Vocabulary: Bits and Pieces 1

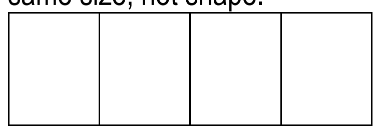
Concept

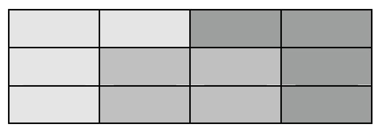
Example

Understanding Fractions as Parts of a Whole: This meaning of “fraction” focuses on partitioning an object or a set of objects into **equal size parts** or groups and making a comparison of some parts to the whole object or set. The **numerator** (top of the fraction) indicates the number of parts chosen, and the **denominator** (bottom of the fraction) indicates the number of parts in the whole. Thus the denominator indicates the size of the parts.

If there are 7 girls, 8 boys and 18 adults in the audience at a school play then $\frac{7}{33}$ of the audience are girls. The **whole** is the audience (“of the audience”), each person is a “part” and the girls comprise 7 parts out of 33 parts. 7 is the **numerator** and 33 is the **denominator**.

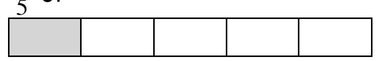
If we have to share a candy bar with 4 sections (the **whole**) between 3 people we need to subdivide the whole into enough **equal parts** to make this possible. The parts have to be the same size, not shape.



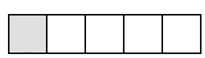


Each person gets $\frac{1}{3}$ or $\frac{4}{12}$ of the candy bar. $\frac{1}{3}$ indicates the bar is divided into 3 parts, and each person gets 1 part. $\frac{4}{12}$ indicates that the bar is divided into 12 parts and each person gets 4 parts. (There are other ways to arrange the 4 parts.)

$\frac{1}{5}$ of



Is not the same quantity as $\frac{1}{5}$ of



Because the “whole” is a different size.

Understanding Fractions as Measures of Quantities: This meaning of “fraction” focuses on a fraction as a number, “between” whole measures.

John’s father worked $7\frac{1}{2}$ hours of overtime this week.

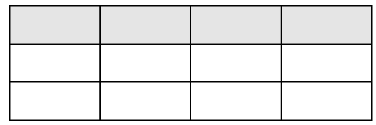
Understanding Fraction as an Indicated Division:

$\frac{a}{b}$ can be evaluated by doing the computation a÷b. This makes a link between decimals and

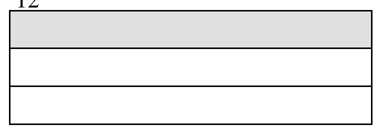
Sharing 12 dollars among 3 people implies a division, with a whole number answer. Likewise sharing 3 dollars among 12 people (or 3 apples among 12 people) implies dividing the whole by 12 so each person gets 1 of the whole. This fractions. For example, $\frac{3}{8} = 3 \div 8 = 0.375$.

12 so each person gets $\frac{1}{12}$ of the whole. This means dividing the whole (3 dollars or 3 apples) into 12 parts and giving 1 part ($\frac{1}{4}$ of apple, or $0.25) to each person.

Equivalence of Fractions:
Fractions may have different names but represent equal values or equal parts**. Common factors and common multiples** help to find other way to name the same fractional part.

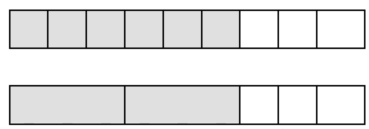


$\frac{4}{12}$ is the same as



$\frac{1}{3}$

6 and 9 have a **common factor** of 3. $\frac{6}{9}$ is the same as (2 groups of **3**) /(3 groups of **3**) and can be rewritten as $\frac{2}{3}$.



Comparison of fractions: Fractions which represent parts of the same whole, or quantities, can be compared and ordered by size. **Benchmark fractions**, such as $\frac{1}{4}$. $\frac{1}{3}$, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, offer a quick way to compare and order. **Common multiples** are helpful in creating common denominators, which makes comparison simpler.

Compare $\frac{3}{7}$ and $\frac{5}{9}$. $\frac{3}{7}$ is less than $\frac{1}{2}$ while $\frac{5}{9}$ is more than $\frac{1}{2}$. So $\frac{5}{9} > \frac{3}{7}$.

Which is larger and what is the distance between $\frac{5}{6}$ and $\frac{7}{9}$? 18 is a **multiple** of both denominators, 6 and 9. Renaming these fractions so they have the same denominator, 18, gives us $\frac{5 \times 3}{6 \times 3}$ or $\frac{15}{18}$ for the first fraction, and $\frac{7 \times 2}{9 \times 2}$ or $\frac{14}{18}$ for the second fraction. So the second fraction is smaller, and the distance between the fractions is $\frac{1}{18}$.

Mixed Numbers and Improper Fractions: represent quantities that may not be a whole number, but are greater than 1.

$\frac{15}{4}$ is an **improper fraction**. $\frac{4}{4}$ would be a whole so $\frac{15}{4}$ is 3 wholes and $\frac{3}{4}$.

$3\frac{3}{4}$ is a **mixed number,** partly a fraction ($\frac{3}{4}$) and partly a whole number (3).

Understanding and Comparing Decimals:

Decimals are special fractions with **denominators of 10 and powers of 10.** Since the decimal place indicates the power of 10 in the denominator this is a natural extension of **place value** for whole numbers.

$\frac{1}{10}$ is exactly the same as 0.1; $\frac{1}{100}$ is exactly the same as 0.01. Thus, 256.182 means 256 and $\frac{182}{1000}$ or 2 hundreds + 5 tens + 6 + $\frac{1}{10}$ + $\frac{8}{100}$ + $\frac{2}{1000}$.

0.05 > 0.009 because $\frac{5}{100} > \frac{9}{1000}$. Or we could rewrite both as 0.050 and 0.009, so we have to compare $\frac{50}{1000}$ and $\frac{9}{1000}$.

Understanding and comparing percents: Percents are fractions with denominator 100. Percents are useful when we want to compare fractional parts of two wholes that are different sizes.

Which pays a greater part of their earnings in tax: a person who earns $1,000,000 and pays $90,000, or a person who earns $48,000 and pays $12,000 in tax? The two fractions are $\frac{90000}{1000000}$ or $\frac{9}{100}$, and $\frac{12000}{48000}$ or $\frac{1}{4}$ or $\frac{25}{100}$. As percents these are **9% and 25%.** So the second person pays a larger part of his earnings.

Connecting Fractions and Decimals and Percents: Various models and strategies facilitate changing representations from decimal to fraction to percent easier.

A **hundreds grid**, representing the whole, allows students to represent fractions, decimals (to the second decimal place) and percents. The shaded area below represents $\frac{4}{5}$. 0.80, or 80%.