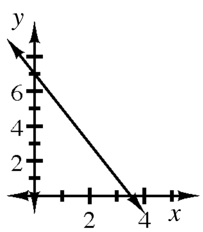
Lesson 1.1.1

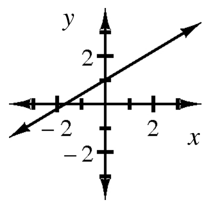
1-4. **a:** $\frac{1}{2}$ **b:** 3

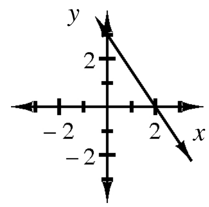
1-5. **a:** 16 **b:** 9 **c:** 478.38

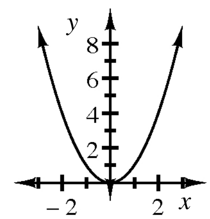
1-6. **a:** $h(x)$ then $g(x)$

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 $h(1) = -5$.

1-7. **a.**


b.


c.


d.


1-8. **a:** not linear **b:** x is squared

c: a parabola **d:** D: All real numbers; R: $y \geq 0$

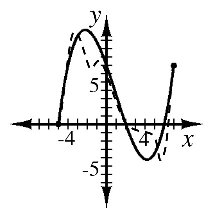
1-9. **a:** $x = 13$ **b:** $x = 8$

1-10. **a:** $5m^2 + 9m - 2$ **b:** $-x^2 + 4x + 12$

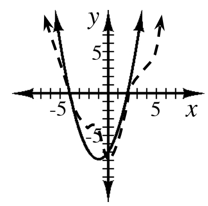
c: $25x^2 - 10xy + y^2$ **d:** $6x^2 - 15xy + 12x$

Lesson 1.1.2 Day 1

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

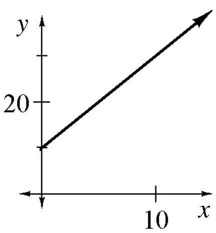


b: More than one function is possible. See sample graph at right.



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 appropriate.

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



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

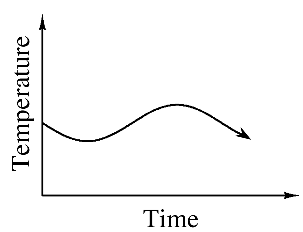
1-18. **a:** 14, –4, $3x - 1$ **b:** $f(x) = 3x - 1$

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:

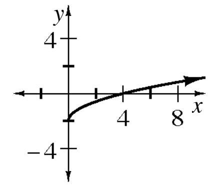


1-21. **a:** $(x - 9)(x + 8)$ **b:** $6x(x + 8)$

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.

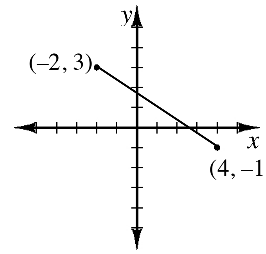
c: As time goes by, the ozone concentration goes down, although the effect is slowing.

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 $-2 \le x \le 4$.

b: The numbers between –1 and 3 inclusive or $-1 \le y \le 3$.

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.

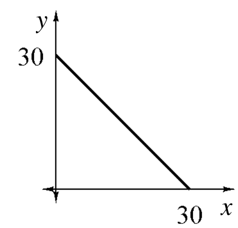
1-36. They are both wrong. The equation needs to be set equal to zero before the Zero Product Property can be applied. $2x^2 + 5x - 3 = 4$ is equivalent to $(2x + 7)(x - 1) = 0$. $x = 1$ or $x = -\frac{7}{2}$

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:** $y = \pm\sqrt{x} + 5$

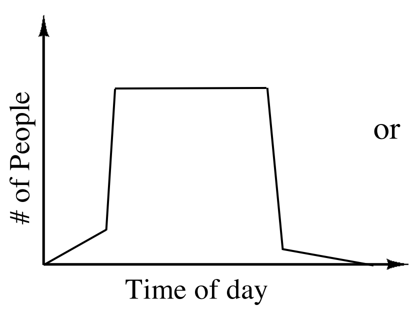
1-38. **a:** –7 **b:** 3.5 **c:** The y- and x-intercepts.

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

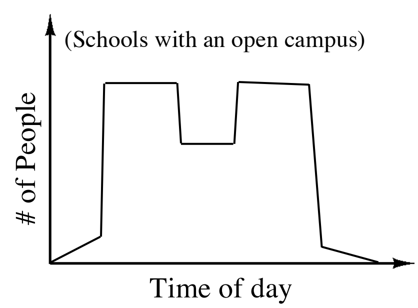
x	0	1	6	20
y	30	29	24	10



1-40. Sample graphs shown below.



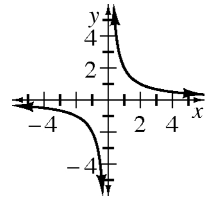
or



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

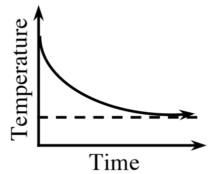
1-42. See table and graph at right. Domain: $x \neq 0$, range: $y \neq 0$, asymptotes are the x- and y-axes, non-linear, two separate curves with reflection symmetry across $y = x$ and $y = -x$, or 180° rotational symmetry.



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

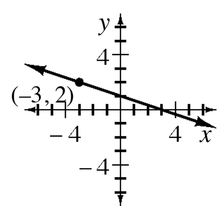
b: Take the square root (undo) $x = -9$ or 5

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

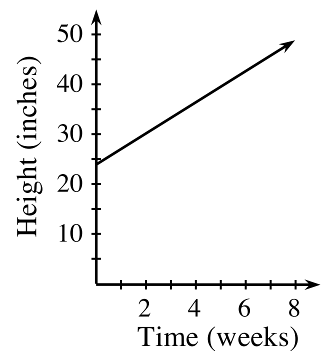
d: undefined **e:** $-\infty < x < \infty$ **f:** $x \geq 5$

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.

x	y
0	24
1	27
2	30
3	33
4	36
5	39

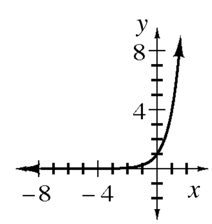


b: At 16 weeks. You can see this in the table and graph where $y = 72$. You can see this growth in the equation by substituting 72 for y and solving for x.

c: Possible inputs: all real numbers greater than and including 0
Possible outputs: all real numbers greater than and including 24

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. $x = 70°$; 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:** $18x$

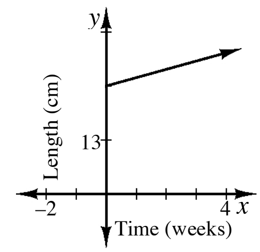
1-68. $x = 2.5$

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 $100 = 2x + 26$.

x	y
0	26
1	28
2	30
3	32
4	34



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:** $x = \frac{-2y+6}{3}$

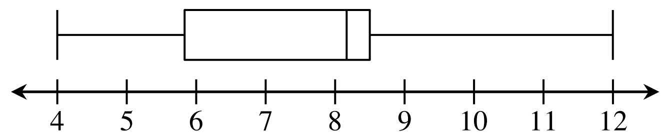
c: $x = \pm\sqrt{y}$ **d:** $x = \pm\sqrt{y+100}$

Lesson 1.2.2 Day 1

1-80. **a:** (–1, 9) and (5, 21) **b:** $x^2 + 17$ **c:** $x^2 - 4x - 5$

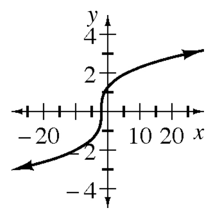
1-81. **a:** 8.4 – 5.8 = 2.6 cm

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: $-1 < x \le 1$; R: $-1 \le y < 2$

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.

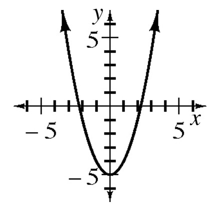
1-86. $2x - \frac{7}{6} = 3 - 3x$; $x = \frac{5}{6}$, $y = \frac{1}{2}$; $\left(\frac{5}{6}, \frac{1}{2}\right)$

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.

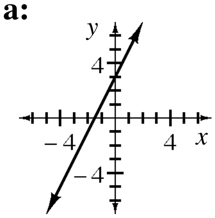


1-90. $y = 0$; $x = 0$

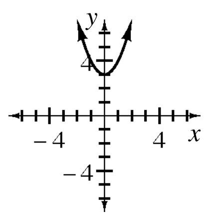
1-91. **a:** $x^2 - 1$ **b:** $2x^3 + 4x^2 + 2x$

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 $\left(-\frac{3}{2}, 0\right)$ 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 ~.

a: $\frac{n}{m}$ **b:** $\frac{m}{x}$

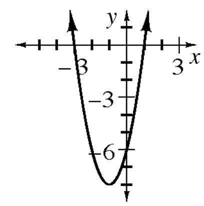
Lesson 1.2.2 Day 3

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: $y \geq -8$



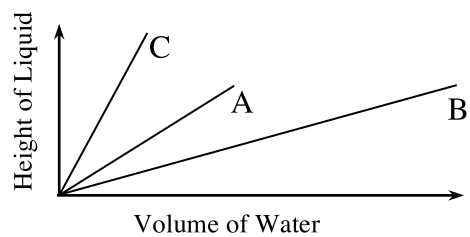
1-98. **a:** D: $-3 \leq x < 3$; R: $y = -2, 1, 3$

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:** $\frac{b^{10}}{a}$

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.

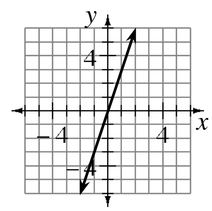
b: The typical number of cups sold in an hour is 29 as determined by the median. Looking at the shape of the distribution, we see that the median is a satisfactory representation of the distribution. The distribution has a skew. There is a gap between 60 and 70 cups. The IQR is 21 cups. 76 cups of coffee in one hour is an apparent outlier.

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

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

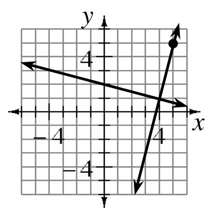


1-106. See graph at right.

a: See graph at right.

b: $y = 4x - 15$

c: (4, 1)

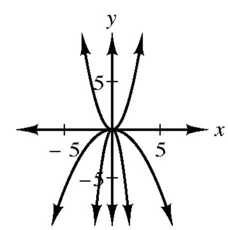


1-107. **a:** D: all real numbers except $x \neq 0$; R: all real numbers except $y \neq 0$

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)