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## Lesson 3.1.1

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**3-5.** a:  $4x^2 - 12x + 14$

b:  $\frac{81y^4}{x^4}$

**3-6.** a: 3

b: 4

c: 1

d: 5

e: 2

**3-7.** They are both correct:  $\frac{x^{12}y^3}{64}$ .

**3-8.** a: Horizontal line through  $(0, 3)$ , domain: all real numbers, range: 3

b: Vertical line through  $(-2, 0)$ , domain:  $-2$ , range: all real numbers

c:  $(-2, 3)$

**3-9.**  $m = 15, b = -3$

**3-10.** a:  $(4, 8, 4\sqrt{3}), (5, 10, 5\sqrt{3})$

b: The long leg is  $n\sqrt{3}$  units long, and the hypotenuse is  $2n$  units long.

**3-11.** a: 15, 21, 27, 33,  $t(n) = 6n - 3$

b: 27, 81, 243, 729,  $t(n) = 3^n$

**3-12.** a:  $\frac{1}{5}$

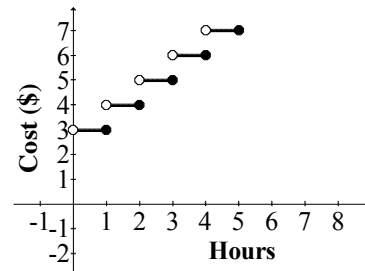
b: 3

c: 27

d:  $\frac{1}{8}$

## Lesson 3.1.2

- 3-23.** **a:** not equivalent      **b:** equivalent      **c:** equivalent  
**d:** equivalent      **e:** not equivalent      **f:** not equivalent
- 3-24.** **a:** equal if  $x = 0$       **e:** equal if  $x = 0$  or  $x = 1$       **f:** equal if  $a = 1$  or  $a = 0$
- 3-25.** **a:** Possibilities include  $x - 2 = 4$  or  $2x - 4 = 8$ .  
**b:** They have the solution  $x = 6$ .  
**c:**  $3 - x = 7, x = -4$
- 3-26.** **a:**  $t(n) = -3n + 17$ , points along a line with y-intercept  $(0, 17)$  and slope  $-3$ ;  
**b:**  $t(n) = 50(0.8)^n$ , points along a decreasing exponential curve with y-intercept  $(0, 50)$
- 3-27.** **a:** 4      **b:**  $-30$       **c:** 12      **d:**  $-2\frac{1}{4}$       **e:**  $x = -4, \frac{1}{3}$
- 3-28.**  $(0, 0)$  and  $(-6, 0)$
- 3-29.** **a:**  $2x^2 + 6x$       **b:**  $x^2 - 2x - 15$       **c:**  $2x^2 - 5x - 3$       **d:**  $x^2 + 6x + 9$
- 3-30.** The first graph opens downward, is stretched, and has its vertex at  $(-1, -3)$ .  
The second is the parent graph.
- 3-31.** **a:**  $(1, -4)$       **b:**  $(1, -4)$       **c:**  $(-2.5, -4.25)$   
**d:** Domain:  $-\infty < x < \infty$ , Range:  $y \geq -4.25$
- 3-32.** **a:**  $\frac{y^8}{x^{12}}$       **b:**  $-18x^3y + 6x^5y^2z$
- 3-33.** **a:** odd      **b:** even      **c:** even
- 3-34.** **a:** \$4.00      **b:** \$4.00  
**c:** \$4.00, \$5.00      **d:** See graph above right.  
**e:** No, it is a step function.      **f:** The graph will shift (translate) upward by \$2.00.
- 3-35.** **a:**  $(x+2)^2 + (y-13)^2 = 144$       **b:**  $(x+1)^2 + (y+4)^2 = 1$   
**c:**  $(x-3)^2 + (y+8)^2 = 16$
- 3-36.** **a:** 24 blocks per hr.      **b:** 18 blocks per hr.      **c:** 11.08 blocks per hr.



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## Lesson 3.1.3

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- 3-45.** a:  $n = -2$                       b:  $x = -4, 1$
- 3-46.** a: equivalent                      b: equivalent                      c: equivalent  
d: not equivalent                      e: not equivalent                      f: not equivalent
- 3-47.** d: equal if  $a = 0$  or  $b = 0$                       e: equal if  $x = 1$                       f: equal if  $x = 5$  and  $y = 2$
- 3-48.**  $10 = 15m + b$  and  $106 = 63m + b$ ;  $m = 2, b = -20, t(n) = 2n - 20$
- 3-49.** a:  $t(n) = 450000(1.03)^n$   
b: They will make \$154,762.37 or 34.39% profit.
- 3-50.**  $5xy(x + 2)(x + 5)$
- 3-51.** a: They both have the solution  $x = 2$ .  
b: She divided both sides of the equation by 150 and used the Distributive Property.  
c: Answers will vary.
- 3-52.** a:  $-6, -14, -22, -30, t(n) = 18 - 8n$   
b:  $\frac{2}{5}, \frac{2}{25}, \frac{2}{125}, \frac{2}{625}, t(n) = 50\left(\frac{1}{5}\right)^n$   
c: Answers will vary.
- 3-53.** a:  $5^{1/2}$                       b:  $9^{1/3}$  or  $3^{2/3}$                       c:  $17^{x/8}$                       d:  $7x^{3/4}$
- 3-54.** a:  $x^2 + y^2 = 36$   
b:  $(x - 2)^2 + (y + 3)^2 = 36$   
c:  $(x - 4)^2 + (y + 5)^2 = 36$
- 3-55.**  $\frac{741.8 - 25}{1800 - 0} = 0.4$  °F/sec

- 3-56.** a:                       b: Shift the graph up \$11.

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## Lesson 3.2.1

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**3-63.** odd numbers; 46<sup>th</sup> term: 91;  $n^{\text{th}}$  term:  $2n - 1$

**3-64.** after 44 minutes

**3-65.** **a:** 1.03      **b:**  $f(n) = 10.25(1.03)^n$       **c:** \$13.78

**3-66.**  $(y - 2)(y - 2)(y - 2)$

**3-67.** **a:**  $x^{1/5}$       **b:**  $x^{-3}$       **c:**  $\sqrt[3]{x^2}$       **d:**  $x^{-1/2}$   
**e:**  $\frac{1}{xy^8}$       **f:**  $\frac{1}{m^3}$       **g:**  $xy^3\sqrt{x}$       **h:**  $\frac{1}{81x^6y^{12}}$

**3-68.** Yes, he can.      **a:**  $x = 2$       **b:** Divide both sides by 100.

**3-69.** **a:**  $5m^2 + 9m - 2$       **b:**  $-x^2 + 4x + 12$   
**c:**  $25x^2 - 10xy + y^2$       **d:**  $6x^2 - 15xy + 12x$

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## Lesson 3.2.2

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**3-78.** **a:**  $\frac{x-4}{3x+2}$       **b:**  $\frac{5}{x-3}$       **c:** 2

**3-79.** **a:** 1      **b:** none      **c:** 2      **d:** 1

**3-80.** **a:**  $x - 2 = 4$       **b:** For each,  $x = 6$ .      **c:**  $x + 3 = 8, x = 5$

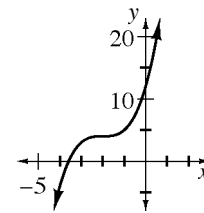
**3-81.** **a:**  $x < 0$       **b:**  $x \leq -4$

**3-82.** **a:**  $\frac{3}{7}$       **b:**  $\frac{5}{4}$

**3-83.** Graph shown at right.

**a:**  $y = x^3$ ; The vertex has been shifted up 4 and left 2.

**b:** It would not differ.

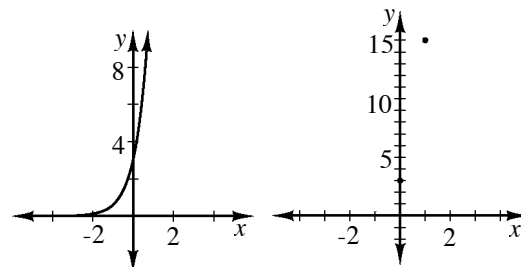


**3-84.** See graph at right.

**a:** Domain is all real numbers.

**b:** See graph at far right.

**c:**  $f(x)$  is a continuous function with range  $y > 0$  while  $t(n)$  is a discrete series with positive integer inputs.



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## Lesson 3.2.3

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3-90.  $\frac{2x}{3(2x-1)} = \frac{2x}{6x-3}$

b:  $\frac{x-4}{x+4}$

3-91. a:  $x \neq -4$  or  $2$ ,  $\frac{x+4}{x-2}$

b:  $x \neq -2$  or  $3$ ,  $\frac{2(x+2)}{(x-3)^2}$

3-92. Answers will vary.

3-93. a:  $(\frac{1}{3}, -2)$

b:  $(4, -9)$

3-94.  $n \cdot 3^{15} = 72$  million,  $n = 5$ ; There were 5 bacteria at first.

3-95. The function is even. A reflection across the y-axis results in the same graph.

3-96. a:  $m = 6$

b:  $x = 5.5$

c:  $k = 4$

d:  $x = 90$

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## Lesson 3.2.4

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3-102. a: Because if  $x = 4$ , then the denominator is zero. Since dividing by zero makes the expression undefined,  $x \neq 4$ .

b: a:  $x \neq -\frac{1}{3}$  and  $x \neq 5$ ; b:  $x \neq 3$  or  $-3$

c: Answers will vary.

3-103. a:  $\frac{8x+8}{(x-4)(x+2)}$

b:  $\frac{1}{x+2}$

3-104. a: all real numbers

b:  $-5 < x < 4$

c: no solution

d:  $x = \frac{1}{3}$

3-105. a:  $x - 4$

b:  $\frac{7m-1}{3m+2}$

c:  $\frac{(4z-1)^2}{z+2}$

d:  $\frac{x-3}{x-2}$

3-106. a: 1722

b: 1368

c:  $y = 1500(1.047)^{n+3}$

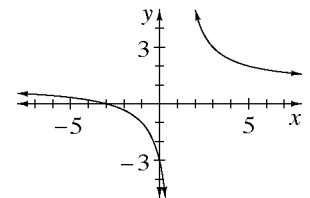
3-107. a:  $\frac{5(3x-1)}{2(4x+1)}$

b: 1

c: 3

d:  $-m^2$

3-108. See graph at right; x-intercept:  $(-2, 0)$ , y-intercept:  $(0, -2)$ ; there is no value for  $f(1)$ , which creates a break in the graph.



3-109. a: -15

b: -4

c: 3

d:  $-m^2$

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## Lesson 3.2.5

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**3-113.** a:  $\frac{2}{3x+1}$       b:  $\frac{x-7}{x-3}$       c:  $\frac{x-2}{2x+12}$       d:  $\frac{13x+31}{(x+5)^2}$

**3-114.** a: 1      b: 4      c: 2      d: 5

**3-115.** a:  $x = 3$       b:  $0 \leq x \leq 6$       c:  $x = 1$  or  $5$       d:  $x < 2$  or  $x > 4$

**3-116.** Domain: all real numbers; Range  $y \geq 0$ ;  $g(-5) = 8$   
 $g(a + 1) = 2a^2 + 16a + 32$ ,  $x = 1$  or  $x = 7$ ,  $x = -3$

**3-117.**  $x = -3$  or  $-11$

**3-118.** a: 1      b: 3      c: 2

**3-119.**  $(-3, 8)$  and  $(1, -12)$

**3-120.** a:  $\frac{x+1}{x^2-4}$       b:  $\frac{x+6}{2(x+2)^2}$       c:  $\frac{1}{x}$       d:  $-\frac{1}{2}$

**3-121.**  $x = 62$

**3-122.** a:  $y = -\frac{1}{2}x + 12$       b:  $y = \frac{2}{3}x - 15$

**3-123.** The width is 1.5 meters, and the outer dimensions are 8 m by 5 m.

**3-124.**  $80x + 0.5 = 100x$ , so  $x = \frac{1}{40}$  of an hour or 1.5 minutes.

**3-125.**  $\frac{6}{7}$

**3-126.** a:  $(5x-1)(5x+1)$       b:  $5x(x+5)(x-5)$

c:  $(x+9)(x-8)$       d:  $x(x-6)(x+3)$