6.EE Introducing Equivalent Expressions 1

Alignments to Content Standards: 6.EE.A

Task

a. Evaluate each of the following expressions:

i. $2(4 - 3)^2$

ii. $2(6 - 3)^2$

iii. $2(8 - 3)^2$

b. In the expressions above, what parts are always the same? What part changes?

c. We can write an expression to represent all of the expressions above if we use a letter for the part that changes. Write an expression using the letter x that could represent all of the numeric expressions above.

d. What value of x would make your expression evaluate to 98?

IM Commentary

The purpose of this series of two tasks (the next one is here) is to highlight that while a numerical expression can only take one value, an algebraic expression can take many different values depending on the value of the variable. All work is done out of a context with positive whole numbers, so that discussion can focus on the shift from numerical to algebraic expressions.

In part (a), students new to working with exponents may need some help evaluating the expressions correctly. They should know to "do the parentheses first" from previous grades, but may need reminding that by convention we evaluate exponents before we multiply.

In part (d), the intention is not for students to write $2(x-3)^2 = 98$ and apply some sort of algorithm, which would not be appropriate work in grade 6, but rather to reason about numbers and operations. For example, they might notice that they are doubling a square, find half of 98, and see that 49 is a perfect square. Or they might notice that 98 is greater than any of the values they found in part (a), so they might conjecture that x will be greater than 8. They are likely to evaluate the expression when x is 9 and when x is 10 and find the answer that way. This approach is perfectly acceptable as the goal of this task is more to understand what the problem is asking than to learn to solve equations by some efficient method. (Note: at some point later in their mathematical careers, we would expect students to find the other solution, -4, but for our sixth-grade purposes it is probably safe to ignore the existence of another solution to part (d).)

Edit this solution
Solution

a.

    i. 2

    ii. 18

    iii. 50

b. In the expressions given in (a), all the parts are always the same except for the first number in the parentheses, that is, the number that 3 is being subtracted from.

c. $2(x-3)^2$

d. If x were 10, then the expression would evaluate to 98.