Locating and Comparing Decimals & Addition and Subtraction of Decimals

i. Definition and Explanation

What is a Decimal? A decimal number is a way of writing a number that is not whole. It uses a decimal point to separate the whole number part from the fractional part.

- The digits to the left of the decimal point represent whole numbers (Ones, Tens, Hundreds, etc.).

- The digits to the right of the decimal point represent parts of a whole (Tenths, Hundredths, Thousandths, etc.).

Example: In the number 34.72

- 34 is the whole number part.

- . is the decimal point.

- 72 is the fractional part. It represents 7 tenths and 2 hundredths, or $\frac{72}{100}$.

ii. Key Points and Important Terms

Decimal Point: The dot (.) that separates the whole number part from the fractional part.

Place Value: The value of a digit based on its position. This is the most important concept for understanding decimals.

**Tenths:** The first place to the right of the decimal (e.g., in 0.1, the 1 is in the tenths place).

Hundredths: The second place to the right of the decimal (e.g., in 0.01, the 1 is in the hundredths place).

Thousandths: The third place to the right of the decimal (e.g., in 0.001, the 1 is in the thousandths place).

Annexing Zeros: Adding zeros to the end of a decimal *after* the last digit. This does not change the value of the decimal. (e.g., 0.5 = 0.50 = 0.500). This is very useful for comparing and subtracting decimals.

iii. Detailed Examples with Solutions

A. Locating Decimals on a Number Line
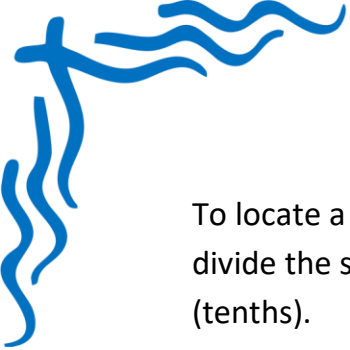
To locate a decimal on a number line, first look at the whole number part. Then, divide the space between that whole number and the next one into 10 equal parts (tenths).

Example: Locate 2.7 on a number line.

Find the whole numbers 2 and 3.

Imagine the space between 2 and 3 is divided into 10 smaller sections.

Count 7 sections to the right of 2. This is the location of 2.7.

B. Comparing Decimals

The best method is to Line Up and Compare.

Steps:
1. Line up the numbers vertically, aligning the decimal points.
2. Annex zeros so that both numbers have the same number of decimal places.
3. Compare the digits from left to right, starting with the largest place value, until you find a difference.

iv. Addition and Subtraction of Decimals

1. The Golden Rule of Adding & Subtracting Decimals

ALWAYS line up the decimal points! By doing this, you ensure that you are adding or subtracting digits with the same place value (tenths with tenths, hundredths with hundredths, etc.).

2. Addition of Decimals: Detailed Examples

Steps:

Write the numbers vertically, lining up the decimal points.

Annex zeros if needed so the numbers have the same length.

Add the columns from right to left, just like with whole numbers.

Place the decimal point in the answer directly below the decimal points in the problem.
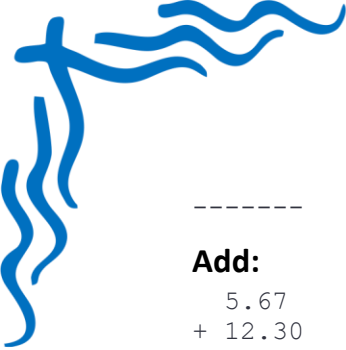
Example 1: Solve 5.67 + 12.3

Line Up:
```
   5.67
+ 12.3
```

Annex Zeros:
```
   5.67
+ 12.30
```

```
-------
```

Add:
```
   5.67
+ 12.30
-------
  17.97
```

Solution: 17.97

v. Subtraction of Decimals: Detailed Examples

Steps:

Write the numbers vertically, lining up the decimal points. The number you are subtracting from goes on top.

Crucially, annex zeros to the top number if it has fewer decimal places than the bottom number.

Subtract the columns from right to left, borrowing (regrouping) as needed.

Place the decimal point in the answer directly below the others.

Example 1: Solve 24.5 - 8.92

Line Up:
```
  24.5
-  8.92
```

Annex Zeros: (This step is critical!)
```
  24.50
-  8.92
-------
```

Subtract (with borrowing):
```
   1  13 14 10  (Borrowing shown above)
  2  4 . 5  0
-    8 . 9  2
---------------
  1  5 . 5  8
```

Solution: 15.58

vi. Summary of Main Concepts

- **Place Value is Key:** The value of a decimal is determined by the place value of its digits, not the number of digits.

- **Comparing Decimals:** Line up the decimal points, annex zeros to make them the same length, and compare from left to right.

- **Adding/Subtracting Decimals:** The #1 rule is to line up the decimal points. This ensures you are combining digits with the same place value.
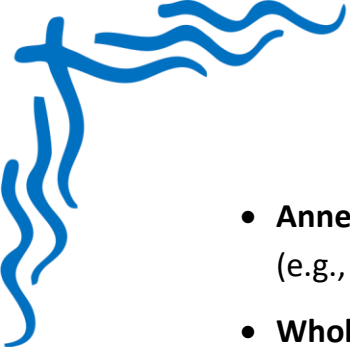
- **Annexing Zeros:** Adding zeros to the *end* of a decimal does not change its value (e.g., 3.2 = 3.20). This is essential for comparing and subtracting.

- **Whole Numbers:** Remember that a whole number has an unwritten decimal point at its end (e.g., 42 is the same as 42.).