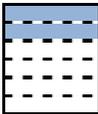


Math for Teaching: Ways We Use Fractions

A fraction is a number, which can tell us about the relationship between two quantities. These two quantities provide information about the parts, the units we are considering and the whole. Determining the whole is important when working with fractions.

Thinking about fractions as unit fractions

This is 'two sixths' but we could think about this as units of one-sixth or we could also think about it as "two times the unit created by partitioning the whole into six equal parts"



1 one-sixth, 2 one-sixths

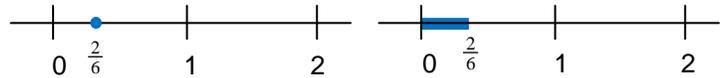


Understanding unit fractions helps students develop fractions number sense and supports work with fractions operations.

$\frac{2}{6}$ can represent one or more of the following, depending on the context:

- a **linear measure** (read 'two sixths').

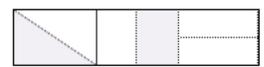
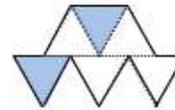
- The number is defined by its distance from 0.



- a **part-whole relationship** (read 'two sixths') which is based upon a *relative measure* or a *set*:

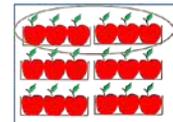
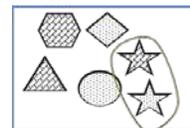
Continuous

- *two-dimensional measures*, such as an area or region, where an equal part is an equal area.
- *three-dimensional measures*, such as capacity or mass, where an equal part is an equal capacity or mass.



Discrete

- *sets*, such as a collection of objects, where an equal part is an item in the set and equal parts are not necessarily identical. Attributes (e.g., colour, size, shape) may or may not be considered. For example, colour is important for the first set but not in the second two. Parts can be organized in an array, randomly, or in composite sets.



- a **part-part relationship** (read ‘two to six’).
 - The parts are equivalent with respect to one attribute (not necessarily size). Ratio is frequently used for part to part relationships.

Linear measure example: 2 cm to 6 cm

Two-dimensional measure example:
2 equal areas shaded to 6 equal areas unshaded

Set example:
2 apples to 6 bananas

- a **quotient**
 - $\frac{a}{b} = a$ divided by b

$$\frac{2}{6} = 2 \div 6 \text{ or } 2 \text{ partitioned into } 6 \text{ equal parts}$$



- an **operator**
 - $\frac{a}{b}$ of a quantity (the whole)
 - The whole is assumed to be the quantity being multiplied by $\frac{a}{b}$. The fraction acts as a transformer by either enlarging or shrinking the operand.

Two-dimensional measure example:

$\frac{2}{6}$ of the area of the floor

Set example:

$\frac{2}{6}$ of the people in the room

Each of these fraction meanings is included in the Ontario curriculum. Although within the curriculum for specific grades students are not expected to use all meanings, they sometimes use a mathematically correct fraction which is unexpected within the lesson focus. When educators understand each of these meanings, they are better able to assess student thinking as correct as well as connect that knowledge to the lesson focus.

For more information on these meanings, see [Paying Attention to Fractions: K-12 on edugains.ca](http://www.edugains.ca)