# Solving Equations with Variables on Both Sides

1. You are looking for a dog spa to care for your dog. Each time you visit a spa, you ask them to give your dog a bath. There are two companies you are considering. Golden Dog Care charges $20 for each visit plus $5 for each bath. Super Dog Delight charges $15 for each visit and a $60 fee for an unlimited number of baths. You need to know how many visits will make the two companies charge the same amount.
2. Write an expression for the amount that Golden Dog Care will charge for *n* visits.
3. Write an expression for the amount that Super Dog Delight will charge for *n* visits.
4. Write an equation which determines when these companies charge the same amount.
5. We can solve this equation in three different ways. Let’s first use a **table**. Complete the table below.

|  |  |  |
| --- | --- | --- |
| **Number of Visits** | **Golden Dog Care** | **Super Dog Delight** |
| 0 |  |  |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |

1. What are some disadvantages to using a table to find the solution of an equation?
2. Now solve the equation using the **properties of equality**. List your steps, and show all of your work. Check your solution.
3. Now solve the equation by making a **graph** on your graphing calculator. Set your graphing window using the values in the window below:



In the Y= menu, enter the left side expression into Y1 and the right side expression into Y2. Press GRAPH and find the point where the two lines intersect.

1. What are some disadvantages to using a graph to find the solution?
2. Dennis is collecting aluminum cans to raise funds for a local animal shelter. He needs to determine whether he should return the cans to the local supermarket or return the cans to the recycling center. If he brings the cans to the supermarket, he receives 5 cents per can. If he brings the cans to the recycling center, he receives 6 cents per can but is forced to pay a $15 recycling fee. How many aluminum cans would he have to return to receive the same amount of money at the supermarket and the recycling center? Write an equation that describes this problem, and then solve it.
3. Create your own problem by filling in the blanks below.

A membership to a rock-climbing gym allows you to climb as much as you want for a fee of $\_\_\_\_\_ but you also pay $\_\_\_\_\_ per day for equipment rental. Nonmembers pay $\_\_\_\_\_ per day to use the gym and $\_\_\_\_\_ per day for equipment rental. Find the *number of days* in which the total cost for the members and nonmembers *are the same*.

Write an equation that solves the problem you created above. Then solve the equation and check your solution.