TOPIC 1 OVERVIEW

Factors and Multiples

How are the key concepts of *Factors and Multiples* organized?

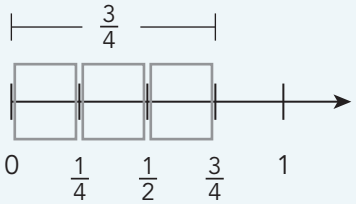
Students begin the topic with an introductory lesson on problem solving. They will use this model throughout the course when solving problems. Students then extend their knowledge of area and numbers to compose and decompose areas that represent numeric expressions. They decompose numbers into factors and apply the distributive property to compute products efficiently. Students use the distributive property to express the sum of two numbers as a product of two factors. They then use their knowledge of factors to determine the greatest common factors and least common multiples.

Students continue to engage in reasoning as they create and use physical models to represent and compare fractions as well as to determine equivalent fractions. They begin moving from concrete models to abstract thinking when they connect strip diagrams to number lines to represent and compare fractions. Students reason about the relative size of a fraction by comparing it to a benchmark fraction and investigating the relationship between the numerator and denominator. Students then consider how to decompose area models that represent fraction multiplication. They relate multiplication and division before investigating strategies for dividing fractions. Learning multiple division strategies and using visual models focuses students on reasoning and conceptual understanding as they increase fluency with dividing fractions.

Math Representation

The model shows $\frac{3}{4} \div \frac{1}{4}$.

The division expression asks, "How many $\frac{1}{4}$s are in $\frac{3}{4}$?"



Although algorithms for fraction multiplication and division are discussed in this topic, students may not achieve fluency within the timeline allowed for this topic. Fluency requires time and practice, and students will continue to develop fluency with fraction operations throughout the course.

Math Representation

You can use an area model to represent the product $15 \cdot 27$.

$15 = 10 + 5$

$27 = 20 + 7$

	20	7
10	200	70
5	100	35

This area model shows the product of $15 \cdot 27$ as $(10 + 5)(20 + 7)$.

$15 \cdot 27 = 200 + 100 + 70 + 35 = 405$

What is the entry point for students?

Students enter Grade 6 with experiences using area models to represent multiplication.

The *Factors and Multiples* topic draws on these experiences to formalize the distributive property and decompose numeric expressions. Students' prior work with factor pairs supports their new learning about least common multiples and greatest common factors.

In previous grades, students began their formal study of fractions. They learned to compare and order fractions, determine equivalent fractions, add and subtract fractions with like and unlike denominators, multiply whole numbers by fractions, and divide whole numbers by unit fractions. This topic builds on students' prior experiences with area models, number lines, and fact families to develop visual models for fraction multiplication and division.

Why is *Factors and Multiples* important?

Factors and Multiples focuses on composing and decomposing numbers and expressions. Students will apply the same properties and terminology to algebraic expressions in the **Determining Unknown Quantities** module, where they will use the distributive property to write equivalent algebraic expressions. Throughout upcoming modules in this course, students will continue to develop fluency with whole-number and fraction operations. They will determine equivalent ratios, percents, and unit rates. Students will evaluate expressions and solve equations that include fractions. They will also investigate negative rational numbers written in a variety of forms.

Math Representation

Isabella

$\frac{2}{5}x = 20$

$\frac{\frac{2}{5}x}{\frac{2}{5}} = \frac{20}{\frac{2}{5}}$

$1x = 20\left(\frac{5}{2}\right)$

$x = 50$

Harper

$\frac{2}{5}x = 20$

$\left(\frac{5}{2}\right)\frac{2}{5}x = \left(\frac{5}{2}\right)20$

$1x = 50$

$x = 50$

How does a student demonstrate understanding?

Students will demonstrate an understanding of the standards in *Factors and Multiples* when they can:

- Apply properties of operations to compose and decompose numbers and shapes to understand the relationship between factors and multiples.
- Create equivalent expressions using the commutative and distributive properties.
- Identify the factors of two whole numbers and determine the greatest common factor.
- Identify the multiples of two whole numbers and determine the least common multiple.
- Generate equivalent numerical expressions using whole number exponents and prime factorization.
- Determine and use equivalent fractions to show equal parts of the same whole.
- Represent and compare benchmark fractions using models, including number lines.
- Order positive rational numbers in mathematical and real-world contexts.
- Compute products of fractions multiplied by whole numbers and fractions (including mixed numbers).
- Determine whether a quantity is increased or decreased when multiplied by a fraction greater than one or less than one.
- Compute quotients of fractions divided by whole numbers and fractions (including mixed numbers).
- Interpret quotients of fractions in real-world and mathematical problems.
- Solve real-world problems involving multiplication and division of fractions and mixed numbers using visual models.
- Recognize that dividing by a rational number and multiplying by its reciprocal result in equivalent values.
- Use an algorithm to fluently solve multiplication and division problems with fractions.

NEW KEY TERMS

- numeric expression [expresión numérica]
- equation [ecuación]
- distributive property [propiedad distributiva]
- base [base]
- power
- exponent [exponente]
- common factor [factor común]
- prime factorization
- relatively prime [primos relativos]
- greatest common factor (GCF)
- multiple [múltiple]
- commutative property [propiedad conmutativa]
- least common multiple (LCM) [mínimo común múltiplo]
- unit fraction [fracción unitaria]
- equivalent fraction [fracción equivalente]
- benchmark fractions
- algorithm [algoritmo]
- positive rational number [número racional positivo]
- reciprocal [recíproco]
- multiplicative inverse
- complex fraction [fracción compleja]

NEW SYMBOL

Symbol	Description
·	Multiplication dot

How do the activities in *Factors and Multiples* promote student expertise in the TEKS mathematical process standards?

Each topic is written with the goal of creating mathematical thinkers who are active participants in class discourse, so elements of 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.

In *Factors and Multiples*, students begin by examining the problem-solving model (6.1B). They will continue to use this model throughout this course. As students continue in this topic, they use precise mathematical language and analyze mathematical relationships to connect and communicate mathematical ideas (6.1F). This topic provides students with formal language for previously learned concepts; this shared language will allow them to communicate more effectively (6.1G). Throughout the topic, students are encouraged to analyze relationships in numbers and shapes. This topic highlights the need for precision in explanations about and computation of fraction division. They will use a variety of strategies to build an understanding of fraction division and determine when each approach is most efficient (6.1C). Students should use reason to consider the relative sizes of numbers and to determine whether their answers make sense. It is important to develop students' disposition early in the course, encouraging them to self-ask, "How is this similar to another concept?" and "Does my answer make sense based on the information given?"

How can you use cognates to support EB students?

Cognates are provided for new key terms when applicable. Encourage students to keep a bilingual math journal, recording reflections and background knowledge on new topics, in either written or verbal format, with added visuals for clarity. Incorporate journal excerpts into a shared word wall or digital bilingual glossary, with a focus on highlighting cognates.

MODULE 1, TOPIC 1 PACING GUIDE

165-Day Pacing

1 Composing and Decomposing

TOPIC 1: Factors and Multiples

1 DAY PACING = 45-MINUTE SESSION

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

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

Topic Pacing: 15 Days

Lesson	Lesson Title	Highlights	TEKS*	Pacing
	Introduction to the Problem-Solving Model and Learning Resources	Students reflect on learning a new skill and the variety of ways they learn. The problem-solving model, TEKS mathematical process standards, and the Academic Glossary help students complete a problem-solving activity. Students reflect on and summarize the problem-solving process. Since the intent of this lesson is to introduce the problem-solving model and review the TEKS mathematical process standards, the focus is on process not content. Students will need access to the Academic Glossary, Problem-Solving Model Graphic Organizer, Problem-Solving Questions to Ask, and TEKS mathematical process standards which are located in the Course Guide. These materials should always be available to students throughout the course. **Materials Needed:** (located in the Course Guide) Academic Glossary, Problem-Solving Model Graphic Organizer, Problem-Solving Model Questions to Ask, TEKS Mathematical Process Standards	**6.7D**	1
1	Writing Equivalent Expressions Using the Distributive Property	Students use the distributive property to decompose and compose numerical expressions to create equivalent representations. **Materials Needed:** None	**6.7D** **6.8D**	1
2	Identifying Common Factors and Common Multiples	Students use prime factorization and tables to organize factors and multiples and are introduced to least common multiple (LCM) and greatest common factor (GCF). **Materials Needed:** Grid Paper (located at the end of lesson), Scissors	**6.7A** **6.7D** **6.8D**	2
3	Dividing a Whole into Fractional Parts	Students create strip diagrams for unit fractions $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{12}$, and $\frac{1}{16}$. They identify equivalent fractions by aligning the strip diagrams on the fold lines, and then complete a graphic organizer to represent all the equivalent fractions represented by the strip diagrams. Students conclude that the numerator and denominator of equivalent fractions are multiples of the original unit fractions. **Materials Needed:** Strip Diagrams (located at the end of the lesson), Scissors	6.4F 6.5C	1

*Bold TEKS = Readiness Standard

MODULE 1, TOPIC 1 PACING GUIDE

Lesson	Lesson Title	Highlights	TEKS*	Pacing
4	**Benchmark Fractions**	Students translate their understanding of strip diagrams to number lines. They use the benchmark fractions 0, $\frac{1}{2}$, and 1 to estimate the value of fractions, write fractions that are close to these benchmarks, estimate sums, and solve problems by comparing fractions that represent shaded parts of figures. **Materials Needed:** None	**6.2D** 6.4F	1
5	**Multiplying Fractions**	Students review the area model for multiplication and apply it to multiplying mixed numbers. They analyze two methods for multiplying mixed numbers and then use these methods to answer questions in the context of a real-world scenario. **Materials Needed:** Problem-Solving Model Graphic Organizer	6.3B **6.3E**	2
6	**Fraction by Fraction Division**	Students connect multiplication to division by writing fraction fact families for area models. They then use strip diagrams and number line models to investigate the division of fractions by fractions. Students use these models to develop an algorithm for rewriting division sentences as multiplication sentences. They apply the procedure to solve problems involving fractions and mixed numbers. **Materials Needed:** Problem-Solving Model Graphic Organizer	6.2E 6.3A **6.3E**	3
End of Topic Assessment				1
Learning Individually with Skills Practice *Schedule these days strategically throughout the topic to support student learning.*				3

*Bold TEKS = Readiness Standard

MODULE 1, TOPIC 1 PACING GUIDE

165-Day Pacing

1 DAY PACING = 45-MINUTE SESSION

Day 1	Day 2	Day 3	Day 4	Day 5
TEKS: **6.7D**	TEKS: **6.7D**, **6.8D**	TEKS: **6.7A**, **6.8D**		
Introduction to the Problem-Solving Model and Lesson Resources GETTING STARTED ACTIVITY 1 TALK THE TALK	**LESSON 1** Writing Equivalent Expressions Using the Distributive Property GETTING STARTED ACTIVITY 1 TALK THE TALK	**LESSON 2** Identifying Common Factors and Common Multiples GETTING STARTED ACTIVITY 1 ACTIVITY 2	**LESSON 2** continued ACTIVITY 3 ACTIVITY 4 TALK THE TALK	**LEARNING INDIVIDUALLY** Skills Practice *This is a suggested placement. Move based on student data and individual needs.*
Day 6	**Day 7**	**Day 8**	**Day 9**	**Day 10**
TEKS: 6.4F, 6.5C	TEKS: **6.2D**, 6.4F	TEKS: 6.3B, **6.3E**		
LESSON 3 Dividing a Whole into Fractional Parts GETTING STARTED ACTIVITY 1 TALK THE TALK	**LESSON 4** Benchmark Fractions GETTING STARTED ACTIVITY 1 ACTIVITY 2 TALK THE TALK	**LESSON 5** Multiplying Fractions GETTING STARTED ACTIVITY 1	**LESSON 5** continued ACTIVITY 2 TALK THE TALK	**LEARNING INDIVIDUALLY** Skills Practice *This is a suggested placement. Move based on student data and individual needs.*
Day 11	**Day 12**	**Day 13**	**Day 14**	**Day 15**
TEKS: 6.2E, 6.3A, **6.3E**				
LESSON 6 Fraction by Fraction Division GETTING STARTED TALK THE TALK	**LESSON 6** continued ACTIVITY 2 ACTIVITY 3	**LESSON 6** continued ACTIVITY 4 TALK THE TALK	**LEARNING INDIVIDUALLY** Skills Practice *This is a suggested placement. Move based on student data and individual needs.*	**END OF TOPIC ASSESSMENT**

*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 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 set 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.