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Topic: Improper Fractions and Mixed Numbers- Converting, Comparing, and Simplifying |

| **Main Learning Goal and Core Concepts :** Students will learn what an improper fraction is and what a mixed number is. In addition, students will be able to convert improper fractions into mixed numbers and vice versa. This lesson assumes students already know how to compare fractions with the same denominators and how to simplify fractions. |
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| **Lesson Brief:** Vocabulary * Improper Fraction: a fraction equivalent to or larger than one whole; the numerator is larger than or equal to the denominator
* Mixed Number: also known as a mixed fraction; a number written as a whole number with a fraction; consists of a whole number and a proper fraction

How do we convert an improper fraction into a mixed number? * We use long division in which we divide the numerator by the denominator.
* We can ask ourselves: How many whole groups of \_ can we pull from \_?
* For example:
	+ How many whole groups of 2 can we pull from 11?
	+ $\frac{11}{2}$ → 2⟌11 → 5$\frac{1}{2}$

How do we convert a mixed number into an improper fraction? * We use multiplication and addition where we multiply the whole number with the denominator and add the numerator.
* Note: The denominator remains the same during this conversion. We always follow the order of operations when converting.
* For example:
	+ 5$\frac{1}{2}$ → 5 x 2 + 1 =11→ $\frac{11}{2}$
	+ Multiply the whole number and denominator: 5 x 2=10
	+ Add the numerator to the whole number times the denominator: 10 + 1=11
	+ OR we can use this set up:
		- $5\_{×}^{+}\frac{1}{2}$ = $\frac{11}{2}$
		- Here, we also follow the order of operations.
		- We multiply the whole number and denominator: 5 x 2=10
		- Then, we add the numerator to the product above: 10 + 1=11
			* We follow this order when using this setup every time.

**Practice Problems:** 1. Convert the following improper fraction to a mixed number.

$\frac{15}{4}$ Answer: 3$\frac{3}{4}$Remember, we use long division. We write it as $4⟌15$ where our goal is to find out how many whole groups of 4 we can pull from 15. The closest number would be 3 (4 x 3= 12). The quotient (3) will be our whole number. From here, we subtract 12 from 15 which leaves us with 3. 3 is the remainder, so it is our numerator. This would look like the following: $\frac{15}{4}$ → $4⟌15$ → 3$\frac{3}{4}$1. Convert the following mixed number to an improper fraction.

2$\frac{3}{5}$Answer: $\frac{13}{5}$Remember, we multiply the whole number to the denominator, then we add the numerator. We start by multiplying the whole number and denominator (2 x 5) which gives us 10. We then add the numerator to the whole number times the denominator (10+3) which leaves us with 13. This would look like the following: 2 x 5 + 3= 13 → $\frac{13}{5}$ OR $2\_{×}^{+}\frac{3}{5}$ = $\frac{13}{5}$1. First, convert the following improper fraction to a mixed number. Then, state which one is greater.

$\frac{31}{12}$ 6$\frac{4}{12}$Converted Answer: 2$\frac{7}{12}$Greater Answer: 6$\frac{4}{12}$First, we divide 31 by 12 in long division form. Then, we find how many whole groups of 12 we can pull from 31. Next, we find our remainder. Lastly, we write out the mixed number. $\frac{31}{12}$ → 12⟌31 → 2$\frac{7}{12}$ When comparing we first look at the whole number, then we look at the proper fraction. Lastly, we state which mixed number is greater. 1. First, convert the following mixed number to an improper fraction. Then, state which one is greater.

5$\frac{1}{9}$ $\frac{24}{9}$Converted Answer: $\frac{46}{9}$Greater Answer: 5$\frac{1}{9}$First, we multiply the whole number to the denominator. Then, we add the numerator. Lastly, we write out the improper fraction. 5 x 9 + 1 = 46 →$\frac{46}{9}$ OR $5\_{×}^{+}\frac{1}{9}$= $\frac{46}{9}$ Because both fractions have like (or common) denominators, we focus on the numerators when comparing. We then state which improper fraction is greater. 1. First, convert the following mixed number to an improper fraction. Then, simplify.

6$\frac{3}{6}$Converted Answer: $\frac{39}{6}$Simplified Answer: $\frac{13}{2}$First, we multiply the whole number to the denominator. Then, we add the numerator and write out the improper fraction. After that, we find the greatest common factor of 39 and 6. Next, we divide the numerator and denominator by the greatest common factor. Lastly, we write out the simplified improper fraction. 6 x 6 + 3 = 39 → $\frac{39}{6}$ OR $6\_{×}^{+}\frac{3}{6}$ = $\frac{39}{6}$ → $\frac{39 ÷ 3}{6 ÷ 3 }$ = $\frac{13}{2}$1. First, convert the following improper fraction to a mixed number. Then, simplify.

$\frac{84}{10}$Converted Answer: 8$\frac{4}{10}$Simplified Answer: 8 $\frac{2}{5}$First, we divide 84 by 10 in long division form. Then, we find how many whole groups of 10 we can pull from 84. Next, we find our remainder. After that, we write out the mixed number. Following this, we find the greatest common factor of 4 and 10. After, we divide the numerator and denominator by the greatest common factor. Lastly, we write out the simplified mixed number. $\frac{84}{10}$ → 10⟌84 → 8$\frac{4}{10}$ → 8$\frac{4 ÷2}{10 ÷ 2}$ = 8 $\frac{2}{5}$ |
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| **Notes:*** During these conversions it is important to keep the denominator the same. The only time the denominator would change would be if we were simplifying the improper fraction or mixed number *before* or *after* we convert.
* When converting, we always follow the order of operations. This is especially important when converting a mixed number to an improper fraction so that we can get the correct answer.
* When simplifying it is important to keep the whole number the same in a mixed number. We are simplifying the fraction, we are not changing the entire value of the mixed number.
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‘Improper Fraction’ Definition: [Source](http://www.amathsdictionaryforkids.com/qr/i/improperFraction.html)

‘Mixed Number’ Definition: [Source 1](http://www.amathsdictionaryforkids.com/qr/m/mixedNumber.html), [Source 2](https://www.khanacademy.org/math/cc-fourth-grade-math/imp-fractions-2/imp-mixed-numbers/a/mixed-numbers-and-improper-fractions-review)