

Notes on Fractions

Definition: a fraction is expressed as two numbers:

- the bottom one is the **denominator** and tells you how many equal parts we are dividing the integers on the number line
 - the top one is the **numerator** which is the counting part.
1. Fractions come in **equivalence** sets – all fractions can be expressed in an infinite number of ways.
 2. To change from one fraction to another equal fraction, multiply the numerator and denominator by the same number, or divide numerator and denominator by a common factor.
 3. **Reduce to lowest terms** – divide numerator and denominator by common factors until there are no common factors left.
 4. Fraction operations:
 - **Addition and subtraction** – change them to have the same denominators – then add or subtract the numerators
 - **Multiplication** – multiply numerators and multiply denominators then reduce to lowest terms. It is often helpful to divide by common factors before doing the multiplication.
 - **Division** – multiply by the inverse (see Notes on Division of Fractions for an explanation).
 5. **Mixed numbers** – if a fraction is bigger than 1, then it can be written as an **improper fraction** e.g. $\frac{5}{2}$ or it can be written as a mixed number $2\frac{1}{2}$ but remember that there is a hidden + in there: $2 + \frac{1}{2}$
 6. Mixed number operations:
 - **Addition and subtraction** – add the integer parts and fraction parts separately. If the fraction addition yields an improper fraction, convert it to a mixed number and add the integer part to the integer part of the answer. If a subtraction gives a negative fraction part, reduce the integer part by 1 and add it into the fraction part.
 - **Multiplication and division** – always convert to improper fractions and then proceed as normal. If the answer is an improper fraction, then convert to a mixed number.

That's it!