Systems of Linear Equations

Suppose a total of $12,000 is invested in two funds paying 4% and 5% simple interest. The yearly interest on the two investments is $560. How much is invested at each rate?

Let

> **x = the dollar amount invested at 4%, and**
> **y = the dollar amount invested at 5%.**

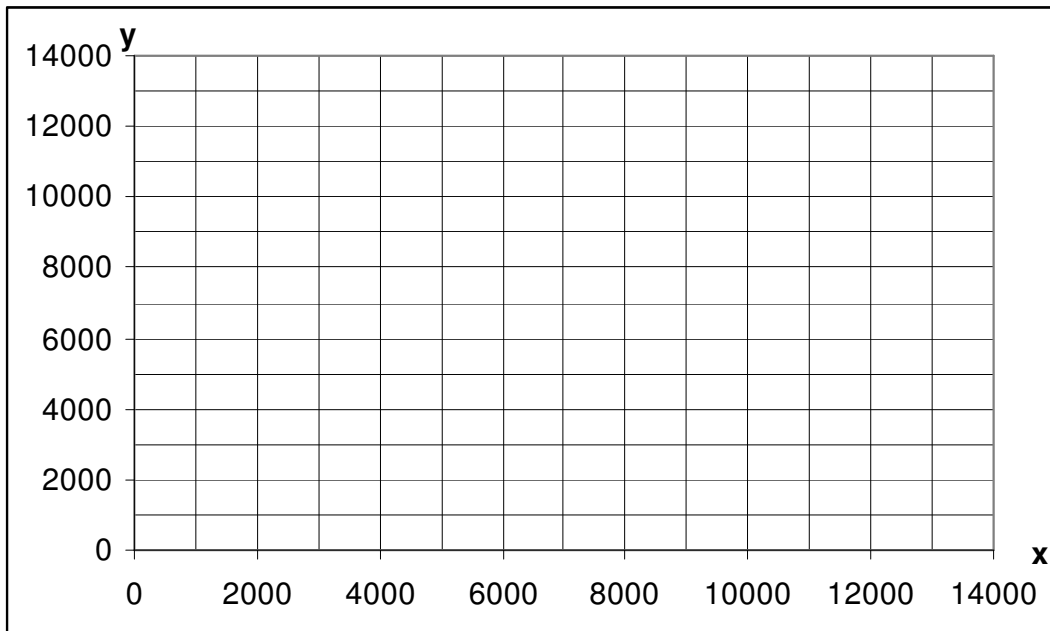**Since the total amount invested is $12,000, we know that**

(1)   x + y = _____

The interest earned on the 4% fund = _____ .

The interest earned on the 5% fund = _____ .

Since the total yearly interest is $560, we know that

(2)   _____ + _____ = 560.

Sketch the graphs of equations (1) and (2).

Can we use the graph to find values for x and y that satisfy both equation (1) and equation (2) simultaneously? What can we conclude?

Can we apply algebraic techniques to solve this problem?

Our problem can be concisely stated as follows:

Find values for x and y so that

(1)   x + y = 12,000, and
(2)   0.04x + 0,05y = 560.

We have already solved the problem by a graphical method. Now, we apply an algebraic technique.

Solve equation (1) for y.

(*)   y = _____

Substitute that value for y in equation (2).

0.04x + 0.05(_____) = 560

Solve this new equation for x. Once x is found, we can use equation (*) to solve for y.

The algebraic method illustrated above is called *solution by substitution*. Show how to solve the following problem using *solution by substitution*.

Find x and y so that

-4x + 2y = 4, and
3x – 2y = -9.