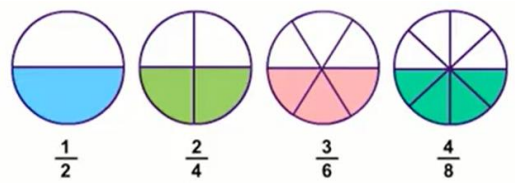
Equivalent Fractions

Last Updated: 6/7/24

Lecture Notes

Notes

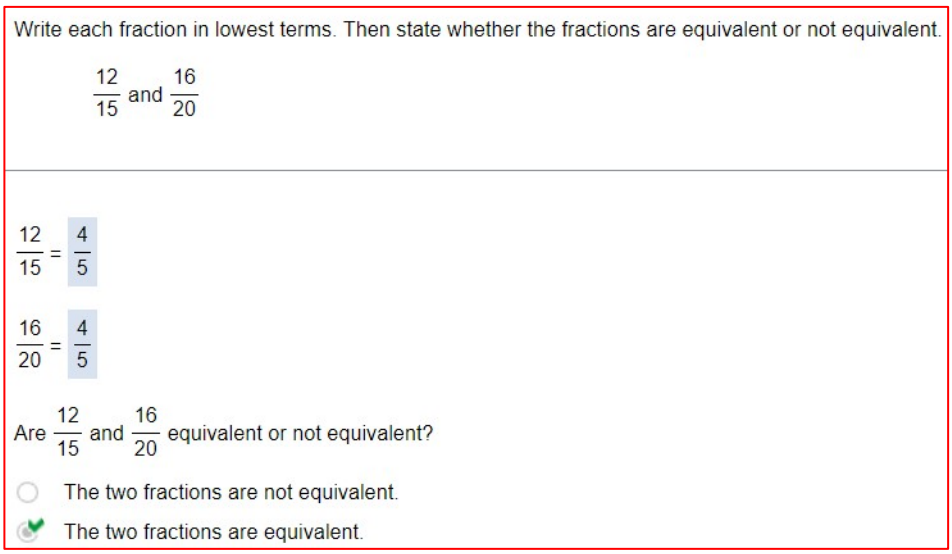
- **Equivalent fractions** represent the same *value*, although they look different.
- The four fractions below have the same shaded area, one-half of the circle. The difference is that the "slices" have different sizes.



- Sometimes we must multiply or divide the numerator or the denominator of a fraction.
  - When we do, we must multiply or divide the *same number* in the numerator and the denominator.
  - Using the same number allows us to maintain the same *ratio* of the fraction.
  - A **ratio** shows the relative size of two values: **numerator** with respect to **denominator**.

Reference

- Equivalent Fractions, by *The Learning Portal*.



- To determine if two fractions are equivalent, start by reducing both fractions to their lowest terms.
  - Use either method: **Reduce by Dividing** or **Reduce by Prime Factorization.**
- Compare the value of the two fractions.
  - If the value is the same, the fractions are equivalent.
  - If the value is not the same, the fractions are not equivalent.
- Here, both fractions reduce to $\frac{4}{5}$ so they are equivalent.

Write each fraction in lowest terms. Then state whether the fractions are equivalent or not equivalent.

$\frac{4}{8}$ and $\frac{2}{6}$

$\frac{4}{8} = \frac{1}{2}$

$\frac{2}{6} = \frac{1}{3}$

Are $\frac{4}{8}$ and $\frac{2}{6}$ equivalent or not equivalent?

- The two fractions are equivalent.
- ✔ The two fractions are not equivalent.

Write each fraction in lowest terms. Then state whether the fractions are equivalent or not equivalent.

$\frac{21}{3}$ and $\frac{77}{7}$

$\frac{21}{3} = 7$ (Type a whole number or a simplified fraction.)

$\frac{77}{7} = 11$ (Type a whole number or a simplified fraction.)

Decide whether the fractions $\frac{21}{3}$ and $\frac{77}{7}$ are equivalent or not equivalent.

- The fractions are equivalent.
- ✔ The fractions are not equivalent.

- Sometimes the denominator divides evenly into the numerator.
- If that happens, the reduced number will be a whole number.

Decide whether the fractions $\frac{6}{18}$ and $\frac{9}{27}$ are equivalent or not equivalent.

Are $\frac{6}{18}$ and $\frac{9}{27}$ equivalent or not equivalent?

- The two fractions are not equivalent.
- ✔ The two fractions are equivalent.

Decide whether the fractions $\frac{2}{6}$ and $\frac{3}{8}$ are equivalent or not equivalent.

Are $\frac{2}{6}$ and $\frac{3}{8}$ equivalent or not equivalent?

- The two fractions are equivalent.
- ✔ The two fractions are not equivalent.

Write the fraction as an equivalent fraction with the given denominator.

$\frac{5}{2} = \frac{?}{4}$

$\frac{5}{2} = \frac{10}{4}$

- We have to find the missing number for the blank numerator on the right fraction.
- Start by placing a multiplication **dot** '•' in front of the *left* denominator: $\frac{5}{\bullet\ 2}$
- Then look at both denominators and ask yourself, "What number times the 2 (left denominator) equals the 4 (right denominator)?"
    - That factor is **2**.
    - Therefore, multiply *both* the numerator *and* denominator of left fraction by **2**: $\frac{2 \bullet 5}{2 \bullet 2}$
- Multiplying the numerator of left fraction (5) by 2 results in 10.
- Thus, replace the blank numerator of right fraction with **10**: $\frac{10}{4}$
- *Notes:*
    - We multiplied by $\frac{2}{2}$ which is the same as 1.
    - Whichever number you multiply the numerator by must be the *same* number you use to multiply the denominator, and vice versa.
    - You have to multiply by a '1' to maintain the *ratio* of the fraction.
    - Not multiplying by '1' changes the overall value of the fracton to some other number.
    - Here, we are "building up" the fraction to make it bigger, the opposite of reducing.
    - This skill will be helpful when we add and subtract fractions with different denominators.

Rewrite the rational expression with the given denominator.

$\frac{8}{7} = \frac{?}{28}$

$\frac{8}{7} = \frac{32}{28}$

Write the fraction as an equivalent fraction with the indicated denominator.

$\frac{1}{8} = \frac{?}{64}$

$\frac{1}{8} = \frac{8}{64}$

Find the missing numerator so that the fractions will be equal.

$\frac{5}{7} = \frac{?}{42}$

$\frac{5}{7} = \frac{30}{42}$