(Olympiad Comprehensive Notes)

NOTES

Decimals

A fraction with the denominator as power of 10 (like 10, 100, 1000 etc.) is called decimal. It is expressed as the numbers with a point in between, called decimal point. It is expressed as the numbers with a point in between, called decimal point. In other words, decimal consists of two parts which are separated by a decimal point.

- **Example**

  2.564, 0.0023, 3.2565, 5431.23 are decimal.

Expanded Form of Decimals

Expanded form of a decimal represents the addition of place values of the digits, respective to their positions in the decimal.

- **Example**

  Write the expanded form of the decimal 69.4756.

  Solution:

  $$60+9+\frac{4}{10}+\frac{7}{100}+\frac{5}{1000}+\frac{6}{10000}$$

- **Example**

  Write the decimal 0.99 in expanded form.

  Solution:

  $$\frac{9}{10}+\frac{9}{100}$$

Decimal Places

The number of digits placed in right to the point of a decimal is called the decimal places of that decimal.

- **Example**

  The decimal 564.3549 has four decimal places because it has four digits right to the point.

Like Decimals

Like decimals have same number of decimal places.

- **Example**

  45.32965 and 0.00236 are like decimals, because they have the same number of decimal places.

Unlike Decimals

Unlike decimals have different number of decimal places.

- **Example**

  236.236 and 236.23 are unlike decimals, because they have different number of decimal places.

Equivalent Decimals

The decimals which have same value are called equivalent decimals.

- **Example**

  4.52 and 4.5200 are equivalent decimals, because they have same value.

Comparison of Decimal

Step 1: Compare the integral parts of the decimals, the decimal having greater integral part is greater.

Step 2: If the integral parts are equal, compare the decimal part. The decimal having greater decimal part is greater.

- **Example**

  Compare between 542.565 and 502.9349 and find which is greater.

  Solution:

  542.565 is greater than 502.9349 because 542.565 has greater integral part.

- **Example**

  Compare between 878.0213 and 878.1213 and find which is greater?

  Solution:

  878.1213 is greater than 878.0213 because 878.1213 has greater decimal part.

Operation on Decimals

Operation on decimals means how to add two or more than two decimals, how to subtract a decimal from other decimal, how to multiply decimals, and how to divide a decimal by other decimal.

Addition of the Decimals

Step 1: Convert the addends into like decimals.

Step 2: Arrange the addends one below other in columns so that decimal points come in the same column.

Step 3: Now add the digits which are the same column, write the sum directly in the below column and place a point in the point column,

- **Example**

  Add 745.547 and 0.21402

  Solution:

$$\begin{array}{r} 745.54700 \\ +\quad 0.21402 \\ \hline 745.76102 \end{array}$$

  Therefore, the answer is 745.76102.

- **Example**

  Add 521254.215 and 4565.3215

  Solution:

$$\begin{array}{r} 521254.2150 \\ +\quad 4565.3215 \\ \hline 525819.5365 \end{array}$$

  Therefore, their sum is 525819.5365

Subtraction of Decimals

Step 1: Convert the minuend and subtrahend into like decimals.

Step 2: Arrange the digits of minuend and subtrahend column wise, one below other, so that decimal points come in the same column.

Step 3: Now subtract the digits column wise from right to left. Write the difference directly below the respective digits and place a point in the point column.

- **Example**

  Subtract 347.6544 from 348.5.

  Solution:

$$\begin{array}{r} 348.5000 \\ -\ 347.6544 \\ \hline 0.8456 \end{array}$$

  Therefore, answer is 0.8456

- **Example**

  Subtract 0.2549 from 25.362.

  Solution:

$$\begin{array}{r} 25.3620 \\ -\quad 0.2549 \\ \hline 25.1071 \end{array}$$

Multiplication of Decimals by Power of 10

Step 1: Shift the point in the decimals to right as many places as there are zeroes the power of 10 contains.

Step 2: If there are short of digits to the right of the point in the decimal, add zeroes right to it and follow the first step.

- **Example**

  Find the product of 5487. 476 and 1000.

  Solution:

  $5487.476 \times 1000 = 5487476$

- **Example**

  Find the product of 2.3 and 100000.

  Solution:

  $2.3 \times 100000 = 230000$

Multiplication of a Decimal by Another Decimal

Step 1: Remove the point from the decimals and multiply them like whole numbers.

Step 2: Insert point in the product so that number of decimals places of the product is equal to the sum of the number of decimals places of the multiplier and the multiplicand.

- **Example**

  Multiply 56.45 and 2.03.

  Solution:

  $56.45 \times 2.03 = 114.5935$

- **Example**

  Multiply 3.499.42 and 6645.21.

  Solution:

  $3499.42 \times 6645.21 = 23254380.7782$

Division of a Decimals

Step 1: Convert the decimals into fractions.

Step 2: Divide the fraction by divisor fraction.

- **Example**

  Divide 16.47 by 3.66.

  Solution:

$$16.47 \div 3.66 = \frac{1647}{100} + \frac{366}{100} = \frac{1647}{366} = 4.5$$

- **Example**

  Divide 62.22196 by 17.236.

  Solution:

$$62.22196 \div 17.236 = \frac{6222196}{100000} \div \frac{17236}{1000}$$

$$= \frac{6222196}{100000} \times \frac{1000}{17236} = \frac{6222196}{17236 \times 100} = 3.61$$

Division of a Decimal by the Power of 10

Step 1: Shift the point in the decimal to left as many places as there are zeroes the power of 10 contains.

Step 2: If there are short of digits left to the point in the decimal, add zeroes left to it and follow the step 1.

- **Example**

  Divide 0.23 by 10000.

  Solution:

$$2345.63 \div 1000 = 2.34563$$

- **Example**

  Divide 0.23 by 10000.

  Solution:

$$0.23 \div 10000 = 0.000023$$