



Digital Design for English Language Learners: Intro to Fraction Mash

Students use Fraction Mash to explore the connections between fractions and art by creating "mashups", making funny selfies, and hiding their faces within images in surprising ways. They will explore fractions visually and numerically and will also discover what makes fractions equivalent.

Learning Goals

1. Students will explore what denominators actually represent by increasing or decreasing the number of parts that make up the whole of the pictures they create.
2. Students will compare and place equivalent fractions on a 0 to 1 number line to explore their understanding of fractions greater than $\frac{1}{2}$, equal to, and less than $\frac{1}{2}$.
3. Students will explore the inverse relationship that larger denominators yield more parts that are smaller in size.
4. Students will use mathematical language to describe their pictures.

Prep

The instructor should have foundational knowledge of [Fraction Mash app](#).

For the *Number Line Activity*, place a long piece of masking tape on the floor and label each end 0 and 1. In the center of the line, label $\frac{1}{2}$.

Materials

- Chart with a fraction number line.
- Tape a number line on the floor representing 0 to 1 with 0, $\frac{1}{2}$, and 1 indicated.
- iPads with [Fraction Mash app](#) installed.
- [Spanish English Picture Dictionary](#).
- Design notebooks (optional).

Key Vocabulary

- fraction
- whole
- part

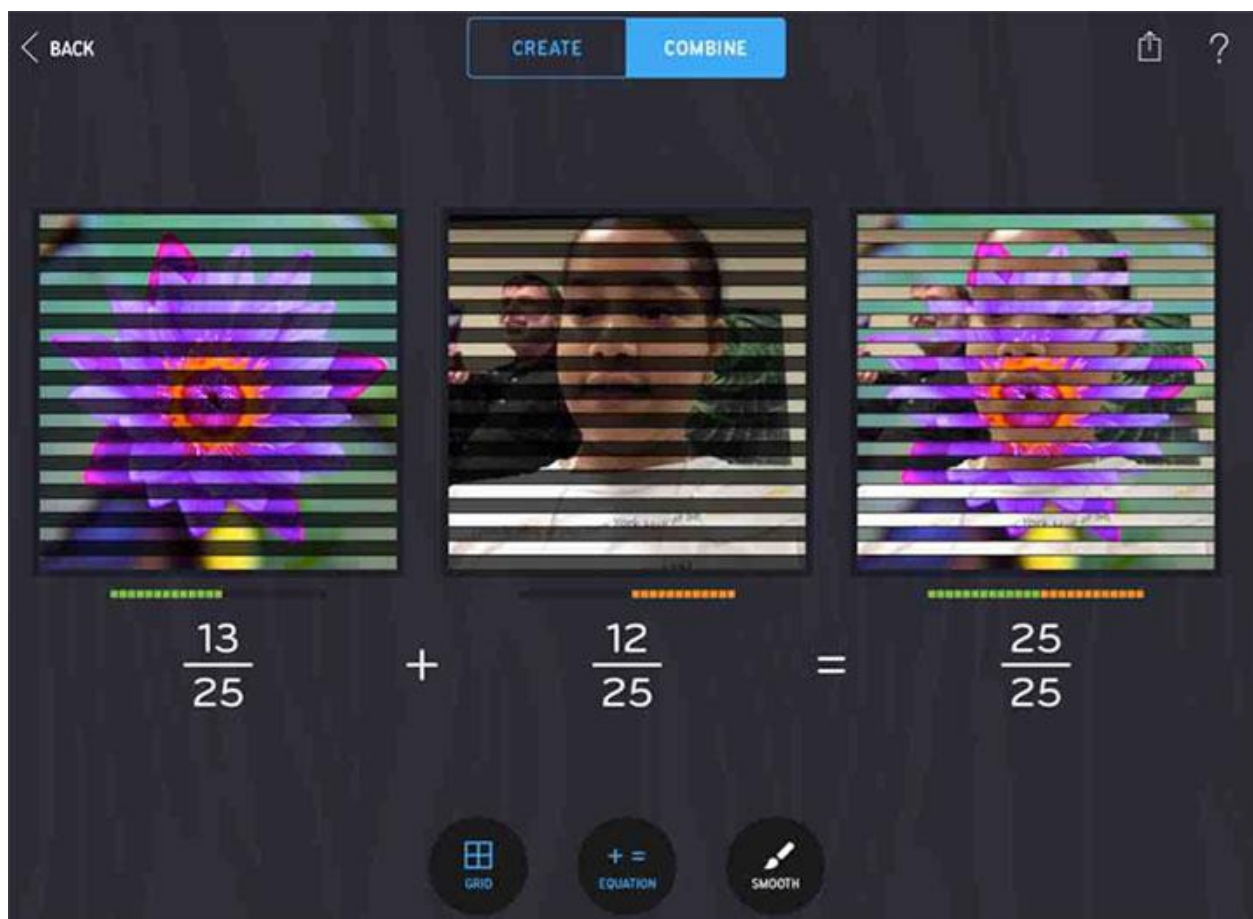
- denominator
- numerator
- equivalent
- number line
- greater than
- less than
- one half (1/2)

Getting Started

Puppy-Tiger

Students will explore the Fraction Mash app, creating simple mashups with the photos in the Starter Pack. A classic to begin with is the puppy and tiger images. This is the chance to learn how to take photos and use them in the mashups.

Selfie Mashup



- Students will take a picture of themselves (a selfie) or of a friend and make a simple mashup of that picture with another image in the starter pack.

- Have students explore what happens when they change the denominator or change the grid they are using in the Fraction Mash app.

Guiding Questions:

- Is part of the selfie that contains you (or your friend) less than or greater than $\frac{1}{2}$? How do you know?
- What is the fraction of the picture that is your selfie image? What is the fraction of the picture that is background? Can you figure out your selfie to background ratio?
- Is the selfie less than or greater than $\frac{1}{2}$ of the total? How can you prove it?
- How does changing the denominator change the number and size of parts?
- Does changing the grid shape change the ratio of your selfie to background?

Share and Present

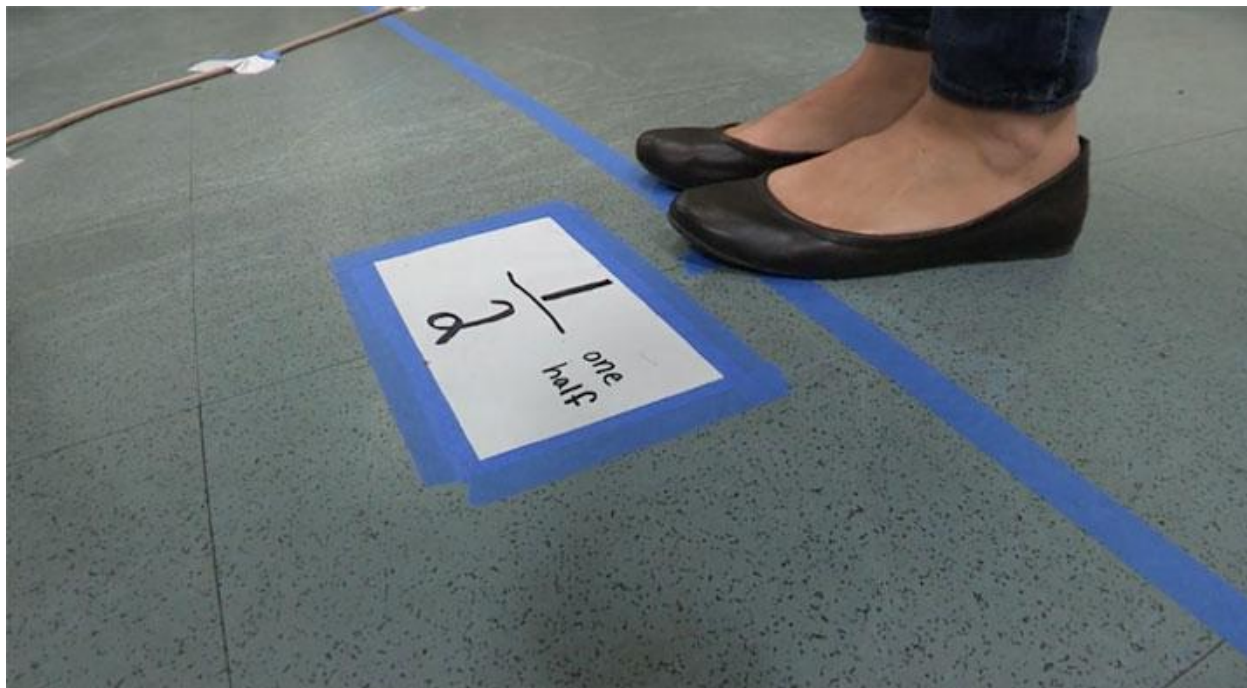
Students will share pictures from *Puppy Tiger* and *Selfie Mashup* activities with each other. Encourage students to describe their creations and/or how they made them using the language of fractions.

Going Deeper: Math Tools and Talk

Drawing upon the simple activity mashups, use a large number line on the floor to invite students to physically consider where the fractions that describe their mashups would be placed between 0 and 1. This offers a great opportunity to discover if any misconceptions need to be addressed. It also allows children to think more deeply about numerators and denominators, equivalent fractions, and how they will describe their Fraction Mash projects.

1. Holding an example of a mashup from fraction mash on your iPad, demonstrate on the floor number line whether the fraction of your image is closer to 0, $\frac{1}{2}$ or 1. (See video for a glimpse of this activity).
2. Using visual examples from fraction mash, discuss equivalent fractions and also how to tell if a fraction is larger than $\frac{1}{2}$.
3. Have students stand on the number line according to where the fractions that describe their mashups would fall. For instance, if a student had an image that is $\frac{5}{8}$ tiger, you would walk along the number line a little past the $\frac{1}{2}$ midpoint

Tip: Pay close attention to where students are placing themselves on the number line and if they, in fact, align with what fractions are represented in their pictures. Encourage debates — this is the way you can see how the children are thinking. Tricky ideas like what is $\frac{1}{2}$ of 25 can come up and be explored more in-depth. This is an excellent way to get a sense of where children are at in their understanding.



Guiding questions:

- What happens to the number of parts/pieces when the denominator increases?
- How do you know your fraction is less than or greater than $\frac{1}{2}$?

Sentence Frames for Using Math Language

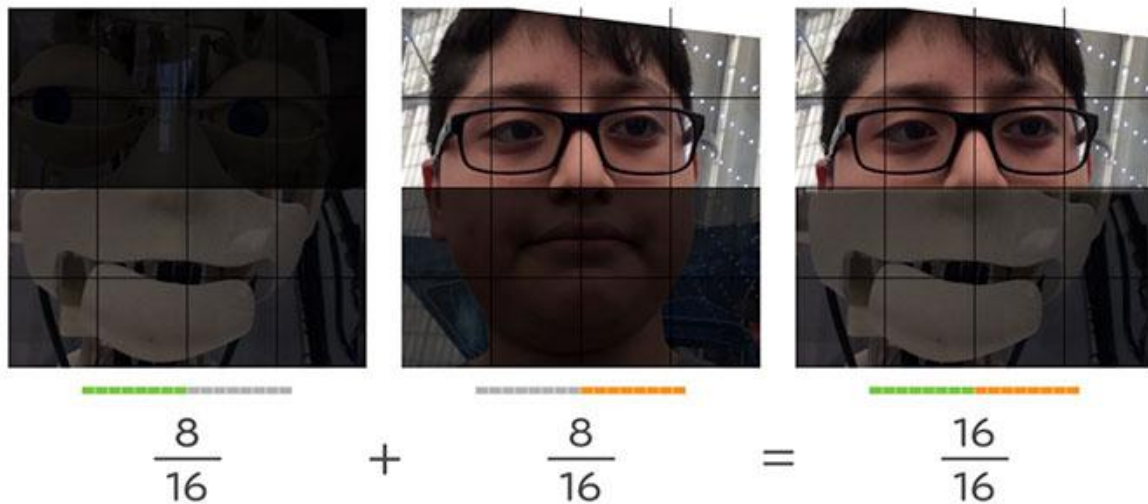
1. In my whole mashup, there are _____ pieces. This is the denominator. It represents the total number of parts, or the whole.
2. I mashed up my selfie with a _____ (other picture). The selfie part is _____ (number) pieces.
3. The selfie part is the fraction _____.
4. My selfie fraction is less than/greater than $\frac{1}{2}$.
I know this because _____.

Tip: The sentence frames are there as an extra tool for those students (especially newcomers and beginners) who might need additional support to express their mathematical ideas. Making these visible on poster paper for all to see usually works. For those individual students who are able to speak fluently in English (Commanding or Expanding students), encourage them to express themselves however they feel most confident. These particular sentence frames also offer the students a way to keep track of their mathematical discoveries.

Digital Design in Fraction Mash

Hide Your Face

Students will take photos of things they like around the classroom or building. When they come back they should make a mashup in which they hide their own faces with some object or background.



Share and Present

- Students will share their Hide Your Face mashups with the class. Encourage students to use Sentence Frames to discuss the fractional parts of their photos, including whether the fractions are greater than or less than $\frac{1}{2}$ and how they know.

Questions for Understanding

- What is a whole?
- What happens to the number of parts/pieces when the denominator increases?
- How can you determine $\frac{1}{2}$ when the denominator is an odd number? How can you find $\frac{1}{2}$ of 9 or $\frac{1}{2}$ of 25?
- How is a fraction made of 8ths different from one made up of 4ths?

Extend Your Learning

- Create mashups of mashups you already made and explain how the total number of parts changes as you add more mashups.

- On the number line, order three or more fractions from least to greatest and explain how you know your order is correct.
- Create and save mashups with equivalent fractions (a mashup that has $\frac{2}{4}$ tiger or $\frac{4}{8}$ of tiger) Why are they equivalent?