6x^2-5x+1} = \frac{(x+2)(4x-3)}{(x+2)(3x-1)} \cdot \frac{(2x-1)(3x-1)}{(x+1)(4x-3)} = \frac{2x-1}{x+1}$

2	$8x$	-6
x	$4x^2$	$-3x$

$4x \quad -3$

$-24x^2$

$8x \quad -3x$

$-5x$

2	$6x$	-2
x	$3x^2$	$-1x$

$3x \quad -1$

$-6x^2$

$6x \quad -1x$

$-5x$

1	$4x$	-3
x	$4x^2$	$-3x$

$4x \quad -3$

$-12x^2$

$4x \quad -3x$

$1x$

-1	$-3x$	1
$2x$	$6x^2$	$-2x$

$3x \quad -1$

$6x^2$

$-3x \quad -2x$

$-5x$

77. $y = x^2 - x + 12$

$y = 2x^2 + 3x + 7$

$x^2 - x + 12 = 2x^2 + 3x + 7$

$0 = x^2 + 4x - 5$

$0 = (x+5)(x-1)$

$x = -5 \quad x = 1$

5	$5x$	-5
x	x^2	$-1x$
	x	-1

$-5x^2$

$5x \quad -1x$

$4x$

$y = (-5)^2 - (-5) + 12 = 42 \Rightarrow \boxed{(-5, 42)}$

$y = 1^2 - 1 + 12 = 12 \Rightarrow \boxed{(1, 12)}$

78. a. $m = \frac{1}{2}$, $(6, 1)$

$y = mx + b$

$1 = \frac{1}{2}(6) + b$

$1 = 3 + b$

$b = -2$

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

b. $y = 2x + b$, $(1, 4)$

$4 = 2(1) + b$

$4 = 2 + b$

$b = 2$

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

Lesson 4.2.2 p. 193-194; 83-89

83 $x+2y=4$
$2x-y=-7$

$x+2y=4$
$(2x-y=-7)\cdot 2$ $\Rightarrow$

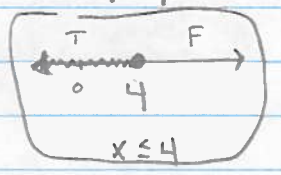
$x+2y=4$
$4x-2y=-14$
$5x=-10$
$x=-2$

$-2+2y=4$
$2y=6$
$y=3$

$x+y+z=-4$
$-2+3+z=-4$
$1+z=-4$
$z=-5$

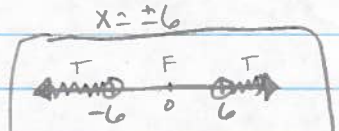
$(-2, 3, -5)$

84. a. $3x-5 \leq 7$
$3x-5=7$
$3x=12$
$x=4$



$x \leq 4$

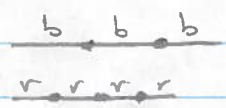
b. $x^2+6>42$
$x^2+6=42$
$\sqrt{x^2}=\sqrt{36}$
$x=\pm 6$



$x<-6$ or $x>6$

85. let r = length of red rod
let b = length of blue rod

$3r=2b+2$



$3b=4r+2$

$3r=2b+2$
$3b=4r+2$ $\Rightarrow$ $(3r-2b=2)\cdot 3$
$(-4r+3b=2)\cdot 2$ $\Rightarrow$

$9r-6b=6$
$-8r+6b=4$
$r=10\text{cm}$

$3b=4(10)+2$
$3b=42$
$b=14\text{cm}$

86. $y \leq 2x-2$ and $y<2x-2$
- the 1st inequality is a solid line, so all pts. on the line and below are part of the solution.
- the 2nd inequality is a dotted line, so all pts. below the line only are part of the solution.

87. a. $x-3(y+2)=6$

$x-3y-6=6$

$x-3y=12$

$-3y=-x+12$

$\boxed{y=\frac{1}{3}x-4}$

b. $\frac{6x-1}{y}-3=2$

$\frac{6x-1}{y}=\frac{5}{1}$

$5y=6x-1$

$\boxed{y=\frac{6}{5}x-\frac{1}{5}}$

c. $\left(\sqrt{y-4}\right)^2=(x+1)^2$

$y-4=(x+1)(x+1)$

$y-4=x^2+2x+1$

	x	1
x	x^2	x
1	x	1

$\boxed{y=x^2+2x+5 \text{ or } y=(x+1)^2+4}$

d. $\left(\sqrt{y+4}\right)^2=(x+2)^2$

$y+4=(x+2)(x+2)$

$y+4=x^2+4x+4$

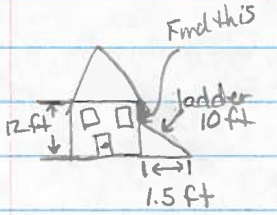
	$2x$	4
x	x^2	$2x$
2	$2x$	4

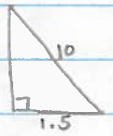
$\boxed{y=x^2+4x \text{ or } y=x(x+4) \text{ or } y=(x+2)^2-4}$

88. Eqn of x-axis is $\boxed{y=0}$

Eqn of y-axis is $\boxed{x=0}$

89.





$a^2+1.5^2=10^2$

$a^2+2.25=100$

$\sqrt{a^2}=\sqrt{97.75}$

$a=9.89$ ft up the house wall

$12-9.89=$ $\boxed{2.11 \text{ ft from top of ladder to roof}}$

Lesson 4.2.3 p. 197-198: 92-97

92. $3x+2=y$

$-9x+3y=11$

$-9x+3(3x+2)=11$

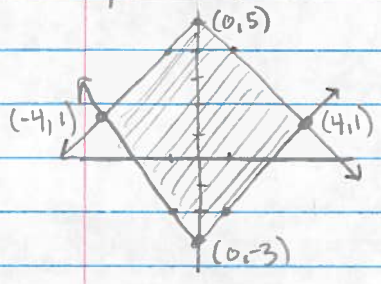
$-9x+9x+6=11$

$6=11$

False means NO solution so the graphs are parallel lines

93. $y \geq |x|-3$

$y \leq -|x|+5$



a. Polygon is a square

b. $y=-x+5$ $\quad -x+5=x-3$ $\quad y=x+5$ $\quad x+5=-x-3$

$y=x-3$ $\quad -2x=-8$ $\quad y=-x-3$ $\quad 2x=-8$

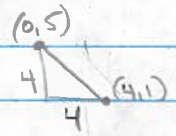
$x=4$ $\quad x=-4$

$y=1$ $\quad y=1$

$(4,1)$ $\quad (-4,1)$

$(0,5)$ $(0,-3)$ $(4,1)$ $(-4,1)$

c. $A_{square}=bh$



$4^2+4^2=c^2$

$16+16=c^2$

$c^2=32$

$c=\sqrt{32}$

$A=bh$

$=\sqrt{32}\cdot\sqrt{32}$

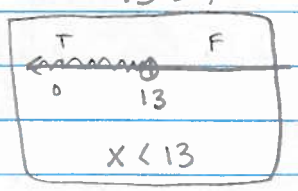
$=32$ sq. units

94. a. $3(x+2)>4x-7$

$3(x+2)=4x-7$

$3x+6=4x-7$

$13=x$

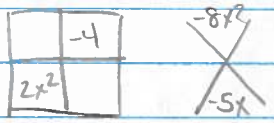


$x<13$

b. $3x^2-4x+2 \leq x^2+x+6$

$3x^2-4x+2=x^2+x+6$

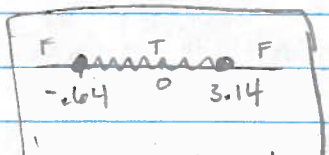
$2x^2-5x-4=0$



doesn't factor

QF: $x=\dfrac{5\pm\sqrt{25-4\cdot2\cdot-4}}{2\cdot2}$

$x=3.14$ $\quad x=-.64$



$-.64 \leq x \leq 3.14$

95. a. $(\sqrt{x+15})^2 = (5+\sqrt{x})^2$

	$\sqrt{x}$	5
$\sqrt{x}$	x	$5\sqrt{x}$
5	$5\sqrt{x}$	25

$x+15 = 25+x+10\sqrt{x}$

$15 = 25+10\sqrt{x}$

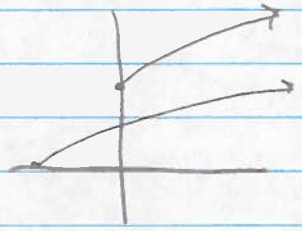
$-10 = 10\sqrt{x}$

$-1 = \sqrt{x}$

This can't ever happen

so **NO solution**

Graphically



or

They will never intersect

b. $(y-6)^2+10 = 3y$

	y	-6
y	y^2	$-6y$
-6	$-6y$	36

$y^2-12y+36+10 = 3y$

$y^2-15y+46 = 0$

	46
y^2	

$46y^2$, $-15y$

doesn't factor

1.46
2.23

QF: $y = \frac{15 \pm \sqrt{225-4\cdot1\cdot46}}{2\cdot1}$

$y = 10.70$, $y = 4.30$

96. $x+3y=16$

$(x-2y=31)\cdot -1$

$x+3y=16$

$-x+2y=-31$

$5y=-15$

$y=-3$

$x-9=16$

$x=25$

$(25,-3)$

a. **$x^2+3y=16$**

$x^2-2y=31$

b. $x^2+3y=16$

$-x^2+2y=-31$

$5y=-15$

$y=-3$

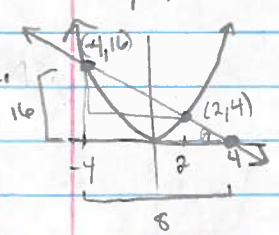
$x^2-9=16$

$x^2=25$

$x=\pm 5$

$(5,-3)$ and $(-5,3)$

97 a.



$m = \frac{-12}{6} = -2$

$y = -2x+b$

$4 = -2(2)+b$

$4 = -4+b$

$b = 8$

$y = -2x+8$

b. $0 = -2x+8$

$2x = 8$

$x = 4$

x-int

$\tan^{-1}\theta = \frac{16}{8}$

$\theta = 63.4^\circ$

$\theta = 180-63.4^\circ = 116.6^\circ$

Lesson 4.2.4 p. 200-201: 99-105

99 a. Parabola $V(-3,-2)$, pt $(-1,0)$

$y = a(x-h)^2 + k$

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

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

$0 = 4a - 2$

$-4a = -2$

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

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

b. line: $m = \frac{5}{5} = 1$, $b = 5$

$\boxed{y = x + 5}$

c. $x + 5 = \frac{1}{2}(x+3)^2 - 2$

Find where the graphs intersect

$\boxed{x = -5, \quad x = 1}$

d. $y = \frac{1}{2}(x+3)^2 - 2$

$y = x + 5$

Find the pts of intersection

$\boxed{(-5,0), \quad (1,6)}$

e. $x + 5 < \frac{1}{2}(x+3)^2 - 2$

line < parabola

$\boxed{x < -5 \text{ or } x > 1}$

f. $\frac{1}{2}(x+3)^2 - 2 = 0$

Parabola = 0 when

$\boxed{x = -5, \quad x = -1}$

g. $x + 5 = 4$ when $\boxed{x = -1}$

h. - Reflect the parabola down ($a = -\frac{1}{2}$)

or

- Translate the parabola up higher than the line

100. Side 1: $m = \frac{-3}{4}$, $b = 3 \Rightarrow y = \frac{-3}{4}x + 3$

Side 2: $m = \frac{3}{6} = \frac{1}{2}$, $b = -2 \Rightarrow y = \frac{1}{2}x - 2$

Side 3: $m = \frac{6}{2} = 3$, $b = 3 \Rightarrow y = 3x + 3$

The inequalities are:

$\boxed{\begin{array}{l} y \le \frac{-3}{4}x + 3 \\ y \ge \frac{1}{2}x - 2 \\ y \le 3x + 3 \end{array}}$

101 a. $2|3x-5| \ge 4$

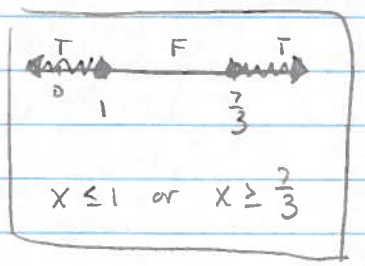
$2|3x-5| = 4$

$|3x-5| = 2$

$3x - 5 = 2$ or $3x - 5 = -2$

$3x = 7$ $\quad$ $3x = 3$

$\boxed{x = \frac{7}{3}}$ $\quad$ $x = 1$



$\boxed{x \le 1 \text{ or } x \ge \frac{7}{3}}$

101 b. $\frac{1}{3}(3x-6)^3 + 4 < 13$

$\frac{1}{3}(3x-6)^3 + 4 = 13$

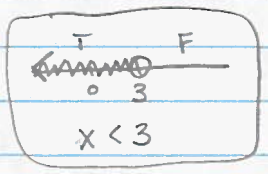
$3 \cdot \frac{1}{3}(3x-6)^3 = 9 \cdot 3$

$(3x-6)^3 = 27$

Looking inside $3x-6 = 3$ b/c $3^3 = 27$

$3x = 9$

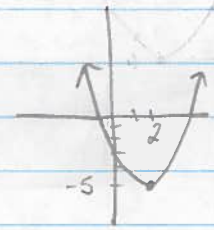
$x = 3$



$x < 3$

102 a. $y+5 = (x-2)^2$

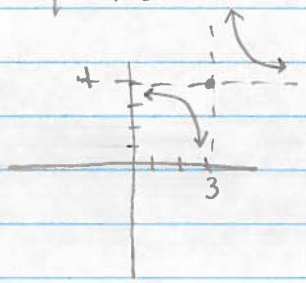
$y = (x-2)^2 - 5$



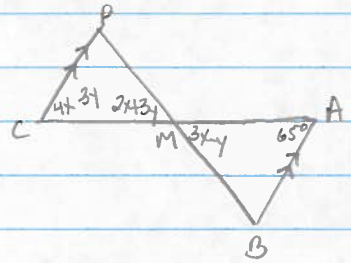
b. $y \leq (x+3)^3$

c. $y = 4 + \frac{1}{x-3}$

$y = \frac{1}{x-3} + 4$



103.



$m\angle C = 4(20) - 3(5)$

$= 80 - 15$

$= 65°$

$m\angle CMP = 2(20) + 3(5)$

$= 40 + 15 = 55°$

$m\angle P = 180 - (65+55) = 180 - 120 = \boxed{60°}$

$\angle CMP \cong \angle AMB$ b/c vertical angles

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

$4y = x$

$\angle PCM = 65°$ b/c alt. int. angles

$4x-3y = 65$

$4(4y) - 3y = 65$

$16y - 3y = 65$

$13y = 65$

$y = 5$, $x = 4(5) = 20$

104. a. $3x-3<y$

$\boxed{y>3x-3}$

Test (0,0)

$0>-3$ is True

b. $3>y$

$\boxed{y<3}$

Test (0,0)

$0<3$ is True

c. $3x-2y\leq 6$

$3x-2y=6$

$-2y=-3x+6$

$y=\frac{3}{2}x-3$

$\boxed{y\geq \frac{3}{2}x-3}$

Test (0,0)

$0-0\leq 6$ is True

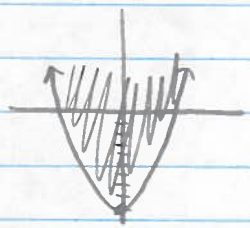
d. $x^2-y\leq 9$

$x^2-y=9$

$-y=-x^2+9$

$y=x^2-9$

$\boxed{y\geq x^2-9}$



Test (0,0)

$0-0\leq 9$ is True

105 a. $w^2+4w=0$

$w(w+4)=0$

$\boxed{w=0,\ w=-4}$

b. $5w^2-2w=0$

$w(5w-2)=0$

$\boxed{w=0 \quad w=\frac{2}{5}}$

c. $w^2=6w$

$w^2-6w=0$

$w(w-6)=0$

$\boxed{w=0 \quad w=6}$