

# Using Spreadsheets to Solve Systems

A system of equations consists of two or more equations with the same variables. To solve a system of equations with two variables, find the ordered pair that satisfies all of the equations. You can solve a system of equations by using a spreadsheet.

## Example 1 Use a Spreadsheet

**JOBS** Bill is considering two job offers in two different telemarketing departments. The salary at the first job is \$400 per week plus 10% commission on sales. At the second job, the salary is \$375 per week plus 15% commission. For what amount of sales would the weekly salary be the same at either job?

**Step 1** Enter the formulas into the spreadsheet.

Enter different sales amounts for Bill's weekly sales in column A. Then enter the formula for the salary at the first job in each cell in column B. In each cell of column C, enter the formula for the salary at the second job.

	A	B	C
1	<b>Sales</b>	<b>Job 1 Salary</b>	<b>Job 2 Salary</b>
2	0	400	375
3	100	410	390
4	200	420	405
5	300	430	420
6	400	440	435
7	500	450	450
8	600	460	465
9	700	470	480
10	800	480	495
11	900	490	510
12	1000	500	525
13			

The formula in cell C13 is  $400+0.1*B13$ .

The formula in cell D13 is  $375+0.15*B13$ .

**Step 2** Locate the row where both formulas have the same result.

The spreadsheet shows that for sales of \$500, the total weekly salary for each job is \$450.

## Exercises

For Exercises 1–4, use the spreadsheet of weekly salaries.

1. If  $x$  is the amount of Bill's weekly sales and  $y$  is his total weekly salary, write a linear equation for the salary at the first job.
2. Write a linear equation for the salary at the second job.
3. Which ordered pair is a solution for both of the equations you wrote for Exercises 1 and 2?
  - a. (100, 410)
  - b. (300, 420)
  - c. (500, 450)
  - d. (900, 510)

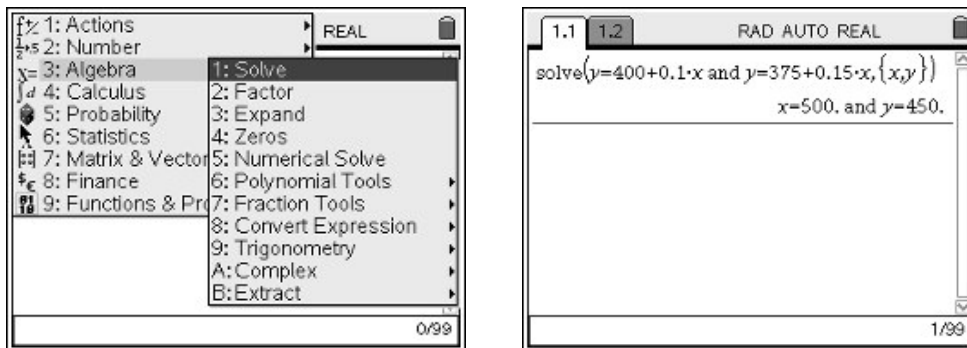
## Using Spreadsheets to Solve Systems (continued)

You can find the sales amount for which Bill's salary will be equal without using a spreadsheet by solving a system of linear equations using a computer algebra system (CAS).

### Example 2 Use a Computer Algebra System

Use a CAS to solve the problem given in Example 1.

Under the Home menu, select **Calculator**. Next, press the menu key, scroll down to **Algebra**, and select **Solve**. Enter the equations as shown below.



The solution of the system is the ordered pair (500, 450). Therefore, the weekly salary at both jobs will be \$450 when the sales are equal to \$500.

### Exercises

- BUSINESS** Alvin and Jason each run a lawn-mowing business. Alvin charges \$15 per lawn plus \$18 per hour. Jason charges \$25 per lawn plus \$10 per hour. When do the two business charge the same amount to mow a lawn? When is it cheaper to use Jason's business?
- SHOPPING** Maria has a \$10 coupon and a 15% discount coupon for her favorite store. The store has a policy that only one coupon may be used per purchase. When is it best for Maria to use the \$10 coupon, and when is it best for her to use the 15% discount coupon?
- TENNIS** At a park, there are 38 people playing tennis. Some are playing doubles, and some are playing singles. There are 13 matches in progress. A doubles match requires 4 players, and a singles match requires 2 players. How many matches of each kind are in progress?
- FUNDRAISER** To raise money for new uniforms, the band boosters sold T-shirts and hats. The cost and sale price of each item is shown. If the boosters spend a total of \$2,000 on T-shirts and hats, and they sold all of the merchandise and made a profit of \$3,375, how many T-shirts did they sell?

Item	Cost	Sale Price
T-shirt	\$6	\$10
hat	\$4	\$7

## ***Using Spreadsheets to Solve Systems***

### **Answers**

1.  $y = 400 + 0.1x$
2.  $y = 375 + 0.15x$
3. c
4. The businesses charge the same amount, \$37.50, when the lawn takes 1.25 hours or 1 hour and 15 minutes to mow. It is cheaper to use Jason's business when it takes longer than 1.25 hours to mow the lawn.
5. Use the \$10 coupon for a purchase less than \$66.67, and the 15% discount coupon for a purchase over \$66.67.
6. 6 doubles games and 7 singles games
7. 250 T-shirts