One Step at a Time

Name _____

Class _____

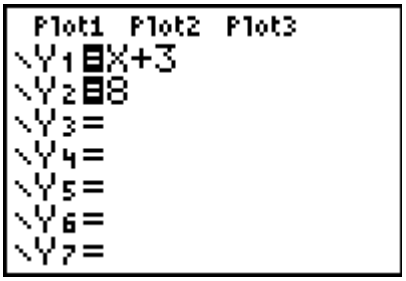
The following equations are examples of one-step equations:

$x + 3 = 8$ $\quad x - 4 = -2$ $\quad 8x = 40$ $\quad \frac{x}{3} = 2$

Is there a rule for solving one-step equations? To find out, solve several one-step equations with your calculator and look for a pattern. To start, clear out any functions from the [Y=] screen.

Problem 1 – Addition Equations

One way to solve an equation is by substitution, or trying different values for the variable until you find one that makes the equation true. Your calculator can help you solve the equation $x + 3 = 8$ by substitution.



- Press [Y=] to access the function entry screen.
- Enter the expression from the left side of the equation into **Y1**.
- Enter the expression from the right side of the equation into **Y2**.

Use the **Table** feature to test different values for x.

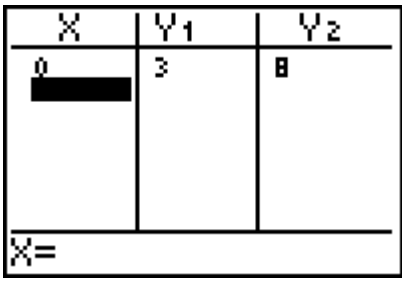
- Press [2nd] [TBLSET] to access the Table Settings menu.
- Change the independent (**Indpnt:**) variable setting from **Auto** to **Ask**, as shown.
- Press [2nd] [TABLE] to access the table.

1st column: values for x

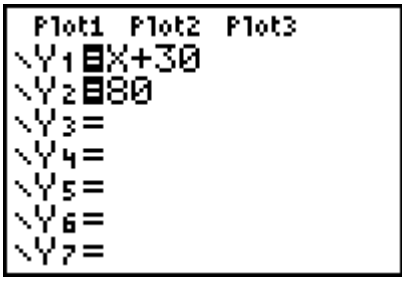
2nd column: value of the left side of the equation, $x + 3$

3rd column: value of the right side of the equation, 8

What value of x will make the two sides of the equation equal and the equation true? Enter guesses in the x column.



Use substitution to solve each equation. Enter the left side of each equation in **Y1** and the right side of each equation in **Y2**. Then use **Table** to look for the value of x that makes the equation true.



1. a. $x + 30 = 80$ $\quad x =$ _____

b. $x + (-3) = 19$ $\quad x =$ _____

c. $73.3 = 4.3 + x$ $\quad x =$ _____

d. $x + 4.5 = 2.5$ $\quad x =$ _____

Write two one-step addition equations of your own. Use substitution to solve them.

2. _____ ___ = ____ _____ ___ = _____

Look for a pattern in the equations you solved and their solutions.

3. **a.** The solution to $x + 3 = 8$ is $x = 5$.
What operation can you perform with 8 and 3 to get 5?

b. Try this pattern on the other equations and solutions. Does it work? Give an example.

Listen as your teacher explains the **Subtraction Property of Equality**. This is what caused the pattern you found. You can use the Subtraction Property of Equality to solve addition equations.	$m + 5 = 1$ $m + 5 - 5 = 1 - 5$ $m = -4$

Fill in the boxes to solve each equation.

4. **a.** $2 + q = 11$

$2 - \square + q = 11 - \square$

$q = \square$

b. $t + 11 = 10$

$t + 11 - \square = 10 - \square$

$t = \square$

c. $n + 32 = 5$

$n + 32 - \square = 5 - \square$

$n = \square$

d. $p + 17 = 0$

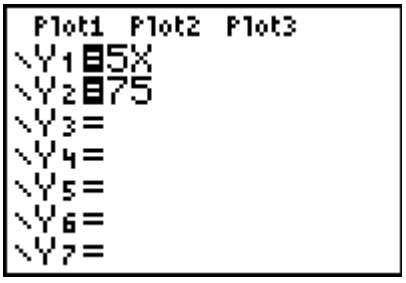
$p + 17 - \square = 0 - \square$

$p = \square$

Problem 2 – Multiplication Equations

You can solve an addition equation by subtracting from both sides, because subtraction "undoes" addition. But what about other types of equations?

Use substitution to solve each equation. Enter the left side of each equation in **Y1** and the right side of each equation in **Y2**. Then use the **Table** to look for the value of x that makes the equation true.



5. **a.** $5x = 75$ $x =$ _____

b. $-7x = 28$ $x =$ _____

c. $4x = 52$ $x =$ _____

d. $-5x = 48$ $x =$ _____

Write two one-step multiplication equations of your own. Use substitution to solve them.

6. _____ ___ = _____

_____ ___ = _____

Look for a pattern in the equations you solved and their solutions.

7. a. The solution to $5x = 75$ is $x = 15$.
What operation can you perform with 75 and 5 to get 15?

b. Try this pattern on the other equations and solutions. Does it work? Give an example.

Listen as your teacher explains the **Division Property of Equality**. This is what caused the pattern you found. You can use the Division Property of Equality to solve multiplication equations.	$7n = 56$ $\frac{7n}{7} = \frac{56}{7}$ $n = 8$

Fill in the boxes to solve each.

8. a.
$$8q = 64$$
$$\frac{8q}{\square} = \frac{64}{\square}$$
$$q = \square$$

b.
$$6t = -120$$
$$\frac{6t}{\square} = \frac{-120}{\square}$$
$$t = \square$$

c.
$$2n = 2$$
$$\frac{2n}{\square} = \frac{2}{\square}$$
$$n = \square$$

d.
$$-3p = 48$$
$$\frac{-3p}{\square} = \frac{48}{\square}$$
$$p = \square$$

Problem 3 – Inverse Operations

When one operation undoes another, they are called **inverse operations**. When two operations are inverse operations, either one undoes the other.

Inverse Operations

addition ⇔ subtraction

multiplication ⇔ division

9. a. What operation would you use to undo addition?

b. What operation would you use to undo subtraction?

c. What operation would you use to undo multiplication?

d. What operation would you use to undo division?

10. Write a rule to solve any one-step equation.