

Problem Solving Strategies: Using a System of Equations

When a problem has two unknowns, you can often write a system of two equations that can be used to solve the problem.

► Example 1 _____

Juliette mailed 31 New Year's greetings. Some were letters at \$0.29 each and some were postcards at \$0.19 each. She paid \$7.89 in all for postage. How many letters and how many postcards did she send?

Solution

Let x = the number of letters.

Let y = the number of postcards.

The system of equations that could be used to solve the problem is as follows.

$$x + y = 31$$

$$0.29x + 0.19y = 7.89$$

► Example 2 _____

In an isosceles triangle, the length of a side is two times the length of the base. The perimeter of the triangle is 30. Find the length of each of the sides.

Solution

Let x = the length of the base. Let

y = the length of one of the congruent sides.

The system of equations that could be used to solve the problem is as follows.

$$y = 2x$$

$$x + 2y = 30$$

EXERCISES _____

For each of the following exercises, define variables and write a system of equations that could be used to solve the problem.

- The sum of two numbers is 95. The larger number is one less than twice the smaller number. Find the two numbers.

- Two angles are complementary. The measure of one angle is twice the measure of the other. What are the measures of the two angles?

- Sam is four years younger than Abby. The sum of their ages is 18. How old are Sam and Abby?

- Two angles are supplementary. The measure of one angle is three times that of the other. What are the measures of the two angles?

5. Steve has 45 coins made up of nickels and dimes. The value of the coins is \$2.75. How many of each coin does he have?
6. Jennifer made a bank deposit of \$238. Her deposit consisted of 50 bills, some one-dollar bills and the rest five-dollar bills. How many bills of each kind did she deposit?
7. A landscaping firm is designing a flower bed to border a rectangular pool. The perimeter of the pool is 32 meters. Three times the width is the same dimension as five times the length. What are the dimensions of the pool?
8. Ricardo and Emilia are cousins. Twice Ricardo's age together with three times Emilia's age totals 34. Twice Emilia's age is one more than three times Ricardo's age. How old is Emilia?
9. The factory foreman makes \$9 more per hour than Janet, the most senior worker. If one dollar is subtracted from the foreman's rate of pay, the resulting amount is $\frac{3}{2}$ what Janet makes. Find the rate of pay for Janet and the foreman.
10. The sum of two numbers is 78. Their difference is 18. Find the numbers.

Writing Systems of Equations

Name _____

Write a system of equations for each word problem.

- 1.) A soccer team bought ice-cream cones to celebrate a victory. The total cost of 12 double cones and 8 single cones was \$17. A double cone cost \$0.25 more than a single cone. What was the price of each type of cone? _____

- 2.) Your family receives basic cable television and one movie channel for \$39 a month. Your neighbor receives basic cable and two movie channels for \$45.50. What is the monthly charge for basic cable? (Assume that each movie channel has the same monthly charge.) _____

- 3.) A hotel has 260 rooms – some singles and some doubles. The singles cost \$35 and the doubles cost \$60. Because of a math teachers' convention, all of the hotel rooms are occupied. The sales for this night are \$14,000. How many of each type of room does the hotel have? _____

- 4.) The measures of the two acute angles of a right triangle differ by 18 degrees. What are their measures? _____

- 5.) A total of \$4500 is invested in two funds paying 4% and 5% annual interest. The combined annual interest is \$210. How much of the \$4500 is invested in each fund? _____

- 6.) How can \$12,600 be split between two investments, one paying 6% annually and one paying 8% annually, so that the amounts of interest from the two investments are equal? _____

- 7.) Your hourly wage at the grocery store is greater after 6:00 p.m. than during the day. One week you work 18 daytime hours and 22 evening hours, and earn \$264. The next week you work 30 daytime hours and 10 evening hours, and earn \$240. What is the daytime hourly rate? What is the evening hourly rate? _____

Writing Systems of Equations

Name _____

- 8.) The sum of two numbers is 17 and their difference is 29. Find the two numbers described. _____
- 9.) The sum of a number and twice a greater number is 8. The sum of the greater number and twice the lesser number is -6 . Find the two numbers described. _____
- 10.) Adult tickets for the school musical sold for \$3.50 and student tickets sold for \$2.50. Three hundred twenty-one tickets were sold altogether for \$937.50. How many adult tickets were sold? _____
- 11.) Colin has \$2.35 in nickels and dimes. If he has 33 coins in all, find the number of nickels and dimes. _____
- 12.) The price of a sweater is \$5 less than twice the price of the shirt. If four sweaters and three shirts cost \$200, find the price of each shirt and each sweater. _____
- 13.) The difference between two numbers is 16. Five times the smaller is the same as 8 less than twice the larger. Find the numbers. _____
- 14.) A shipment of TV sets, some weighing 30 kg each and the others weighing 50 kg each, has a total weight of 880 kg. If there are 20 TV sets all together, how many weigh 50 kg? _____
- 15.) Two records and three tapes cost \$31. Three records and two tapes cost \$29. Find the cost of each record and each tape. _____