

## 6.4 Applications of Linear Systems (D1)

SWBAT translate a break-even word problem into a system of linear equations and solve.

### Finding a Break-Even Point

**Step 1:** \_\_\_\_\_ the problem

**Step 2:** Underline or \_\_\_\_\_ the \_\_\_\_\_

**Step 3:** Define the \_\_\_\_\_ (they are found in the question)

**Step 4:** Reread the problem and \_\_\_\_\_ (one cost, one profit)

**Step 5:** Set the \_\_\_\_\_ to each other and solve!

1. A fashion designer makes and sells hats. The material for each hat costs \$5.50. The hats sell for \$12.50 each. The designer spends \$1400 on advertising. How many hats must the designer sell to break even?

**Set Up:**

**Equations:**

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

SOLVE:

2. A puzzle expert wrote a new Sudoku puzzle book. His initial costs are \$864. Binding and packaging each book cost \$0.80. The price of the book is \$2. How many copies must be sold to break even?

**Set Up:**

**Equations:**

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

SOLVE:

3. A bicycle store costs \$2400 per month to operate. The store pays an average of \$60 per bike. The average selling price of each bicycle is \$120. How many bicycles must the store sell each month to break even?

**Set Up:**

**Equations:**

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

SOLVE:

4. Producing a musical cost \$88,000 plus \$5900 per performance. One sold-out performance earns \$7500 in revenue. If every performance sells out, how many performances are needed to break even?

**Set Up:**

**Equations:**

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

SOLVE:

5. A carpenter makes and sells rocking chairs. The material for each chair costs \$22.50. The chairs sell for \$75 each. If the carpenter spends \$420 on advertising, how many chairs must she sell to break even?

**Set Up:**

**Equations:**

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

SOLVE:

### **Solving Word Problems with Two Variables**

**Step 1:** Read the problem

**Step 2:** Underline or highlight the question

**Step 3:** Define the variables (they are found in the question)

**Step 4:** Reread the problem and write the equations

**Step 5:** Solve!

6. The sum of two numbers is 73. When the smaller number is subtracted from twice the greater number, the result is 50. Find the two numbers.

**Set Up:**

**Equations:**

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

SOLVE:

7. The length of a rectangle is 5 cm less than three times its width. If the perimeter is 70 cm, find the area of the rectangle.

**Set Up:**

**Equations:**

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

SOLVE:

8. John has 15 coins, all dimes and quarters, worth \$2.55. How many dimes and how many quarters does John have?

**Set Up:**

**Equations:**

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

SOLVE:

9. Tickets for the senior play cost \$4 for adults and \$2 for students. This year there were 600 tickets sold, and the class made \$1900. How many of each type of ticket was sold?

**Set Up:**

**Equations:**

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

SOLVE:

10. Kathleen invested \$5000, some at 6% and the rest at 5%. Her annual income from the investments is \$280. How much is invested at 5%?

**Set Up:**

**Equations:**

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

SOLVE:

11. A baseball manager bought 4 bats and 9 balls for \$168.75. On another day, he bought 3 bats and 1 dozen balls for \$172.50. How much did he pay for each bat and each ball?

**Set Up:**

**Equations:**

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

SOLVE:

12. CHALLENGE: You want to sell 1 lb jars of mixed peanuts and cashews for \$5. You pay \$3 per pound for peanuts and \$6 per pound for cashews. You plan to combine 4 parts peanuts and 1 part cashews to make your mix. You have spent \$70 on materials to get started. How many jars must you sell to break even?

**Set Up:**

**Equations:**

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

Let \_\_\_\_\_ = \_\_\_\_\_

\_\_\_\_\_

SOLVE:

**Solve each system. Explain why you chose the method you used.**

**14.**  $4x + 5y = 3$   
 $3x - 2y = 8$

**15.**  $2x + 7y = -20$   
 $y = 3x + 7$

**16.**  $5x + 2y = 17$   
 $x - 2y = 8$