Improper Fractions and Mixed Numbers

Improper fractions are fractions where the numerator (top number) is equal to or larger than the denominator.

$\frac{7}{4}$ is an example of an improper fraction. Remember that the denominator tells how many pieces the whole is divided into.

If the whole is a pizza  then $\frac{1}{4}$ of the pizza would look like  and $\frac{7}{4}$ would look like

.

If the seven pieces were put back together to make whole pizzas there would be enough pizza to make

1 whole  and $\frac{3}{4}$  of another pizza. $1\frac{3}{4}$ is a mixed number. Mixed numbers or mixed fractions are a combination of a whole number and a proper fraction.

$\frac{7}{4}$ and $1\frac{3}{4}$ are equivalent fractions. Equivalent fractions have the same value, even though they may look different.

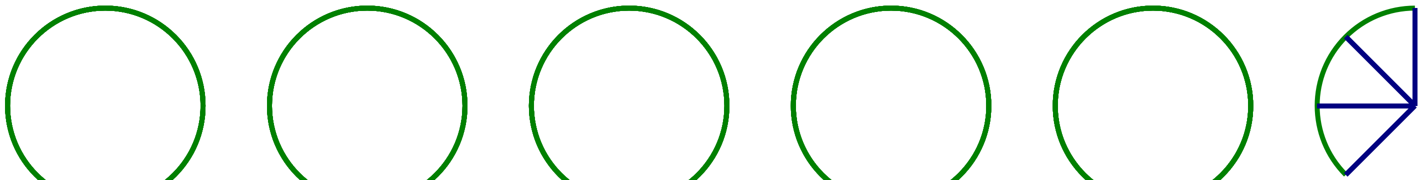
Draw a sketch of $4\frac{2}{3}$ cookies.

Divide each of the whole cookies into thirds. How many thirds are there in $4\frac{2}{3}$? _______ How would you write this amount as an improper fraction? _______

$4\frac{2}{3}$ =

If I want to change $5\frac{3}{8}$ into an improper fraction I could draw pictures like we just did, but drawing pictures isn't very efficient if the numbers get large. You probably learned a rule for changing mixed numbers into improper fractions, but if you don't remember it now, just relearning a rule probably won't stay with you long. Understanding what you are doing and why it makes sense, will make you less dependent on just a memorized (and easily forgotten) rule.

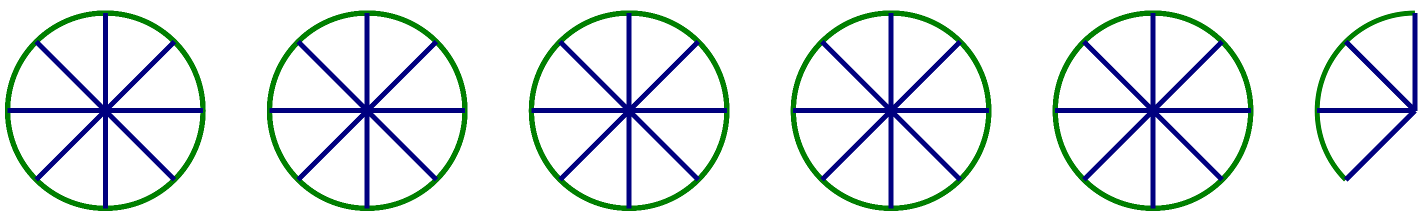
Let's look at pictures one more time to make sense out of what has to happen to change a mixed number into an equivalent improper fraction.



This is a picture of $5\frac{3}{8}$. It is a mixed number (or mixed fraction) because it is a combination of whole pieces and fractional pieces.

The process of changing a mixed number to an improper fraction involves taking a mixed number with wholes and parts and expressing it as a fraction with just same size pieces. Since we already have one-eighth pieces, the goal is to make everything into one-eighth pieces.

We do this by cutting each whole into 8 pieces.



The question then is, how many pieces are there all together? Well, you could count them one-by-one, but it would be much quicker to use multiplication. 5 x 8 (five wholes, each cut into 8 pieces) makes 40 pieces, plus the original 3 pieces give us 43 pieces. Since each piece is an eighth of the whole circle, we have $\frac{43}{8}$, so $5\frac{3}{8} = \frac{43}{8}$. Thinking about why this answer makes sense might lead you to the rule you learned at an earlier age. You can definitely use that rule, but make certain you understand why it makes sense, because then you have something to fall back on if you forget the rule.

We can use this same example to go the other direction. What if we have the improper fraction $\frac{43}{8}$ and we want to change it back into a mixed number? Imagine pies cut into 8 pieces with each piece on its own plate. If you 43 slices of pie and you want to put them back into their original pie tins it would take 8 slices to make one whole. The question then is, how many whole pies and how many pieces are left over if you start with 43 slices.

Since we want to know how many groups of 8 there are in 43, we can use division to answer this question.

$43 \div 8 = 5\ r3$ or, since each of the 3 leftover slices is one-eighth of the pie, we can write this as $5\frac{3}{8}$.

This should also make sense, since another way we can think about fractions is as division problems.

Practice changing the mixed numbers into equivalent improper fractions and the improper fractions into mixed numbers.

$6\frac{3}{4} =$ $8\frac{2}{3} =$ $10\frac{5}{7} =$ $2\frac{1}{2} =$

$\frac{35}{6} =$ $\frac{50}{7} =$ $\frac{24}{3} =$ $\frac{27}{6} =$