

Fraction Fix Overview

A coherent pathway from early fraction meaning to rational-number fluency

Purpose

Fraction Fix is a research-informed curriculum and intervention framework designed to help students build durable fraction understanding from foundational equal-sharing ideas through operations, proportional reasoning, and algebraic transfer. Its primary use is Grades 5-8 intervention and acceleration, while its developmental map begins in the early grades.

Central conclusion

The persistent fraction problem is not simply forgotten rules. Many students never reorganize their idea of number when whole numbers expand to rational numbers. They may treat the numerator and denominator as two separate counts instead of experiencing a fraction as one number with a magnitude, a location, and many equivalent names.

Where students tend to get lost

Breakpoint	What it looks like
Fraction is not one number	Counts shaded pieces but cannot locate or estimate the fraction.
The whole is unstable	Changes the referent whole without recognizing that the fraction changes.
Equivalence becomes a trick	Multiplies top and bottom without understanding that the value is unchanged.
Whole-number bias persists	Assumes a larger denominator means a larger fraction or that multiplication must increase.
Procedures arrive too early	Uses slogans without being able to reconstruct, explain, or check the procedure.
Knowledge remains model-bound	Succeeds with a shaded shape but not on a number line, in a context, or in an equation.

Instructional response

- Begin with equal sharing, measurement, and an explicit referent whole.
- Use the number line as the organizing representation for magnitude, order, equivalence, improper fractions, and later algebra.
- Teach a/b as a copies of the unit fraction $1/b$.
- Move from context to model to student language to equation to generalization to efficient procedure.
- Require estimation, explanation, error analysis, and cumulative retrieval alongside accurate computation.

Design synthesis

Source	Contribution to Fraction Fix
IES and rational-number research	Equal sharing, number lines, procedure meaning, estimation, and misconception repair
Art of Problem Solving	Problem-first discovery, complete reasoning, and nonroutine transfer
Explicit instruction	Worked examples and scaffolding when prerequisite knowledge is unfinished
Cumulative practice	Spaced retrieval, mixed review, and delayed checks for durable access

Curriculum pathway

Module	Central work
0 The Whole and the Unit	Referent whole and equal shares
1 Unit Fractions	Build every a/b by iterating $1/b$
2 Fractions Are Numbers	Locate proper and improper fractions
3 Magnitude and Benchmarks	Estimate and compare efficiently
4 Equivalence	Understand many names for one number
5 Composition and Decomposition	Connect improper fractions and mixed numbers
6 Addition and Subtraction	Combine quantities only after units match
7 Multiplication and Scaling	Interpret a fraction of a quantity
8 Division	Connect sharing and measurement division
9 Rational Number Languages	Move among fractions, decimals, and percents
10 Ratio Rate and Proportion	Scale quantities through multiplicative relationships
11 Signed Rational Numbers	Coordinate magnitude and direction
12 Algebraic Transfer	Use fractions in equations, slope, and complex expressions

How the materials are used

The complete sequence contains 54 lessons. Students begin with a construct-based diagnostic, and secure concepts may be compacted. Each lesson interweaves understanding, computation, and reasoning. A typical 50-minute lesson includes cumulative retrieval, a launch problem, representation and discussion, explicit generalization, deliberate practice, and an exit ticket.

Definition of mastery

Dimension	Evidence
Accuracy	Computes correctly and efficiently
Magnitude	Estimates, compares, or bounds the result
Representation	Connects at least two models or forms
Transfer	Uses the idea in a new or contextual problem

A suggested mastery guide is 80-85 percent overall, no missing dimension, and success on a delayed check. Speed is considered only after accuracy and reasoning are secure.

Instructional non-negotiables

- Name the whole before naming or comparing a fraction.
- Use improper fractions early so fractions are not framed only as numbers below one.
- Estimate before exact computation often enough for the habit to become automatic.
- Derive procedures from representations and properties before relying on shortcuts.
- Treat repeated misconceptions as evidence about the student's current number model.