Assessment : End-of-Unit Assessment

Problem 1

Students identify which fractions are equivalent to $\frac{3}{12}$. They may fail to select A if they make an arithmetic error. They may fail to select B if they try to relate $\frac{2}{8}$ and $\frac{3}{12}$ directly, not thinking that they are both equivalent to $\frac{1}{4}$. They may select C seeing that the numerator and denominator both differ from the numerator and denominator of $\frac{3}{12}$ by 1. They may select D if they do not understand the meaning of the numerator and denominator in a fraction. They may fail to select E if they do not realize that $\frac{5}{20}$ is equivalent to $\frac{1}{4}$.

Statement

Select **all** fractions that are equivalent to $\frac{3}{12}$.

A. $\frac{1}{4}$

B. $\frac{2}{8}$

C. $\frac{2}{11}$

D. $\frac{4}{1}$

E. $\frac{5}{20}$

Solution

["A", "B", "E"]

Aligned Standards

4.NF.A.1

Problem 2

Students compare fractions to the benchmarks $\frac{1}{2}$ and 1. Students may select response C and not select the correct responses A and D if they confuse the meaning of the numerator and denominator. They may select E if they do not read the directions carefully or fail to realize that $\frac{5}{10}$ is equivalent to $\frac{1}{2}$.

Statement

Select **all** fractions that are greater than $\frac{1}{2}$ but less than 1.

A. $\frac{4}{5}$

B. $\frac{1}{3}$

C. $\frac{5}{4}$

D. $\frac{4}{7}$

E. $\frac{5}{10}$

Solution

["A", "D"]

Aligned Standards

4.NF.A.2

Problem 3

Students identify a fraction that is less than $\frac{3}{5}$. Students can reason that choices A and B are greater than $\frac{3}{5}$ by finding a common denominator or by seeing that they are all 2 parts short of 1 and those parts are smaller for $\frac{5}{7}$ and $\frac{4}{6}$ than for $\frac{3}{5}$. They can see that $\frac{9}{15} = \frac{3}{5}$ by dividing each fifth into 3 equal parts. To see that $\frac{7}{12} < \frac{3}{5}$ they will likely need to find a common denominator or eliminate the other 3 possibilities.

Statement

Which fraction is less than $\frac{3}{5}$?

A. $\frac{5}{7}$

B. $\frac{4}{6}$

C. $\frac{9}{15}$

D. $\frac{7}{12}$

Solution

D

Aligned Standards

4.NF.A.2

Problem 4

Students find fractions equivalent to a given fraction with no scaffold. They may draw a picture or use a number line or reason abstractly in terms of the number and size of parts. Other items give opportunities for students to demonstrate these skills. The goal here is to check their understanding and fluency with equivalent fractions.

Statement

List three different fractions that are equivalent to $\frac{4}{5}$. Explain or show your reasoning.

Solution

Sample response: $\frac{8}{10}$, $\frac{40}{50}$, $\frac{80}{100}$. If each $\frac{1}{5}$ is divided into two equal pieces then they are tenths and there are 8 of them. If each $\frac{1}{5}$ is divided into ten equal pieces, they are fiftieths and there are 40 of them. If each $\frac{1}{50}$ is divided into two equal pieces, they are hundredths and there are 80 of them. Any equivalent fraction is acceptable, for example $\frac{3\times4}{3\times5}$ or $\frac{12}{15}$, $\frac{4\times4}{4\times5}$ or $\frac{16}{20}$, $\frac{5\times4}{5\times5}$ or $\frac{20}{25}$.

Aligned Standards

4.NF.A.1

Problem 5

Students address a common misconception about fractions, namely, reasoning that focuses on the numerator without taking into account the meaning of the denominator. Students may draw many different pictures to help explain the equivalence, but the work of the unit supports tape diagrams and number line diagrams. They may also reason using words as in the provided solution.

Statement

Elena says that $\frac{3}{5}$ and $\frac{6}{10}$ are not equivalent because there are twice as many parts in $\frac{6}{10}$. Do you agree with Elena? Explain your reasoning.

Solution

No, $\frac{3}{5}$ and $\frac{6}{10}$ are equivalent fractions. There are twice as many parts in $\frac{6}{10}$, but each one is half as large.

Aligned Standards

4.NF.A.1

Problem 6

Students list fractions in terms of increasing size. No method is suggested, but the denominators are large enough that finding a common denominator will not be efficient. The fractions have been selected to encourage other techniques. The benchmarks of $\frac{1}{2}$, 1, and 2 determine the order other than for $\frac{1}{4}$ and $\frac{3}{8}$, and that comparison can be done by finding a common denominator.

Statement

List these fractions from smallest to largest. Explain how you found the order.

$\frac{7}{4}$ $\frac{7}{12}$ $\frac{3}{8}$ $\frac{13}{6}$ $\frac{1}{4}$

Solution

$\frac{1}{4}$, $\frac{3}{8}$, $\frac{7}{12}$, $\frac{7}{4}$, $\frac{13}{6}$. Sample response: $\frac{13}{6}$ is the largest because it is greater than 2, and $\frac{7}{4}$ is less than 2 but

greater than 1, so it comes next. $\frac{7}{12}$ is between $\frac{1}{2}$ and 1 so it is the next greatest, and $\frac{1}{4}$ is the same as $\frac{2}{8}$, so $\frac{3}{8}$ is greater than $\frac{1}{4}$.

Aligned Standards

4.NF.A.1, 4.NF.A.2

Problem 7

Students generate equivalent fractions given a fraction and the denominator of the equivalent fraction they are creating.

Statement

For each fraction, write an equivalent fraction with the given denominator.

1. $\frac{1}{2} = \frac{}{12}$
2. $\frac{2}{3} = \frac{}{24}$
3. $\frac{6}{5} = \frac{}{35}$
4. $\frac{5}{7} = \frac{}{28}$
5. $\frac{7}{8} = \frac{}{32}$

Solution

1. $\frac{1}{2} = \frac{6}{12}$
2. $\frac{2}{3} = \frac{16}{24}$
3. $\frac{6}{5} = \frac{42}{35}$
4. $\frac{5}{7} = \frac{20}{28}$
5. $\frac{7}{8} = \frac{28}{32}$

Aligned Standards

4.NF.A.1

Problem 8

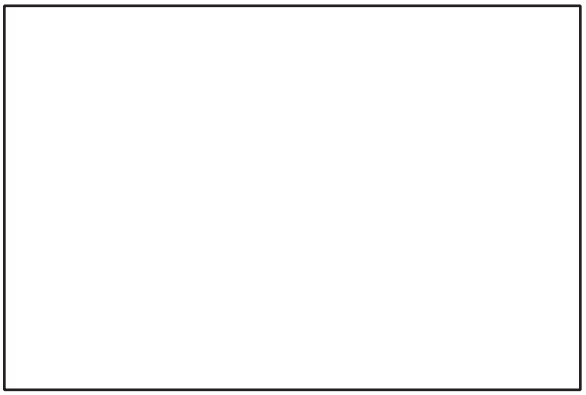
Students compare fractions in context. The first comparisons are with the benchmark fraction $\frac{1}{2}$ and students can make these comparisons by finding a common denominator or comparing the denominator to twice the numerator. Students have different ways they can compare $\frac{4}{10}$ and $\frac{5}{12}$. In an earlier item on the assessment students compared $\frac{3}{5}$ and $\frac{7}{12}$ and the ideas, methods, and numbers here are almost identical.

Statement

Noah and Lin drew different geometric designs on the same-size rectangular paper and colored the designs.

1. $\frac{4}{10}$ of Noah's design is blue. How can you describe the size of the fraction?
2. $\frac{5}{12}$ of Lin's design is blue.

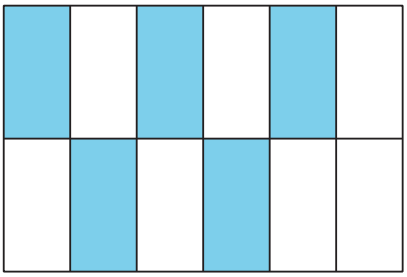
   Sketch an example of what Lin's design could look like.



3. Whose design has more blue, Noah's or Lin's? Explain or show your reasoning.

Solution

Sample responses:

1. If Noah divided the design into 10 equal strips, then 4 of them would be blue. Less than half of the design is blue.
2. 
3. Lin's design has more blue. Sample responses:
   - I know that $\frac{4}{10}$ is $\frac{1}{10}$ less than $\frac{1}{2}$ and $\frac{5}{12}$ is $\frac{1}{12}$ less than $\frac{1}{2}$. Since tenths are bigger than twelfths that means $\frac{4}{10}$ is further away from $\frac{1}{2}$ so it is smaller.
   - I checked that $\frac{4}{10} = \frac{4\times6}{10\times6}$, so Noah's design is $\frac{24}{60}$ blue. Then I checked that $\frac{5}{12} = \frac{5\times5}{5\times12}$, so Lin's design is $\frac{25}{60}$ blue. Since $\frac{25}{60}$ is greater than $\frac{24}{60}$, there is more blue in Lin's design.

Aligned Standards

4.NF.A.2