Math 6 - Act. 07: Evaluating Expressions Using Tiles

Summary

Students will use algebra tiles to help them evaluate algebraic expressions.

Main Core Tie

Mathematics Grade 6

Strand: EXPRESSIONS AND EQUATIONS (6.EE) Standard 6.EE.2

Materials

Algebra tiles
Foam craft mat for each student
Colored pencils
Additional Resources
The Algebra Lab: Middle School (Creative Publications)
Prentice Hall *Middle Grades Math Tools for Success, Course 1*, 2001.

Background for Teachers

Evaluating expressions is a concept used throughout all of algebra. The student is required to replace a variable (unknown) with a given value and then evaluate (calculate) the answer. There are many realworld situations in which this is used, (e.g., If I order 3 CD's at $17 apiece and add shipping and handling charges, what will my final cost be?) We also come upon formulas that require a value to take the place of an unknown variable. Students must follow the order of operations in order to correctly evaluate algebraic expressions.

Using algebra tiles to introduce the evaluation of expressions helps students to have a visual image of what is happening. They are actually replacing the variable with a tile that represents a number. This should make the transition to paper and pencil evaluations easier to understand.

Intended Learning Outcomes

5. Make mathematical connections.
6. Represent mathematical situations.

Instructional Procedures

Invitation to Learn
Discuss with students the fact that some jobs pay the worker a certain amount per hour. For instance, babysitting may pay $2 or $3 per hour. Other jobs pay per piece. Lawn mowing may pay $10 or $15 per lawn. In both situations, there is always an unknown involved. In babysitting, one must know the number of hours worked and in lawn mowing, one must know the number of lawns mowed. As soon as we know that, we can calculate how much money we have earned.

Instructional Procedures
Using the algebra tiles, demonstrate a variable expression and have students model it with their tiles, (e.g., 3h to show $3 per hour of babysitting). Have a student choose the number of hours they babysat (2 hours) and demonstrate how each variable (h) is replaced with 2 "ones." They will see that 6 ones or $6 is the amount earned. Use the algebra tiles to manipulate the same situation with lawn mowing at $10 per lawn. These are very simple problems and most will immediately see the connection between the problem and the algebra tiles.
Continue working with algebra tiles making the problems increasingly more difficult.
$2x + 1$, where $x = 3$

5b – 1, where b = 2
4 + 2t, where t = 4
Using 2 variables:
2x + 3y, where x = 3 and y = 4
3g - h, where g = 2 and h = 5
While using the algebra tiles for each problem, make sure students write down the expression and solve it with pencil and paper so that the transition becomes easier.

Curriculum Integration

Meteorology—The temperature formula above (T = (n/4) + 37) is fun for students when they learn that crickets actually chirp more times per minute as the temperature rises. There are also formulas to convert from °C to °F. °F = 1.8 x °C = 32, or °C = 1.8(°F – 32). Many countries use the Celsius scale rather than the Fahrenheit scale for measuring temperature.

Extensions

Extensions and Adaptations

Introduce some formulas and have students evaluate the formulas. For instance:
A = l x w (Area = length times width), where l = 8 and w = 6.
P = 2l + 2w (perimeter = 2 times length + 2 times width), where l = 3 and w = 2.
d = rt (distance = rate times time), where r = 60 mph and t = 2 hours.
T = (n ÷ 4) + 37 (Temperature (°F) = number of times a cricket chirps in one minute divided by 4 plus 37), where n = 100.
a = h ÷ n (batting average = number of hits ÷ number of times at bat), where h = 11 and n = 40.

Homework & Family Connections

Give the students the formula s = 3f – 24 (shoe size = 3 times foot length in inches minus 24), which is used to calculate men's shoe size. Assign them to calculate the shoe size of 3 men in their family or among their friends by measuring the length of the man's foot in inches and calculating the formula.

Assessment Plan

Have students evaluate the expression 2a + 3b for a = 2 and b = 5, showing each step. Have them exchange their work with a partner. Next to each step, the partner writes what operation was performed.

Authors

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