

Fraction conceptualizations learning progression (LP)

LP Level	Student Characteristics	Item Responses
4. Multiply & Divide	<p>Understands that:</p> <ul style="list-style-type: none"> • Multiplying a value by a fraction $\frac{a}{b}$ results in a value that is a-bths of the original value • Understands the difference between multiplying and dividing fractions 	<p>Is able to:</p> <ul style="list-style-type: none"> • Use multiplication to find a portion of a value • Determine that multiplying a value by a fraction with magnitude less than 1 will result in a value with smaller magnitude and multiplying by an improper fraction will result in a value with larger magnitude, and vice versa for division, without performing the calculations • Divide a value by a fraction <p>Common Errors:</p> <ul style="list-style-type: none"> • May not understand the conceptualization of a fraction as a ratio • May have difficulty understand practical applications of fractions in solving real-world problems
3. Represent on Line	<p>Understands that:</p> <ul style="list-style-type: none"> • Fractions represent unique numerical values (real numbers) • Two fractions are equivalent if they represent the same numerical value • Fractional values can be converted to decimals or percentages while maintaining their numerical value • Improper fractions may be rewritten as mixed numbers and vice versa • Fractions with different denominators may be readily compared, added, or subtracted once they are put into the same units <p>May not yet understand that:</p> <ul style="list-style-type: none"> • Fractions may be written as ratios and may represent part-part relationships or rates 	<p>Is able to:</p> <ul style="list-style-type: none"> • Create and identify equivalent fractions, including converting between improper fractions and mixed numbers • Order fractions and mixed numbers with different numerators and different denominators • Add and subtract fractions and mixed numbers with different denominators <p>Common Errors:</p> <ul style="list-style-type: none"> • May not understand the conceptualization of a fraction as a ratio • May have difficulty understand practical applications of fractions in solving real-world problems
2. Understanding Unit Fractions (Finding Fair Shares)	<p>Understands that:</p> <ul style="list-style-type: none"> • Fractional parts must be equal ("fair shares") but may not appear the same 	<p>Is able to:</p> <ul style="list-style-type: none"> • "Share" a whole between a specified number of groups • Identify unit fractions

	<ul style="list-style-type: none"> The fraction $\frac{a}{b}$ represents the division of a by b Unit fractions can be iterated to reproduce the original whole or part of the whole Dividing the same whole into more parts (larger denominator) results in smaller unit pieces <p>May not yet understand that:</p> <ul style="list-style-type: none"> A fraction has its own specific value that can be uniquely placed on a number line. The same fractional value may be represented in multiple ways 	<ul style="list-style-type: none"> Use unit fractions $\left(\frac{1}{b}\right)$ to reproduce composite fractions $\left(\frac{a}{b}\right)$, including the whole $\left(\frac{b}{b}\right)$ Compare fractions with the same numerator and different denominators Add and subtract composite fractions with the same denominator <p>Common Errors:</p> <ul style="list-style-type: none"> Misplacing a fraction on a number line Incorrectly comparing two fractions with different numerators and different denominators Not recognizing improper fractions as valid
1. See Part-Whole	<p>Understands that:</p> <ul style="list-style-type: none"> A fraction represents a specified number of parts out of the total number of parts <p>May not yet understand that:</p> <ul style="list-style-type: none"> A whole must be partitioned equally <p>All parts of the whole must be used when partitioning</p>	<p>Is able to:</p> <ul style="list-style-type: none"> Identify the number of specified and total parts in an area model or in a described situation. Compare fractions with the same denominator and different numerators <p>Common Errors:</p> <ul style="list-style-type: none"> Making unequal parts or fail to exhaust the whole when attempting an equipartitioning task Treating the numerator and denominator of a fraction as unrelated values