Extra Practice 5.3

Name _____

Distributing Division

Divide.

1. $\frac{10x^2 + 6x + 2}{2} =$

2. $\frac{12x + 18y}{6} =$

3. $\frac{12x + 18y}{2x + 3y} =$

4. $\frac{14xy - 6x^2}{2x} =$

5. $\frac{x^2 - 6x + 2xy}{x} =$

6. $\frac{5y^3 - 2y^2 - y}{y} =$

7. $\frac{x^2y + xy^2}{xy} =$

8. $\frac{x(y + 1) + 2(y + 1)}{y + 1} =$

Extra Practice 5.4

Name _____

Factoring Trinomials

1. Find all trinomials of the form $x^2 + 10x + \_\_\_$ that can be factored, and write each one in factored form. Use Lab Gear if you wish.

2. Find all trinomials of the form $x^2 + \_\_\_ x + 48$ that can be factored, and write them in factored form. Lab Gear may help.

3. Factor each trinomial into the product of two binomials, if possible:

   a) $x^2 + 10x + 9 =$ _____ b) $x^2 - 10x + 9 =$ _____

   c) $x^2 + 7x + 6 =$ _____ d) $x^2 - 7x + 6 =$ _____

   e) $x^2 + 12x + 20 =$ _____ f) $x^2 - 11x + 18 =$ _____

   g) $x^2 + 6x + 4 =$ _____ h) $x^2 - 7x + 10 =$ _____

4. Suppose that a trinomial of the form $x^2 + bx + c$ can be factored into $(x + p)(x + q)$. What is the relationship among p, q, and b? What is the relationship among p, q, and c?

Extra Practice 5.6

Name _____

Factoring Completely

Write each expression below as a product of two or three factors in the number of ways given. (Changing the order of the factors doesn't count, and neither does including 1 as a factor!). You may use Lab Gear if you wish.

1. 18 in 3 ways

2. $5xy$ in 4 ways

3. $10x + 20$ in 4 ways

4. $3x^2 + 6x$ in 3 ways

5. $3x(5x + 10)$ in 4 ways

6. $2(6xy + 9y)$ in 4 ways

Extra Practice 6.3

Name _____

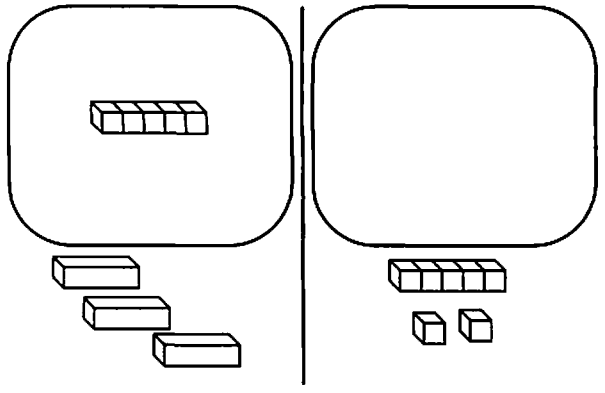
Solving Linear Equations with Lab Gear

For problems 1-4:

a) Write the equation represented in the Lab Gear picture.

b) Use the Lab Gear to find the solution. Each time you change the Lab Gear write the new equation that results.

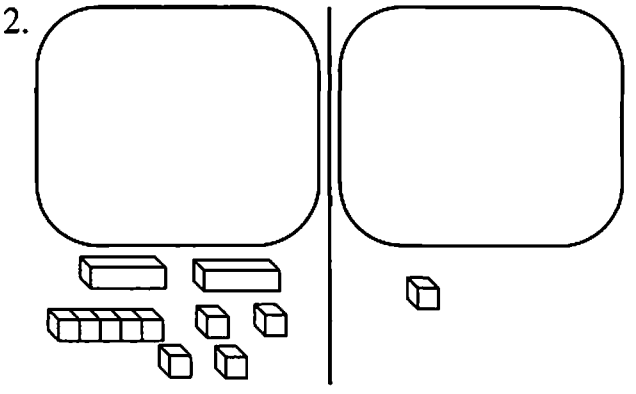
1.



a) _____

b)

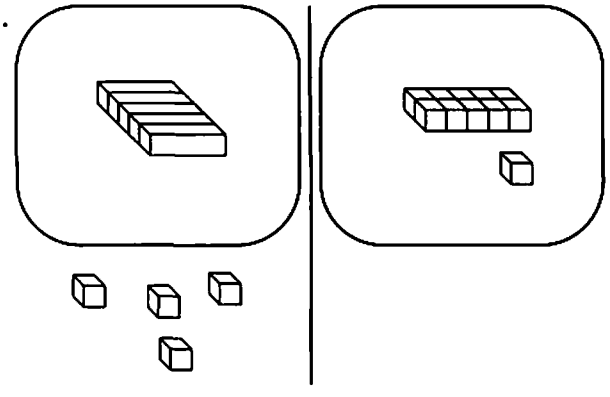
2.



a) _____

b)

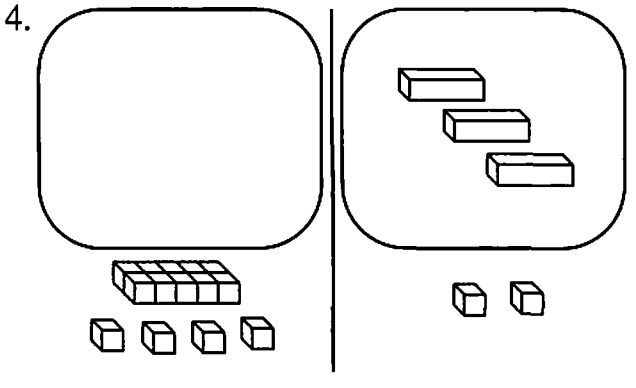
3.



a) _____

b)

4.



a) _____

b)

For problems 5–12:

a) Build each equation with Lab Gear.

b) Use the Lab Gear to find the solution. Write equations to show some of the steps as you move the blocks.

5. $5x = 12 - x$

6. $2x = 20 - 3x$

7. $5x + 2 = 3x + 12$

8. $x - 8 = 4x - 2$

9. $3x + 8 = 6x + 20$

10. $5 - 2x = 11 - 4x$

11. $6x - 5 = 4x + 7$

12. $3x - 2 = 5x + 6$

13. Look over the sequences of equations you wrote while solving problems 1–12 and describe any patterns you notice as you go from one equation to the next. Compare those to any shortcuts you discovered in solving with the Lab Gear.

Extra Practice 6.3 (continued)

Name _____

Solve each equation. Use the Lab Gear, patterns you discovered with the Lab Gear, and/or the cover-up method. Show your work by writing a sequence of equations leading to the solution.

14. $4 + 5x = 14 + 10x$

15. $6x + 2 = 10x + 10$

16. $6x + 2 = 10x - 10$

17. $1 + 8x = 11x - 5$

18. $5x + 3 = 11 - 3x$

19. $5x - 3 = 11 - 2x$

20. $-7 + 2x = -12x$

21. $4x = -5x - 36$

22. $-4 - 3x = 2 + 3x$

23. $8 - x = 4 - 3x$

Extra Practice 6.8

Name

Solving Linear Equations

Solve each equation. Use Lab Gear if you wish. Show your work by writing a sequence of equations leading to the solution.

1. $3x = 7 - x$

2. $5(x+3) - 2(x-1) = 4 - 3x$

3. $\frac{1}{4}x = \frac{1}{12}$

4. $10(0.3 - 0.7x) = 4$

5. $7 - 8x = 2x + 2$

6. $\frac{6}{x} - 1 = -2$

7. $2x - 7 = 5 - 2(x + 4) + 2$

8. $\frac{2}{3}(5x + 4) = 10x$

9. $\frac{6x + 8}{2} = x + 1$

10. $2x - 3(2x-1) = 4(1 - x)$

Extra Practice 8.1 Name

Introduction to Linear Functions

Answer these questions using any method you like, but be sure you can explain your reasoning. Don't get frustrated if you can't solve it right away; you haven't been given a method. Think about it for a while, and try what seems logical.

Elg and Abra spent a day at Dizzyland Amusement Park, and came home broke but happy. Rea asked them, "How much does Dizzyland cost?"

Elg replied, "Well, it depends on how many Thrill Rides you take; those cost extra. I took 8 Thrill Rides, and spent $30.50."

Abra added, "I only took 1 Thrill Ride, and I spent $14.75."

1. How much would it cost Rea to go to Dizzyland and take 9 Thrill Rides? Explain how you got your answer.

2. Find the cost of admission to Dizzyland with no Thrill Rides. Explain how you got your answer.

3. Find a formula for the total cost, C, of a visit to Dizzyland for a person who takes T Thrill Rides. Explain what each part of your formula represents.

Extra Practice 8.4

Name _____

Applying Linear Functions

For each problem:

a) Draw a graph of the data given on grid paper.
b) Write a function equation.
c) Find the slope and y-intercept of the function.
d) Explain what the slope and y-intercept mean in terms of the problem situation.

1. Guido has a water storage tank that he fills in winter to use throughout the spring and summer. One day in spring he begins using 12.5 gallons of water per day to water his garden. After 23 days of watering he has 6212.5 gallons remaining in the tank. (No water has been added since he began using it.) Find a function equation for the amount of water, y, left after x days of watering.

   b) $y =$ _____ c) slope = _____ y-intercept = _____

   d)

2. A Minnesota police officer has theorized that there is a linear relationship between the daily high temperature and the number of crimes in the city. On a day when the high was $-5°$, there were 17 crimes, and on a $+35°$ day there were 37 crimes. Find a function equation for the number of crimes, y, on a day when the high temperature is x, if the officer's theory is correct.

   b) $y =$ _____ c) slope = _____ y-intercept = _____

   d)

3. If a San Andreas Airlines flight to L.A. flies with only 20 passengers, the airline loses $3,000. If there are 170 passengers, the flight makes a profit of $7,350. Assume that this is a linear relationship. Find a function equation for the profit, y, resulting from a flight with x passengers.

   b) $y =$ _____ c) slope = _____ y-intercept = _____

   d)

Extra Practice 8.7, 8.8 Name

Percent Increase and Decrease

1. Alegra receives annual salary raises of 8%.
   a) If she earns approximately $30,000 per year now, how much will she earn next year, and the following year?

   b) By what number can you multiply each year's salary to get the next year's? (It's not 0.08; that just gives the increase, not the new salary.)

   c) How much did Alegra earn last year, if she received an 8% raise to get to $30,000?

2. A. B. Large, a store for big and tall men, has a clearance sale. Beginning August 1, each item will be reduced in price 5%. On each successive day the price will be reduced by 5%, until it is sold.
   a) A sportcoat is priced at $190 on August 2. How much will it cost on August 3? on August 4? on August 5?

   b) By what number can you multiply each day's price to get the next day's price?

   c) How much did the sportcoat cost on August 1?

3. Barb paid $31.30 for a pair of jeans, which included 8% sales tax. What was the pre-tax price of the jeans?

4. Gabe bought a suit at Marcy's, where he works. Using his employee's discount of 30%, he paid $160.30. What was the full price of the suit?

Extra Practice 10.2

Name

Two-Variable Equations with Constraints

The Drama Society is setting ticket prices for their spring musical, "Hare." Max decides on $4 for children and $8 for adults. Sophie reminds him that they need to make $600 each night to cover their expenses.

1. If 60 adults attend and ticket sales total $600, how many children must attend?

2. If 70 children attend and ticket sales total $600, how many adults must attend?

3. If x is the number of children and y is the number of adults attending a performance at which ticket sales total $600, what equation must x and y satisfy?

4. Make a table showing at least 5 possible values of x and y that satisfy the equation in #3. Check a few of the pairs to see that, if x is the number of children's tickets and y is the number of adults' tickets, they do yield $600 in ticket sales. This will verify that the equation in #3 is correct.

5. Find (x, y) pairs that satisfy both the equation in #3 above and each of the constraints given below. Some may not be possible.
   a) all 140 seats in the theater are full.

   b) the number of adults is twice the number of children.

   c) there are 18 more children than adults.

   d) there are 3 times as many children as adults.

   e) a total of 70 tickets are sold.

Extra Practice 10.4

Name _____

Solving Linear Systems

Solve each system. Write your solution as an (x, y) pair. Use the Lab Gear if you wish. Remember that you can transform either equation into any equivalent equation.

1. $\begin{cases} x - 2y = -6 \\ x + 3y = 14 \end{cases}$

2. $\begin{cases} y = 3x - 4 \\ y = \frac{1}{2}x + 5 \end{cases}$

3. $\begin{cases} 2x + 3y = 4 \\ y = 9 - 2x \end{cases}$

4. $\begin{cases} 7x - 2y = -7 \\ 2y = 4x + 1 \end{cases}$

5. $\begin{cases} -3x - y = 9 \\ 2x + 6y = -22 \end{cases}$

6. $\begin{cases} 6x + 5y = -1 \\ 2x - 9 = 3y \end{cases}$

Extra Practice 10.8

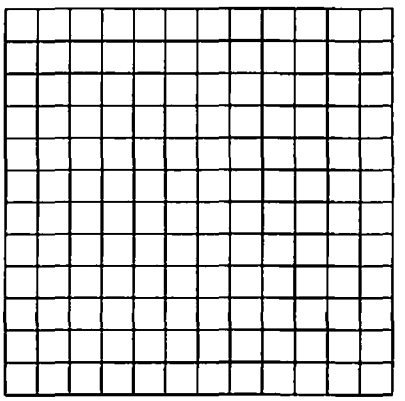
Name _____

Finding Equations of Lines

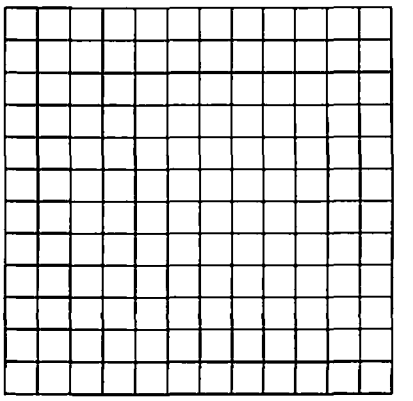
For each line described below:

a) Find an equation in slope-intercept or standard form.
b) Sketch the line. Use the sketch to check that your equation is correct.

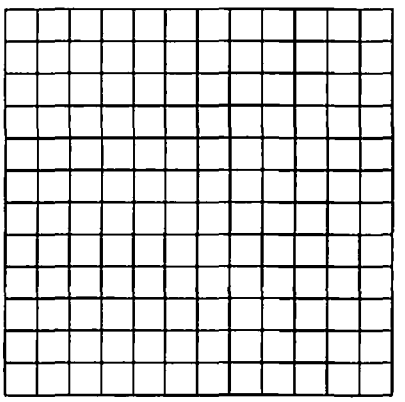
1. through $(0, -2)$, with slope $= \frac{4}{5}$
   a) _____
   b)



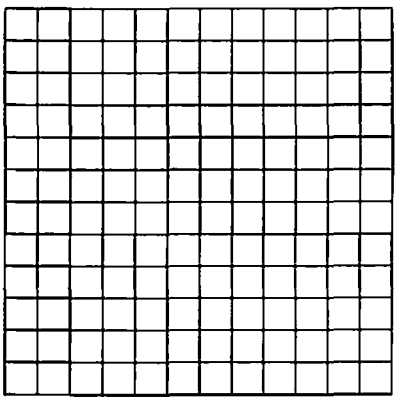
2. through $(0, 6)$ and $(3, 4)$
   a) _____
   b)



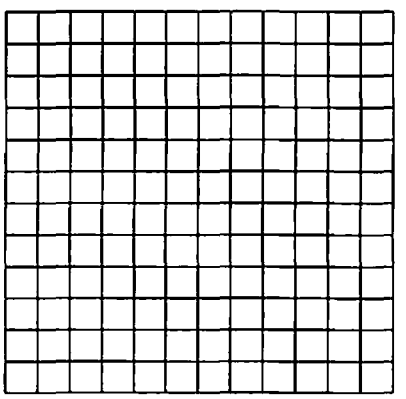
3. through $(-1, 7)$ and $(5, 7)$
   a) _____
   b)



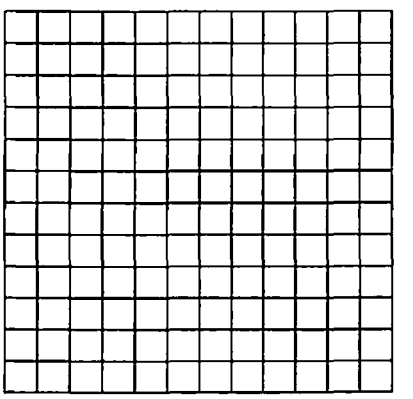
4. through $(3, 7)$, with slope $= 4$
   a) _____
   b)



5. through $(-1, 8)$ and $(4, 0.5)$
   a) _____
   b)



6. through $(5, -1)$ and $(5, 3)$
   a) _____
   b)



Selected Answers

2.1, 2.2

1. a) $x^2 - 5 + 2$ c) $x^2 - 3$
2. a) $-[(25 - 2x) + 5x]$
   c) $-(25 + 3x)$ or $-25-3x$
3. a) $2x - (x + 5)$ c) $x - 5$
4. a) $x + 5 - (2 + 3x)$
   c) $3 - 2x$
5. a) $(3x - x) + 4 - (2x + 7)$
   c) -3
6. a) $(2x^2 - 2x - 2) + x + 1 - (x^2 + x)$
   c) $x^2 - 2x - 1$
7. b) $-(x^2 + 5)$ or $-x^2 - 5$
8. b) 2
9. b) $x^2 - 3x + 3$
10. b) -3
11. b) $x - 9$
12. b) $2x^2 - 13x$
13. Answers will vary.

2.9

3. a) $y = x + 2$
   b) $y = x + (-2)$
   c) $y = \frac{1}{2}x$
   d) $y = -2x$
   e) $y = -\frac{1}{2}x$
   f) $y = 2 - x$
   g) $y = 2x$
   h) $y = -x$
   i) $y = x$
4. a) $y = x + 2$
   b) $y = x + (-2)$
   i) $y = x + 0$
5. c) $y = 0.5x$
   d) $y = -2x$
   e) $y = -\frac{1}{2}x$
   g) $y = 2x$
   h) $y = -1x$
   i) $y = 1x$
6. b is positive.
7. b is negative.
8. b is zero.
9. $0 < m < 1$
10. $m > 1$
11. m is negative.
12. f) $y = 2 - x$
    h) $y = 0 - x$

3.3

1. $6x - 7$
2. $-2x + 3$
3. 7
4. $x^2 + 2x - 2$
5. $-4x - 9$
6. $-3 + x^2$
7. $-2x^2 + 7$
8. $-2y^2 + 4xy - 2$

3.5

1. $4x - 6 \,?\, 3x - 6$
2. $-3x - 2 > -3x - 5$
3. $x - 3 \,?\, 3 - x$
4. $3 + 4x \,?\, 4 + 3x$
5. $>$
6. $<$
7. $>$ if $x > 2$ or $x < -2$
   $<$ if $-2 < x < 2$
8. $=$
9. $>$ if $x < 1$
   $<$ if $x > 1$
10. $>$ if $x > 1$
    $<$ if $x < 1$

3.6

1. $x + 3$
2. 4
3. $5x + y$
4. x
5. $x + 2$
6. $x + y$

3.7

1. $a = \frac{1}{3}, b = 5, x = \frac{5}{3}$
2. $a = \frac{1}{7}, b = 2, x = \frac{2}{7}$
3. $a = \frac{1}{24}, b = 8, x = \frac{1}{3}$
4. $x = 21$
5. $x = \frac{1}{30}$
6. $x = 3$
7. $x = \frac{9}{10}$
8. $x = (1/m) \cdot n$ or $x = n$ times the reciprocal of m.

3.9

1. $x = 12$
2. $x = 0.5$
3. $x = 11$
4. $x = 9.5$
5. $x = 25$
6. $x = -36$
7. $x = 22$
8. $x = 2$
9. $x = 32$

5.3

1. $5x^2 + 3x + 1$
2. $2x + 3y$
3. 6
4. $7y - 3x$
5. $x - 6 + 2y$
6. $5y^2 - 2y - 1$
7. $x + y$
8. $x + 2$

5.4

1. $x^2 + 10x = x(x+10)$
   $x^2 + 10x + 9 = (x + 1)(x + 9)$
   $x^2 + 10x + 16 = (x + 2)(x + 8)$
   $x^2 + 10x + 21 = (x + 3)(x + 7)$
   $x^2 + 10x + 24 = (x + 4)(x + 6)$
   $x^2 + 10x + 25 = (x + 5)(x + 5)$
2. $x^2 + 49x + 48 = (x + 1)(x + 48)$
   $x^2 + 26x + 48 = (x + 2)(x + 24)$
   $x^2 + 19x + 48 = (x + 3)(x + 16)$
   $x^2 + 16x + 48 = (x + 4)(x + 12)$
   $x^2 + 14x + 48 = (x + 6)(x + 8)$

   Some students may also find six additional answers with corresponding negative linear coefficients. In the context of the question, the positive answers are sufficient.
3. a) $(x + 9)(x + 1)$
   b) $(x - 9)(x - 1)$
   c) $(x + 6)(x + 1)$
   d) $(x - 6)(x - 1)$
   e) $(x + 10)(x + 2)$
   f) $(x - 9)(x - 2)$
   g) not factorable
   h) $(x-5)(x-2)$
4. $p + q = b$ and $pq = c$.

5.6

Answers may vary. Sample answers are given.

1. $9 \cdot 2, 6 \cdot 3, 3 \cdot 3 \cdot 2$
2. $5 \cdot x \cdot y, (5x) \cdot y, 5 \cdot (xy), (5y) \cdot x$
3. $10(x + 2), 2(5x + 10), 5(2x + 4), 2 \cdot 5 \cdot (x + 2)$

4. $3(x^2 + 2x)$, $x(3x + 6)$, $(3x)(x + 2)$, $3 \cdot x \cdot (x + 2)$
5. $3(5x^2 + 10x)$, $x(15x + 30)$, $(15x)(x + 2)$, $3 \cdot 5 \cdot (x^2 + 2x)$, $5(x)(3x + 6)$
6. $(2y)(6x + 9)$, $3 \cdot 2 \cdot (2xy + 3y)$, $6 \cdot y \cdot (2x + 3)$, $2(3y)(2x + 3)$, $6(2xy + 3y)$

6.3

Sequences of steps will vary.

1. $x = 4$
2. $x = -4$
3. $x = 3$
4. $x = -4$
5. $x = 2$
6. $x = 4$
7. $x = 5$
8. $-2 = x$
9. $-4 = x$
10. $3 = x$
11. $x = 6$
12. $-4 = x$
13. Answers will vary.
14. $-2 = x$
15. $-2 = x$
16. $3 = x$
17. $2 = x$
18. $x = 1$
19. $x = 2$
20. $x = 0.5$
21. $x = -4$
22. $-1 = x$
23. $x = -2$

6.8

1. $x = 1.75$
2. $x = -\frac{13}{6}$
3. $x = \frac{1}{3}$
4. $x = -\frac{1}{7}$
5. $x = 0.5$
6. $x = -6$
7. $x = 1.5$
8. $x = 0.4$
9. $x = -1.5$
10. no solution

8.1

1. Elg took 7 more Thrill Rides than Abra, and spent \$15.75 more, so each Thrill Ride costs one-seventh of \$15.75, or \$2.25. Rea is taking one more Thrill Ride than Elg, and will pay \$2.25 more, or \$32.75.
2. Abra's cost minus the cost of one Thrill Ride is \$12.50, the basic admission fee.
3. $C = \$12.50 + \$2.25T$. The \$12.50 is the basic admission charge, and the $\$2.25T$ is the additional cost for T Thrill Rides.

8.4

1. $y = 6500 - 12.5x$. There were 6500 gallons in the tank when he began watering, $6212.5 + 23(12.5)$. Slope is -12.5, which is how much the water volume changes each day. y-intercept is 6500, which is the water volume after 0 days of watering.
2. $y = 19.5 + 0.5x$. Slope is 0.5, which is how much the number of crimes changes each time the temperature goes up one degree. y-intercept is 19.5, which is the number of crimes on a day when the temperature is 0°.

3. $y = 69x - 4380$. Slope is 69, which is the change in the airline's profit for each additional passenger. y-intercept is -4380, which is the "profit" (actually a loss) if the flight has zero passengers.

8.7, 8.8

1. a) \$32,400, \$34,992
   b) 1.08
   c) \$27,777.78
2. a) \$180.50, \$171.48, \$162.90
   b) 0.95
   c) \$200
3. \$28.98
4. \$229

10.2

1. 30
2. 40
3. $4x + 8y = 600$
4. Answers will vary.
5. a) (130, 10)
   b) (30, 60)
   c) (62, 44)
   d) (90, 30)
   e) not possible

10.4

1. (2, 4)
2. (3.6, 6.8)
3. (5.75, −2.5)
4. (−2, −3.5)
5. (−2, −3)
6. (1.5, −2)

10.8

1. a) $y = \frac{4}{5}x - 2$
2. a) $y = -\frac{2}{3}x + 6$
3. a) $y = 7$
4. a) $y = 4x - 5$
5. a) $y = -1.5x + 6.5$
6. a) $x = 5$