ADDING MIXED NUMBERS

Introduction: Student's will be able to use bar models (fraction bars) and decomposition to add mixed numbers with regrouping. Students will also see the use of improper fractions when adding mixed numbers. (5NS 2.3)

Materials: Fraction bars

Key Concepts: Equivalent forms of one, decomposition, equivalent fractions, least common multiple/denominator, regrouping

"We have learned what happens when we add fractions and we have a sum greater than one whole. Today we will examine what to do when we add a mixed number and our fractional part is greater than one whole. Let's look at an example!"

Example #1 (I do): $1\frac{7}{8}+\frac{2}{8}$

Build It:

1	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

$\frac{1}{8}$	$\frac{1}{8}$

Ask:

- Turn to your partner and tell them what you notice about my fractional parts? (Greater than one, more eights than one whole, etc.) Have students share out their observations.
- Class, how many eighths do I have in all? Let's count them together. (Have students chorally count out the nine eighths pieces)
- What do we call a number like nine eighths? (Improper Fraction)
- Is there a way for me to regroup and rewrite nine eighths? (As a mixed number)
- How would I regroup and rewrite nine eighths as a mixed number? ($1\frac{1}{8}$)

Use fraction bars to build and model the two mixed numbers. Collect like pieces and show that $\frac{9}{8}=1+\frac{1}{8}$.

Bar Model (Fraction Bars)	Decomposition	Improper Fractions
$1\frac{7}{8}+\frac{2}{8}$ $=1+\frac{2+7}{8}$ $=1+\frac{8}{8}+\frac{1}{8}$ $=1+1+\frac{1}{8}$ $=2+\frac{1}{8}$ $=2\frac{1}{8}$	$1\frac{7}{8}+\frac{2}{8}$ $=1+\frac{7}{8}+\frac{2}{8}$ $=1+\frac{7+2}{8}$ $=1+\frac{9}{8}$ $=1+\frac{8}{8}+\frac{1}{8}$ $=1+1+\frac{1}{8}$ $=2+\frac{1}{8}$ $=2\frac{1}{8}$	$1\frac{7}{8}+\frac{2}{8}$ $=\frac{15}{8}+\frac{2}{8}$ $=\frac{15+2}{8}$ $=\frac{17}{8}$ $=\frac{8+8+1}{8}$ $=\frac{8}{8}+\frac{8}{8}+\frac{1}{8}$ $=1+1+\frac{1}{8}$ $=2+\frac{1}{8}$ $=2\frac{1}{8}$

Ask:

- What happened to the sum of the fractional part of our number? (It was an improper fraction, it was greater than one whole)
- What did we need to do to our fractional part? (Decompose, break into one whole and a fractional unit, simplify)

Example #2 (We do): $3\frac{2}{3}+2\frac{3}{4}$

Build It/ Draw It:

1	1	1	$\frac{1}{3}$	$\frac{1}{3}$

1	1	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

Bar Model (Fraction Bars)	Decomposition	Improper Fractions
$3\frac{2}{3}+2\frac{3}{4}$ $=3+2+\frac{2}{3}+\frac{3}{4}$ $=5+\frac{2}{3}\left(\frac{4}{4}\right)+\frac{3}{4}\left(\frac{3}{3}\right)$ $=5+\frac{8}{12}+\frac{9}{12}$ $=5+\frac{8+9}{12}$ $=5+\frac{12}{12}+\frac{5}{12}$ $=5+1+\frac{5}{12}$ $=6+\frac{5}{12}$ $=6\frac{5}{12}$	$3\frac{2}{3}+2\frac{3}{4}$ $=3+\frac{2}{3}+2+\frac{3}{4}$ $=3+2+\frac{2}{3}+\frac{3}{4}$ $=5+\frac{2}{3}\left(\frac{4}{4}\right)+\frac{3}{4}\left(\frac{3}{3}\right)$ $=5+\frac{8}{12}+\frac{9}{12}$ $=5+\frac{8+9}{12}$ $=5+\frac{12}{12}+\frac{5}{12}$ $=5+1+\frac{5}{12}$ $=6\frac{5}{12}$	$3\frac{2}{3}+2\frac{3}{4}$ $=\frac{11}{3}+\frac{11}{4}$ $=\frac{11}{3}\left(\frac{4}{4}\right)+\frac{11}{4}\left(\frac{3}{3}\right)$ $=\frac{44}{12}+\frac{33}{12}$ $=\frac{44+33}{12}$ $=\frac{77}{12}$ $=\frac{12}{12}+\frac{12}{12}+\frac{12}{12}+\frac{12}{12}+\frac{12}{12}+\frac{12}{12}+\frac{5}{12}$ $=1+1+1+1+1+1+\frac{5}{12}$ $=6+\frac{5}{12}$ $=6\frac{5}{12}$

"With your partner, find the sum of the following mixed numbers using your fraction bars."

<u>Partner You Try #1 (You Do a Think, Pair, Share)</u>: $2\frac{2}{3}+3\frac{1}{2}$

Build It/ Draw It:

1	1	$\frac{1}{3}$	$\frac{1}{3}$

1	1	1	$\frac{1}{2}$

Bar Model (Fraction Bars)	Decomposition	Improper Fractions
$2\frac{2}{3}+3\frac{1}{2}$ $=2+3+\frac{2}{3}\left(\frac{2}{2}\right)+\frac{1}{2}\left(\frac{3}{3}\right)$ $=5+\frac{4}{6}+\frac{3}{6}$ $=5+\frac{4+3}{6}$ $=5+\frac{6}{6}+\frac{1}{6}$ $=5+1+\frac{1}{6}$ $=6+\frac{1}{6}$ $=6\frac{1}{6}$	$2\frac{2}{3}+3\frac{1}{2}$ $=2+\frac{2}{3}+3+\frac{1}{2}$ $=2+3+\frac{2}{3}+\frac{1}{2}$ $=5+\frac{2}{3}\left(\frac{2}{2}\right)+\frac{1}{2}\left(\frac{3}{3}\right)$ $=5+\frac{4}{6}+\frac{3}{6}$ $=5+\frac{4+3}{6}$ $=5+\frac{6}{6}+\frac{1}{6}$ $=5+1+\frac{1}{6}$ $=6+\frac{1}{6}$ $=6\frac{1}{6}$	$2\frac{2}{3}+3\frac{1}{2}$ $=\frac{8}{3}+\frac{7}{2}$ $=\frac{8}{3}\left(\frac{2}{2}\right)+\frac{7}{2}\left(\frac{3}{3}\right)$ $=\frac{16}{6}+\frac{21}{6}$ $=\frac{16+21}{6}$ $=\frac{37}{6}$ $=\frac{6}{6}+\frac{6}{6}+\frac{6}{6}+\frac{6}{6}+\frac{6}{6}+\frac{6}{6}+\frac{1}{6}$ $=1+1+1+1+1+1+\frac{1}{6}$ $=6+\frac{1}{6}$ $=6\frac{1}{6}$

Example #3 (We do): $4\frac{1}{2}+3\frac{4}{5}$

Build It/ Draw It:

1	1	1	1	$\frac{1}{2}$

1	1	1	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$

Bar Model (Fraction Bars)	Decomposition	Improper Fractions
$4\frac{1}{2}+3\frac{4}{5}$ $=4+3+\frac{1}{2}+\frac{4}{5}$ $=7+\frac{1}{2}\left(\frac{5}{5}\right)+\frac{4}{5}\left(\frac{2}{2}\right)$ $=7+\frac{5}{10}+\frac{8}{10}$ $=7+\frac{5+8}{10}$ $=7+\frac{10}{10}+\frac{3}{10}$ $=7+1+\frac{3}{10}$ $=8+\frac{3}{10}$ $=8\frac{3}{10}$	$4\frac{1}{2}+3\frac{4}{5}$ $=4+\frac{1}{2}+3+\frac{4}{5}$ $=4+3+\frac{1}{2}+\frac{4}{5}$ $=7+\frac{1}{2}\left(\frac{5}{5}\right)+\frac{4}{5}\left(\frac{2}{2}\right)$ $=7+\frac{5}{10}+\frac{8}{10}$ $=7+\frac{5+8}{10}$ $=7+\frac{10}{10}+\frac{3}{10}$ $=7+1+\frac{3}{10}$ $=8+\frac{3}{10}$ $=8\frac{3}{10}$	$4\frac{1}{2}+3\frac{4}{5}$ $=\frac{9}{2}+\frac{19}{5}$ $=\frac{9}{2}\left(\frac{5}{5}\right)+\frac{19}{5}\left(\frac{2}{2}\right)$ $=\frac{45}{10}+\frac{38}{10}$ $=\frac{45+38}{10}$ $=\frac{83}{10}$ $=\frac{10}{10}+\frac{10}{10}+\frac{10}{10}+\frac{10}{10}+\frac{10}{10}+\frac{10}{10}+\frac{10}{10}+\frac{10}{10}+\frac{3}{10}$ $=1+1+1+1+1+1+1+1+\frac{3}{10}$ $=8+\frac{3}{10}$ $=8\frac{3}{10}$

<u>You Try # 2</u>: $1\frac{3}{4}+2\frac{7}{8}$

Build It/ Draw It:

1	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

1	1	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

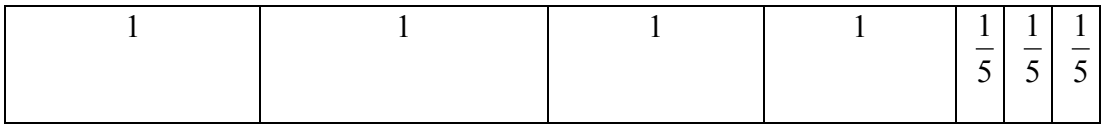
Bar Model (Fraction Bars)	Decomposition	Improper Fractions
$1\frac{3}{4}+2\frac{7}{8}$ $=1+2+\frac{3}{4}+\frac{7}{8}$ $=3+\frac{3}{4}\left(\frac{2}{2}\right)+\frac{7}{8}$ $=3+\frac{6}{8}+\frac{7}{8}$ $=3+\frac{6+7}{8}$ $=3+\frac{8}{8}+\frac{5}{8}$ $=3+1+\frac{5}{8}$ $=4+\frac{5}{8}$ $=4\frac{5}{8}$	$1\frac{3}{4}+2\frac{7}{8}$ $=1+\frac{3}{4}+2+\frac{7}{8}$ $=1+2+\frac{3}{4}+\frac{7}{8}$ $=3+\frac{3}{4}\left(\frac{2}{2}\right)+\frac{7}{8}$ $=3+\frac{6}{8}+\frac{7}{8}$ $=3+\frac{6+7}{8}$ $=3+\frac{8}{8}+\frac{5}{8}$ $=3+1+\frac{5}{8}$ $=4+\frac{5}{8}$ $=4\frac{5}{8}$	$1\frac{3}{4}+2\frac{7}{8}$ $=\frac{7}{4}+\frac{23}{8}$ $=\frac{7}{4}\left(\frac{2}{2}\right)+\frac{23}{8}$ $=\frac{14}{8}+\frac{23}{8}$ $=\frac{14+23}{8}$ $=\frac{37}{8}$ $=\frac{8}{8}+\frac{8}{8}+\frac{8}{8}+\frac{8}{8}+\frac{5}{8}$ $=1+1+1+1+\frac{5}{8}$ $=4+\frac{5}{8}$ $=4\frac{5}{8}$

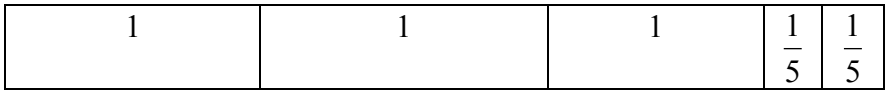
"Now that we have found the sum of two mixed numbers let's take a look and see if we can apply the same strategies with three mixed numbers."

Example # 4 (I do/We do): In one week during P.E., Mary ran $4\frac{3}{5}$ miles, Lauren ran $1\frac{3}{10}$ miles, and Dante ran $3\frac{2}{5}$ miles. In one week, how many miles total did the three students run?

$$4\frac{3}{5}+1\frac{3}{10}+3\frac{2}{5}$$

Build It/ Draw It:





Bar Model (Fraction Bars)	**Decomposition**	**Improper Fractions**
$4\frac{3}{5}+1\frac{3}{10}+3\frac{2}{5}$ $=4+1+3+\frac{5}{5}+\frac{3}{10}$ $=4+1+3+1+\frac{3}{10}$ $=9+\frac{3}{10}$ $=9\frac{3}{10}$ miles	$4\frac{3}{5}+1\frac{3}{10}+3\frac{2}{5}$ $=4+1+3+\frac{3}{5}+\frac{3}{10}+\frac{2}{5}$ $=8+\frac{3+2}{5}+\frac{3}{10}$ $=8+\frac{5}{5}+\frac{3}{10}$ $=8+1+\frac{3}{10}$ $=9+\frac{3}{10}$ $=9\frac{3}{10}$ miles	$4\frac{3}{5}+1\frac{3}{10}+3\frac{2}{5}$ $=\frac{23}{5}+\frac{13}{10}+\frac{17}{5}$ $=\frac{23}{5}\left(\frac{2}{2}\right)+\frac{13}{10}+\frac{17}{5}\left(\frac{2}{2}\right)$ $=\frac{46}{10}+\frac{13}{10}+\frac{34}{10}$ $=\frac{46+13+34}{10}$ $=\frac{93}{10}$ $=\frac{10}{10}+\frac{10}{10}+\frac{10}{10}+\frac{10}{10}+\frac{10}{10}+\frac{10}{10}+\frac{10}{10}+\frac{10}{10}+\frac{10}{10}+\frac{3}{10}$ $=1+1+1+1+1+1+1+1+1+\frac{3}{10}$ $=9+\frac{3}{10}$ $=9\frac{3}{10}$ miles

<u>You Try # 3</u>: Carla bought candy at the Candy Shop for the party. She purchased $2\frac{2}{3}$ pounds of chocolate almonds, $3\frac{2}{5}$ pounds of red vines, and $1\frac{1}{3}$ pounds of gummy bears. How many pounds of candy did Carla buy for the party?

$$2\frac{2}{3}+3\frac{2}{5}+1\frac{1}{3}$$

Build It/ Draw It:

1	1	$\frac{1}{3}$	$\frac{1}{3}$

1	1	1	$\frac{1}{5}$	$\frac{1}{5}$

1	$\frac{1}{3}$

Bar Model (Fraction Bars)	**Decomposition**	**Improper Fractions**
$2\frac{2}{3}+3\frac{2}{5}+1\frac{1}{3}$ $=6+\frac{1}{3}+\frac{2}{3}+\frac{2}{5}$ $=6+\frac{3}{3}+\frac{2}{5}$ $=6+1+\frac{2}{5}$ $=7+\frac{2}{5}$ $=7\frac{2}{5}$ pounds of candy	$2\frac{2}{3}+3\frac{2}{5}+1\frac{1}{3}$ $=2+3+1+\frac{2}{3}+\frac{2}{5}+\frac{1}{3}$ $=6+\frac{2+1}{3}+\frac{2}{5}$ $=6+\frac{3}{3}+\frac{2}{5}$ $=6+1+\frac{2}{5}$ $=7+\frac{2}{5}$ $=7\frac{2}{5}$ pounds of candy	$2\frac{2}{3}+3\frac{2}{5}+1\frac{1}{3}$ $=\frac{8}{3}+\frac{17}{5}+\frac{4}{3}$ $=\frac{8}{3}\left(\frac{5}{5}\right)+\frac{17}{5}\left(\frac{3}{3}\right)+\frac{4}{3}\left(\frac{5}{5}\right)$ $=\frac{40}{15}+\frac{51}{15}+\frac{20}{15}$ $=\frac{40+51+20}{15}$ $=\frac{111}{15}$ $=\frac{15}{15}+\frac{15}{15}+\frac{15}{15}+\frac{15}{15}+\frac{15}{15}+\frac{15}{15}+\frac{15}{15}+\frac{6}{15}$ $=1+1+1+1+1+1+1+\frac{6}{15}$ $=7+\frac{2\bullet\cancel{3}}{\cancel{3}\bullet 5}$ $=7+\frac{2}{5}$ $=7\frac{2}{5}$ pounds of candy

Do: Have students present out on the overhead/ board their answers. Look for different ways that students approached the problem.

Debrief: Ask students to discuss what they discovered today when building the sum of mixed numbers and when using decomposition. Ask what strategies they used today when adding mixed numbers.