## Math 6 - Act. 06: Two-Step Equations

## Summary

Students will work through Two-Step Equations using algebra tiles, drawing pictures, and writing the step-by-step process.

## Main Core Tie

Mathematics Grade 6
Strand: EXPRESSIONS AND EQUATIONS (6.EE) Standard 6.EE. 2
Materials
Algebra tiles for each student
Foam working mat for desk top
Colored pencils
One-step and two-step equations worksheets
Additional Resources
The Algebra Lab: Middle School, 1990 Creative Publications, 1300 Villa Street, Mountain View, CA 94041
Middle Grades Math, Course 1, Prentice Hall, 2001

## Background for Teachers

Solving two-step equations algebraically has many real world applications. Keeping an equation in balance is a common thread throughout all algebra. Students must learn to automatically perform the same operation with the same number on both sides of the equation.
Linear equations with one variable have only one solution. To find the solution, first simplify by using the properties and the order of operations to rewrite without grouping symbols and to collect like terms. Then isolate the variable by using inverse operations. Addition and subtraction are inverse operations; multiplication and division are inverse operations.
When you solve a two-step equation, whether modeling with tiles or using algebraic properties, you get the variable alone on one side of the equation by reversing the order of operations.

## Intended Learning Outcomes

6. Represent mathematical situations.

## Instructional Procedures

Invitation to Learn
Choose one task from the following list and write the step-by-step instructions on how to accomplish the task:
making cookies
mowing the lawn
building a snowman
building a fence
Call on students to share their step-by-step instructions. Discuss the importance of completing one step before moving on to the next.
Many math problems need to be handled in a step-by-step method as well.
Instructional Procedures
Distribute algebra tiles, mats, and colored pencils accompanying worksheets.
Review writing and solving one-step equations using algebra tiles. (Note: one-step equations
should have been mastered in the 5th grade. However, since the equation concept is relatively new and requires such abstract thinking, the teacher may want to conduct a very thorough review of one-step equations. Two or three class periods might even be used for review to ensure confidence in these equations.)
Demonstrate the following on overhead:
Addition equation $x+2=6$
Subtraction equation $x-3=7$
Multiplication equation $3 x=6$
Have students work through the worksheet using their algebra tiles, drawing pictures, and writing the solution to each problem.
Two-Step Equations:
Step 1: Add or subtract the same number from each side of equation
Step 2: Divide the same number (the number beside the variable) from both sides of equation.
Demonstrate the following on the overhead with students using tiles. Discuss each step
thoroughly.

$$
\begin{aligned}
& 2+5 x=12 \\
& 3 y-5=10
\end{aligned}
$$

$3 y-2=7$

Have students work through problems on the worksheet using algebra tiles, drawing pictures, and writing the step-by-step process as well as the solution to each equation.
Curriculum Integration
Present some real world problems that require a two-step equation to solve the problem.
Economics example-Carmela wants to buy a digital camera for $\$ 249$. She has $\$ 24$ and is saving $\$ 15$ each week. Solve the equation $\$ 15 \mathrm{w}+\$ 24=\$ 249$ to find how many weeks she will take to save enough to buy the camera. (answer: 15 weeks)
Nutrition example-A soccer player wants to eat 800 calories at a meal that includes a roast beef sandwich and potato chips. The sandwich has 570 calories and the potato chips have 23 calories each. Solve the equation $570+23 p=800$ to find the number of potato chips the soccer player can eat. (answer: 10 chips)

## Extensions

Homework \& Family Connection
A family vacation to Disneyland will cost $\$ 2,000$. Your family has already saved $\$ 450$ toward the trip and they are saving $\$ 300$ every month. How many months will you have to save before you can go on your family vacation? Write an equation to solve the problem. Since the solution is not a whole number, discuss with your family about how to round the answer. Should you round up or down?

## Assessment Plan

Give students 2 or 3 two-step equations and ask them to draw algebra tiles to represent the equations, showing the steps involved. Then find the solution to the equations.

## Authors

Utah LessonPlans

