

## Expressions &amp; Equations

Solving Equations  
by Using Addition

Students have learned that equations are mathematical sentences and that addition and subtraction are inverse operations. They will now use both of these understandings to solve one-step equations using addition. The concept of solving equations permeates algebra. Being able to solve basic equations is essential for future success in mathematics.

## Objective

Solve equations by adding the same number to both sides.

## NCTM Expectations

## Algebra

- Understand the meaning of equivalent forms of expressions, equations, inequalities, and relations.
- Write equivalent forms of equations, inequalities, and systems of equations and solve them with fluency—mentally or with paper and pencil in simple cases and using technology in all cases.
- Use symbolic algebra to represent and explain mathematical relationships.

## Materials

- Algebra Tiles
- Algebra Tiles Equations Mat (BLM 6); one per student
- Algebra Tiles Mini Equations Mats (BLM 14); one per student
- Colored Pencils

**Try It!** Perform the Try It! activity on the next page.

## Talk About It

Discuss the Try It! activity.

- **Ask:** What is known? What is unknown? What operation is the opposite of subtraction?
- **Ask:** How do you isolate the variable?
- **Ask:** How do you know when you have the solution to the equation? How can you check your answer?

## Solve It

Read the problem with the students. Have students solve the equation by creating a model that uses addition with Algebra Tiles. Then have students sketch the model and record their work.

## More Ideas

For another way to teach about solving equations by using addition—

- Use Algeblocks and the Algeblocks Sentences Mat to have students model the equation. Students can isolate the variable by adding blocks to each side. They should add enough to each side so that every unit block on the variable's side is in a zero pair.

## Standardized Practice

Have students try the following problem.

*Helen traveled 48 miles less than Peter. If she traveled 117 miles, how many miles did Peter travel?*

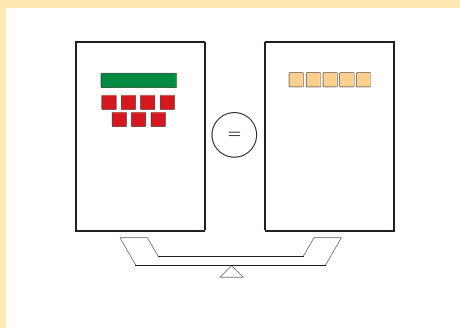
- A. 69
- B. 71
- C. 155
- D. 165

## Try It! 20 minutes | Groups of 3

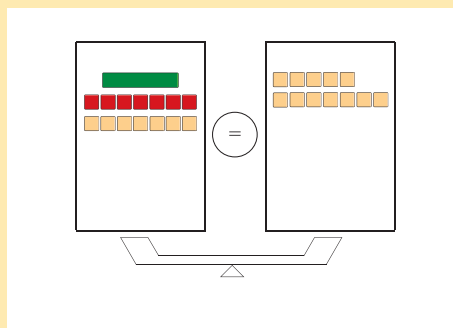
Here is a problem about solving equations by using addition.

*Patrice is 7 years younger than Henrik. Patrice is 5 years old. How old is Henrik?*

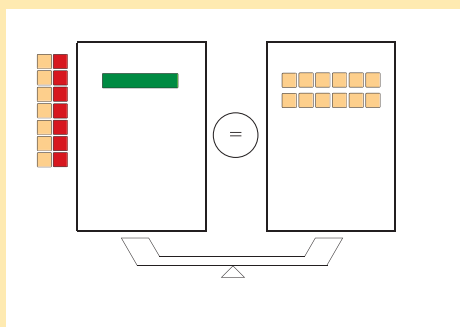
Introduce the problem. Then have students do the activity to solve the problem.  
Distribute the materials.



**1. Ask:** *What is it that we are asked to find? What will the rectangular Algebra Tile represent? Have students write what  $x$  represents. Have students use Algebra Tiles to model the problem and then draw the model on their Algebra Tiles Mini Equations Mats BLM 14. Ask: What equation does this represent? Below their sketch, students will write the mathematical equation. [ $x - 7 = 5$ ]*



**2. Ask:** *What is the opposite of subtracting 7? Have students use Algebra Tiles to add 7 to each side. Then, students should draw the Algebra Tiles on their mini mats and record this step in their solution to the equation. [ $x - 7 + 7 = 5 + 7$ ]*



**3. Ask:** *Can you simplify either side? Have students create zero pairs and then remove the zero pairs. Students should circle and draw a line through all zero pairs on their mini mats. They also should mark which numbers cancel in their solution. Have students write the final step in their solution to the equation. Ask: How old is Henrik? [ $x = 12$ ]*

### ! Look Out!

Students may struggle with solving equations by performing the same operation on both sides. Use Algebra Tiles and the Algebra Tiles Equations Mat to practice solving equations. Emphasize that an equation is like a scale—it stays balanced as long as you add the same amount to each side. Remind students that by using properties of equality, we are modeling equivalent equations.