NAME

Module 7 Solving Linear Equations and Inequalities of Two Variables

Lesson 4 Solving Consumer/Business Problems Using Linear Equations and Inequalities of Two Variables

Solve the following problems.

1. Troy and Jimmy see a pair of bicycles in the window of Mr. Johnson's sporting goods store. The total cost of the bicycles is $269. They need to earn the money to buy the bicycles. If they sell 30 glasses of lemonade at $2 a glass and then decide to raise the price to $2.75, how many more glasses do they have to sell before they can afford the bicycles?

   76 glasses

2. Mahesh earns $1.25 for cleaning the kitchen and $0.75 for taking out the trash. Mahesh cleaned the kitchen twice before he and his sister made a deal. Mahesh will always take out the trash, and his sister will always clean the kitchen. If Mahesh combines what he has already earned with what he will earn, how many times will he need to take the trash out to earn $13?

   14 times

3. Stacy saved $100 to buy five model airplanes. When Stacy arrived at the store, she found that each airplane cost $12.25. She also wants to buy two display racks at $1.00 each to display her finished models. How many airplanes can she afford if she buys the two racks?

   8 model airplanes

4. At a car dealership, the sticker price of red cars is $12,000, and the sticker price of white cars is $10,275. Danny's dad owns the dealership and agrees to sell Danny one red car for $\frac{3}{4}$ the sticker price and any number of white cars for $\frac{4}{5}$ the sticker price. Danny spends $19,700 on one red car and some white cars. How many white cars does Danny buy?

   1 white car

5. Antwan has asked Tracy to go to the spring dance. Antwan wants to impress Tracy, so he decides to take some dance lessons. Antwan has $200 to spend, and dance lessons cost $25 each. He is also going to buy Tracy a dozen roses for the dance. If the florist charges $2 per rose, how many dance lessons can Antwan afford?

   7 lessons

6. Manuel wants 15 of Marcus' baseball cards. Marcus wants as many of Manuel's bobble-head dolls as a trade will allow. If the two boys agree that each card is worth $15 and that each doll is worth $5, how many dolls can Marcus get from Manuel for all 15 of the baseball cards?

   45 dolls

7. The theater club collected $1,455 in ticket sales for a school play. Ticket prices were $3 for students and $5 for nonstudents. If 120 student tickets were sold, how many nonstudent tickets were sold?

219 nonstudent tickets

Solve the following problems. Use the variables *x* and *y*, and state what they represent. Write the solutions as ordered pairs.

8. George is the star of a rodeo. He needs to amass 36 total points. He gets 12 points for every calf he ropes and six points for every bull he tames. List four different combinations of calf-ropings and bull-tamings that would give George exactly 36 total points.

Let *x* be a number of calves roped.

Let *y* be a number of bulls tamed.

(0, 6), (1, 4), (2, 2), (3, 0)

9. Pam, Mary, and Dave went to a baseball game. They had $48 to spend on T-shirts and baseball hats. If T-shirts cost $12 and baseball hats cost $8, find three possible combinations of T-shirts and baseball hats they can buy.

Let *x* be a number of T-shirts.

Let *y* be a number of baseball hats.

(2, 3), (0, 6), (4, 0)

10. Each tower of blocks takes 45 minutes to construct and each wooden spider takes 15 minutes to construct. List five different combinations of towers and spiders that can be constructed in 3 hours.

Let *x* be a number of towers.

Let *y* be a number of spiders.

(0, 12), (1, 9), (2, 6), (3, 3), (4, 0)

11. Joy plans to spend $40 at a toy store on stuffed tigers and stuffed lions. Stuffed tigers are $7 each, and stuffed lions are $12 each. List all combinations of stuffed tigers and lions she can buy.

Let *x* be a number of tigers.

Let *y* be a number of lions.

(1, 4)

12. Joan has $3.50 to spend at the candy shop. Chocolate bars are $1.50 each, and peanut butter bars are $0.50 each. List three combinations of chocolate bars and peanut butter bars that Joan can buy.

Let *x* be a number of chocolate bars.

Let *y* be a number of peanut butter bars.

(0, 7), (1, 4), (2, 1)

Journal

1. Why is it important to write a sentence as an answer to an application problem?
2. Describe a situation that could be modeled using a linear equation of two variables.
3. Describe a situation that could be modeled using a linear inequality of two variables.
4. In an application problem, how do you know when to use a linear equation and when to use a linear inequality?
5. List at least six phrases that indicate an inequality.

Possible Journal Responses

1. **Writing the answer as a sentence serves a two-fold purpose. First, it forces you to check to be sure that you have answered the stated question. Second, it helps you see if the answer makes sense within the context of the problem.**
2. **Mike gets paid $35 a week plus a 5% commission on each item he sells. Write an equation to describe Mike's pay for 1 week.**

(possible journal responses continued on page 43)

Cumulative Review

For each problem, define the variable, write an equation or inequality, and solve.

1. There are 50 soldiers in a boot camp. How many of the soldiers are wearing green if 35 of them are not wearing green?
   Let g = number of soldiers wearing green
   $g + 35 = 50$
   $g = 15$
   15 soldiers are wearing green.

2. There were 30 students on a bus trip. When the bus stopped for lunch, nine of the students went for a walk. How many of the students did not go for a walk?
   Let s = number of students who did not go for a walk
   $s + 9 = 30$
   $s = 21$
   21 students did not go for a walk.

3. Two hundred fifty minus what number is 35 times five?
   Let n = the number
   $250 - n = 35 \cdot 5$
   $n = 75$
   The number is 75.

4. Seventeen is three more than twice what number?
   Let n = the number
   $2n + 3 = 17$
   $n = 7$
   The number is 7.

5. If twice a number is 12, what is three times that number?
   Let n = the number
   $2n = 12$
   $n = 6$
   So $3n = 3(6) = 18$.
   Three times the number is 18.

6. How many dimes are worth 75 cents less than 35 quarters?
   Let d = the number of dimes
   $10d = 35 \cdot 25 - 75$
   $d = 80$
   80 dimes are worth 75 cents less than 35 quarters.

7. How many 12-cent balls can be purchased for $12?
   Let b = the number of balls
   $12b = 1200$
   $b = 100$
   100 balls

8. Find all the numbers that satisfy the following statement: Half of a number is greater than 3 more than twice the number.
   Let n = the number
   $\frac{n}{2} > 2n + 3$
   $n > 4n + 6$
   $-3n > 6$
   $n < -2$; All numbers less than –2 satisfy the statement.

9. Find all the numbers that satisfy the following statement: One third a number is less than or equal to four more than three times the number.
   Let n = the number
   $\frac{1n}{3} \leq 3n + 4$; $n \geq -\frac{3}{2}$
   The numbers are all numbers greater than or equal to $-\frac{3}{2}$.

10. For what numbers is three greater than four times the number?
    Let n = the number
    $3 > 4n$
    $\frac{3}{4} > n$ or $n < \frac{3}{4}$
    The numbers are all numbers less than $\frac{3}{4}$.

(possible journal responses continued)

3. **Mike gets paid at least $35 a week plus a 5% commission on each item he sells. Write an inequality to describe Mike's pay for one week.**
4. **If the quantities in the problem are described as being equal, use an equation. If one quantity in the problem is described as being greater or less than another quantity, use an inequality. If one quantity in the problem is described as being greater than or equal to, or less than or equal to another quantity, use an inequality.**
5. **Possible answers: less than, greater than, at least, at most, no more than, no less than, greater than or equal to, less than or equal to, more than, less than, a maximum of, a minimum of.**