Supplemental Worksheet Problems To Accompany:

The Pre-Algebra Tutor: Volume 2
Section 5– Introduction to Fractions and Fraction Simplification

Please watch Section 5 of this DVD before working these problems.

The DVD is located at:

http://www.mathtutordvd.com/products/item67.cfm
Part 1: Identifying Proper, Improper and Mixed Fractions

1) What type of fraction is the following?

\[ \frac{9}{3} \]

2) What type of fraction is the following?

\[ \frac{7}{16} \]
3) What type of fraction is the following?

\[
\frac{29}{10}
\]

4) What type of fraction is the following?

\[
\frac{20}{19}
\]
5) What type of fraction is the following?

\[
\frac{5}{3}
\]

6) What type of fraction is the following?

\[
\frac{5}{2}
\]
Part 2: Are The Fractions Equal, or is One Fraction Larger?

7) Are the following two fractions equivalent?

\[
\frac{9}{3}, \frac{17}{6}
\]

8) Are the following two fractions equivalent?

\[
\frac{2}{6}, \frac{4}{12}
\]
9) Which is greater?

\[
\frac{3}{5} \quad \frac{8}{15}
\]

10) Which is greater?

\[
\frac{2}{5} \quad \frac{1}{3}
\]
11) Which is smaller?

\[
\frac{3}{16} \quad \frac{1}{4}
\]

12) Which is smaller?

\[
\frac{13}{10} \quad \frac{3}{2}
\]
Part 3: Faction Simplification

13) Simplify the following fraction.

\[ \frac{8}{6} \]

14) Simplify the following fraction.

\[ \frac{18}{30} \]
15) Simplify the following fraction.

\[ \frac{4}{7} \]

16) Simplify the following fraction.

\[ 5 \frac{7}{21} \]
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) What type of fraction is the following?</td>
<td>Begin.</td>
</tr>
<tr>
<td><img src="image" alt="Fraction" /></td>
<td>Since the numerator is greater than the denominator and the fraction does not have a preceding whole number, this is an improper fraction. Ans: Improper fraction</td>
</tr>
<tr>
<td>This is an improper fraction.</td>
<td></td>
</tr>
<tr>
<td>2) What type of fraction is the following?</td>
<td>Begin.</td>
</tr>
<tr>
<td><img src="image" alt="Fraction" /></td>
<td>Since the numerator is less than the denominator and the fraction does not have a preceding whole number, this is a proper fraction. The fact that this fraction is negative does not affect the type of fraction. Ans: Proper fraction</td>
</tr>
<tr>
<td>This is a proper fraction.</td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3) What type of fraction is the following?</td>
<td>Begin.</td>
</tr>
</tbody>
</table>
| \[
\frac{9}{10} + 2
\]                                                       | Since this fraction has a preceding whole number it is a mixed fraction. Ans: Mixed fraction |
| This is a mixed fraction.                                                 |                                                                        |
| 4) What type of fraction is the following?                                | Begin.                                                                 |
| \[
\frac{20}{19}
\]                                                   | Since the numerator is greater than the denominator and the fraction does not have a preceding whole number, this is an improper fraction. Ans: Improper fraction |
| This is an improper fraction.                                             |                                                                        |
### Question 5
What type of fraction is the following?

\[
\begin{align*}
\frac{52}{3} & \\
\end{align*}
\]

Begin.

Since this fraction has a preceding whole number it is a mixed fraction.

**Ans: Mixed fraction**

This is a mixed fraction.

### Question 6
What type of fraction is the following?

\[
\begin{align*}
\frac{5}{2} & \\
\end{align*}
\]

Begin.

Since the numerator is greater than the denominator and the fraction does not have a preceding whole number, this is an improper fraction.

**Ans: Improper fraction**
7) Are the following two fractions equivalent?

\[
\frac{9}{3} \quad \frac{17}{6}
\]

**Begin.**

To determine if the fractions are equal, we need to express both fractions in terms of the same denominator.

The denominators are 3 and 6, as shown in red. Since 6 is 3 times 2, it’s easy to express both fractions in terms of 6 in the denominator.

We want both denominators to equal 6, so we have to change the first fraction (9/3). Since we need to multiply the denominator by 2 to equal 6, we must also multiply the numerator by 2. Whatever operation we perform to one half of the fraction we must do to the other.

For the numerator, 9 times 2 gives us 18. For the denominator, 3 times 2 gives us 6.

We now have both fractions with 6 in the denominator so we can compare the numerators. Since 18 is not the same as 17, the fractions are not equal.

We have determined that \(\frac{9}{3}\) is not equal to \(\frac{17}{6}\).

**Ans: No, the fractions are not equal.**
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>8) Are the following two fractions equivalent?</td>
<td>Begin.</td>
</tr>
</tbody>
</table>
| \[
\frac{2}{6}, \frac{4}{12}
\]                                         | To determine if the fractions are equal, we need to express both fractions in terms of the same denominator. The denominators are 6 and 12, as shown in red. Since 12 is 6 times 2, it’s easy to express both fractions in terms of 12 in the denominator. |
| \[
\frac{2}{6}, \frac{4}{12}
\]                                         | We want both denominators to equal 12, so we have to change the first fraction \(-2/6\). Since we need to multiply the denominator by 2 to equal 12, we must also multiply the numerator by 2. Whatever operation we perform to one half of the fraction we must do to the other. |
| \[
\frac{2\cdot2}{6\cdot2}
\]                                          | For the numerator, \(-2\) times 2 gives us \(-4\). For the denominator, \(6\) times 2 gives us 12. |
| \[
\frac{2\cdot2}{6\cdot2} = \frac{-4}{12}
\]                            | We now have both fractions with 12 in the denominator so we can compare the numerators. Since both fractions have \(-4\) in the numerator the fractions are equal. |
| \[
\frac{4}{12}, \frac{4}{12}
\]                                         | We have determined that \(-2/6\) is the same as \(-4/12\). Ans: Yes, the fractions are equal. |
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>9) Which is greater? [ \frac{3}{5} \text{ and } \frac{8}{15} ]</td>
<td>Begin.</td>
</tr>
<tr>
<td>To determine which fraction is greater, we need to express both fractions in terms of the same denominator to more easily compare them. The denominators are 5 and 15, as shown in red. Since 15 is 5 times 3, it’s easy to express both fractions in terms of 15 in the denominator.</td>
<td></td>
</tr>
<tr>
<td>We want both denominators to equal 15, so we have to change the first fraction ((3/5)). Since we need to multiply the denominator by 3 to equal 15, we must also multiply the numerator by 3. Whatever operation we perform to one half of the fraction we must do to the other.</td>
<td></td>
</tr>
<tr>
<td>We now have both fractions with 15 in the denominator so we can compare the numerators. Since 9 is greater than 8, the left fraction is greater.</td>
<td></td>
</tr>
<tr>
<td>We have determined that (3/5) is greater than (8/15).</td>
<td>Ans: (3/5) is greater than (8/15).</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
</tr>
</tbody>
</table>
| 10) Which is greater? \[
\frac{2}{5}, \frac{1}{3}
\] | Begin. |

To determine which fraction is greater, we need to express both fractions in terms of the same denominator to more easily compare them. The denominators are 5 and 3, as shown in red. The easiest way to make both fractions have the same denominator is to make both denominators 15 since the least common multiple of 5 and 3 is 15.

\[
\frac{2 \cdot 3}{5 \cdot 3} = \frac{6}{15}
\]

We want both denominators to equal 15, so we have to change both fractions. Starting with \(\frac{2}{5}\), we must multiply the denominator by 3 to equal 15 so we must also multiply the numerator by 3.

\[
\frac{1 \cdot 5}{3 \cdot 5} = \frac{5}{15}
\]

Now we must change the right fraction to also have a denominator of 15. Since we must multiply the denominator (3) by 5 to get 15, we must also multiply the numerator by 5.

\[
\frac{6}{15}, \frac{5}{15}
\]

We now have both fractions with 15 in the denominator so we can compare the numerators. Since 6 is greater than 5, the left fraction is greater.

\[
\frac{2}{5} > \frac{1}{3}
\]

We have determined that \(\frac{2}{5}\) is greater than \(\frac{1}{3}\).

**Ans: \(\frac{2}{5}\) is greater than \(\frac{1}{3}\).**
11) Which is smaller?

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ \frac{3}{16} \quad \frac{1}{4} ]</td>
<td>Begin.</td>
</tr>
</tbody>
</table>

To determine which fraction is smaller, we need to express both fractions in terms of the same denominator to more easily compare them.

The denominators are 16 and 4, as shown in red. Since 16 is 4 times 4, it’s easy to express both fractions in terms of 16 in the denominator.

\[ \frac{3}{16} \quad \frac{1}{4} \]

We want both denominators to equal 16, so we have to change the second fraction \( \frac{1}{4} \). Since we need to multiply the denominator by 4 to equal 16, we must also multiply the numerator by 4. Whatever operation we perform to one half of the fraction we must do to the other.

\[ \frac{1 \cdot 4}{4 \cdot 4} = \frac{4}{16} \]

We now have both fractions with 16 in the denominator so we can compare the numerators. Since 3 is less than 4, the left fraction is smaller.

\[ \frac{3}{16} \quad \frac{4}{16} \]

We have determined that \( \frac{3}{16} \) is less than \( \frac{1}{4} \).

**Ans:** \( \frac{3}{16} \) is less than \( \frac{1}{4} \).
12) Which is smaller?

\[
\frac{13}{10}, \quad \frac{3}{2}
\]

Begin.

To determine which fraction is smaller, we need to express both fractions in terms of the same denominator to more easily compare them.

The denominators are 10 and 2, as shown in red. Since 10 is 2 times 5, it's easy to express both fractions in terms of 10 in the denominator.

We want both denominators to equal 10, so we have to change the second fraction \(\frac{3}{2}\). Since we need to multiply the denominator by 5 to equal 10, we must also multiply the numerator by 5. Whatever operation we perform to one half of the fraction we must do to the other.

We now have both fractions with 10 in the denominator so we can compare the numerators. Since 13 less than 15, the left fraction is smaller.

We have determined that \(\frac{13}{10}\) is less than \(\frac{3}{2}\).

Ans: \(\frac{13}{10}\) is less than \(\frac{3}{2}\).
13) Simplify the following fraction.

\[
\frac{8}{6}
\]

Begin.

To simplify a fraction, we need to determine if there is a number we can divide both the top and bottom by that will result in a whole number.

In this case, both 8 and 6 are divisible by 2. So we divide both the top and bottom of the fraction by 2.

\[
\frac{8 \div 2}{6 \div 2} = \frac{4}{3}
\]

8 divided by 2 gives us 4. 6 divided by 2 gives us 3.

Is there anything that divides evenly into both 4 and 3? No.

Since nothing else can divide evenly into both 4 and 3, we have simplified our fraction.

\[
\frac{8}{6} \text{ simplified, is } \frac{4}{3}
\]

Ans: \(\frac{4}{3}\)
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>14) Simplify the following fraction.</td>
<td>Begin.</td>
</tr>
<tr>
<td>$\frac{18}{30}$</td>
<td></td>
</tr>
<tr>
<td>To simplify a fraction, we need to determine if there is a number we can divide both the top and bottom by that will result in a whole number.</td>
<td></td>
</tr>
<tr>
<td>$\frac{18}{30} \div 6 = \frac{3}{5}$</td>
<td></td>
</tr>
<tr>
<td>In this case, both 18 and 30 are divisible by 6. So we divide both the top and bottom of the fraction by 6.</td>
<td></td>
</tr>
<tr>
<td>$\frac{18}{30} = \frac{3}{5}$</td>
<td></td>
</tr>
<tr>
<td>Is there anything that divides evenly in to both 3 and 5? No.</td>
<td></td>
</tr>
<tr>
<td>$\frac{18}{30}$ simplified, is $\frac{3}{5}$</td>
<td></td>
</tr>
<tr>
<td>Since nothing else can divide evenly in to both 3 and 5, we have simplified our fraction.</td>
<td></td>
</tr>
<tr>
<td>Ans: $\frac{3}{5}$</td>
<td></td>
</tr>
</tbody>
</table>

*Note: What if you didn’t realize that both 18 and 30 were divisible by 6? Using any valid common divisor of the numerator and denominator will ultimately result in the correct answer. For example, let’s say that we started by dividing the numerator and denominator by 2:*

$$\frac{18 \div 2}{30 \div 2} = \frac{9}{15}$$

The resulting fraction has a numerator and a denominator that share another common factor, 3. Thus the fraction can be further simplified:

$$\frac{9 \div 3}{15 \div 3} = \frac{3}{5}$$

$$\frac{18}{30} = \frac{3}{5}$$

We have arrived at the same answer as above using a valid, intermediate step. Starting with the largest common denominator (in this case 6) will always arrive at the final answer using the least amount of steps.
15) Simplify the following fraction.

\[
\frac{4}{7}
\]

Begin.

To simplify a fraction, we need to determine if there is a number we can divide both the top and bottom by that will result in a whole number.

In this case, 4 and 7 do not share any common factors, thus the fraction cannot be further simplified.

The fraction is already simplified.

\[
\frac{4}{7}
\]

is already simplified

Ans: \(\frac{4}{7}\)
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
</table>
| 16) Simplify the following fraction. \[
\frac{5 \cdot 7}{21} \]
| Begin. |

To simplify a fraction, we need to determine if there is a number we can divide both the top and bottom by that will result in a whole number. The fact that this is a mixed fraction does not change the process.

\[
\frac{7 \div 7}{21 \div 7} = \frac{1}{3}
\]

For now, we will work just with the fraction. In this case, both 7 and 21 are divisible by 7. So we divide both the top and bottom of the fraction by 7.

\[
\frac{7}{21} = \frac{1}{3}
\]

Is there anything that divides evenly into both 1 and 3? No.

Since nothing else can divide evenly into both 1 and 3, we have simplified our fraction. However, don’t forget that this fraction is a mixed fraction and we cannot leave out the whole number component.

\[
\frac{5 \cdot 7}{21} \text{ simplified, is } 5 \frac{1}{3}
\]

\[
\text{Ans: } 5 \frac{1}{3}
\]