Equivalent Expressions

Summary

Solve single-variable equations

Main Core Tie

Mathematics Grade 6

Strand: EXPRESSIONS AND EQUATIONS (6.EE) Standard 6.EE.5

Additional Core Ties

Mathematics Grade 6

Strand: EXPRESSIONS AND EQUATIONS (6.EE) Standard 6.EE.3

Mathematics Grade 6

Strand: EXPRESSIONS AND EQUATIONS (6.EE) Standard 6.EE.4

Materials

- Pre-cut Equivalent Expressions Cards
- Agree-Disagree-Unsure Student Response Cards
  TI-73 and TI-Viewscreen or TI-Presenter
- 1-100 Chart
  and two markers for each student
  " Isolating The Variable" worksheet,
  Foldable for journal: Using Inverse Operations To Isolate The Variable

Background for Teachers

Enduring Understanding (Big Ideas):
Solving Equations
Essential Questions:

What value of the variable will create two equivalent expressions? How can this solution be checked?
How can inverse operations be used to isolate the variable?
What operation(s) will be needed to isolate the variable?

Skill Focus:
Creating equivalent expressions. Isolating the variable
Vocabulary Focus:
equivalent expressions, equation, inverse operation, multiplicative inverse, transform an equation, isolate the variable, solve, solution, check
Ways to Gain/Maintain Attention (Primacy):
game, technology, manipulative, create a foldable, cooperative discussion

Instructional Procedures

Starter:

Find the value of 2.5m -- 0.5, if m = 4
Order these number from least to greatest -1/2, -0.75, -2/3
Use the distributive property to fill in the blanks
3x + 4x = (__ + __)x

Lesson Segment 1: Accessing Background knowledge, Launch-Finding Equivalent Expressions.

Accessing background knowledge:

Match Mine Game

Two expressions can be equivalent even if they do not look alike. Give each student an Equivalent Expressions Card (attached). Tell the class they have four minutes to find as many people as possible whose expressions have the same value, or is equal to, the expression on their card. The group who finds the greatest number of people with equivalent expressions in four minutes wins a little treat.

After playing the Match Mine game, tell students that when two expressions are equivalent we call this an EQUATION. We can have numerical equations and algebraic equations. Remind them algebraic expressions have a variable. Give students the Student Response Cards (attached). You write several math expressions on the board. Students are to hold up the card and pinch to indicate whether they agree, disagree, or are unsure whether the expression you write is an equation. Write the following on the board, have students hold and pinch their card. Then discuss why each is or is not an equation deciding if the symbols indicate that two expressions are equivalent:

4 + 5
3m -- 7
7 -- 3 = 4
2x + 5 = 9

Lesson segment 2: What value of the variable will create two equivalent expressions? How can this solution be checked?

Finding a Value for the Variable that is a Solution

When one or both of our equivalent expressions are algebraic expressions, we are often asked to find a value for the variable that would make the two expressions true. Q. Think Team Share: In #4 above, if 3 were substituted for X, would the value of the two expressions be equivalent? How about substituting 10? What value would make the two expressions equivalent?

A value for the variable that makes the two expressions equivalent is called THE SOLUTION FOR THE EQUATION. When we are trying to find the solution, we are SOLVING THE EQUATION. Refer to the vocabulary on the Word Wall

One way to find a solution that will create two equivalent expressions is to guess and check different numbers. Play Guess My X.

Guess My X

Divide the class into teams. Give each team a dry erase marker, rag, and whiteboard. Store an integer between -10 and 10 for x in the TI-73 calculator. Then, clear the home screen and type an equation such as 2x+3. Help students read the equation. Give the teams a few seconds to think about a guess for the value of X. A scribe will write the team's guess in large symbols on a team board or a piece of paper. Teacher says, "Show guesses", and scribe holds up the whiteboard to be seen. Teams are awarded a point for correct guesses. Individuals are then asked to tell the class members how that guess was derived. Store another value and continue the game. Have students write the equation each time on their assignment paper and show the check to justify the guess.

a. 4 -- p = -5
4 + w/3 = 4
m/-2 + 6 = 0
15 = 4x + 3

After the game is complete, show the students how to store and have them play the game with a partner. Each player stores a number, then writes an equation using +, -, or x. The player challenges the other to Aguess my x@. Partners each take four turns challenging the other. Both partners write the equations on paper and show the checking process.

Lesson Segment 3: How can inverse operations be used to isolate the variable?

Another way to solve equations is to work backwards. Tell students you will have them write some

numerical expressions where they work backwards. Give each student a 1- 1-100 Chart (attached) and two markers. As you go through the examples below, have them place one marker on the beginning number, then move the second marker. Explain that an operation which "undoes" another operation is the inverse of the other. Have them record each step on their own assignment paper titled Using Inverse Operations. Explain that an operation which 'Undoes" another is called the INVERSE OPERATION. After doing A-D, challenge the students to guess the inverse operations to undo the multiple steps in E-G.

48 -- 6 + 6
75 + 21 -- 21
20 x 2 Ã· 2
28/7 x 7
4 x 2 + 7 -- 7 Ã· 2
25 Ã· 5 + 3 -- 8 x 2 Ã· 2 + 8 -- 3 x 5
n x 4 + 7 -7Ã· 4

Do a few problems on the graphing calculator with students where you divide by a number and multiply by the multiplicative inverse to undo, so they can see either will work. For example dividing by 2 and multiplying by ½. Students should record these.
Tell students using inverse operations can undo any operations in an algebraic expression as well. Work with students to complete a couple of the items on the "Inverse Operations For Isolating A Variable" worksheet. Reviewing symbolic representation for multiplying a number and a variable such as, 2a, may be necessary.
Lesson Segment 3: Summarize
Journal: Make a four-flap foldable with one inch folded up across the bottom as shown below. Under each flap write two numerical examples and two algebraic examples for performing an operation and then undoing it. Beneath the examples write "The inverse operation for _____ is _____. Under the multiplication flap, show dividing and multiplicative inverse examples.
Assignment. Finish the "Isolating The Variable" worksheet

Assessment Plan

observation, questioning, performance

Bibliography

This lesson plan was created by Linda Bolin.

Authors

Utah LessonPlans