1.1 $\sqrt[4]{13} = 13^{\frac{1}{4}}$

1.2 $11^{\frac{3}{5}}$

1.3 $\sqrt[5]{x^2} = x^{\frac{2}{5}}$

1.4 $30^{\frac{5}{7}}$

6. $P = (5x-3)+(5x-3)+(-2x+1)+(-2x+1) = 6x-4$

$A = (5x-3)(-2x+1) = -10x^2+5x+6x-3 = -10x^2+11x-3$

7. Area of large rectangle –Area of small rectangle

$A = (5x+1)(4x-2) - x(x+2)$

$= 20x^2 - 10x + 4x - 2 - x^2 - 2x$

$= 19x^2 - 8x - 2$

2.1 $x^{\frac{14}{15}}$

2.2 $b^{\frac{41}{10}}$

2.3 $c^{\frac{2}{5}}$

2.4 $x^{\frac{7}{4}}$

8. $y = (x-3)^2 + 4$ 1

$y = (x+7)^2 - 13$ 2

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

$y = -(x-8)^2 + 5$ 4

$y = -(x-8)^2$ 5

3.1 $4(25+2x) = 100+8x$

3.2 $(25+2x)(25+2x) = 4x^2+100x+625$

4.1 $(-11x^2-5x+3)+(-3x^2+4x-13) = -14x^2 - x - 10$

4.2 $(-11x^2-5x+3)-(-3x^2+4x-13)$

$= -11x^2-5x+3+3x^2-4x+13 = -8x^2-9x+16$

4.3 $(-11x^2-5x+3)(-3x^2+4x-13)$

$= 33x^4-44x^3+143x^2+15x^3-20x^2+65x-9x^2+12x-39$

$= 33x^4-29x^3+114x^2+87x-39$

4.4 $\dfrac{-11x^2-5x+3}{-3x^2+4x-13}$

9. a. $i^{23} = i^3 = -i$ $i^0 = 1$

b. $i^{40} = i^0 = 1$ $i^1 = i$

c. $i^{11} \cdot i^3 = i^{14} = i^2 = -1$ $i^2 = -1$

d. $(i^3)^2 = i^6 = i^2 = -1$ $i^3 = -i$

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

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

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

$= x^2 - 4x - 1$

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

$= 3x^2 - 6x$

5.1 $(x^2-4x-1)+(3x^2-6x)$

$= 4x^2 - 10x - 1$

5.2 $(x^2-4x-1)-(3x^2-6x)$

$= x^2-4x-1-3x^2+6x$

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

5.3 $(x^2-4x-1)(3x^2-6x)$

$= 3x^4-6x^3-12x^3+24x^2-3x^2+6x$

$= 3x^4-18x^3+21x^2+6x$

5.4 $\dfrac{x^2-4x-1}{3x^2-6x}$

10. $a.\ -\frac{b}{2a}=\frac{-8}{2(-2)}=\frac{-8}{-4}=2 \quad x=2$

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

$c.\ -\frac{b}{2a}=\frac{8}{2(1)}=4 \quad x=4$

11. $a.\ \sqrt{x-4}$ $\quad$ $b.$ *ignore what is outside the* $\sqrt{\ }$

$x-4\geq 0 \qquad x+7\geq 0$

$x\geq 4 \qquad x\geq -4$

domain $\qquad$ *domain*

12. $$\left.\begin{array}{l} y=a(x-h)^2+k \\ y=a|x-h|+k \\ y=a\sqrt{x-h}+k \end{array}\right\} V(h,k)$$

$a.\ (2,5) \qquad b.\ (-3,-4)$

$c.\ (-5,-3) \qquad d.\ (-8,\ 2)$

13. Equation 1 matches graph B
Equation 2 matches graph A
Equation 3 matches graph C

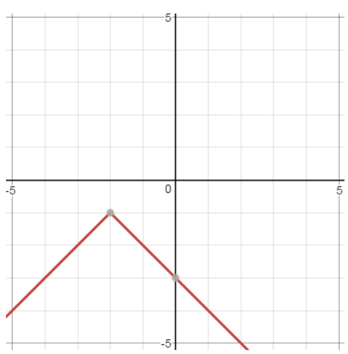
14. $f(x)=|x-3|$

translate up 5 $\quad f(x)=|x-3|+5$

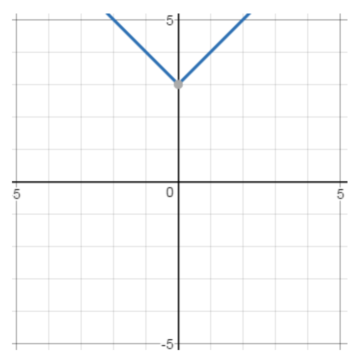
left 7 $\quad f(x)=|x+4|+5$

15. $y=-|x+2|$ means left 2 and flip over so matches graph 4

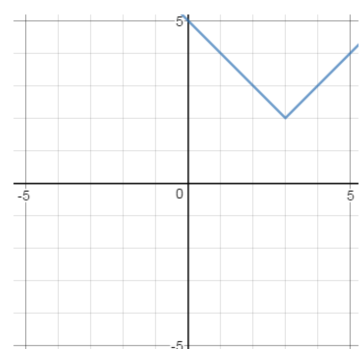
16. a.



b.



c.



17. $a.\ y=13-2x$

$x=13-2y$

$x-13=-2y$

$\frac{x-13}{-2}=y$

$-\frac{x}{2}+\frac{13}{2}=y$

$y^{-1}=\frac{x-13}{-2}\ or\ -\frac{x}{2}+\frac{13}{2}$

17. $b.\ y=-5x+2$

$x=-5y+2$

$x-2=-5y$

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

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

$y^{-1}=\frac{x-2}{-5}\ or-\frac{x}{5}+\frac{2}{5}$

17. $c.\ y=x^2+7$

$x=y^2+7$

$x-7=y^2$

$\pm\sqrt{x-7}=y$

$y^{-1}=\pm\sqrt{x-7}$

18. Use the discriminant
$b^2 - 4ac > 0 \quad 2\ real\ solutions$
$b^2 - 4ac = 0 \quad 1\,real\ double\ solutions$
$b^2 - 4ac < 0 \quad 2\ imaginary\ solutions$

$a.\ (-4)^2 - 4(3)(2)$
$16 - 24$
-8
$2\ imaginary$

$b.\ (0)^2 - 4(1)(-25)$
$0 + 100$
100
$2\ real$

$c.\ (-10)^2 - 4(1)(25)$
$100 - 100$
0
$1\ real$

$d.\ (-4)^2 - 4(2)(1)$
$16 - 8$
8
$2\ real$

19. $a.\ \dfrac{12 \pm \sqrt{(-12)^2 - 4(1)(33)}}{2(1)}$

$= \dfrac{12 \pm \sqrt{144 - 132}}{2}$

$= \dfrac{12 \pm \sqrt{12}}{2} = \dfrac{12 \pm \sqrt{(4)(3)}}{2}$

$= \dfrac{12 \pm 2\sqrt{3}}{2} = \dfrac{12}{2} \pm \dfrac{2\sqrt{3}}{2}$

$= 6 \pm \sqrt{3}$

$x = 7.73\ or\ x = 4.27$

$b.\ \dfrac{1 \pm \sqrt{(-1)^2 - 4(1)(-2)}}{2(1)}$

$= \dfrac{1 \pm \sqrt{1+9}}{2}$

$= \dfrac{1 \pm 3}{2}$

$x = 2\ or\ x = -1$

20. $a.\ \dfrac{6 \pm \sqrt{(-6)^2 - 4(1)(13)}}{2(1)}$

$= \dfrac{6 \pm \sqrt{36 - 52}}{2}$

$= \dfrac{6 \pm \sqrt{-16}}{2}$

$= \dfrac{6 \pm 4i}{2}$

$x = 3 + 2i\ or\ x = 3 - 2i$

20. $b.\ x^2 - 6x + 13 = 0$

$x^2 - 6x = -13$

$x^2 - 6x + \_\_\_\_\_\_ = -13 + \_\_\_\_\_\_$

$x^2 - 6x + 3^2 = -13 + 3^2$

$(x-3)^2 = -4$

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

$x - 3 = \pm 2i$

$x = 3 + 2i\ or\ x = 3 - 2i$

21. $a.\ 3i - 10 - 4i - 5 = -i - 15$

$b.\ 28 + 35i - 8i - 10i^2 = 28 + 27i + 10 = 38 + 27i$

$c.\ 4i - 4 + 5i - 7 - 3 + 7i = 2i - 7$

$d.\ 16 + 4i - 4i - i^2 = 16 - (-1) = 17$

22. Equation a matches graph 2
Equation b matches graph 1
Equation c matches graph 3

23. $-\dfrac{b}{2a} = \dfrac{12}{2(3)} = \dfrac{12}{6} = 2$

$(2,\ \ )$

$3(2)^2 - 12(2) + 13 = 12 - 24 + 13 = 1$

$(2,1)$

The minimum point is (2, 1)
The minimum value is 1

24. $-\dfrac{b}{2a} = \dfrac{-10}{2(-1)} = \dfrac{-10}{-2} = 5$

$(5,\ \ )$

$-(5)^2 + 10(5) + 2 = -25 + 50 + 2 = 27$

$(5,\ 27)$

The coconut reaches a maximum height of 27 feet.
The maximum height happens at 5 seconds.

25. $\textit{average rate of change} = \dfrac{y_2 - y_1}{x_2 - x_1}$

$\textit{according to the graph } (1,5) \textit{ and } (3,9)$

$= \dfrac{9-5}{3-1} = \dfrac{4}{2} = 2 \textit{ so } 2 \textit{ tens of yards per second}$

26. 1) a, d, f
2) b
3) c, d, f
4) b, e

27. a) $y = 0$ *when* $x = 1$
b) $y = 0$ *when* $x = -3$ *and* $x = 1$
c) $y = 0$ *never*

28. *a.* $(x+1)(x+8) = 0$

$x+1 = 0 \quad x+8 = 0$

$x = -1$ *or* $x = -8$

b. $(x+9)(x+6) = 0$

$x+9 = 0 \quad x+6 = 0$

$x = -9$ *or* $x = -6$

c. $(5x-1)(x+7) = 0$

$5x-1 = 0 \quad x+7 = 0$

$x = \dfrac{1}{5}$ *or* $x = -7$

d. $(x-8)(x+8) = 0$

$x-8 = 0 \quad x+8 = 0$

$x = 8$ *or* $x = -8$

e. $(4x-9)(4x+9) = 0$

$4x-9 = 0 \quad 4x+9 = 0$

$x = \dfrac{9}{4}$ *or* $x = -\dfrac{9}{4}$

29. a. 4^2 or 16 b. 6^2 or 36 c. skip

30. *a.* $f(x) = x^2 - 8x + 12$

$= x^2 - 8x + 4^2 + 12 - 4^2$

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

b. $f(x) = x \ \ + 4x - 1$

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

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

c. $f(x) = 2x^2 + 12x + 2$

$= 2(x^2 + 6x + \_\_\_\_\_\_) + 2$

$= 2(x^2 + 6x + 3^2) + 2 - 2(3^2)$

$= 2(x+3)^2 - 16$

tricky

31. *a.* $x^2 - x - 6 = 2x - 2$

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

$(x-4)(x+1) = 0$

$(x-4) = 0 \quad (x+1) = 0$

$x = 4 \qquad x = -1$

plug in to either equation

$y = 2(4) - 2 = 8 - 2 = 6 \quad (4,\ 6)$

$y = 2(-1) - 2 = -2 - 2 = -4 \quad (-1,\ -4)$

b. $x^2 - x - 2 = -x + 2$

$x^2 - 4 = 0$

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

$(x-2) = 0 \quad (x+2) = 0$

$x = 2 \qquad x = -2$

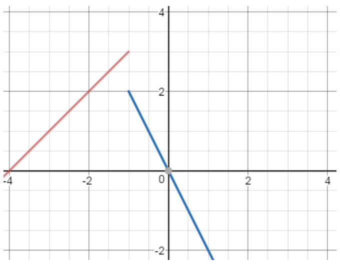
$y = -(2) + 2 = 0 \quad (2,\ 0)$

$y = -(-2) + 2 = 2 + 2 = 4 \quad (-2,\ 4)$

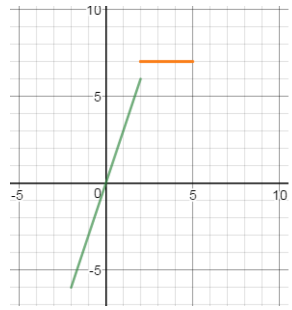
32.

	Terms	Coefficients	Factors	Constants
a) $-11c^3+4b^7-4x^6y^8+3j-11+(-2u^4)$	6	-11, 4, -4, 3, -2		-11
b) $12c-3t^2+8v^2n^5+20h^9+3-(-2e^3)$	6	12, -3, 8, 20, -2		3

33. a.



b.



34. 1) domain: all reals
range: all reals

2) domain: $-5 < x < -2$
range: $-4 < y < 4$

3) domain: $x > -4$
range: $y > -1$

35) a) growth b) growth c) decay d) decay e) growth

36)

a) $P = \frac{2}{3}Rt^2$

$\frac{3}{2}P = Rt^2$

$\frac{\frac{3}{2}P}{R} = t^2$

$\pm\sqrt{\frac{\frac{3}{2}P}{R}} = t$

b) $U = \frac{3(2x)}{5t^2}$

$5t^2U = 6x$

$t^2 = \frac{6x}{5U}$

$t = \pm\sqrt{\frac{6x}{5U}}$

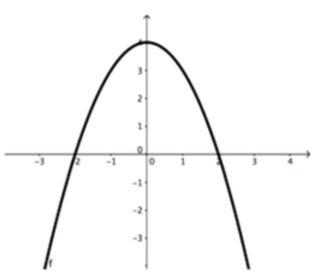
c) $2t^2 + 2x = 2y$

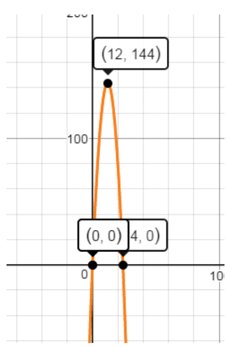
$2t^2 = 2y - 2x$

$t^2 = y - x$

$t = \pm\sqrt{y-x}$

37)





a) when t =2 the height of the function is 0 b) when t = 3 the height of the graph 63
c) the maximum height of the function is 4 d) maximum height of the graph is 144
e) the flight time of the function is 2, no negative time
f) the flight of the graph is 4, no negative time
g) both have 2 zeros/x-intercepts but for a real world problem you need to ignore the negative time, both have the shape

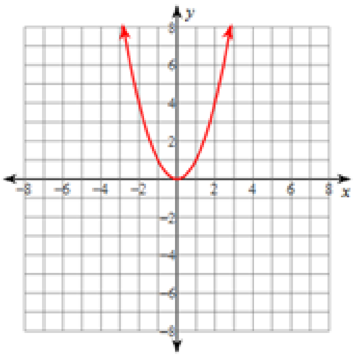
38) a) vertex: (2, –6)
axis of symmetry: x = 2

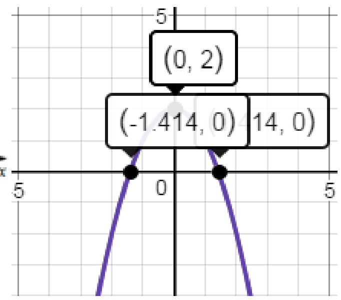
b) vertex: (4, 2)
axis of symmetry: x = 4

c) vertex: (0, 0)
axis of symmetry: x = 0

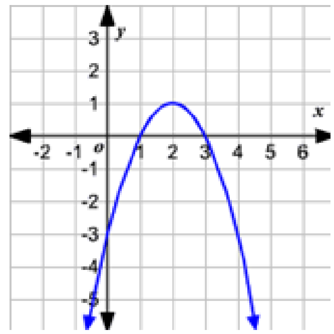
39)

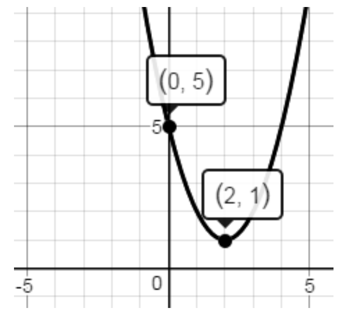
a. $f(x) = -x^2 + 2$
g(x) graph below





b. $f(x) = (x-2)^2 + 1$
g(x) graph below





a) f(x) vertex at (0,2), g(x) vertex is (0,0)
f(x) max value at 2, g(x) min value at 0
f(x) x-intercepts/zeros at x = –1.414 and x =1.414
g(x) x-intercepts/zeros at x = 0
f(x) y-intercept y = 2, g(x) y-intercept y = 0

b) f(x) vertex at (2, 1), g(x) vertex at (2, 1)
f(x) min value 1, g(x) max value at 1
f(x) x-intercepts/zeros there are none
g(x) x-intercepts/zeros at x = 1 and x = 3
f(x) y-intercept y = 5, g(x) y-intercept y = –3

40) Solution: plug each value into each equation, if it is true for both then the answer is yes

$$a)\ -4 = 1 - 5$$
$$-4 = -4$$
$$-4 = (1)^2 - 3(1) - 2$$
$$-4 = 1 - 3 - 2$$
$$-4 = -4$$
yes

$$b)\ -5 = 0 - 5$$
$$-5 = -5$$
$$-5 = (0)^2 - 3(0) - 2$$
$$-5 = 0 - 0 - 2$$
$$-5 = -2\ False$$
no

$$c)\ -2 = 3 - 5$$
$$-2 = -2$$
$$-2 = (3)^2 - 3(3) - 2$$
$$-2 = 9 - 9 - 2$$
$$-2 = -2$$
yes