Quiz Bank Answers

Chapter 1

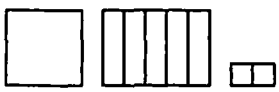
[1.1] 6

[1.1] 

[1.2] 12, 14, 16

[1.2] 90

[1.2] 28

[1.3] 

[1.4] 26

[1.4] a)

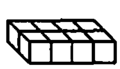
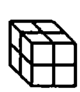
◊	Δ
0	0
3	2
6	4
9	6

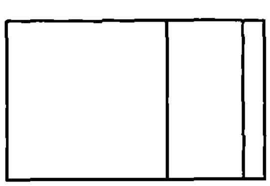
Answers will vary. Any values in ratio 3:2 are correct.

b) Δ = 1 is the only possible value because if Δ + 2 = 3Δ, then 2Δ must equal 2.

c) No value. A number cannot be 5 more than itself.

[1.5] a) 

b)  c) 

[1.5] 

length = $y + x + 1$, width = y, area = $y^2 + xy + x$

[1.6] a) 0 b) 1 c) 3

[1.6] 3

[1.6] $x^2 + 2xy + 3x + 5$

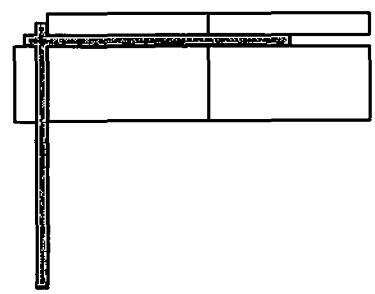
[1.6] $4x^2 + 4x + 4$

[1.7] a) area = $3y$, perimeter = $2y + 6$

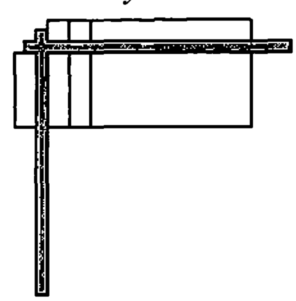
b) area = $xy + 2$, perimeter = $2y + 2x + 2$

[1.8] a) \$26 b) \$39

[1.9] a) $2xy$



b) $2x + xy$



[1.10] $2xy + 2x + 2y$

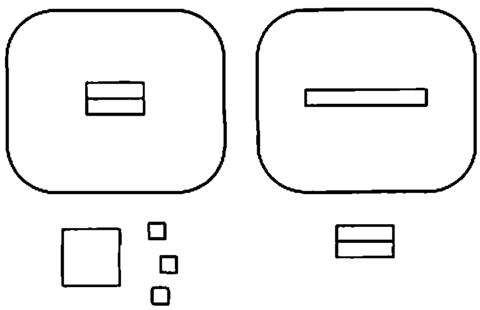
[1.11] 50th rectangular number is 50(51) = 2550. 50th triangular number is half that, 1275.

[1.12] Area = 10. Explanations will vary.

Chapter 2

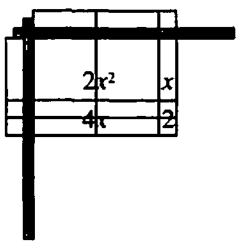
[2.1] first: negative or opposite
second: subtract
third: opposite

[2.2] a) b)



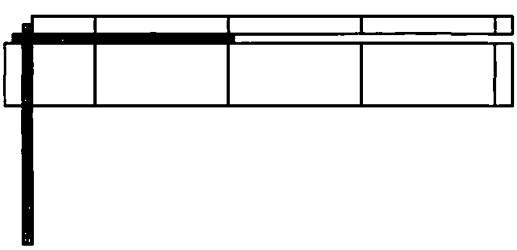
[2.2] a) $3 - 3x$ b) $7 - 2x$

[2.3] a, b)

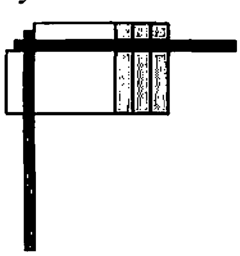


c) $2x^2 + 5x + 2$

[2.3] $x(x + 3y + 1)$

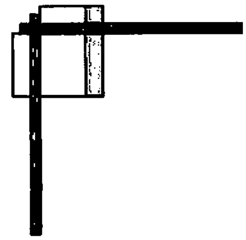


[2.4] $xy - 3x$



[2.4] $12y + 6xy - 3y^2$

[2.4] a)



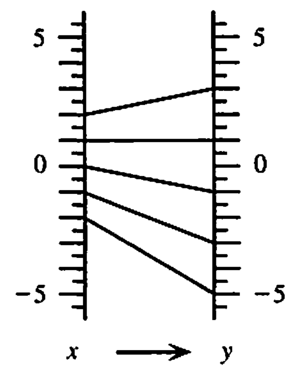
b) $x \cdot (x - 1) = x^2 - x$

[2.5] a) \$243 b) 3^{n-1}

[2.6] \$3.60

[2.6] 377, 610

[2.7] Answers will vary.



[2.7]

Input	Output
2	7
−4	−11
0.5	2.5
5	16
$1\frac{2}{3}$	6

[2.8] a) 150 miles

b) 50 mph. For the first 3 hours, as the time increases by 1 hour, the distance increases by 50 miles.

c) 60 mph

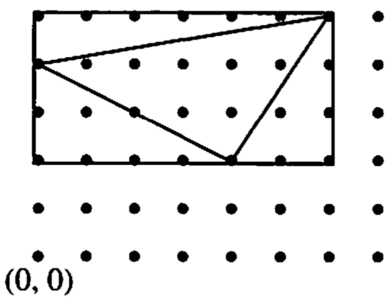
[2.9] a) i, ii, iv b) i, iii, v

[2.10]

Figure #	4	10	n
Perimeter	14	26	$2n + 6$

[2.11] 32

[2.12] Area = 8. Surrounding rectangle has area 18; corner triangles have areas 4, 3, and 3.
So $18 - 4 - 3 - 3 = 8$.



[2.12] a) 15

b) It has no effect; the area stays 15.

c) area = $3 \cdot n$

Chapter 3

[3.1] a) \$800

b) \$1000 is the break-even point, so investments above that will make money.

[3.2] For negative values of x, because then when you calculate the y-value you'll be subtracting a negative number from 3, which is the same as adding a positive number, so it gives an answer bigger than three.

[3.2] $-70xy$

[3.3] $2x + 4 - 3y$

[3.3] $-2x^2 + 3x - 7$

[3.4] step 6: Divide by three. (Answers may vary.)

[3.5] $2x - 5 < 2x + 2$

[3.5] a) $x^2 - 5 - x > x^2 - 10 - x$

b) Depends on x. Any $x > 0$ makes $5 - x > 5 - 3x$. Any $x < 0$ makes $5 - x < 5 - 3x$.

[3.6] $2x + 3$

[3.6]

	x	$+2$	$-x$
x	xy	$2x$	$-x^2$
$+3$	$3y$	6	$-3x$

answer = $xy - x^2 - x + 6 + 3y$

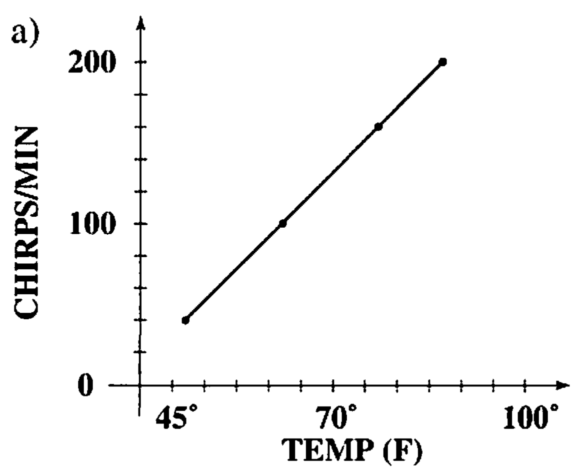
[3.7] answers may vary: $a = 5/3$, $b = 7$

[3.7] a) 3 b) 1/3

c) They are reciprocals, because multiplying by three is the same as dividing by the reciprocal of three.

[3.8] 122°F

[3.8] a)



b) Approximately 130 chirps per min.

c) As the graph shows, each time the temperature goes up 1°, the chirps go up about 4. To check with the chart, observe that when the temperature increases by 15°, the chirps increase by 60.

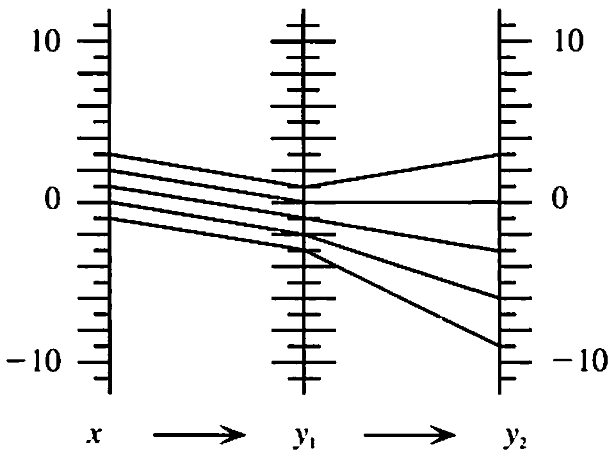
[3.9] $7 - 5(x - 3) = 6$

$5(x - 3) = 1$

$x - 3 = \frac{1}{5}$

$x = 3\frac{1}{5}$

[3.10] a)



b) $y = 3(x - 2)$

[3.10] Subtract three, then divide by four; or $y = \frac{x - 3}{4}$

[3.11] 1 florin

[3.11] a)

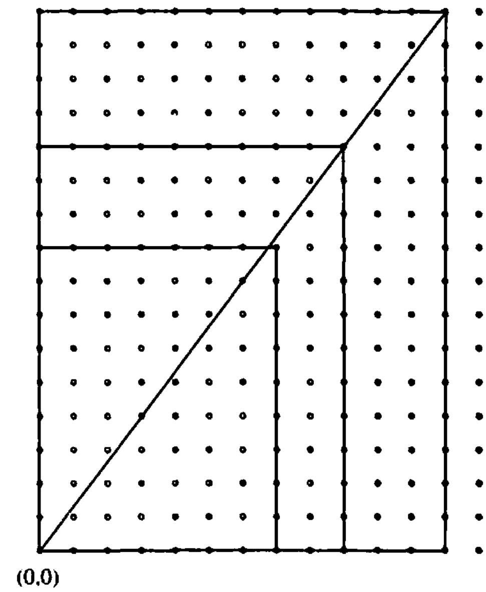
sum	Ro	Sham	Bo
Ro	Ro	Sham	Bo
Sham	Sham	Bo	Ro
Bo	Bo	Ro	Sham

b) Ro. When Ro is added to another day the sum is that day.

c) Sham and Bo are Calendar Opposites because they add up to make Calendar Zero. Ro is its own Calendar Opposite.

[3.12] (0, 0) (3, 0) (3, 4) (0, 4)

[3.12] The ratios are 12/9 = 1.333..., 16/12 = 1.333..., 9/7 = 1.286, so the 9 by 12 and 12 by 16 rectangles are similar. On dot paper, their diagonals coincide.



Chapter 4

[4.1] a) $5H$ miles, because Gabe gains 5 miles for each hour that they travel.

b) Each person's graph will be a line through the origin. Gabe's greater speed will cause his line to rise more steeply.

c) 3 hours

[4.2] No, because when 3.4 is substituted for x, the resulting y-value is 0.2, not 0.

[4.2] 5

[4.3]

x	x^2	$-x^2$	$(-x)^2$	x^3	$-x^3$	$(-x)^3$
3	9	−9	9	27	−27	−27
−2	4	−4	4	−8	27	27

[4.3] $y_2 = x^2$ and $y_4 = (-x)^2$; $y_6 = -x^3$ and $y_7 = (-x)^3$.

[4.3] 3

[4.3] Answers will vary.

a) Any horizontal line

b) Any slanted line

c) Any parabola

d) Any cubic

[4.4] Answers are of the form $y = Ax^2 + Bx + 4$, for $A \neq 0$.

[4.4] Answers are of the form $y = Ax^3 + Bx^2 + Cx + 0$, for $A \neq 0$.

[4.4] $(0, -6)$

[4.4] $(3, 0)$

[4.5] x, y must be in the ratio 2:3, so $(2, 3)$, $(4, 6)$, and any point $(2k, 3k)$.

[4.5] $y = \frac{3}{2}x$

[4.6] In both Bea's and Gabe's tables, each time volume increases by 10 ml, weight increases by 13 g.

[4.6] A line through the origin.

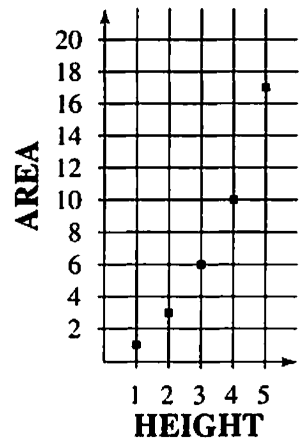
[4.6] The ratio of the coordinates is constant (except for the point $(0, 0)$ which is always included). Also, y is always a constant multiple of x.

[4.7] a) Answers will vary. The line through the origin and $(18, 10)$ comes close to all the points. Its equation is $y = \frac{5}{9}x$, so the density is approximately $\frac{5}{9} = 0.555$.

b) The three sample densities are $\frac{7}{12} = 0.586$, $\frac{2}{4} = 0.5$, and $\frac{10}{19} = 0.526$. The average of these is 0.537, which is another estimate for the density of the mystery substance.

[4.8]

Height	Area
1	1
2	3
3	6
4	10
5	17



[4.9] a) 220.5 ft b) 80 ft

[4.10] a) 4 minutes

b) The train goes instantly from speeding up to slowing down

c) D and E

[4.11] a) $x = 2$

b) x must be larger than 2, but y can be anything.

c) $x < 2$

[4.12] a) 24 b) 64

Chapter 5

[5.1] a) Impossible. If the in-out line (a, b) is in the diagram, so is the line (b, a). One slants up and the other slants down.

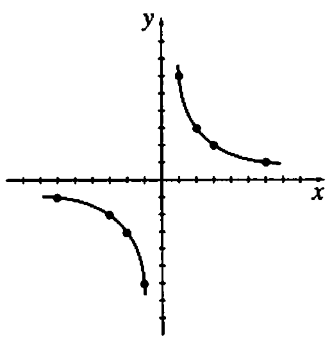
b) $x + y = 8$

c) $x + y = -4$

d) Impossible. If the constant sum is positive, the graph is in quadrants I, II, IV; if negative, II, III, IV; and if zero, II and IV.

e) Impossible. The two pairs given have different sums.

[5.2] a)



b) Answers will vary. Example: (0.1, 60)

[5.2] Any point on the x- or y-axis has one coordinate of zero, so the product of its coordinates is zero. Therefore, the only constant product graph that could contain any of those points is $xy = 0$. That graph doesn't cross the axes; it *is* the axes.

[5.3] $3x + y - 2$

[5.4] $x(x + 6) = x^2 + 6x$

$(x + 1)(x + 5) = x^2 + 6x + 5$

$(x + 2)(x + 4) = x^2 + 6x + 8$

$(x + 3)(x + 3) = x^2 + 6x + 9$

[5.4] $(x - 5)(x - 7)$

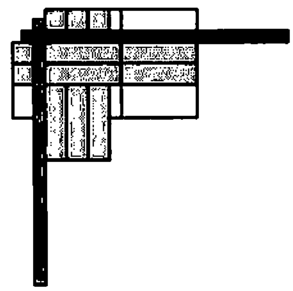
[5.5] x-intercepts are (4, 0) and (5, 0). Because the function has factors of $(x - 4)$ and $(x - 5)$, if x equals either 4 or 5, y will equal 0.

[5.5] $y = -(x - 6)(x + 1)$

[5.6] $5x(3x - 2)$

[5.6] $x(x + 1)(x + 2)$

[5.7] $2x^2 - 7x + 6$



[5.8] \$0.53

[5.9] The staircase 10 + 11 + ... + 17 has 8 steps. Placing a second copy of the staircase upside down on the first forms an 8 by 27 rectangle. The sum of the staircase is $(8 \cdot 27)/2 = 108$. By Gauss's method we write the staircase twice:

$$\begin{array}{l} 10 + 11 + \ldots + 16 + 17 \\ \underline{17 + 16 + \ldots + 11 + 10} \\ 27 + 27 + \ldots + 27 + 27 = 8 \cdot 27. \end{array}$$

The sum of the staircase is half that, or 108.

[5.10] $200^2 = 40{,}000$

[5.10] 3504

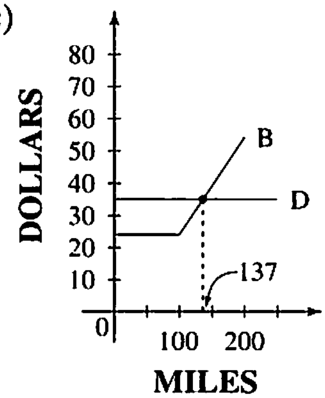
[5.11] Mean = (18 + 1018)/2 = 518.
Sum = (201)(518) = 104,118.

[5.12] s

[5.12] a) (4, 4) b) N^4E^4

Chapter 6

[6.1] a) and c)



b) at least 137 miles

[6.1] The sale cost is \$29.95 per day, with 100 "free" miles, and \$0.25 for each additional mile.

[6.2] a) Answers will vary.
$3x - 1 < x + 9$ when $x < 5$.
$3x - 1 > x + 9$ when $x > 5$.

b) $x = 5$

[6.2] $2 + 2x$

[6.3] a) $3x + 5 - 8 = 5 - x$

b) Sequence of equations will vary.

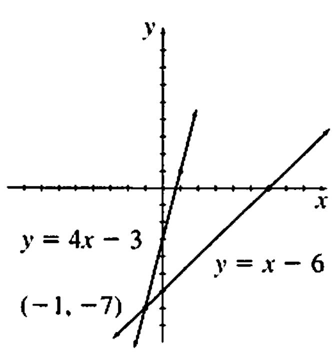
c) $x = 2$

[6.4] a) identity: solution is all numbers

b) $x = 9$

c) no solution

[6.5] a)



b) The graphs intersect at $(-1, -7)$, and $y = x - 6$ is below $y = 4x - 3$ for all x's to the right of that point, so the solution is $x > -1$.

c) $x > -1$

[6.6] a) $675 + 22n$

b) $675 + 22n = 1199$, so $n = 23.8$. It will take Abel 24 weeks.

[6.7] a) $12y - 4$ b) $3y$

[6.7] about 10.29 meters

[6.7] 24 years old

[6.8] a) $x = 45$ b) $x = 26$

[6.8] $x = \dfrac{2}{7}$

[6.8] $y = 4 - 2.5x$

[6.9] $x = 4.5$

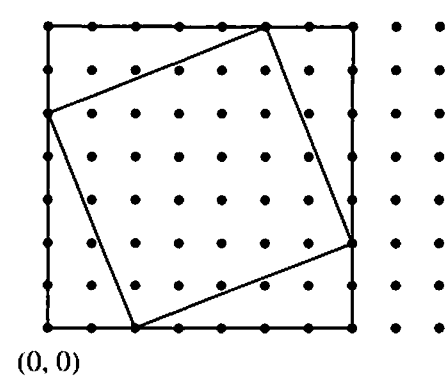
[6.10] $\dfrac{13 + 0.5x}{20 + x}$

[6.11] a) $\dfrac{3}{64}$ times

b) about 0.234 inches

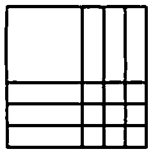
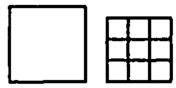
[6.12] a) (7, 2) and (5, 7)

b) Outer square − corner triangles $= 49 - 4(5) = 29$



c) $a = 2, b = 5,$
$a^2 + b^2 = 4 + 25 = 29$

Chapter 7

[7.1] a)  b) 

[7.1] $2xy$

[7.2] Four corner panes, 232 edge panes, and 3364 inside panes

[7.3] Side = $x + 3$, area = $x^2 + 6x + 9$

[7.3] a) not a perfect square; change $18x$ to $12x$ to get $(x + 6)^2$, or change 36 to 81 to get $(x + 9)^2$.

b) $(3x + 2)^2$

[7.4] $(4x - 3)(4x + 3)$

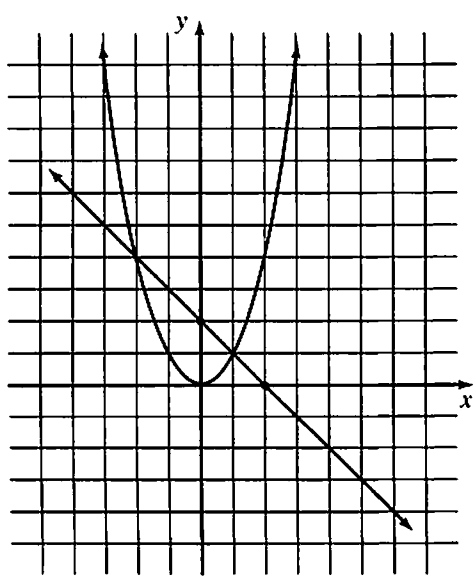
[7.4] length = $10 + y$, width = $10 - y$

[7.5] a) $(2y - 1)^2$

b) $(x - 8)(x + 8)$

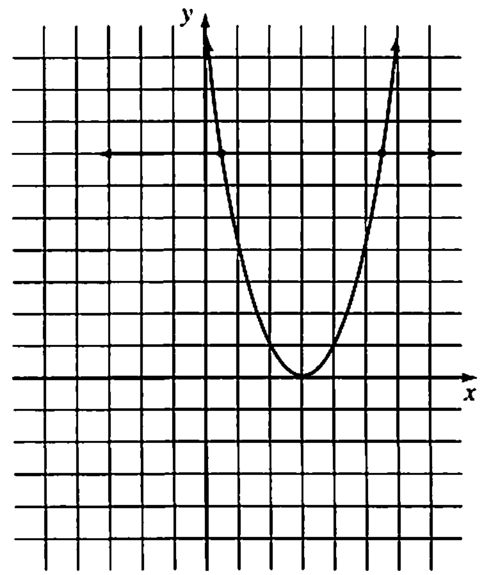
c) $(3x + 2)^2$

[7.6] There are two solutions because the line $y = 2 - x$ crosses the parabola $y = x^2$ at two points.



[7.6] $y = 8$

[7.7] The solutions are approximately $x = 5.5$ and $x = 0.5$, because the line $y = 7$ crosses the parabola at points with those two x-values.



[7.7] $(x + 2)^2 = 7^2$; $x + 2 = 7$ or $x + 2 = -7$; $x = 5$ or -9.

[7.8] a) 243 b) 3^n
c) It gives 3^0 which is correct, because $3^0 = 1$.

[7.9] $5.1(10^{12})$

[7.9] about $1.456(2^{11})$

[7.10] a) $2(10^6)$

b) $8/4 = 2$ and $10^{15}/10^9 = 10^{15-9} = 10^6$.

[7.11] $4.2895(10^{13})$

[7.12] approx. 4.47 units, or $\sqrt{20}$.

[7.12] approx. 4.47 units, or $\sqrt{20}$.

Chapter 8

[8.1] a) About 1.08 cm/month or 13 cm/year.

b) Between birth and 3 months, when his weight grew 0.76 pounds/month.

[8.2] a) 2

b) -5, because that's where the in-out line from $x = 0$ goes.

c) $y = 2x - 5$

[8.3] $\frac{5}{3}$

[8.3] 10 inches

[8.4] a) slope $= -1/3$, y-int. $= 8$

b) slope $= 2$, y-int. $= -6$

[8.5] 5^8

[8.5] a) 4^8 b) 6^6

[8.6] $500(6^x)$

[8.6] $4(3^x)$

[8.7] 1.05

[8.7] $23.49

[8.8] $A = 150(0.99^n)$

[8.9] Double the power when the base changes from 25 to 5. Example: $25^3 = 5^6$.

[8.9] x^{15}

[8.10] $5 \cdot x^9, 5x \cdot x^8, 5x^2 \cdot x^7, 5x^3 \cdot x^6$, etc.

[8.10] a) $64a^3b^3$ b) $\frac{81x^4}{y^4}$

[8.11] Let $x = -2$, then $S = 50(4^{-2}) = 50\left(\frac{1}{16}\right) = 3.125$.

[8.11] $\frac{1}{4^3} = \frac{1}{64}$

[8.12] $5.83(10^{-6})$

[8.12] $1.6129(10^{-3})$

Chapter 9

[9.1] 12

[9.1] 0.68

[9.1] $|5 - y|$ or $|y - 5|$

[9.2] $\sqrt{3^2 + 9^2} = \sqrt{90}$

[9.2] 12

[9.3] a) $5\sqrt{3} \cdot 2\sqrt{3} = 5 \cdot 2 \cdot \sqrt{3}\sqrt{3} = 5 \cdot 2 \cdot 3 = 30$

b) $\sqrt{5} \cdot \sqrt{20} = \sqrt{100} = 10$

[9.4] $3\sqrt{6}$

[9.4] $\sqrt{15}$

[9.4] $6\sqrt{2}$

[9.5] a) any number between 0 and 1

b) any number between 0 and 1

[9.6] method 1: $\frac{-18 + 87}{2} = 34.5$

method 2: $\frac{87 - (-18)}{2} + (-18) = 34.5$

[9.6] (4, 4.5)

[9.7] a) $11.75/hr b) $10.51/hr

[9.8] $10^5\sqrt{5}$

[9.8] $x^{1/2}$ means the positive square root of x. By the properties of exponents $(x^{1/2})(x^{1/2}) = x^1 = x$. If $x^{1/2}$ times itself makes x, then it must be a square root of x.

[9.9] $11\sqrt{2} + 14$

[9.9] $\frac{\sqrt{5} - 1}{2}$

[9.10] a) 20 b) can't tell

c) 40 d) 40

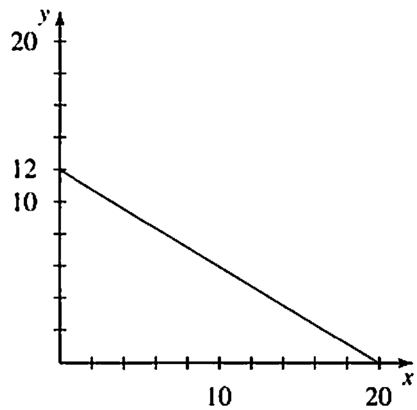
[9.11] \$36

[9.12] 160 square units

[9.12] $\frac{9}{4}$ or 9:4

Chapter 10

[10.1] $3x + 5y = 60$



[10.2] a) $0.20x + 0.30y$

b) Answers will vary.

c) $0.20x + 0.30y = 10$

[10.2] a) $x + 0.25y$ b) $0.75y$ c) 5 cups

[10.3] (6, 13)

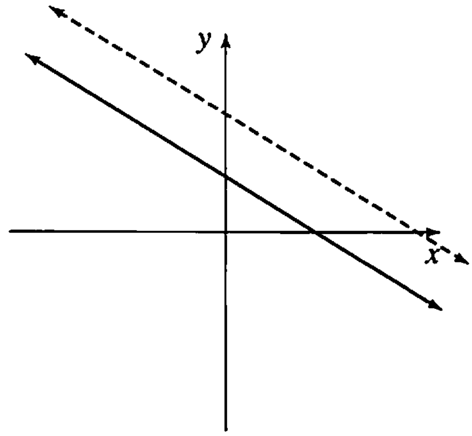
[10.3] $y = \frac{10 - 2x}{5}$ or $y = 2 - 0.4x$

[10.4] (3, 2)

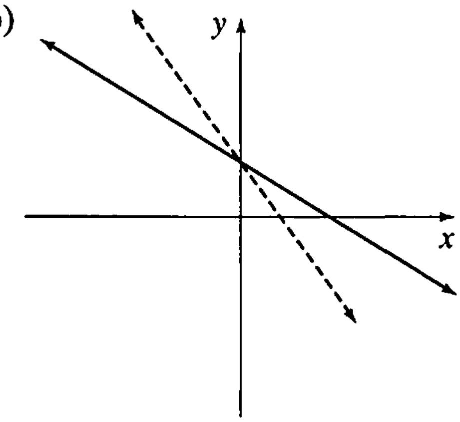
[10.4] (2, −1)

[10.5] $3x + 5y = 15$

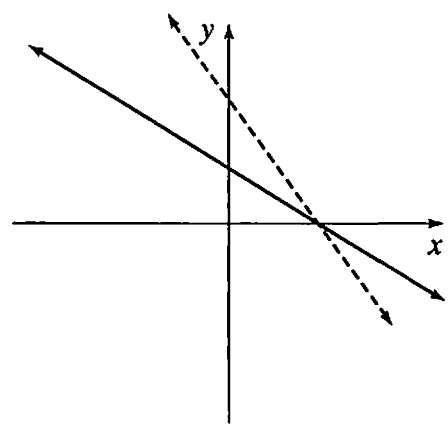
[10.5] a)



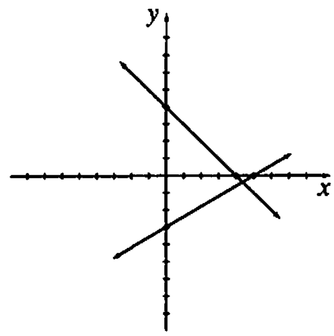
b)



c)



[10.6]



[10.6] a) $A = 5, B = -1, C \neq 7$ (or A and B the same multiples of 5 and -1, with C not that same multiple of 7)

b) $A = 10, B = -2, C = 14$ (or A, B, C the same multiples of 5, -1, 7 respectively)

c) $A = 1, B = 1, C = 1$ (or any A and B, with $A/B \neq -5$)

[10.7] 35 \$0.19 stamps and 65 \$0.29 stamps

[10.7] Sandwiches \$3.35, sodas \$0.65

[10.8] $y = -\frac{3}{2}x + 13$

[10.8] $y = \frac{1}{3}x + 2$

Chapter 11

[11.1] $D_{20} = 150 + 150(0.6) + 150(0.6^2) + ... + 150(0.6^{19})$

$D_{20}(0.6) = 150(0.6) + 150(0.6^2) + ... + 150(0.6^{19}) + 150(0.6^{20})$

$D_{20} - D_{20}(0.6) = 150 - 150(0.6^{20})$

$D_{20} = \frac{150 - 150(0.6^{20})}{0.4} =$ 374.99 ft

$U_{20} = (0.6)D_{20} = 0.6(374.989) =$ 224.99 ft

Total distance $= D_{20} + U_{20} =$ 599.98 ft

[11.2] a) first term = 0.14, common ratio = 0.01

b) $S = 0.14 + 0.14(0.01) + 0.14(0.01^2)$

$0.01S = 0.14(0.01) + .014(0.01^2) + 0.14(0.01^3)$

$0.99S = 0.14 - 0.14(0.01^3)$

$S = \frac{0.14(1 - 0.01^3)}{0.99}$

c) $S = \frac{0.14(1 - 0.01^{100})}{0.99}$

d) $\frac{0.14}{0.99} = \frac{14}{99}$

[11.2] $S = 0.\overline{76}$; $100S = 76.\overline{76}$; $99S = 76$; $S = \frac{76}{99}$; so S is rational.

[11.3] Answers will vary. Ratio of rise to run must be 6 to 1.

[11.3] points of the form $(5k, 7k)$ for any integer k

[11.4] Suppose $\frac{p}{q} = \sqrt{5}$, for some integers p and q. Then $\frac{p^2}{q^2} = 5$, and $p^2 = 5q^2$. Since all perfect squares have an even number of prime factors, p^2 has an even number of prime factors, but then $5q^2$ has an odd number of prime factors, so p^2 cannot equal $5q^2$, and $\frac{p}{q}$ cannot equal $\sqrt{5}$.

[11.5] It is a fair game. There are 36 total outcomes possible from rolling two dice, and the total number of outcomes that yield 2, 4, 6, 9, 10, or 11 is 18, so each player has an 18 out of 36 chance of winning.

[11.6] $\frac{4}{36} = \frac{1}{9}$

[11.6] a) $\frac{18}{20} = 0.9$

b) No. The relative frequency approaches the theoretical probability over a large number of trials. There are 8 possible outcomes for 3 coin tosses, and 7 of them have at least one head, so the theoretical probability is $\frac{7}{8} = 0.875$.

[11.7] $2^{10} = 1024$

[11.7] $\frac{15}{64} = 0.234375$

[11.8] $\frac{1\ foot}{12\ inches}$

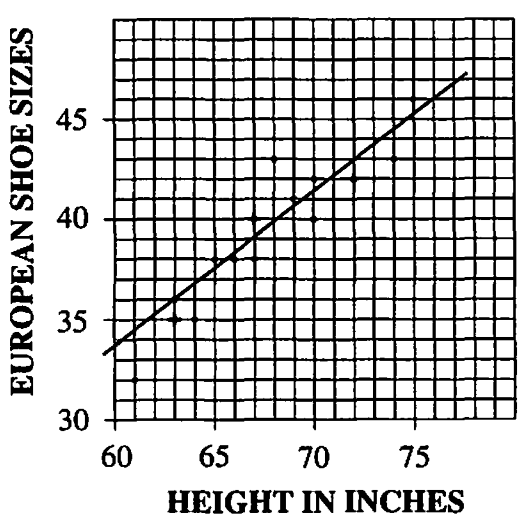
[11.8] $\frac{7\ days}{1\ week} \cdot \frac{1\ foot}{12\ inches}$

Chapter 12

[12.1] a) 1736 b) 1787

[12.2] a) (63, 35), (67, 40), (72, 42)

b) Answers may vary slightly.



c) $y = .77x - 12.5$ Answers may vary slightly.

[12.3] a) directly b) inversely

c) directly

[12.4] a) 132 ft/sec b) 32 ft/sec

c) $s = 132 - 32t$

d) It makes sense to extend the line as far as the x-axis. At that point the ball's speed has fallen to zero because it is at the top of its trajectory. Extending the line would yield negative speed, which makes no sense. In reality the ball begins to gain speed again as it falls to earth, so the graph would go upward again.

[12.5] 10 mph

[12.5] 45 mph

[12.6] a) $42/35 = 6/5 = 1.2$

b) $1.2(28) = 33.6$

c) $33.6\pi = 105.6$ inches

d) about 6 mph

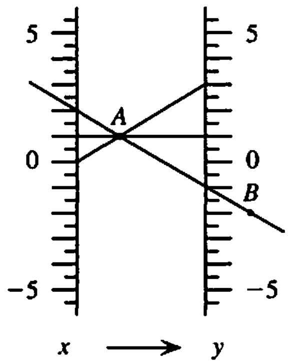
[12.7] a) $y = 0.98x + 4$, where y = next month's weight and x = this month's weight.

b) His weight will approach 200 lbs., because that is the fixed point for the equation in a). $0.98(200) + 4 = 200$.

[12.8] a) Draw line from 0 to 3. $b = 3$

b) Draw line from 1 to 1. Magnification is -2. Equation is $y = -2x - 3$.

c) Connect A and B and extend the line to cross both the x- and y-lines of the function diagram. This line goes from 2 to -1, so $(2, -1)$ is the point of intersection.



Chapter 13

[13.1] a) $\dfrac{80 - 2L}{2} = 40 - L$

b) $L\left(\dfrac{80 - 2L}{2}\right) = L(40 - L)$

c) (20, 400) This point represents the rectangle of largest area possible with perimeter 80. It is a square of side 20 and area 400.

[13.1] a) x-intercepts: (0, 0) (16, 0), vertex (8, 64)

b) x-intercepts: (0, 0) (16, 0), vertex (8, -64)

[13.2] $x(200 - 7x)$

[13.2] $y = -2x(x - 8)$

[13.2] intercepts: (0, 0) (4, 0), vertex (2, 24)

[13.3] $x^2 + 4x + 3 = (x + 3)(x + 1) = 0$

$x + 3 = 0$ or $x + 1 = 0$

$x = -3$ or $x = -1$

[13.3] intercepts: $(0, -30)$, $(6, 0)$, $(-10, 0)$; vertex $(-2, -32)$

[13.4] a) $2L + 2\left(\dfrac{100}{L}\right) = 2L + \dfrac{200}{L}$

b) 40 feet

c) No, the perimeter can be made as large as desired by making the length large enough.

[13.4] $2\sqrt{60}$ or $4\sqrt{15}$

[13.5] $x(30 - 2x)^2$

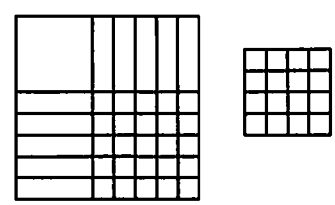
[13.5] 5

[13.6] $x^2 + 10x + 25 = -9 + 25 = 16$

$(x + 5)^2 = 4^2$

$x + 5 = 4$ or $x + 5 = -4$

$x = -1$ or $x = -9$



[13.7] $y = (x - 3)^2 - 5$

[13.7] $H = -2$, $V = 6$

[13.7] $x^2 + 8x + 19$ makes a perfect square with 3 extra one-blocks, so $V = 3$. Because the square is $(x + 4)^2$, $H = -4$.

[13.8] $(-3 + \sqrt{5}, 0)$, $(-3 - \sqrt{5}, 0)$

[13.8] a) $x^2 + 2x + 1$ (or any b and c such that $c = \dfrac{b^2}{4}$)

b) $x^2 + 2x + 2$ (or any b and c such that $c > \dfrac{b^2}{4}$)

Chapter 14

[14.1] The smaller rectangles have length 5 and width $\frac{x}{2}$, and since they are similar to the original, then

$$\frac{x}{5} = \frac{5}{\left(\frac{x}{2}\right)}$$

$$\frac{x^2}{2} = 25$$

$$x^2 = 50$$

$$x = \sqrt{50}$$

[14.1] 15

[14.2] a) $\frac{2x^2 + 5x + 2}{3x + 6}$ b) $\frac{2x + 1}{3}$

[14.2] $\frac{2x}{5}$

[14.2] always true except when $x = 2$

[14.3] a) $\frac{12x^2y}{2x^2y - 2xy}$ b) $\frac{18x^2}{3x^2 - 3x}$

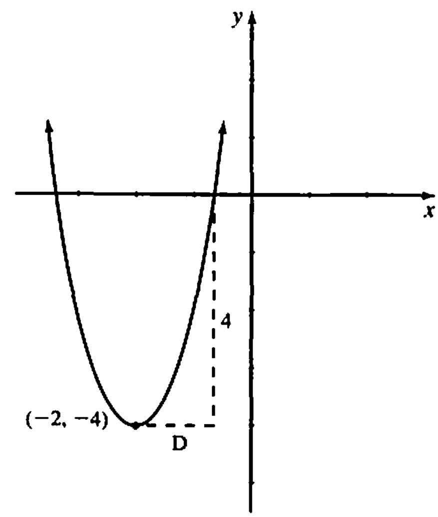
[14.3] common denominator $= 20x^2$, sum $= \frac{8x + 5y}{20x^2}$

[14.3] $x^2 = 5x - 3$ or $x^2 - 5x + 3 = 0$

[14.4] $y = -3x^2$

[14.4] The given function is a vertical translation of $y = 5x^2 + 20x = 5x(x + 4)$, so it has the same H. x-intercepts are at $x = 0$ and $x = -4$, so $H = -2$ (halfway between). Substitute $H = -2$ in for x in the original function to find $V = -31$. Vertex is $(-2, -31)$.

[14.5] The parabola is a translation of $y = 3x^2$. $3D^2 = 4$, so $D^2 = \frac{4}{3}$, $D = \sqrt{\frac{4}{3}}$, and the intercepts are at $(-2 + D, 0)$ and $(-2 - D, 0)$.



[14.5] $a = 5, b = 2, c = -6$, so

$$x = \frac{-2 \pm \sqrt{2^2 - 4(5)(-6)}}{2(5)}$$

$$= \frac{-2 \pm \sqrt{4 + 120}}{10}$$

$$= \frac{-2 \pm \sqrt{124}}{10}$$

$$\approx .9136 \text{ or } -1.3136$$

[14.6] $y = -3(x + 5)^2 + 2$

[14.6] $(x + 4)^2 = 6$

$x + 4 = \sqrt{6}$ *or* $x + 4 = -\sqrt{6}$

$x = -4 + \sqrt{6}$ *or* $x = -4 - \sqrt{6}$

[14.7] If both a and V are positive, then it is a smile parabola with vertex above the x-axis. Since the vertex is the lowest point of a smile parabola, the graph does not hit the x-axis. If both a and V are negative, then it is a frown parabola with vertex below the x-axis. Since the vertex is the highest point of a frown parabola, the graph does not hit the x-axis.

[14.7] V and a must have opposite signs, but we cannot conclude anything about H.

[14.8] The remaining rectangle has length x and width $1 - x$. Since it is similar to the original, $\frac{1}{x} = \frac{x}{1-x}$. Thus $x^2 = 1 - x$, or $x^2 + x - 1 = 0$. Solving by the quadratic formula and disregarding the negative answer gives

$$x = \frac{-1 + \sqrt{5}}{2}$$

[14.8] a) $3 + 5a$

b) $\frac{a}{1} = \frac{1+a}{a}$

$$a^2 = 1 + a$$

$$a^2 - a - 1 = 0$$

$$a = \frac{1 \pm \sqrt{5}}{2}$$