The Cover-Up Method

Definition: Finding all the values of a variable that make an equation true is called *solving the equation*.

You have already solved equations by trial and error. The *cover-up method* is another technique for solving equations. It is based on the idea of working backwards.

Example 1:

$$60x + 50 = 300$$

Cover up the term that has the x in it with your finger. The equation looks like:

$$\square + 50 = 300$$

Clearly, what's in the box is 250. So:

$$60x = 250$$

Think of a division that is related to this multiplication, and you will see that:

$$x = 250 / 60$$

or $\mathbf{x = 4.1666\ldots}$

Example 2: This one is about a more complicated equation.

$$5 + \frac{3x-1}{4} = 7$$

Cover up the expression $\frac{3x-1}{4}$. You get:

$$5 + \square = 7$$

Whatever is hidden must be equal to 2. So:

$$\frac{3x-1}{4} = 2$$

Now cover up 3x-1 with your finger.

$$\frac{\square}{4} = 2$$

What is under your finger must be 8, so:

$$3x - 1 = 8$$

Cover up the term containing x:

$$\square - 1 = 8$$

What's under your finger must equal 9, so:

$$3x = 9$$

and $\mathbf{x=3}$

1. Check the solutions to each of the examples by substituting them into the original equations.

Solve each equation. Use the cover up method, then check each answer by substituting.

2. a. $3(x - 10) = 15$
   b. $3(x + 10) = 15$
   c. $3 + \frac{x}{10} = 15$

3. $\frac{18}{x} + 12 = 15$

4. a. $34 - \frac{2x+6}{2} = 4$
   b. $34 - \frac{2x+6}{2} = -4$

5. a. $21 = 12 + \frac{3x}{8}$ b. $12 = 21 + \frac{3x}{8}$

6. a. $5 + \frac{x}{6} = 17$ b. $5 + \frac{6}{x} = 17$
   c. $5 - \frac{x}{6} = 17$ d. $5 - \frac{6}{x} = 17$

7. a. $3 = \frac{12}{x+1}$ b. $3 = \frac{x+1}{12}$
   c. $3 = \frac{12}{x+7}$ d. $3 = \frac{x+7}{12}$

8. Make up an equation like the ones above that has as its solution:
   a. 4 b. -4 c. 1/4

Since the cover-up method is based on covering up the part of the equation that includes an x, it can only be used in equations like the ones above, where x only appears once. In other equations, for example:

$$160x + 100(8 - x) - 750 = 300$$

you cannot use the cover-up method, unless you simplify first.

Review: Dividing by Zero

9. Explain, using multiplication, why 20 / 5 = 4.

10. Explain, using multiplication, why 20 / 0 is not defined. (Hint: Start by writing 20 / 0 = q. Write a related multiplication. What must q be?)

11. Explain, using multiplication, why 0 / 0 is not defined. (Hint: Start by writing 0 / 0 = q. Write a related multiplication. What must q be? Could it be something else?)

