



Checkpoint 7A

Problem 7-49

Solving Problems by Writing Equations

It is common to represent situations using a single equation or a system of equations. When solving a problem involving a proportional relationship, using equal ratios is the most common method. In any case, it is important that you define the variables.

Example 1: A bag of coins are all nickels and dimes. If there are 33 coins and the value is \$2.40, how many of each kind of coin are in the bag?

Solution 1: Using only one variable.

If d = the number of dimes then $33 - d$ = the number of nickels.

$10d$ = the value of the dimes and $5(33 - d)$ = the value of the nickels.

The total value of the dimes and nickels together is 240 cents so:

$$10d + 5(33 - d) = 240$$

Solving yields $d = 15$ (dimes) and $33 - 15 = 18$ (nickels).

Solution 2: Using two variables.

Let d = the number of dimes and n = the number of nickels. Now we write two equations. The first relates the number of coins and the second relates the value of the coins.

$$d + n = 33$$

$$10d + 5n = 240$$

Solving again yields $d = 15$ (dimes) and $n = 18$ (nickels).

Example 2: Michael is swimming at a rate of 450 feet in 4 minutes. At that rate, how far will he swim in 15 minutes?

Solution:

Since he is swimming at a constant rate, this is a proportional situation.

Let d = the distance traveled and write two ratios comparing distance and time.

$$\frac{\text{distance}}{\text{time}} = \frac{450}{4} = \frac{d}{15}$$

Solving yields $d = 1687.5$ feet.

Here are some more to try. For each problem, write one or two equations to represent the situation and then solve. Be sure to define your variable(s) and clearly answer the question.

1. A rectangle is three times as long as it is wide. The perimeter is 36 cm. Find the length of each side.

2. The sum of two consecutive odd numbers is 76. Find the numbers.
3. Nancy started the year with \$435 in the bank and is saving \$25 a week. Shane started with \$875 and is spending \$15 a week. When will they both have the same amount of money in the bank?
4. There is a \$45 tax on an \$800 scooter. How much tax would there be on a \$1000 scooter?
5. Jorge has some dimes and quarters. He has 10 more dimes than quarters and the collection of coins is worth \$2.40. How many dimes and quarters does Jorge have?
6. Tickets to the school musical are \$5.00 for adults and \$3.50 for students. If the total value of the tickets sold was \$2517.50 and 100 more students bought tickets than adults, how many adults and students bought tickets?
7. If 50 empty soda cans weigh $3\frac{1}{2}$ pounds, how much would 70 empty soda cans weigh?
8. Holmes Junior High has 125 more students than Harper Junior High. When the two schools are merged there will be 809 students. How many students currently attend each school?
9. As treasurer of her school's 4H club, Carol wants to buy gifts for all 18 members. She can buy t-shirts for \$9 and sweatshirts for \$15. The club has \$180 to spend and Carol wants to spend all of the money. How many of each type of gift should she buy?
10. Ms. Jeffers is splitting \$775 among her three sons. If the oldest gets twice as much as the youngest and the middle son gets \$35 more than the youngest, how much does each boy get?
11. Evan has 356 stuffed animals, all of which are either monkeys or giraffes. The number of giraffes he owns is 17 more than twice the number of monkeys. How many monkeys does he own?
12. Oliver earns \$50 per day plus \$7.50 for each package he delivers. If his paycheck for the first day was \$140, how many packages did he deliver that day?
13. Leticia spent \$11.19 on some red and some blue candies. The bag of candies weighed 11 pounds. If the red candy costs \$1.29 per pound and the blue candy costs \$0.79 per pound, how much of each candy did she buy?
14. In 35 minutes, Suki's car went 25 miles. If she continues at the same rate, how long will it take her to drive 90 miles?

15. Fresh Pond has a population of 854 and is increasing by 3 people per year. Strawberry has a population of 427 and is increasing by 10 people per year. In how many years will the two villages have the same number of residents?

16. Marin County fair charges \$4 to enter and \$3.50 for each ride on the Screamer. Sonoma County fair charges \$7 to enter but only \$2 for each ride on the Screamer. How many times would you need to ride the Screamer so that you spent the same at each fair?

17. Find three consecutive numbers whose sum is 219.

18. The germination rate for zinnia seeds is 78%. This means that 78 out of every 100 seeds will sprout and grow. If James wants 60 zinnia plants for his yard, how many seeds should he plant?