1 Fractions

When we make calculations in the set of **rational** numbers $\mathbb{Q}$ or in the set of **real** numbers $\mathbb{R}$, remainders are normally not used. Therefore, we use **fractions**.

$\frac{n}{p} = s$ reads "*n* over *p* ____ _____ ____ *s*".
The top number is the **numerator** (or simply **top**), the bottom one is the **denominator** (or simply **bottom**).
The number $\frac{n}{p}$ is called the _____ of *n* by *p* or the **ratio of** *n* **to** *p*.
Example: The _____ ___ the circumference ___ the diameter of any circle is equal to π /paɪ/.

The usual representation of a number of set $\mathbb{Q}$ is a fraction where the _____ can be any integer, whereas the _____ is always a _____ _____.

$\frac{z}{x-y}$ reads "*z* over *x* minus *y*"; $\frac{x+y}{x-y}$ reads "*x* plus *y* **all over** *x* minus *y*".

Examples of fractions:

$\frac{1}{2}$: one half $\frac{7}{2}$: seven halves $\frac{5}{8}$: five eighths $\frac{9}{5}$: nine fifths $3\frac{1}{4}$: three and a quarter.
When the denominator is a large number, it is easier to use "over" instead of the ordinal number.
For instance, $\frac{11}{223}$ is more easily read "eleven over two hundred and twenty-three" than "eleven two hundred and twenty-thirds".

$\frac{3}{7}$ is a **proper** (or **bottom heavy**) fraction, since its _____ is bigger than its _____.
$\frac{355}{113}$ is an **improper** (or **top heavy**) fraction, since the top is _____ _____ the bottom.
$4\frac{1}{9}$ is a **mixed fraction** or a **mixed number**. It contains an integer and a _____ fraction.

Exercise 1 : write down the following fractions in words

$\frac{5}{12}$ « *five over twelve* » *or* « *five* ***twelfths*** »	$\frac{-14}{9}$
$\frac{8}{63}$	$5\frac{1}{21}$
$\frac{11}{7}$	$1\frac{3}{13}$
$\frac{1}{x+1}$	$\frac{y-1}{x-1}$

Vocabulary: all over – bottom – bottom heavy – denominator – fraction – improper – mixed – numerator – proper – ratio of ... to ... – rational – real – top – top heavy – one twelfth (*several twlefths*)

2 Working fractions

The top and the bottom of a fraction can be multiplied or divided by the same (non zero) number without changing its value. Therefore, each time the _____ and the _____ of a fraction can be divided by the same whole number, the fraction should be **reduced** .

When it is no longer possible to divide the ____ and the _____ evenly by the same number, the fraction is in its **lowest terms**. This process is also called **simplifying** or **cancelling down**.

If a number ends with an even number, it is **divisible** by 2 . /dɪˈvɪzɪbl/
A number that ends in 0 or 5 is _____ by 5.
When all the digits of a number **add up to** a **multiple** of 3, then the number itself is divisible by 3.
If they _____ ____ ____ a multiple of 9, then the number itself ____ divisible ____ 9.

Exercise 2: simplify the fractions and write sentences as in the example (use different words).

You can cancel down the fraction $\frac{56}{21}$ *to its lowest terms by dividing both numbers by 7 :* $\frac{56}{21} = \frac{8\times7}{3\times7} = \frac{8}{3}$ (eight thirds)	$\frac{390}{650}$
$\frac{51}{255}$	$\frac{836}{121}$
$\frac{75}{225}$	$\frac{-117}{285}$
$\frac{721}{47}$	$\frac{221}{169}$

In order to _____ or _____ fractions, do the following:

- Express all mixed fractions as top-heavy ones in their _____ _____ and _____ the other fractions,
- Write down each fraction in terms of the same common denominator,
- Add or subtract the numerators, do not forget to _____ _____ the resulting fraction.

In order to _____ or _____ fractions, do the following:

- Express all fractions as top-heavy fractions in their _____ _____ ,
- **Turn** the fractions you are dividing by **upside down** and multiply by the result instead,
- After multiplying the numerators and denominators, do not forget to _____ _____ the resulting fraction.

Vocabulary: to add up to – to cancel down – divisible – lowest terms – multiple – to reduce – to simplify – to turn upside down