



## Topic B

# Fraction Equivalence Using Multiplication and Division

## 4.NF.1, 4.NF.3b

<b>Focus Standard:</b>	4.NF.1	Explain why a fraction $a/b$ is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.
<b>Instructional Days:</b>	5	
<b>Coherence</b>	<b>-Links from:</b>	G3–M5 Fractions as Numbers on the Number Line
	<b>-Links to:</b>	G5–M3 Addition and Subtraction of Fractions
		G5–M4 Multiplication and Division of Fractions and Decimal Fractions

In Topic B, students begin generalizing their work with fraction equivalence. In Lessons 7 and 8, students analyze their earlier work with tape diagrams and the area model in Lessons 3 through 5 to begin using multiplication to create an equivalent fraction that comprises smaller units, e.g.,  $\frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$ . Conversely, students reason, in Lessons 9 and 10, that division can be used to create a fraction that comprises larger units (or a single unit) equivalent to a given fraction, e.g.,  $\frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \frac{2}{3}$ . The numerical work of Lessons 7 through 10 is introduced and supported using area models and tape diagrams.

In Lesson 11, students use tape diagrams to transition their knowledge of fraction equivalence to the number line. They see that any unit fraction length can be partitioned into  $n$  equal lengths. For example, each third in the interval from 0 to 1 may be partitioned into 4 equal parts. Doing so multiplies both the total number of fractional units (the denominator) and the number of selected units (the numerator) by 4. Conversely, students see that, in some cases, fractional units may be grouped together to form some number of larger fractional units. For example, when the interval from 0 to 1 is partitioned into twelfths, one may group 4 twelfths at a time to make thirds. By doing so, both the total number of fractional units and number of selected units are divided by 4.

$$\frac{1}{3} = \frac{4 \times 1}{4 \times 3}$$

$$= \frac{4}{12}$$

1 third = 4 twelfths

**A Teaching Sequence Toward Mastery of Fraction Equivalence Using Multiplication and Division**

**Objective 1:** Use the area model and multiplication to show the equivalence of two fractions.  
(Lessons 7–8)

**Objective 2:** Use the area model and division to show the equivalence of two fractions.  
(Lessons 9–10)

**Objective 3:** Explain fraction equivalence using a tape diagram and the number line, and relate that to the use of multiplication and division.  
(Lesson 11)