

Why

Expressions, Equations, and Inequalities

I notice that this module does not encourage the use of manipulatives. Why not?

The use of manipulatives can support student engagement and provide differentiation and equity. Manipulatives can promote student thinking and aid in communicating about the mathematics being learned. Manipulatives often bridge learning from the conceptual stage to the pictorial or abstract stages of learning. However, students may lose the chance to deepen their understanding of concepts if manipulatives are used in isolation from mathematical connection.

Algebra tiles are a widely used manipulative to engage students in understanding the “rules” for solving equations. Although the tiles can be helpful in representing variables and constants, these and other difficulties may occur when students employ these manipulatives:

1. Students must assign numbers and variables to a set of colored tiles. Students are then tasked with remembering which color and shape of tile represents a positive number, which color and shape represents a negative number, and which color and shape represents a variable.
2. Use of colored tiles connects easily to addition, but some learners cannot conceptualize subtracting a negative number or multiplying when the first factor is negative. Some interpretations of division cannot be modeled by using the tiles.
3. Tiles do not represent non-integer rational numbers and cannot be used to model arithmetic with rational numbers.

Further, use of algebra tiles often imposes procedural directions that mask the mathematics happening when an equation is being solved. The properties of operations, and, in this module, the if-then moves, are not clear when focus is placed on the movement of the manipulative rather than on the solving of the equation.

I notice that this module includes standards for geometry. Why are these standards addressed in this module?

Students understand and apply angle relationships to determine unknown angle measures. These relationships necessitate equivalence. To determine whether angles are complementary, students understand that the two angle measures must sum to 90° . To determine whether angles are supplementary, students understand that the two angle measures must sum to 180° . A natural approach to determine unknown angle measures in these and other cases is to solve for the unknown by using an equation. Determining unknown angle measures drives the need to solve equations. Students use equations to show why angles are equal in measure.

Why is the word *simplified* not used in this module?

The word *simplified* has multiple meanings depending on the different situations in which it is used. For example, when asked to simplify a fraction, students perform a different task than they would when they simplify an expression. When a student is directed to simplify in any situation, a specific description of the term should be provided that is appropriate for that situation. If you choose to have students simplify expressions in this module, we recommend that you define *simplify* for each case in which it is used, and we encourage you to accept all equivalent forms of the expression as correct.