

Lesson 1.1.1

1-4. a: $\frac{1}{2}$

b: 3

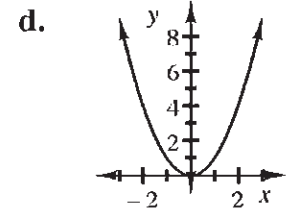
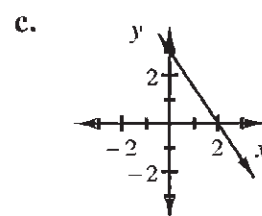
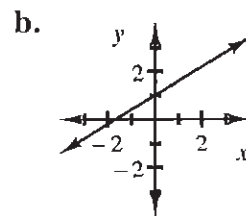
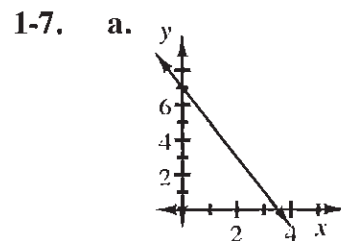
1-5. a: 16

b: 9

c: 478.38

1-6. a: $h(x)$ then $g(x)$

b: Yes, it is possible. Since the output of $g(x)$ is positive, the only way to get a final negative output is if $g(x)$ goes first. This gives $g(6) = 1$ and $h(1) = -5$.



1-8. a: not linear

b: x is squared

c: a parabola

d: D: All real numbers; R: $y \geq 0$

1-9. a: $x = 13$

b: $x = 8$

1-10. a: $5m^2 + 9m - 2$

b: $-x^2 + 4x + 12$

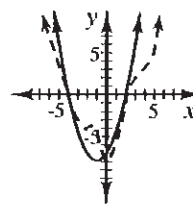
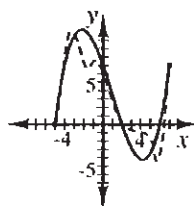
c: $25x^2 - 10xy + y^2$

d: $6x^2 - 15xy + 12x$

Lesson 1.1.2 Day 1

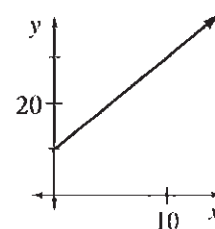
1-15. **a:** More than one function is possible.
See sample graph at right.

b: More than one function is possible.
See sample graph at right.



1-16. Let y represent the amount of money (cents) in the piggy bank, and x represent the time (days). $y = 2x + 10$; See graph and table shown below. A discrete graph would also be appropriate.

x	0	1	2	3	4
y	10	12	14	16	18



1-17. **a:** 2 **b:** 10 **c:** 100 **d:** ≈ 142.86

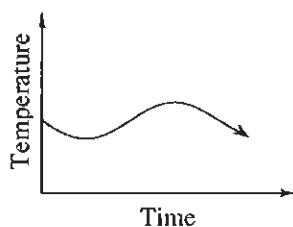
1-18. **a:** 14, -4 , $3x - 1$ **b:** $f(x) = 3x - 1$

1-19. **a:** $x = 5, 3$ **b:** $x = \frac{5 \pm \sqrt{73}}{4}$ or $x \approx 3.39, -0.89$

1-20. **a:** y depends on x ; x is independent. Explanations vary.

b: Temperature is dependent; time is independent.

c:



1-21. **a:** $(x - 9)(x + 8)$

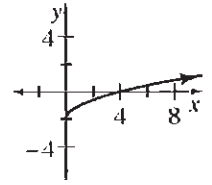
b: $6x(x + 8)$

c: $(x - 4)^2$

d: $(x + 7)(x - 7)$

Lesson 1.1.2 Day 2

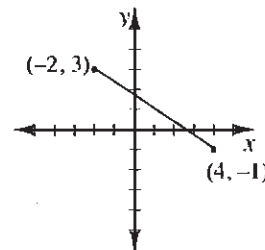
- 1-22. Graph shown at right. curved; increasing; intercepts: $(0, -2)$ and $(4, 0)$; domain: $x \geq 0$; range: $y \geq -2$; endpoint: $(0, -2)$; continuous; function



- 1-23. a: $x = -13$ or 7 b: $x = -\frac{3}{2}$ or $\frac{7}{3}$ c: $x = 0$ or 3
d: $x = 0$ or 5 e: $x = 7$ or -5 f: $x = -\frac{1}{3}$ or -5
- 1-24. a: 2 b: -4 c: $\frac{1}{0}$ is undefined d: Justifications vary.
- 1-25. a: 1 b: $x = 12$ c: 13
d: no real solution e: $x = \pm\sqrt{\frac{13}{2}} \approx \pm 2.55$ f: $x = \pm\sqrt{7} \approx \pm 2.65$
- 1-26. $f(x) = x^3$
- 1-27. a: The amount of money you spend is proportional to the amount of gas you buy.
b: People grow a lot in their early years and then their growing slows down.
c: As time goes by, the ozone concentration goes down, although the effect is slowing.
d: As the number of students grows, more classrooms are used and each classroom holds 30 students.
e: Possible inputs: any non-negative integer; Possible outputs: any non-negative integer
- 1-28. a: $x \approx -7.37$ b: $x = 2.8$ c: $x = 2$ d: $x = -3.25$

Lesson 1.1.3 Day 1

- 1-35. a: The numbers between -2 and 4 inclusive or $-2 \leq x \leq 4$.
 b: The numbers between -1 and 3 inclusive or $-1 \leq y \leq 3$.
 c: No. He is missing all the values between those numbers. The curve is continuous, so the description needs to include all real numbers, not just integers.
 d: Sample graph shown at right.



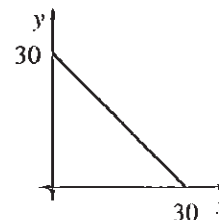
- 1-36. They are both wrong. The equation needs to be set equal to zero before the Zero Product Property can be applied. $2x^2 + 5x - 3 = 4$ is equivalent to $(2x + 7)(x - 1) = 0$. $x = 1$ or $x = -\frac{7}{2}$

- 1-37. a: $y = \frac{x-6}{3}$ b: $y = \frac{x+10}{5}$ c: $y = \pm\sqrt{x}$ d: $y = \pm\sqrt{\frac{x+4}{2}}$ e: $y = \pm\sqrt{x} + 5$

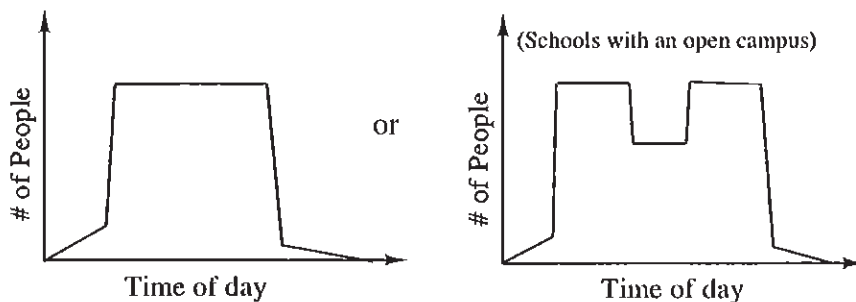
- 1-38. a: -7 b: 3.5 c: The y - and x -intercepts.

- 1-39. $y = 30 - x$; Graph and table shown at right.
 Answers vary.

x	0	1	6	20
y	30	29	24	10



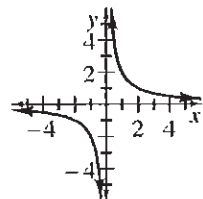
- 1-40. Sample graphs shown below.



- 1-41. There is an error in line 2. Both sides need to be multiplied by x : $5 = x^2 - 4x$, $0 = x^2 - 4x - 5 = (x - 5)(x + 1)$, $x = -1, 5$.

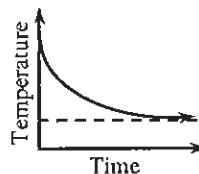
Lesson 1.1.3 Day 2

- 1-42. See table and graph at right. Domain: $x \neq 0$, range: $y \neq 0$, asymptotes are the x - and y -axes, non-linear, two separate curves with reflection symmetry across $y = x$ and $y = -x$, or 180° rotational symmetry.



x	y
-3	$-\frac{2}{3}$
-2	-1
-1	-2
-0.5	-4
0	undef.
0.5	4
1	2
2	1
3	$\frac{2}{3}$

- 1-43. a: See graph at right.
b: Yes, the pizza will never get below room temperature.



- 1-44. a: $x = 3$ or -2 b: $x = 3$ or -3

- 1-45. Solve $x^2 + 2x + 1 = 1$; $x = 0$ or -2

- 1-46. a: $(0, 6)$ b: $(0, 2)$ c: $(0, 0)$ d: $(0, -4)$ e: $(0, 25)$ f: $(0, 13)$

- 1-47. Possible answers listed below.

a: Factor and use the Zero Product Property (rewrite) $x = -8$ or 1

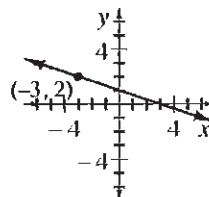
b: Take the square root (undo) $x = -9$ or 5

c: Quadratic Formula $x = \frac{1 \pm \sqrt{141}}{10} \approx -1.09$ or 1.29

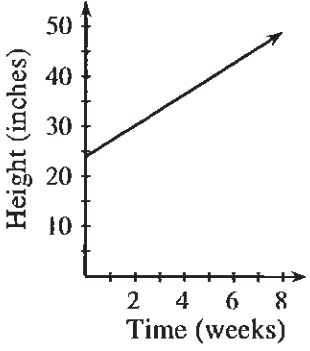
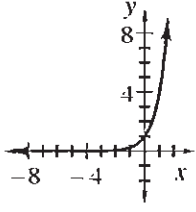
d: Quadratic Formula $x = -2 \pm \sqrt{3} \approx -3.73$ or -0.27

- 1-48. a: See answer graph at right.

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



Lesson 1.1.4

- 1-56.** a: 70 b: 2 c: 43
d: undefined e: $-\infty < x < \infty$ f: $x \geq 5$
g: The square root of a negative number is undefined, whereas any real number can be squared.
- 1-57.** The functions in parts (a), (b), (d), (e), (h), (i), and (j) are polynomial functions. Part (c) has an exponential term. Part (f) is not a function. If part (g) is rewritten in standard form, it will have negative exponents.
- 1-58.** a: $y = 3x + 24$; Table and graph shown at right.
b: At 16 weeks. You can see this in the table and graph where $y = 72$. You can see this growth in the equation by substituting 72 for y and solving for x .
c: Possible inputs: all real numbers greater than and including 0.
Possible outputs: all real numbers greater than and including 24
- | x | y |
|-----|-----|
| 0 | 24 |
| 1 | 27 |
| 2 | 30 |
| 3 | 33 |
| 4 | 36 |
| 5 | 39 |
- 
- 1-59.** The error is in line 3. It should be: $0 = 5.4x + 23.7, x \approx -4.39$
- 1-60.** See graph at right. Exponential function (increasing), horizontal asymptote $y = 0$, y -intercept $(0, 1)$, D: all real numbers, R: $y > 0$, continuous function.
- 
- 1-61.** a: D: $x = -1, 1, 2$; R: $y = -2, 1, 2$
b: D: $-1 \leq x < 1$; R: $-1 \leq y < 2$
c: D: $x \geq -1$; R: $y \geq -1$
d: D: $-\infty < x < \infty$; R: $y \geq -2$
- 1-62.** $x = 70^\circ$; straight \angle s are supplementary and ext. \angle .

Lesson 1.2.1

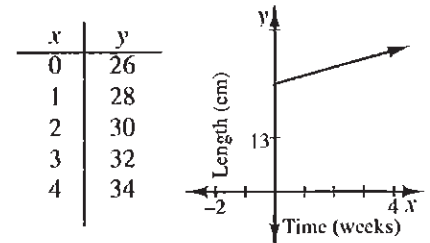
1-66. $(2, 1)$

1-67. a: 3 b: $\frac{y^2}{25x^{14}}$ c: $18x$

1-68. $x = 2.5$

1-69. a: $\sqrt{34} \approx 5.83$ units b: $\frac{3}{5}$

1-70. a: Table and graph shown at right. $y = 2x + 26$
 b: 37 weeks after Carlo's birthday. In the table and the graph, the point $(37, 100)$. Using the equation, the value of x for which $100 = 2x + 26$.



1-71. $y = 0$

a: $(-2, 0)$ b: $(-10, 0)$ c: $(0, 0)$

d: $(\pm\sqrt{2} \approx \pm 1.41, 0)$ e: $(5, 0)$ f: $(\sqrt[3]{13} \approx 2.35, 0)$

1-72. a: $x = \frac{5(y-1)}{3}$ b: $x = \frac{-2y+6}{3}$
 c: $x = \pm\sqrt{y}$ d: $x = \pm\sqrt{y+100}$

Lesson 1.2.2 Day 1

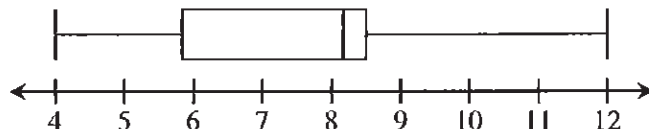
1-80. a: $(-1, 9)$ and $(5, 21)$

b: $x^2 + 17$

c: $x^2 - 4x - 5$

1-81. a: $8.4 - 5.8 = 2.6$ cm

b: See boxplot at right.



1-82. a: 32

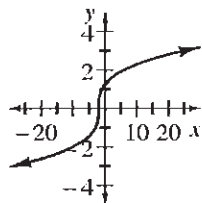
b: $x^2y^2\sqrt{x}$

c: $\frac{x^2}{y}$

1-83. See graph at right.

Domain: all real numbers

Range: all real numbers



1-84. a: D: $-2, -1, 2$; R: $-1, 0, 1$

b: D: $-1 < x \leq 1$; R: $-1 \leq y < 2$

c: D: $x > -1$; R: $y > -1$

d: D: $-\infty < x < \infty$; R: $-\infty < y < \infty$

1-85. $l = 4w$ and $l + w = 22$ or $w + 4w = 22$; The length is 17.6 cm, and the width is 4.4 cm.

1-86. $2x - \frac{7}{6} = 3 - 3x$; $x = \frac{5}{6}$, $y = \frac{1}{2}$; $(\frac{5}{6}, \frac{1}{2})$

Lesson 1.2.2 Day 2

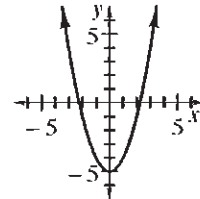
1-87. a: $w = 0$ or $w = -4$

b: $w = 0$ or $w = \frac{2}{5}$

c: $w = 0$ or $w = 6$

1-88. Mean: 7.6 g; Sample standard deviation: $\sqrt{\frac{2.56+0.16+0.16+1.96+0.36}{5-1}} = \sqrt{1.3} \approx 1.14$ g

1-89. $(\pm\sqrt{5}, 0)$; See graph at right.



1-90. $y = 0$; $x = 0$

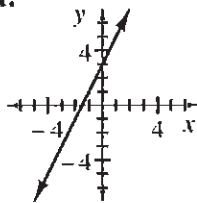
1-91. a: $x^2 - 1$

b: $2x^3 + 4x^2 + 2x$

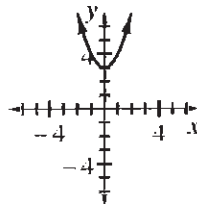
c: $x^3 - 2x^2 - x + 2$

d: $y: (0, 2)$; $x: (1, 0), (-1, 0), (2, 0)$

1-92. a:



b:



c: y -intercept $(0, 3)$ for both, x -intercept $(-\frac{3}{2}, 0)$ for part (a) and none for part (b)

d: $(0, 3)$ and $(2, 7)$, solve $2x + 3 = x^2 + 3$ to get $x = 0$ or $x = 2$

1-93. They are similar by AA \sim .

a: $\frac{n}{m}$

b: $\frac{m}{x}$

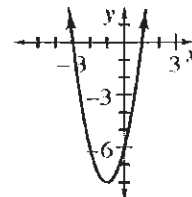
Lesson 1.2.2 Day 3

1-94. Mean: 52 g; sample standard deviation is $\sqrt{\frac{64+64+4+144+4}{5-1}} = \sqrt{70} \approx 8.4$ g

1-95. a: $x = -6$ b: $x = \frac{38}{13} \approx 2.92$

1-96. a: $\frac{1}{12}$ b: $\sqrt{580} = 2\sqrt{145} \approx 24.08$ c: $(-9, 1)$ d: $y = \frac{1}{12}x + \frac{7}{4}$

1-97. See graph shown at right. Parabola with vertex/minimum $(-1, -8)$; increasing for $x > -1$; decreasing for $x < -1$; intercepts $(-3, 0)$, $(1, 0)$, and $(0, -6)$. Line of symmetry at $x = -1$, domain: $-\infty < x < \infty$; range: $y \geq -8$



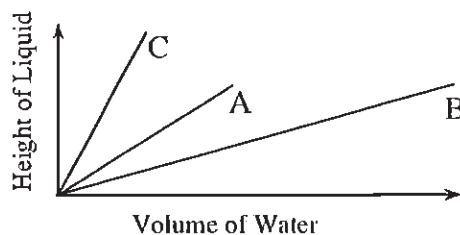
1-98. a: D: $-3 \leq x < 3$; R: $y = -2, 1, 3$

b: D: $x = 2$; R: $-\infty < y < \infty$

c: D: $x \geq -2$; R: $-\infty < y < \infty$

1-99. a: $\frac{1}{25}$ b: $\frac{x}{y^2}$ c: $\frac{1}{x^2y^2}$ d: $\frac{b^m}{a}$

1-100. The independent variable is the volume of water; the dependent variable is the height of the liquid. The graph is three line segments starting at the origin. C is the steepest, and B is the least steep.



Lesson 1.2.3

1-103. a: The five-number summary is (1, 19.5, 29, 40.5, 76) cups of coffee per hour.

b: The typical number of cups sold in an hour is 29 as determined by the median.

Looking at the shape of the distribution, we see that the median is a satisfactory representation of the distribution. The distribution has a skew. There is a gap between 60 and 70 cups. The IQR is 21 cups. 76 cups of coffee in one hour is an apparent outlier.

1-104. a: $x = \frac{-3 \pm \sqrt{21}}{2} \approx -3.79, 0.79$

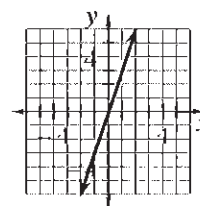
b: $x = \frac{7 \pm \sqrt{193}}{6} \approx 3.48, -1.15$

1-105. Diagrams vary.

See graph and table at right.

$$y = 3x$$

x	y
1	3
2	6
3	9

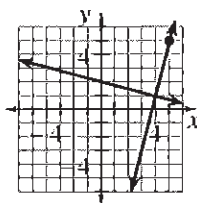


1-106. See graph at right.

a: See graph at right.

b: $y = 4x - 15$

c: (4, 1)

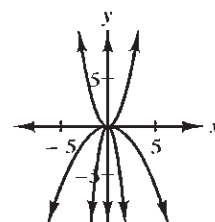


1-107. a: D: all real numbers except $x \neq 0$; R: all real numbers except $y \neq 0$

b: D: $-5 \leq x \leq 6$; R: $-4 \leq y \leq 2$

c: D: all real numbers; R: $y \leq 1$

1-108. The negative coefficient causes parabolas to open downward, without changing the vertex. See graph at right.



1-109. (1, 3) and (7, 81)