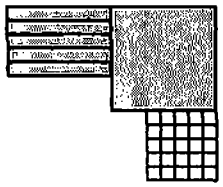
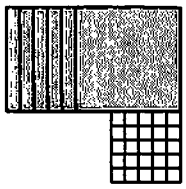
# Test Bank Solutions

## Chapter 1

1. a. $y^2 + x^2y + xy + 5x + y + 5$
   b. $16 + (\frac{1}{4})(4) + (\frac{1}{2})(4) + (5)(\frac{1}{2}) + 4 + 5 =$
   $16 + 1 + 2 + 2.5 + 4 + 5 = 30.5$
2. Answers will vary. Two examples:

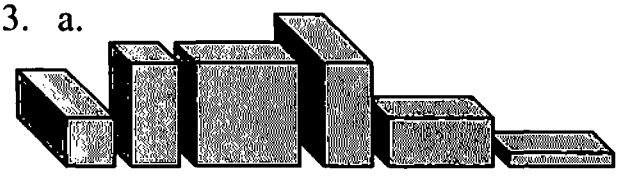


$A = y^2 + 5y + 25$
$P = 6y + 10$



$A = y^2 + 5y + 25$
$P = 4y + 20$

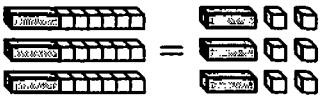
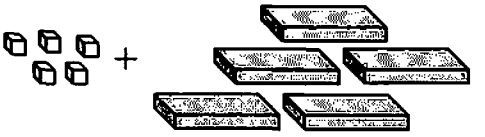
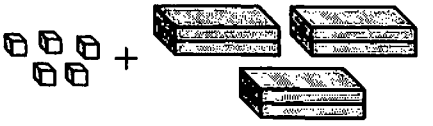
3. a.



$x^2y$ $x^2y$ $xy^2$ $xy^2$ $x^2y$ $xy$

b. $3x^2y + 2xy^2 + xy$
c. If $x = 0, y = 1$,
then $3x^2y + 2xy^2 + xy = 0$

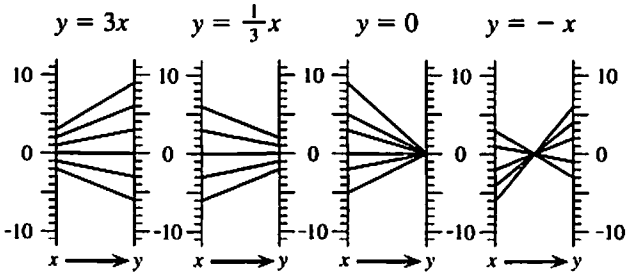
4. a.  You can't draw $x^4$.
b. 
c. 
d. 

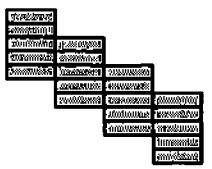
5. a. 
   Sometimes true. True when $x = 1$
   b.  Never true.
6. a. 
   b. 
   c. 
   d. 
7. a. $x = 2, y = 2$ b. $x = 1, y = 1$
8. $y(y + 3) = y^2 + 3y$
9. a. $x + 3$ b. $2y$ c. $3y$ and $4x$
10. $18x$

## Chapter 2

1. a. $x$ = Any positive number
   b. $x$ = Any number larger than 6
   c. $x$ = Any number larger than 6
   d. $x$ = Any negative number
   e. $x$ = Any number smaller than 6
   f. $x$ = Any number smaller than 6
2. a. $-3x$ b. $-3 - x$ c. $-3 + x$
3. a. Answers will vary. Some examples: $15 \cdot 2xy$; $5x \cdot 6y$; $2x \cdot 15y$; $30x \cdot y$; $30 \cdot xy$; $3 \cdot 10xy$
   b. Answers will vary. Some possibilities are: $30 \cdot x \cdot y$; $2x \cdot 3y \cdot 5$; $(-x)(15)(-2y)$

4. a. $4y - 20$ b. $5 - y$
   c. $x^2 + xy - 4x + y - 5$
5. $y = 3x$ 6. $y = \frac{1}{3}x$
7. $y = 0$ 8. $y = -x$




9. a. 

b.

| Figure # | Perimeter |
|---|---|
| 1 | $2x + 10$ |
| 2 | $4x + 14$ |
| 3 | $6x + 18$ |
| 4 | $8x + 22$ |
| ⋮ | |
| 10 | $20x + 46$ |
| ⋮ | |
| 100 | $200x + 406$ |
| ⋮ | |
| $n$ | $2nx + 4n + 6$ |

10. Answers will vary. One way is to draw a rectangle around the triangle and then subtract the areas of the right-angle triangles formed between the inner triangle and the rectangle.

## Chapter 3

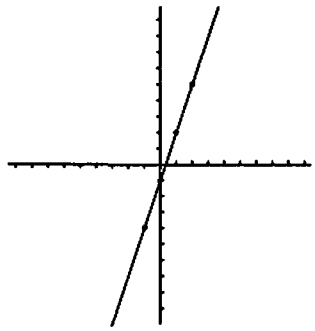
1. a. 13 b. -13 c. 1 d. 42
2. a. $x > 0$, $x$ = Any positive number
   b. $x < 0$, $x$ = Any negative number
   c. Not possible. All values of $x$ when raised to the fourth power will be positive.
   d. $x > \frac{1}{4}$ $x$ = Any positive number greater than $\frac{1}{4}$
   e. $x > 0$ $x$ = Any positive number
   f. $x > 0$ $x$ = Any positive number
   g. $x = \pm 2$
   h. $x = \frac{1}{4}$
3. a. (1) $x$
   (2) $6x$
   (3) $6x - 4$
   b. $6x - 4 = -1 \therefore 6x = 3; x = \frac{1}{2}$
4. a. $y = \frac{1}{2}(x - 3)$
   b. Multiply $x$ by 2 and then add 3.
   c. $y = 2x + 3$
5. a. Subtract 32 from the Fahrenheit temperature, then divide by 1.8.
   b. Add 273 to the above equation.
6. The correct equation is a.
7. a. 288°K b. 212°F
8. a. $16xy$ b. $14xy - 3x - 2y$
   c. $18xy + 6x^2y$
   d. $x^2 + 4xy + 2x + 3y^2 + 6y$
9. a. Less than, because $\frac{2}{N} < 1$
   b. Greater than, because dividing by less than one results in a larger number
10. a. Not possible
    b. Possible when the number subtracted is the larger of the two

## Chapter 3 • Additional Problems

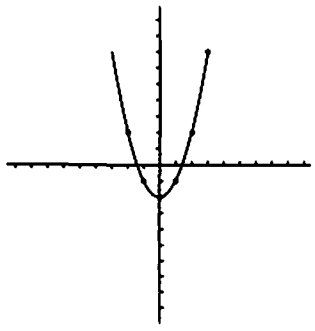
1. a. Does not exist
   b. 0
   c. 0
   d. Does not exist
   e. 0
2. Always. $\frac{1}{-x} = -(\frac{1}{x})$
   Examples will vary.
3. a. 1, -1 b. 0 c. 0 d. None
4. a. Answers will vary. $x > 1$ or $-1 < x < 0$
   b. Answers will vary. $0 < x < 1$ or $x < -1$
   c. Answers will vary. Any positive number
   d. Answers will vary. Any negative number
5. a. 1 b. The number is squared ($x^2$).

## Chapter 4

1. a. $y = \frac{8}{3}x$
   b. Answers will vary. $y = 8$ is a possible answer.
   c. $y = x^2 - 1$
2. (2, -9) and (-2, -9) are on the graph by substitution in the equation.
3. $y = -41$
4. $x = \pm 7$
5. a. Any number for $x$ less than zero
   b. Any number for $x$ greater than zero
   c. Not possible
   d. Not possible
6. a. Any negative number for $x$, or zero
   b. Not possible
   c. Not possible
   d. Any number for $x$
7. a.



   b. Answers will vary. Possible answers: (3, 8), (-2, -7)
   c. $y = 3x - 1$
8. a.



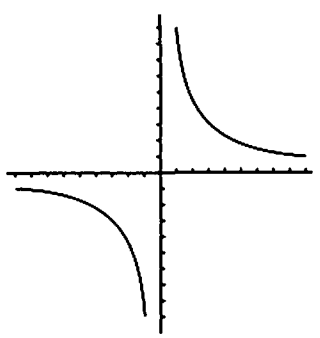
   b. Answers will vary. Possible answers: (-3, 7), (4, 14)
   c. $y = x^2 - 2$
9. a and b
10. Points that have the same $x$, $y$ ratio are on a line through the origin.
11. It does not. The ratios are the same, but the line does not pass through the origin.
12. No. Direct variation is defined as passing through the origin and having a constant $x$ to $y$ ratio.
13. a. The car started at some ($y$) distance from the house and remained stationary until the slope. The car moved away from the house until it stopped and was stationary for the second horizontal distance (Time). The car then returned home.
    b. The car started a distance ($y$) from the house and proceeded toward home. The horizontal line shows a stop for some ($x$) period of time after which the car proceeded home. Velocities will be determined by the slope of the lines and the units chosen.

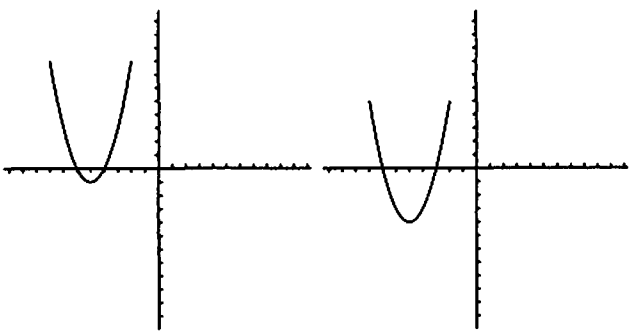
## Chapter 5

1. a. $x + y = -7$ b. $x + 2y = 0$
   c. Answers will vary. $x + y = S$, where $S > 0$.
   d. Not possible except when $x = 0$ and $S \neq 0$; ($y = \pm S$)
2. a. $xy = P$ where $P \neq 0$
   b. $xy = -5.2$
   c. $xy = 16$
   d. Not possible except $xy = 0$
3. $x + y = -9$
   $x \cdot y = 18$

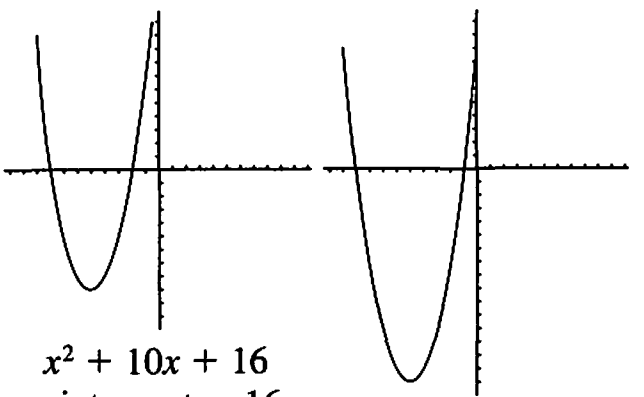
4. a. $120x^2$ b. $24x^2 + 30x$
   c. $8x^2 + 22x + 15$
5. b and c
6. a. $2x^2 + 7x + 5$ b. $2x^2 + 3x - 5$
   c. $2x^2 - 3x - 5$ d. $2x^2 - 7x + 5$
7. a. $x + 1$ b. $2x + 4y$
8. a. $x(x + 1)(x + 2)$
   b. $12x(3x + 1)(x + 4)$
9. Two. At $y = 0$ ($x$-intercepts)
   $(x + 2)(x + 4) = 0$ or $x = -2, -4$
10. 13, 24, 33, 40, 45, 48, 49
    $(x + 13)(x + 1)$ $(x + 12)(x + 2)$
    $(x + 11)(x + 3)$ $(x + 10)(x + 4)$
    $(x + 9)(x + 5)$ $(x + 8)(x + 6)$
    $(x + 7)(x + 7)$

## Chapter 5 • Additional Problems

1. 17 $(x + 1)(x + 16)$
   10 $(x + 2)(x + 8)$
   8 $(x + 4)(x + 4)$ or $(x + 4)^2$
2. 17 $(x + 1)(x + 16)$
   10 $(x + 2)(x + 8)$
   8 $(x + 4)(x + 4)$ or $(x + 4)^2$
   -17 $(x - 1)(x - 16)$
   -10 $(x - 2)(x - 8)$
   -8 $(x - 4)(x - 4)$ or $(x - 4)^2$
3. 
   Neither $x$ nor $y$ can be zero, therefore the curve cannot pass through the origin, nor can it touch either axis.
4. Two negatives cannot add to a positive.
5. 63
6. $\frac{B(B+1)}{2} - \frac{T(T-1)}{2}$
7. a. $(x + 0)(x + 10) = x^2 + 10x$
   $(x + 1)(x + 9) = x^2 + 10x + 9$
   $(x + 2)(x + 8) = x^2 + 10x + 16$
   $(x + 3)(x + 7) = x^2 + 10x + 21$
   $(x + 4)(x + 6) = x^2 + 10x + 24$
   $(x + 5)^2 = x^2 + 10x + 25$
   b. $(x + 5)^2 = x^2 + 10x + 25$
8. a. $x^2 + 10x + 24$
   $x^2 + 10x + 21$
   $x^2 + 10x + 16$
   $x^2 + 10x + 9$



$x^2 + 10x + 24$ $x^2 + 10x + 21$



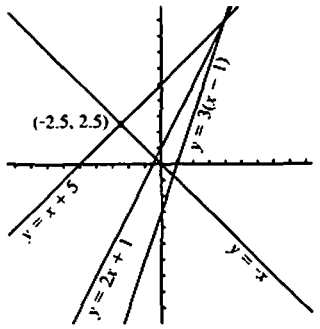
$x^2 + 10x + 16$
$y$-intercept = 16

$x^2 + 10x + 9$
$y$-intercept = 9

   b. $x^2 + 10x + 25$
9. They are the same. $y = x^2 + 10x + 25$ has one $x$-intercept because $x^2 + 10x + 25 = (x + 5)(x + 5)$, so only $x = -5$ makes $y = 0$.
10. a. $30 - 8x$ b. $6 - 2x$
    c. $6x^2 - 26x + 24$ d. $24 - 2x$

## Chapter 6

1. and 2.

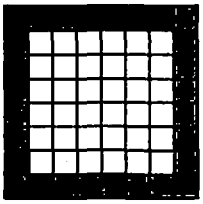
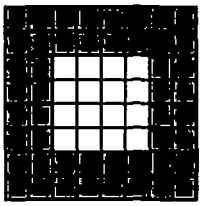



3. a. -2.5 b. $-\frac{1}{3}$ c. 4 d. $\frac{1}{4}$
4. $-\frac{1}{3} > x > -2.5$ or $-2.5 < x < -\frac{1}{3}$
5. a. $x < 3.5$ b. $x < 5$ c. $x < 2.5$
6. a. $x = 14$ b. $x = 101$
   c. $y = -\frac{16}{11}$ d. $d = 1$
7. a. $y = 3 - 2x$ b. $y = 2x - \frac{8}{3}$
8. a. \$15.45 b. \$10.95 + \$3$T$
   c. \$$P$ + \$$nT$
9. 43.7 inches or 3.64 feet

## Chapter 6 • Additional Problems

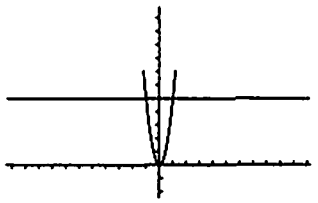
1. a. $R$ + 1 mile per day
   b. end of September
   c. $R + \frac{M}{4}$ miles
   d. $M = 4(12 - R)$ for $R \leq 12$
2. a. FCP = \$7.50 for $n \leq 60$
   FCP = \$7.50 + \$0.15 $(n - 60)$ for $n > 60$
   b. SDP = \$0.20$n$
3. Answers will vary. Graph or chart may be used.
   FCP = SDP at $n = 37.5$
   $0.2n = 7.50$ $n = 37.5$
   SDP is better when $n < 37.5$

## Chapter 7

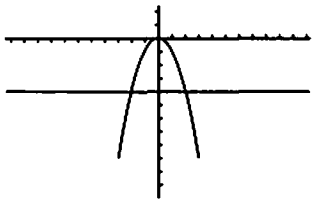
1. a. $2x^2 - 2x - 24$
   b. $y^2 - x^2 + yz - xz$
2. a. $a^2x^2 + 2abx + b^2$
   b. $a^2x^2 - 2abx + b^2$
   c. $a^2x^2 - 2abx + b^2$ or $b^2 - 2abx + a^2x^2$
   d. $b^2x^2 + 2abx + a^2$
3. a. $25b^2 + 80bc + 64c^2 = (5b + 8c)^2$
   b. $\frac{1}{16}x^2 + \frac{1}{2}xy + y^2 = (\frac{1}{4}x + y)^2$
4. a. $(y - b)$
   b. $a$; $6ay$ $[(3y + a)^2 = 9y^2 + 6ay + a^2]$
5. a. $\pm 7$ b. $\pm\frac{2}{5}$ c. 4
6. a. $-4 < x < \frac{1}{2}$ b. $-1 < x < 0$
7. a. $(3x + 4)(3x - 4)$
   b. $(4 + 3x)(4 - 3x)$
   c. $(3x - 4)^2$
8. a. Scientific notation is defined as a power of base 10.
   b. $1.024 \times 10^3$
9. a.  b. 
10. a. $4(n - 2) + 4 = 4n - 4$ blue border tiles, $(n - 2)^2$ red interior tiles.
    b. $4n - 4 + (n^22)^2 = 4n - 4 + n^2 - 4n + 4 = n^2$
11. a. $8(n - 4) + 16 = 8n - 16$ blue border tiles
    b. $8n - 16 + (n - 4)^2 = 8n - 16 + n^2 - 8n + 16 = n^2$ red interior tiles.
12. Additional border tiles = new border − old border = $(n - 1)^2 - (n - 2)^2 = 2n - 3$. Additional interior tiles = $[4(n + 1) - 4] - (4n - 4) = 4$.

## Chapter 7 • Additional Problems

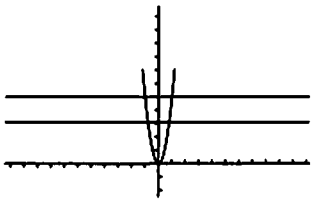
1. a. $-5 < x < 5$
   b. $x < -5$ or $x > 5$



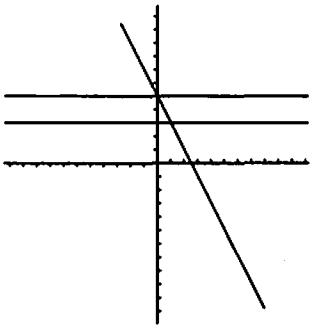

   c. $x < -2$ or $x > 2$
   d. $-2 < x < 2$




   e. $-5 < x < -4$ or $4 < x < 5$




   f. $0 < x < 1$




2. a. $9 + 6y + y^2$ b. $\frac{x^2}{16}$
   c. $4x^2 - 12x + 9$ d. $16x^2$
3. a. $x^2 - 2x - y^2 + 1$
   b. $9x^2 + 36xy + 36y^2 - 4$
   c. $a^2 + 2ab - 2ac + b^2 - 2bc + c^2$
   d. $a^2 - b^2 + 2bc - c^2$
4. a. $(xy - a)^2 = x^2y^2 - 2axy + a^2$
   b. $a^2b^2 - c^2 = (ab - c)(ab + c)$
5. a. $3(x + 5)(x - 5)$ b. $4(x + 5)^2$
   c. $4(x - 5)^2$ d. $12x(y + 3)^2$

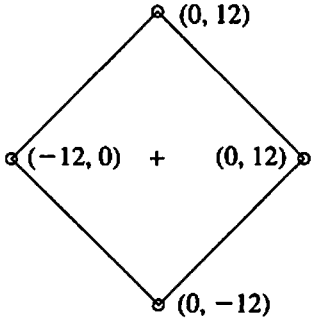
## Chapter 8

1. a. -7 b. $-\frac{1}{7}$ c. $-\frac{1}{4}$ d. -4
2. a. When $x$ moves positive, $y$ moves negative.
   b. $m = -5, b = 8$
3. a. Not possible
   b. Not possible
   c. Not possible
   d. $y = 0x + b$, when $b \neq 0$
4. a. Possible. Any 2 lines with same $b$, different $m$. Answers will vary.
   b. Not possible. All lines of slope $m$ will be parallel.
5. $y = 2x + b$
   All lines of slope 2 will be parallel.
6. a. Answers will vary. Any equation where $m < 1$ and $b = 4$ will satisfy the conditions.
   b. Answers will vary. Any equation where $m > -1$ and $b \geq 0$
7. a. $y = -4$ b. $x = 5$
8. a. 180 grams b. $20 \cdot 3^x$
9. a. $4^4$ b. $4^5$ c. $4^3$ d. $4^{3.5}$
10. $5^{24}$
11. a. 3 b. 81
12. a. $6 \times 10^7$ b. $6 \times 10^{-5}$
13. a. $6^4$ b. $2^5$
14. a. $4 \cdot 10^2$ b. $\frac{1}{4}M^3$ c. $4P^4$

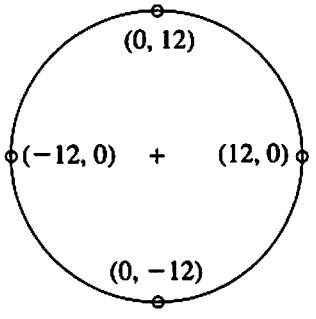
15. a. \$1210
    b. Simple interest is calculated only on the principal. Compound interest is calculated on the principal plus accumulated interest.
    c. At 2 years
       Mr. G: $\$20{,}000(1.05)^2$
       Ms. B: \$22,000 + 2(1210)
       At 5 years
       Mr. G: $\$20{,}000(1.05)^5$
       Ms. B: \$22,000 + 5(1210)
    d. 14
16. $5^{2x}$

## Chapter 9

1. a. 20 b. $|5 - y|$
2. -4 and 2
3. a. 0 b. 1.25 c. $\frac{x+y}{2}$
4. (0, 6)
5. a.



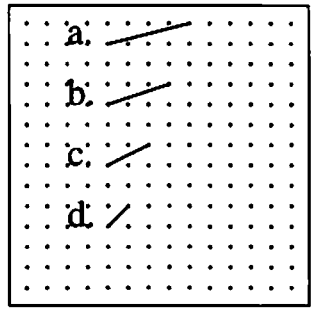

   b.




6. a. 17 b. $-\frac{8}{9}$ c. 12.04
7. a. $5\sqrt{2}$ b. $y\sqrt{2}$
8. a. $\frac{5}{\sqrt{2}}$ b. $\frac{y}{\sqrt{2}}$
9. a. $5\sqrt{10}$ b. $\sqrt{50}$
   c. $6\sqrt{50}$ d. $6\sqrt{10} + 3\sqrt{50}$
10. 12, $\sqrt{5}$ 3, $4\sqrt{5}$ 2, $6\sqrt{5}$
11. a. $2\sqrt{5}$ b. $2\sqrt{10}$ c. $2\sqrt{15}$
    d. $4\sqrt{5}$ e. 10
12. a. $3\sqrt{2}$ b. $20 - 3\sqrt{5} - \sqrt{35}$
    c. $4 + \frac{13}{2}\sqrt{2}$ d. $10\sqrt{3}$
13. a. 12,712,084 b. 12,621,673

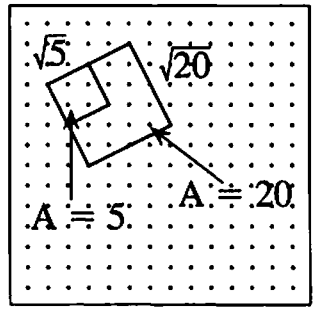
## Chapter 9 • Additional Problems

1. a. Answers will vary.
   An example is $x = 1$, or any positive number
   b. Answers will vary.
   An example is $x = -4$, or any negative number
   c. $x = 0$
2. a. $\frac{1}{4}$ b. $\frac{1}{4}$ c. $-\frac{1}{4}$ d. 4
3. a. True b. True c. False
   d. False e. False
4.




   a. $\sqrt{17}$
   b. $\sqrt{10}$
   c. $\sqrt{5}$
   d. $\sqrt{2}$

5. a.

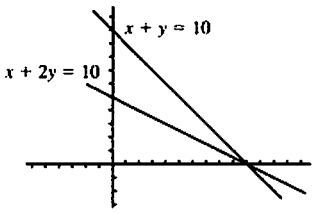



   b. The side of the square with area = 20 is twice the side of the square with area 5, so $\sqrt{20} = 2\sqrt{5}$.

6. a. 12 times
   b. 144 times ($12^2$)
   c. 1728 times ($12^3$)

## Chapter 10

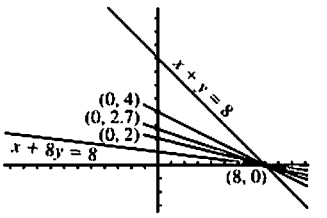
1. a. (0, 4)
   b. Infinite. Equations are equivalent.
   c. (5, 1.5)
   d. (-1, -2)
2. Answers will vary. One method using $ax + by = c$ is to make up values for $a$ and $b$. Substitute the known values of $x$ and $y$, and solve for $c$. Put that value of $c$ in the equation.
3. a. Answers will vary. Possible answers are: (4, 10) (2, 4) (0, -2) (1, 1) (-2, -8)
   b. Yes
   c. $y = 3x - 2$
4. a. $x - 2y = -2$ or $y = \frac{1}{2}x + 1$
   b. $x - 2y = 14$ or $y = \frac{1}{2}x - 7$
5. $a$, $b$, and $f$ are parallel.
   $c$ and $d$ are parallel.
6. quart = \$0.78
   half-gallon = \$1.12
7. a.




   b. $x + y = 10$
   c. Yes, at (10, 0)

## Chapter 10 • Additional Problems

1. $t = 4$
2. a. Answers will vary.
   All will have $2W + 2L = 80$
   b. Answers will vary.
   All will have $L = W + 5$
   c. $2W + 2L = 80$
   $L = W + 5$
   $2W + 2(W + 5) = 80$
   $4W + 10 = 80$
   $4W = 70$
   $W = 17.5$
   $L = 17.5 + 5 = 22.5$
3. Answers will vary. Examples: $y = -x + 2$, $y = x + 8$, $y = -2x - 1$. The equation of any line that is satisfied by substituting (-3, 5)
4. \$24.95/day
   \$0.20/mile
5. Warren drove 1 hour 27 minutes and traveled 72.5 miles at highway speeds.
6. a. and b.




   c. $x + y = 8$
   d. $x + 8y = 8$
7. Answers will vary. Examples: $x + 2y = 10$, $x + 4y = 10$
8. Answers will vary. Examples: $x + 2y = 10$, $x + 4y = 20$

## Chapter 11

1. a. 0.24
   b. 0.248
   c. 0.2496
   d. $\frac{1}{4}(1 - (\frac{1}{5})^n)$
2. $\frac{1}{4}$
3. a. Geometric $r = \frac{3}{5}$

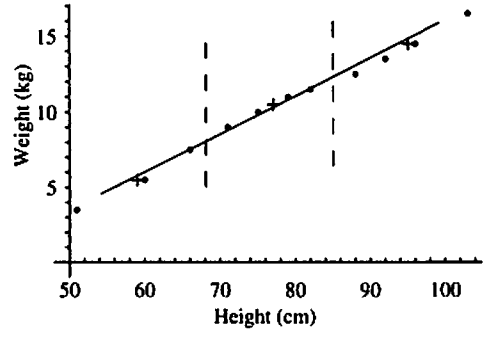
b. Geometric $r = \frac{1}{5}$

c. Arithmetic $d = 3$

4. $10.\overline{6}$
5. a. Converges to $10.\overline{6}$
   b. Does not converge
   c. Does not converge
6. $0.\overline{3}$
7. a. $\frac{3}{90}$
   b. $0.0\overline{3}$
8. a. $\frac{4}{25}$
   b. 0.16
9. One has an odd number of prime factors and the other has an even number. Since each number has a unique prime factorization, these two numbers cannot be equal.
10. $\frac{3}{7}$
11. a. Fair. The dime is the only coin that affects the winner, and it has a 50% chance of being heads.
    b. Not fair. There is a 50% chance of the quarter's landing heads, but a $\frac{7}{16}$ chance that the quarter and another coin will land heads, making the odds favor Player B.
12. a. $1.917 \times 10^{13}$ miles
    b. 0.3 parsec
13. a. Always. A rational number is the ratio of any two integers.
    b. Sometimes. The equation results in reciprocals of only odd numbers. Some of these will result in a terminating decimal, e.g., $x = 2, x = 12, x = 312$.

## Chapter 12

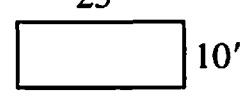
1. a. 12 mph
   b. 5 minutes
2. a. 51.4 mph
   b. 58.2 mph
   c. 46.05 mph
3. a. Average speed is obtained by dividing total distance by the total time. Average speed is the average of the speeds only when equal times are spent at each speed.
   b. 51.4 because closest to = times at each speed; 46.05 because most time spent at 45 mph; 58.2 because most time spent at 60 mph
4. 425
5. Answers will vary. An example plot is shown.




6. Results may vary slightly in 6, 7, 8, and 9, but they should be close to the following:
   a. $y = \frac{1}{4}x - 9$
   b. $m = \frac{1}{4}$
7. 17.5 kg
8. 10.75
9. 0.25 kg

## Chapter 13

1. $L = 2W + 5$
   $L = 25$
   $W = 10$
   $A = 250$ square feet




2. a. $L = 40, W = 2.5$
   b. $L = W = 21.25$
3. a and b have the same intercepts, $x = 9$

d and e have the same intercepts, $x = 6$

4. a. one
   b. one
   c. two
   d. two
   e. one
   f. one
5. $2.25
   450 people
6. Answers may vary. Examples:
   a. $y = x^2 - 3x - 10$ or $y = (x + 2)(x - 5)$
   b. $y = (x + 2)^2 + 6$
   c. $y = x^2 - 4$
   d. $y = 5x^2 - 40x + 75$ or $y = 5(x - 3)(x - 5)$
7. a. $x = 5, x = 4$
   b. $x = \pm 2\sqrt{3}$
   c. $x = 0, x = 12$
   d. $x = 0.9, x = 11.1$
   e. $x = 0.8, x = 11.2$
   f. $x = -0.7, x = 12.7$

## Chapter 13 • Additional Problems

1. Solutions will vary. Examples:
   $y = 2(x - 2)(x + 3)$
   $y = -(x - 2)(x + 3)$
   $y = 3(x - 2)(x + 3)$
2. Solutions will vary. Examples:
   $y = \frac{1}{2}(x + 1)(x + 5)$
   $y = \frac{1}{2}(x + 3)^2 - 2$
3. a. 6 cm-by-6 cm square
   b. $V = 600\ cm^3$
      $S = 680\ cm^2$
4. a. $160.05
   b. $211.25, 6500
   c. $150; free?
   d. Answers will vary.
5. 12 and 9
6. 28 and 28
7. a. (-1, -12)
   b. (-2, -5)
   c. (3, 1)
8. $x = -2, x = 5$

## Chapter 14

1. a. $\frac{x}{12x}$ b. $\frac{144x}{12x}$
   c. $\frac{144x^2}{12x}$ d. $\frac{144xy}{12x}$
2. a. $\frac{x + 6}{x}$ b. $\frac{y^2 + 4}{y}$ c. $\frac{6y + 4x}{xy}$
   d. $\frac{b(2 + b)}{2a}$ e. $\frac{a(b + c)}{bc}$
3. $\frac{6}{5}$
4. $\frac{3}{x - y}$
5. $\frac{y + 6}{y + 5}$
6. $\frac{1}{x + 1}$
7. Not possible
8. $2x - 1$
9. $5n$
10. $\frac{1}{2(2a + b)}$
11. $\frac{1}{3}$
12. a. Always true
    b. Sometimes true. When $x = y = 1$
    c. Always true
    d. Sometimes true. When $y = 0$
13. a. Solutions to an equation are not changed when dividing all terms by the same nonzero amount, but you can't divide by $x$, because $x$ might $= 0$.
    b. $5x^2 - 20x = 0$
       $5x(x - 4) = 0$
       $x = 0, 4$
14. a. $(x + 7)(x + 1); x = -7, x = -1$
    b. $(x - 1)^2; x = 1$
    c. $x^2 + 6x + 4 = 0;$
       $x = -3 \pm \sqrt{5}, x = -5.236, x = -0.764$

d. $x^2 + 6x - 4 = 0$;
$x = -3 \pm \sqrt{13}$, $x = -6.6$, $x = 0.6$

15. a. Results may differ slightly depending on method used.
Vertex: (-0.65, -10.3)
$x = 1.2$, $x = -2.5$ or $x = -\frac{2}{3} \pm \sqrt{\frac{31}{9}}$
$y = -9$ at $x = 0$

b. Vertex at (1.5, 49)
$x$-intercepts: $x = 5$, $x = -2$
$y$-intercept: $y = 40$ at $x = 0$

16. $y = (x - 2)^2 - 7$
$= x^2 - 4x + 4 - 7$
$= x^2 - 4x - 3$

17. a. 1

b. $\frac{(x + 2)^2 + 1}{x + 2}$

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

d. $(x + 2)^2$

18. a. $\frac{2}{x}$

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

c. $\frac{x}{2x + 1}$

d. $\frac{x}{x + 2}$