

Topic A

Equivalent Expressions

Module 3 explores expressions, equations, and inequalities. Students begin to work with algebraic expressions in grade 6 when they use the distributive property to combine like terms and find products. In this topic, students extend what they know about numerical expressions with rational numbers to manipulate algebraic expressions that now include rational numbers.

The topic begins with students writing several examples of equivalent numerical expressions. Students verify that the expressions are equivalent by evaluating them. Then students are tasked with writing several equivalent expressions again, this time using variables. Students realize they cannot verify that the expressions are equivalent in the same way. Therefore, students look for other ways to verify that algebraic expressions are equivalent. Students substitute numbers for variables to verify that the algebraic expressions are equivalent, but they realize it is impossible to test every number since there are infinitely many. Instead, students use properties of operations to write one expression in the form of another.

Students use tape diagrams to show that the distributive property can be used to write an algebraic expression in an equivalent form. Students determine that the tape diagram cannot be used when working with negative numbers, so they transition to the tabular model to represent the distributive property with rational numbers. Students blend their understanding of combining like terms from grade 6 with their understanding of the distributive property to combine like terms with rational numbers. Students apply the distributive property to write algebraic expressions in equivalent forms.

Using the Distributive Property to Combine Like Terms

$$\begin{aligned} 9x - 3x - 5x + 10 &= 9x + (-3x) + (-5x) + 10 \\ &= (9 + (-3) + (-5))(x) + 10 \\ &= x + 10 \end{aligned}$$

Modeling the Distributive Property with a Tabular Model

	l	-2
8	$8l$	-16

$$8(l - 2) = 8l - 16$$

In lesson 4, students use the skills from the previous lessons in the topic to add and subtract algebraic expressions. Students use a context to explore a common misconception and determine that when they subtract one expression from another they must subtract every term in the expression.

As the topic progresses, students refer back to the tabular model to factor algebraic expressions by using the distributive property. Students start by factoring out whole numbers; by the end of the lesson, they also factor out rational numbers. Given a context, students write two equivalent algebraic expressions and explain why both expressions represent the context. Students wrap up the topic by using their new learning to solve problems with expressions.

In the rest of the module, students use what they know about generating equivalent expressions, such as combining like terms and using the distributive property, to solve various types of equations and inequalities.

Showing Factoring with the Tabular Model

	$5x$	-4
3	$15x$	-12

$$15x - 12 = 3(5x - 4)$$

Progression of Lessons

- Lesson 1** Equivalent Expressions
- Lesson 2** The Distributive Property and the Tabular Model
- Lesson 3** The Distributive Property and Combining Like Terms
- Lesson 4** Adding and Subtracting Expressions
- Lesson 5** Factoring Expressions
- Lesson 6** Comparing Expressions