

UNIT 2: EQUATIONS & INEQUALITIES

Unit 2, Page 10

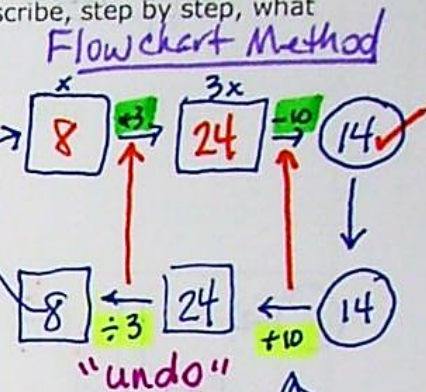
Objectives: I can solve two step equations.

SOLVING TWO STEP EQUATIONS

Now we'll solve some more complicated equations and inequalities - ones that have **two-step solutions**, because they involve two operations. Solving equations is like solving a puzzle. Just keep working through the steps until you get the variable you're looking for alone on one side of the equation. This is called **isolating the variable**.

Here's a two-step equation. Let's start with the variable x, and describe, step by step, what is being done to x in an equation.

$3x - 10 = 14$	Equation
$3x$	First, x is multiplied by three.
$3x - 10$	Next, ten is subtracted from the term $3x$.
$3x - 10 = 14$	We get a result of 14.
Start with x --> Multiply by 3 --> Subtract 10 --> Result is 14.	



Solving an equation is like working the equation backwards to discover what number will work in the equation. Now let's work backwards and use **inverse operations** to undo all the steps. We can start with the result of 14.

14	Start with result. (undo operations to remove numbers)
$14 + 10$	Next, working backwards, we can add 10, which is the inverse of subtracting 10.
$\frac{14 + 10}{3}$	Now we divide by 3, since that's the inverse of multiplying by 3.
$\frac{24}{3} = 8$	We get an answer of 8.
Start with result of 14 --> Add 10 --> Divide by 3 Answer is 8.	

Do you see how it's important when solving an equation to **"undo"** all the steps in the correct order? No matter how many steps are in the original equation, you can work backwards and apply the inverse operations, in order, to arrive at the solution!

Undo Steps
① ② ③ ④
SADMEP

Solving a two-step equation requires the same procedure(s) as a one-step equation.

However, the order in which the procedures are done makes a difference.

Use reverse order of operations to "solve"

1 Do the inverse operation for addition or subtraction first.

2 Do the inverse operation of multiplication or division last.

Step 1 SA undo

Step 2 DM undo

Notes 9/11 Friday

Unit 2, Page 11

I can: solve two-step equations!

He need to undo	To Do
*5	÷5 step 2
-9	+9 step 1

Step 1: Add 9 to both sides	$5x - 9 = 31$ $\frac{5x - 9 + 9}{+9} = \frac{31 + 9}{+9}$ $5x = \frac{40}{5}$ $x = 8$	Check your answer. $5(8) - 9 = 31$ $40 - 9 = 31$ $31 = 31 \checkmark$
Step 2: Then divide both sides by 5		
Isolate the variable "x"	Perform the inverse operations when solving equations. SA DM EP ① ② ③ ④ don't have these!	When checking your solution, use the correct order of operations (PEMDAS) PEMDAS ① ② ③ ④ don't have these!

You can use two-step equations to solve many problems. Write an equation for each and solve.

① Five more than 2 times a number is -7.

With variable	undo	step
+5	-5	①
*2	÷2	②

Equation: $5 + 2n = -7$

Solve: $\frac{5 + 2n - 5}{-5} = \frac{-7 - 5}{-5}$
 $\frac{2n}{2} = \frac{-12}{2}$
 $n = -6$

Check: $5 + 2n = -7$
 $5 + 2(-6) = -7$
 $5 + (-12) = -7$
 $-7 = -7 \checkmark$

② Two diminished by 7 times a number is 51.

With variable	undo	step
+2	-2	①
*7	÷7	②

Equation: $2 + 7n = 51$

Solve: $\frac{2 + 7n - 2}{-2} = \frac{51 - 2}{-2}$
 $\frac{7n}{7} = \frac{49}{7}$
 $n = 7$

Check: $2 + 7n = 51$
 $2 + 7(7) = 51$
 $2 + 49 = 51$
 $51 = 51 \checkmark$

③ Six meters less than twice length x is 18.

With variable	undo	step
*2	÷2	②
-6	+6	①

Equation: $2x - 6 = 18$

Solve: $\frac{2x - 6 + 6}{+6} = \frac{18 + 6}{+6}$
 $\frac{2x}{2} = \frac{24}{2}$
 $x = 12$

Check: $2x - 6 = 18$
 $2(12) - 6 = 18$
 $24 - 6 = 18$
 $18 = 18 \checkmark$

SA DM EP
① ② x x

PEMDAS
① ② ③ ④

① SA ② DM

Practice:

Solve and check each solution.

PEMDAS

To Do
 $\begin{array}{r} \div 10 \\ +4 \end{array} \left| \begin{array}{r} *10 \\ -4 \end{array} \right. \textcircled{2}$

1. $\frac{r}{10} + 4 = 5$
 $\frac{r}{10} - 4 = -4$
 $10 \left(\frac{r}{10} \right) = (1) 10$
 $r = 10$

check $\textcircled{2}$
 $\frac{(10)}{10} + 4 = 5$
 $1 + 4 = 5$
 $5 = 5 \checkmark$

To Do
 $\begin{array}{r} *4 \\ -9 \end{array} \left| \begin{array}{r} \div 4 \\ +9 \end{array} \right. \checkmark$
 $4n - 9 = -9$
 $\frac{4n}{4} - \frac{9}{4} = \frac{-9}{4}$
 $n = 0$

check
 $4(0) - 9 = -9$
 $-9 = -9 \checkmark$

To Do
 $\begin{array}{r} \div 16 \\ -9 \end{array} \left| \begin{array}{r} *16 \\ +9 \end{array} \right. \textcircled{3}$

3. $\frac{m}{16} + 9 = -8$
 $\frac{m}{16} - 9 = -17$
 $16 \left(\frac{m}{16} \right) = 1(16)$
 $m = 16$

check
 $\frac{(16)}{16} + 9 = -8$
 $1 + 9 = 10 \neq -8$
 $-8 = -8 \checkmark$

4. $-4x + 38 = -122$
 $\frac{-4x}{-4} + \frac{38}{-4} = \frac{-122}{-4}$
 $-4x = -160$
 $x = 40$

To Do
 $\begin{array}{r} * -4 \\ +38 \end{array} \left| \begin{array}{r} \div -4 \\ -38 \end{array} \right. \textcircled{5}$
 $-4(40) + 38 = -122$
 $-160 + 38 = -122$
 $-122 = -122 \checkmark$

To Do
 $\begin{array}{r} -17 \\ +17 \end{array}$

Homework: