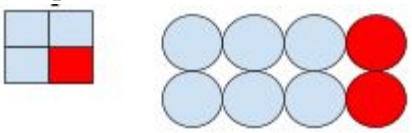
Fraction Misconceptions & Instructional Next Steps

Misconceptions	Instructional Next Steps
Fractions Learning Pathway: Unit Fractions *Unit A: Use proportional reasoning to make reasonable estimates* ***"Which represents a half?"*** • Does not recognize a fraction when fractional parts are separated by space "This is not ½ "  • Does not recognize a fraction when fractional parts are not all the same shape "This is not ¼"  • Misidentifies fractions of a set due to confusion with area model "This is not ¼. The star is bigger than the circles"  *Unit E* *Use unit fractions to compose and decompose fractions with models and symbols.* ***"Show ⅛ in as many ways as you can"*** • Confuses fractions and whole numbers. Represents the denominator as a whole number "This is a ⅓ . There are three of them"  • When trying to show a part-whole relationship, they represent the numerator and denominator as two separate whole numbers "This is ⅓. There is one white"	• Show examples in class of area models and fractions of a set where parts are separated and discuss how the space does not change the fraction • Show examples in class of area models of fractions where parts are not all the same shape and discuss how the shape does not change the fraction • Expose students to fractions of a set and discuss how this representation is different to the area model • Practice counting by unit fractions e.g. ⅛, 2/8, ⅜, 4/8, etc. • Practice showing fractions on a number line along with whole numbers • Practice representing unit fractions with different denominators • Discuss the difference between part whole relationships and part part relationships to make sure this difference is understood

 • Draws an area model of a fraction, where the size of each piece is unequal "This is a third. One of the three is shaded"  *Unit B* *Equally partition area, linear and set models* ***"How could you use this number line to count up by thirds? Mark the fractions as you count on the line. "*** • Confuses the unit fraction with a whole number when counting. "1, 2, 3, 4, 5, etc." • Misunderstands "counting up" as involving changing the denominator rather than the numerator. " 1/1, ½ , ⅓ , ¼ , ⅕ , ⅙ , etc." • Does not correctly partition the linear space relative to the fraction being shown on a number line • Does not relate fractional amount to a benchmark whole number. "⅓, ⅔, 3/3, 4/3, 5/3, 1"	• Expose students to area models and discuss how this representation is different to the set model ie. the space must be divided equally • Practice counting by unit fractions e.g. ⅛, 2/8, ⅜, 4/8, etc. • Practice showing fractions on a number line along with whole numbers, drawing diagrams or representations to illustrate relationships when needed • Practice dividing linear and area models into fractional amounts e.g. "divide this line into fifths" • Practice estimating unit fractions relative to familiar benchmarks e.g. "Is ⅛ closer to 0, ½ or 1?"
Fractions Learning Pathway: Comparing Fractions *Comp A* *Generate and recognize equivalent fractions using models and symbols* ***"Are 2/6 equivalent to ⅓? Use the manipulatives or draw to explain."*** • Mistakes the fraction with the larger numerator & denominator as the larger fraction. Does not pay attention to the relationship between numerator & denominator when estimating "2/6 is bigger than ⅓, because 2 is bigger than 1 and 6 is	• Practice representing and comparing fractions on a number line and using a variety of other models • Discuss the importance of using the same model when

bigger than 3’ *Comp B* *Compare familiar fraction quantities with and without benchmark referents* ***“Is 1/4 closer to 0, ½, or 1? Write it on the number line.”*** ● Does not look at the relationship between the size of the numerator and denominator when comparing fractions. Misidentifies the fraction as being larger than it is, because the “bottom number is big”. “¼ is closer to 1 than it is to ½ , because 4 is a big number” *Comp E* *Compare fractions with unlike numerators and unlike denominators using models and symbols* *“Which is greater 1 ⅔ or 5/4? “* ● Incorrectly judges that a mixed fraction is always greater than an improper fraction because of the whole number in front. “1 ⅔ is bigger than 5/4, because it has 1 whole in front” ● Creates an incorrect proof by creating two fractions that show different models. “2/8 is bigger, because the circles take up more space in the picture” 	comparing two fractions ● Practice representing and comparing benchmark fractions and comparison fractions using a number line and a variety of other models ● Discuss the importance of using the same model to compare two fractions ● Practice representing both mixed and improper fractions using concrete materials ● Modeled and guided creation of double number lines with both improper and mixed fractions shown to make comparisons ie. improper fractions shown on top of the number line and mixed at the bottom or vice versa ● Discuss the importance of using the same model to compare two fractions
Fractions Learning Pathway: Operations with Fractions: Addition & Subtraction *OP C* *Add and subtract fractions with like denominators using models and symbols* ● Adds numerator and denominator (without recognizing like denominators) e.g. ¼ + ¼ = 2/8	● Demonstrate operations using concrete tools/representations to illustrate why only the numerator needs to be added when denominators are the same ● Provide experiences with authentic fractional models e.g. baking, clock, coins, etc.

	• Number talks involving estimation of fractional sums
OP D *Add and subtract fractions with friendly but unlike denominators (e.g., 2 and 10) using models and symbols* • Adds numerator and denominator (without recognizing unlike denominators & creating common denominator) e.g. ½ + ¼ = 2/6 *OP E: Add and subtract fractions with unlike demoninators (e.g., 2 and 7) using models and symbols* • Adds numerators without estimating or creating common denominator e.g. 12/13 + ⅞ = 19 "because 12 + 7 = 19" • Adds denominators without estimating or creating common denominator e.g. 12/13 + ⅞ = 21 "because 13 + 8 = 21"	• Practice estimating unit fractions relative to familiar benchmarks e.g. "Is ⅛ closer to 0, ½ or 1?" • Practice estimating unit fractions relative to familiar benchmarks to determine reasonableness of an answer e.g. "Is ⅛ closer to 0, ½ or 1?" • Practice estimating sums