Equivalent Equations

Summary

Students will produce equivalent equations by performing the same operation on both sides of an equation.

Main Core Tie

Secondary Mathematics I

Strand: ALGEBRA - Reasoning With Equations and Inequalities (A.REI) Standard A.REI.1

Materials

- True/False Student Response Cards
  (attached)
  Worksheets: Defining Equivalent Equations, Equivalent Equations With Counters And Balances
  Cups, Counters and Balances overheads and student manipulatives(attached)
  Journal: Defining Equivalent Equations

Background for Teachers

Enduring Understanding (Big Ideas):
Equivalent expressions
Essential Questions:
What are equivalent equations?
How does performing the same operation on both sides of an equation affect the equation?
Skill Focus:
Operate on equations, Produce equivalent equations
Vocabulary Focus:
Equivalent, expression, equation, operation, operate
Ways to Gain/Maintain Attention (Primacy):
Predicting, journaling, cooperative learning, manipulatives.

Instructional Procedures

Starter: Review
Simplify
2 + 6 • 5 ÷ 3(8 -- 3)
4(v + 2)
5(4m) + 2m
Lesson Segment 1: Access background knowledge
Use True/False Student Response Cards (attached). These are a two-sided card, so students can see which response they are indicating, and the teacher can see which response the student has chosen. Have each student hold their card chest high and pinch their response as you make the following statements. After each statement, clarify and correct.
True/False
Equivalent means equal to.
In order for two expressions to be equivalent, they must look identical.
(3 + 4) -- 5 = 3 + 4
If x = 12 and y equals 12, then x = y.
After the brief discussion about the True/False statements ask students what they might do to make the expression on the left equivalent to the expression on the right in question # 3 above.

Lesson Segment 2: What are equivalent equations?
Q. When we see an equal sign what does that mean? (Many students think an equal sign means, "The answer follows". Clarify that it means one expression is equivalent to the other.)
We represent two equivalent expressions using an equation. For example: 12 + 4 = 16 is an equation. 12 + 4 -- 2 = 16 -- 2 is also an equation. These two equations are called equivalent because the same operation was performed on both sides of the equation to produce the new equation.
Tell the students that the equations on the right above show an operation performed on both sides of the equation on the left. Ask them to compare the original equation to transformed equation to determine what operation has been performed.
Next ask the students how performing that operation on both sides affected the equation. Ask them to determine whether or not the expressions formed by operating are still equivalent. When we perform the same operation to both sides of an equation we produce another equation. The two equations are *equivalent equations* .
Journal: Work with students to fill in sections 1 and 2 in the Frayer Model for vocabulary "Equivalent Equations" (attached). When doing the sketch section, discuss a balance beam, seesaw, or scale for showing how performing the same operation to both sides of an equation creates two equivalent expressions or an equation. Also, make sure one of the facts about equations is that an equal sign indicates the two expressions are still balanced, so an equivalent equation is produced.
Have students work in pairs taking turns so that one partner writes a simple numerical equation and the other performs the same operation on both sides creating an equivalent equation. Ask several pairs to share there ideas. Then, have the students choose two of the examples to write in the Frayer Model. Work with them to write two non examples.
Lesson Segment 3: How does performing the same operation on both sides of an equation affect the equation?
Q. When we say two things are balanced, what does that mean to you? Discuss that a balance is a tool used to measure whether or not two quantities are equivalent or not. Model using the balance (attached) on an overhead transparency to show balanced quantities. Start with 4 counters on one side and 4 on the other. Take a counter off one side and ask, "What must we do to make these two sides balance?"
Give student pairs a few counters and balances. Work with them to model how to sketch and complete a couple of the problems on the first page of the "Equivalent Equations With Counters And Balances" worksheet. Students will be asked to identify what operation must be done to create an equivalent equation and to check to make sure the result is an equation. Have the students Do Rally Coach to complete the worksheet. In Rally Coach one partner coaches the other explaining what, why, how to complete a problem. Then, the other partner becomes the coach for the next problem. Both partners complete the two problems on their worksheets. They continue taking turns coaching each other until they complete the first page of the worksheet.
When the numerical page has been done, you may want to introduce the cup as representing an undetermined number represented by a variable. Model a couple of problems from page 2 of the worksheet, and then have the students do Rally Coach again to complete the page.
Have students complete # 5 and #6 on the "Defining Equivalent Equations" journal entry page.

Assessment Plan

observation, performance task, questions

Bibliography

This lesson plan was created by Linda Bolin.

Authors

Utah LessonPlans