

## Equality Means the Same As

### Student Probe

What is a symbol?

Is this true or false?  $7 = 7$

$$0 + 7 = 7$$

$$5 + 2 = 7$$

$$7 = 4 + 3$$

$$5 + 2 = 6 + 1$$

What number is missing to make the equation true?

$$5 + \square = 7$$

### Lesson Description

This lesson is intended to help students develop an understanding of equality using the equal sign to symbolize the equivalence of numbers and equations.

### Rationale

The equals sign is one of the most important yet misunderstood symbols in elementary arithmetic and algebra. Students frequently indicate that the symbol = means “the answer is” rather than a symbol that represents equivalence or “the same as.” After students understand that the equals sign is a symbol that represents equality, they will be able to correctly identify true/false equations and open number sentences. In addition, they will be able to use relational thinking in solving problems thus building a foundation for algebraic thinking.

### Preparation

Create a visual display of various symbols found in real world situation and in mathematics. For example, M (McDonald’s), no smoking symbol, men’s restroom symbol, the recycle symbol, a stop sign, addition symbol, subtraction symbol, and equals sign are good choices. This display should be large enough to record students’ interpretation of each symbol.

### At a Glance

What: Using the equal sign to symbolize equivalence.

Standard:

AR.Math.Content.1.OA.D.7

Understand the meaning of the equal sign and determine if *equations* involving addition and subtraction are true or false.

Mathematical Practices:

SMP1: Make sense of problems and persevere in solving them.

SMP4: Model with mathematics.

Who: Students who do not understand that the equals sign (symbol) means the “same as” or “equal to.”

Grade Level: 1

Prerequisite Vocabulary: adding, joining, take away

Prerequisite Skills: Understand the meaning of the addition and subtraction symbols

Delivery Format: Individual or small group

Lesson Length: 30 to 45 min.

Materials, Resources, Technology: pan balance, linking cubes, chart paper

Student Worksheets: None

## Lesson

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
1. Do you know what symbols are? What do you think symbols are?	Symbols are pictures for things around us.	A symbol is a way of expressing and/or recording representations of things in our environment and in mathematics.
2. Show students symbols from the world around them. Look at these symbols of things in our world. What do these symbols represent?	M (McDonald's), No smoking! Men's bathroom! Recycle! Etc...	These symbols stand for McDonald's, no smoking, men's bathroom, recycle, etc...
3. Show students these math symbols: =, +, -.  Look at these symbols. Mathematicians use them to represent a way of recording their thinking and actions. What do these symbols represent?	Adding Taking away Equals	Adding or joining to. Taking away or subtracting. Equals or the "same as".
4. What do these math symbols mean?	These math symbols mean joining, taking away, and the "same as" or "equal to".	The plus symbol means joining groups, the subtraction symbol means taking away or separate from, and the equals sign means the "same as" or "equal to."

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
<p>5. Let's talk more about the equals symbol. Boys and girls often get mixed up when they use this symbol. Remember that the equals symbol means the "same as." The "same as" means what's on the left side of the equals symbol is the "same as" what's on the right side of the equals symbol. Show students a pan balance. Put linking cubes or similar objects into the pan balance so that it is unbalanced. Put seven cubes on the left and two cubes on the right. Ask students if the left side is the "same as" or "equal to" the right side.</p>	<p>No</p>	<p>Notice how this side went down and this side went up. This means that the left is not the "same as" or "equal to" the right. Which pan is heavier?</p>
<p>6. Record <math>7 = 2</math> on chart paper. Is 7 the "same as" or "equal to" 2? Ask students if this is true/false.</p>	<p>No False</p>	<p>Look at the pan balance. See how the left side went down and the right side went up. This means that 7 is not the "same as" or "equal to" 2.</p>
<p>7. Put linking cubes into the pan balance so that the balance is equal. Put 5 cubes on the left and 5 cubes on the right. Ask the students if the left side is the "same as" or "equal to" the right side.</p>	<p>Yes</p>	<p>Notice how both sides are level or the same. This means that the left is the "same as" or "equal to" the right.</p>

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
<p>8. Record <math>5 = 5</math> on chart paper. Is 5 the “same as” or “equal to” 5? Ask students if this is true/false. How can we “prove” this statement as true?</p>	<p>Yes True</p> <p>pan balance</p>	<p>Look at the pan balance. See how both sides are balanced or the same. This means that 5 is the “same as” 5. 5 is “equal to” 5.</p>
<p>9. Now let’s look at some number sentences. Tell me if the left side is the “same as” or “equal to” the right side.</p> <p><math>0 + 7 = 7</math>  <math>10 - 3 = 7</math>  <math>3 + 6 = 10</math>  <math>5 + 2 = 7</math>  <math>10 = 7 + 4</math>  <math>7 = 10 - 4</math>  <math>7 = 4 + 3</math>  <math>11 = 11</math>  <math>5 + 2 = 6 + 1</math></p> <p>Present one equation at a time and record true/false.</p>	<p>True  True  False  True  False  False  True  True  True</p>	<p>Work with student/students to use the pan balance to represent each equation or direct model each part of the equation using pictures.</p>

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
<p>10. Now look at this equation:</p> $5 + \square = 7$ <p>Do you see that something is missing? What number should be in the box to make the left side the “same as” or “equal to” the right side?</p>	<p>Yes</p> <p>2, because 5 added to 2 is the “same as” 7.</p> <p>The left side is the “same as” the right side.</p>	<p>What can you join with five to make the left side be the “same as” or “equal to” the right.</p> <p>Underline the left side with a blue marker and the right side with a red marker.</p> <p>Instruct the student to put 5 linking cubes on the left side of the pan balance.</p> <p>How many should be on the right side?</p> <p>Notice how the balance isn’t equal or the same on both sides.</p> <p>What will happen if you put one more linking cube on the left side?</p> <p>What will happen if you put another cube on the left side? Notice how the balance is the same on both sides.</p> <p>How many cubes did you join with 5 to make the left side be the same as 7 on the right side?</p> <p>Record 2 in the box to make the equation true.</p>

### Teacher Notes

None

### **Variations**

3=3   2+1=3   3=2+1   2+1=3+0   4-1=3  
 3=1+1   0=3   1+1=3+0   3=4-1

14=14   7+7=14   13=14+1   6+8=7=7   14=10-4  
 14=16   14=10+5   11= 10-1   6+7=7+7

## Formative Assessment

Students should record true or false for each equation.

$$6+3=9$$

$$10=10$$

$$8=10-2$$

$$5+5=9+1$$

$$8+ \square =10$$

## References

Van de Walle, John A., Karp, Karen S., and Bay-Williams, Jennifer M. (2010). *Elementary and Middle School Mathematics Teaching Developmentally*. Boston: Allyn & Bacon.

*An Emerging Model: Three-Tier Mathematics Intervention Model*. (2005). Retrieved 3 10, 2011, from rti4success: <http://www.rti4success.org/images/stories/pdfs/serp-math.dcairppt.pdf>.