

TOPIC 1 OVERVIEW

Expressions

How are the key concepts of Expressions organized?

In *Expressions*, students build on their existing knowledge of operating with numbers and geometric measurement to develop their understanding of variables and algebraic expressions. Students formalize powers as repeated multiplication and evaluate expressions involving whole number exponents, expanding their application of the order of operations to include exponents. Students compose algebraic expressions from verbal statements, decompose expressions into their component terms, and evaluate algebraic expressions for given values of the variable. They use algebra tiles and properties of number and operations to form equivalent expressions.

- Key points
- Expressions
 - Numbers & geom measurements
 - Repeated mult.
 - Evaluate Express
 - order of operations
 - Alg Expressions
 - Alg Tiles & EQ Express-

Math Representation

Consider the expression $3(x + y)$.

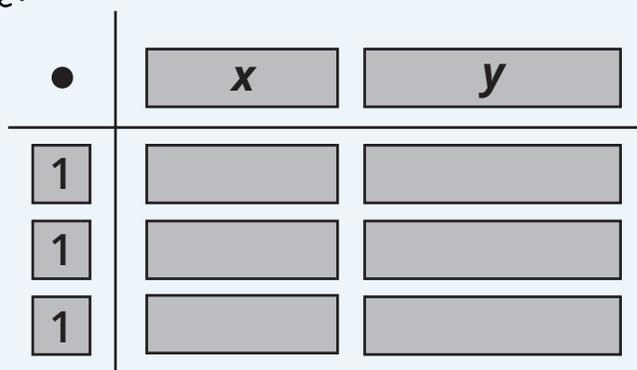
This expression has two factors:

3 and the quantity $(x + y)$.

You can use the distributive property to rewrite this expression. In this case, multiply the 3 by each term of the quantity $(x + y)$.

The algebra tiles shown model the expression.

model of Alg tiles



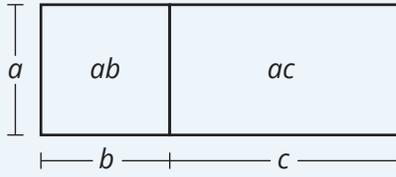
$$3(x + y) = 3x + 3y$$

Students also use tables and graphs to determine whether expressions are equivalent. Finally, students use a scenario to write algebraic expressions and solve problems with those expressions. Throughout the topic, students use a variety of rational numbers as they evaluate expressions and create equivalent expressions.

model the distributive property

Math Representation

The **distributive property of multiplication over addition** states that for any numbers a , b and c , the equation $a(b + c) = ab + ac$ is true.



An example of the distributive property:

$$4(2 + 15) = 4 \cdot 2 + 4 \cdot 15$$

What is the entry point for students?

Students enter this course with knowledge of factors and properties of numbers. They have used the commutative and associative properties, as well as the order of operations, although formal terminology may not have been used. These properties, along with the distributive property were also reviewed in an earlier module with numeric expressions.

In previous courses, students wrote expressions with whole number exponents for powers of 10, and they wrote numeric expressions to record verbal descriptions of calculations. This topic draws on this prior knowledge, beginning with numeric expressions and applying properties of operations. Students'

Prior Knowledge

knowledge of area and volume are used to help them understand number facts, specifically squares and cubes.

Why is Expressions important?

This topic provides the foundation for future work with algebraic structures, including algebraic equations and inequalities and their representations. The properties studied in this topic are tools that students can use to create equivalent, and possibly more useful, forms of the expressions. The remaining topics in this module require students to write and use expressions. Expressions are the foundation of equations.

Expertise in writing expressions enables students to write and solve equations for many real-world and mathematical problems. As students continue on their mathematical journeys, they will continue to write more complex expressions. They must be able to evaluate the expressions and determine whether expressions are equivalent.

Real world situation

Math Representation

The total cost, t , of an online order is the cost of the items, c , plus the cost of the shipping, s . You can use expressions to write equations representing each of the quantities.

Total cost: $t = c + s$

Cost of the items: $c = t - s$

Cost of shipping: $s = t - c$

equivalent expressions

write & use expressions

solve eqs in real world situations

possible learning objectives

How does a student demonstrate understanding?

Students will demonstrate understanding of the standards in this topic when they can:

- Determine whether two expressions are equivalent using the order of operations, including expressions with whole number exponents.
- Recognize that an algebraic expression is a mathematical phrase involving at least one variable and/or numbers and operation symbols.
- Translate written phrases into algebraic expressions and vice versa.

- Evaluate algebraic expressions, including those that model real-world problems.
- Generate equivalent expressions using the properties of operations.
- Determine whether two expressions are equivalent using concrete and pictorial models as well as algebraic representations.

How do the activities in Expressions promote student expertise in the TEKS mathematical process standards?

Every topic is written with the goal of creating mathematical thinkers who are active participants in class discourse, so the TEKS mathematical process standards should be evident in all lessons. Students are expected to make sense of problems and work toward solutions, reason using concrete and abstract ideas, and communicate their thinking while providing a critical ear to the thinking of others.

This topic focuses on reasoning from prior knowledge and using appropriate mathematical tools to understand algebraic expressions (6.1C). Algebraic expressions exhibit structure and can be composed and decomposed to reveal that structure or to help learners attend to a particular aspect of that structure (6.1F). As students grow as mathematical thinkers, their toolbox of strategies must also grow. Students are expected to use a variety of tools, including algebra tiles, tables, graphs, and properties, to create or recognize equivalent expressions (6.1C). Students must also exhibit precision as they master the skills of creating and evaluating equivalent expressions, particularly when modeling real-world phenomena (6.1G).

How can you use cognates to support EB students?

Cognates are provided for new key terms when applicable. Strategically grouping students with varying language proficiencies and factoring in group members' shared languages helps foster a collaborative learning environment. Peer discourse enables students to explain concepts to each other in both languages and build off of each other's language, enhancing understanding and language skills simultaneously.

NEW KEY TERMS

- perfect square
- perfect cube [cubo perfecto]
- evaluate a numeric expression [evaluar una expresión numérica]
- order of operations [orden de las operaciones]
- variable [variable]
- algebraic expression [expresión algebraica]
- coefficient [coeficiente]
- term [término]
- evaluate an algebraic expression [evaluar una expresión algebraica]
- like terms
- equivalent expressions [expresiones equivalentes]

MATHEMATICAL
THINKERS
vs
PROBLEM
SOLVERS

TOOLBOX
• algebra tiles
• tables
• graphs

EB
SUPPORT
STRATEGIES

4 Determining Unknown Quantities

TOPIC 1: Expressions

1 DAY PACING = 45-MINUTE SESSION

TEKS Mathematical Process Standards: 6.1B, 6.1C, 6.1D, 6.1E, 6.1F, 6.1G

ELPS: 1.B, 1.C, 1.G, 2.D, 2.G, 2.I, 3.D, 3.F, 4.A, 4.C, 4.G

Topic Pacing: 13 Days

Lesson	Lesson Title	Highlights	TEKS*	Pacing
1	Evaluating Numeric Expressions	<p>Students write and simplify numeric expressions. The terms <i>power</i>, <i>base</i>, and <i>exponent</i> are revisited, and the terms <i>perfect square</i>, <i>perfect cube</i>, and <i>order of operations</i> are introduced and defined. Students create numeric expressions to represent geometric models and draw geometric models to represent numeric expressions. Students learn that an expression represents a relationship between quantities rather than a recipe to perform operations on values. Students apply the order of operations and prime factorization to evaluate and rewrite numeric expressions.</p> <p>Materials Needed: Scissors, Expression Cards (located at the end of the lesson)</p>	6.3D 6.7A	3
2	Introduction to Algebraic Expressions	<p>Students write algebraic expressions and evaluate numeric expressions. They practice writing algebraic expressions for mathematical word sentences and then reverse the process. Students decompose given algebraic expressions by stating the number of terms in each algebraic expression and listing the terms. Students conclude the lesson by evaluating algebraic expressions individually and in table form. Finally, they practice composing algebraic expressions from verbal phrases written with mathematical terminology.</p> <p>Materials Needed: Scissors, Expression Explosion Cards, Index Cards, Problem-Solving Model Graphic Organizer</p>	6.3D 6.7B	2
3	Equivalent Expressions	<p>Students consider a situation about packing two suitcases for a camping trip and then combining the contents of the suitcases to model the need to combine like terms in algebraic expressions. Students model and simplify algebraic expressions first by using algebra tiles to make sense of combining like terms and then by using the rules and properties. Algebra tiles are used as a method to make sense of the distributive property. Students rewrite expressions using the distributive property the order of operations rules, and combining like terms. Students then use algebra tiles to apply the distributive property to division problems. Finally, students rewrite expressions as a product of two factors.</p> <p>Materials Needed: Algebra Tiles, Scissors</p>	6.7C 6.7D	2

READER
 ADDITIONAL
 NOTES
 HERE

*Bold TEKS = Readiness Standard

Lesson	Lesson Title	Highlights	TEKS*	Pacing
4	Verifying Equivalent Expressions	<p>Students begin by reviewing the properties of numbers and operations that they have formally or informally studied in the past. This allows students to use the properties as they rewrite algebraic expressions in equivalent forms. Students analyze pairs of expressions. They use properties, tables, graphs, and algebra tiles to show that the expressions are or are not equivalent. This opens the discussion that one non-example is necessary to disprove a claim, while an infinite number of examples are necessary to prove a claim.</p> <p>Materials Needed: Algebra Tiles, Problem-Solving Model Graphic Organizer, Scissors, Property Cards (located at the end of the lesson)</p>	6.7C 6.7D	2
End of Topic Assessment				1
Learning Individually with Skills Practice <i>Schedule these days strategically throughout the topic to support student learning.</i>				3

REDEFINERS

*Bold TEKS = Readiness Standard

MODULE 4, TOPIC 1 PACING GUIDE

165-Day Pacing

150 Day Pacing

1 DAY PACING = 45-MINUTE SESSION

<p>Day 1</p> <p>TEKS: 6.3D, 6.7A</p> <p>LESSON 1 Evaluating Numeric Expressions GETTING STARTED ACTIVITY 1</p>	<p>Day 2</p> <p>LESSON 1 continued ACTIVITY 2 ✕ ACTIVITY 3</p>	<p>Day 3</p> <p>LESSON 1 continued ACTIVITY 4 ✕ ACTIVITY 5 ✕ TALK THE TALK ✕</p>	<p>Day 4</p> <p>LEARNING INDIVIDUALLY Skills Practice <i>This is a suggested placement. Move based on student data and individual needs.</i></p>	<p>Day 5</p> <p>TEKS: 6.3D, 6.7B</p> <p>LESSON 2 Introduction to Algebraic Expressions GETTING STARTED ACTIVITY 1 ✕ ACTIVITY 2 ✕</p>
<p>Day 6</p> <p>LESSON 2 continued ACTIVITY 3 ✕ ACTIVITY 4 ✕ TALK THE TALK</p>	<p>Day 7</p> <p>TEKS: 6.7C, 6.7D</p> <p>LESSON 3 Equivalent Expressions GETTING STARTED ACTIVITY 1 ✕ ACTIVITY 2 ✕</p>	<p>Day 8</p> <p>LESSON 3 continued ACTIVITY 3 ✕ ACTIVITY 4 ✕ TALK THE TALK ✕</p>	<p>Day 9</p> <p>LEARNING INDIVIDUALLY Skills Practice <i>This is a suggested placement. Move based on student data and individual needs.</i></p>	<p>Day 10</p> <p>TEKS: 6.7C, 6.7D</p> <p>LESSON 4 Verifying Equivalent Expressions GETTING STARTED ✕ ACTIVITY 1 ✕</p>
<p>Day 11</p> <p>LESSON 4 continued ACTIVITY 2 TALK THE TALK</p>	<p>Day 12</p> <p>LEARNING INDIVIDUALLY Skills Practice <i>This is a suggested placement. Move based on student data and individual needs.</i></p>	<p>Day 13</p> <p>END OF TOPIC ASSESSMENT</p>		

*Bold TEKS = Readiness Standard

How can you incorporate Skills Practice with students?

There are three Learning Individually days scheduled within this topic. The placement of these days within the topic is flexible. The intent is to distribute spaced and interleaved practice throughout a topic and throughout the year.

It is not necessary for students to complete all Skills Practice for the topic and different students may complete different problem sets. You should use data to strategically assign problem sets aligned to individual student needs. You should analyze student responses from the following embedded assessment opportunities to help assess individual needs: Essential Questions, Talk the Talks, Student Self-Reflections, and End of Topic Assessments. For students who are building their proficiency, you can assign problem sets can be assigned to target specific skills. For students who have demonstrated proficiency, there are extension problems of varied levels of challenge.

How can you identify whether students are ready for new learning?

The Prepare section of the Lesson Assignments and the Spaced Practice sets of Skills Practice can serve as diagnostic tools. Depending on available time, you can assign the Prepare section of the Lesson Assignments as homework or as a warm-up to identify students' prior knowledge for the upcoming lesson's activities. You can also use the Spaced Practice sets of Skills Practice to analyze individual students' level of proficiency on standards from previous topics.