DECIMALS

Decimal numbers & decimal places

A decimal number is a number whose decimal part is separated from its whole part with a decimal point.

The number of digits after the decimal point is also named as <u>decimal places</u>

$$3.45$$

> The decimal point

> This number has 2 decimal places.
> Because there are 2 digits after the decimal point.

Ordering decimals

$$3.4 = 3.40 = 3.400 = 3.4000$$

After placing the decimal point you may add as many zeros as you wish. These zeros are called annex zeros and they do not change the value of the number.

While ordering decimals

- *Make sure they have the same number of decimal places, if not just add annex zeros*
- *Assume that there is no decimal point and compare like whole numbers.*

For example: You are asked to compare the following numbers,

$$3.4, 2.30, 5.25, 1.253 \longrightarrow 3.400, 2.300, 5.250, 1.253$$

You will think like you are comparing $3400, 2300, 5250, 1253$

Write your original numbers in your final comparison: $1.253 < 2.30 < 3.4 < 5.25$

Adding & Subtracting decimals

- *Align the decimal points, add annex zeros if you like*
- *Add/ subtract like whole numbers*
- *Drag down the decimal point*

Whole numbers

$$
\begin{array}{r}
12.60 \\
4.00 \\
0.24 \\
100.00 \\
\hline
116.84
\end{array}
$$

$$
\begin{array}{r}
31.3 \\
+16.4 \\
\hline
47.7
\end{array}
\qquad
\begin{array}{r}
31.3 \\
-16.4 \\
\hline
14.9
\end{array}
$$

Multiplying decimals

- *Assume that there is no decimal point & multiply them together like whole numbers.*
- *Count the total number of decimal places and place the decimal point.*

There are 2 decimal places in total (1+1).

$3.4 \times 1.6 = ?$

$34 \times 16 = 544$

$3.4 \times 1.6 = 5.44$

Dividing decimals

Case 1: The divisor is a whole number

- *Divide like you are dividing whole numbers*

$$3 \overline{\smash{)}4.2} = 1.4$$

- *Count the number of places of the dividend and place the decimal point accordingly.*

Case 2: The divisor is __not__ a whole number

- *Multiply both the divisor and the dividend by multiples of 10 until the divisor becomes a whole number.*
- *Continue with the process in Case 1.*

Let's say you divide 4.2 by 0.3 this time:

$$4.2 \div 0.3 = 42 \div 3 = 14$$

$\times 10 \qquad \times 10$

Recurring decimals

Some decimals terminate, which means the decimals do not recur, they just stop. For example, 0.15.

A recurring decimal exists when some (maybe all) digits in decimal places repeat forever.

$$3.\overline{5} = 3.5555555\ldots$$

How do we express them as fractions?

Let's say: $x = 3.\overline{5}$ Then; $10x = 35.\overline{5}$ if you subtract x from 10x the recurring part will cancel each other $9x = 35 - 3 = 32$ $\rightarrow$ $x = \dfrac{32}{9}$

Any shortcut ???

- *Write the number like a whole number (without any decimal point)- and subtract the non-recurring part. The result becomes our numerator.*
- *Count the recurring decimals and put as many 9's as the number of recurring digits*
- *Add zeros to denominator as many as the non-recurring decimal places*
- *Simplify the fraction*

$$3.\overline{5} = \frac{35-3}{9} = \frac{32}{9} \qquad\qquad 2.\overline{13} = \frac{213-2}{99} = \frac{211}{99}$$

$$2.1\overline{3} = \frac{213-21}{90} = \frac{192}{90} = \frac{32}{15}$$