



Decimal Place Value & Units of Measurement

i. Definition and Explanation

What is Decimal Place Value? Decimal place value is a system where the position of a digit in a number determines its value. Our number system is "base-10," meaning each place value is 10 times greater than the place to its right.

- **Whole Number Part:** Digits to the left of the decimal point (e.g., Ones, Tens, Hundreds).
- **Fractional Part:** Digits to the right of the decimal point, representing parts of a whole (e.g., Tenths, Hundredths, Thousandths).

Example: In the number 345.678

- 3 is in the Hundreds place (300)
- 4 is in the Tens place (40)
- 5 is in the Ones place (5)
- . is the Decimal Point
- 6 is in the Tenths place ($\frac{6}{10}$ or 0.6)
- 7 is in the Hundredths place ($\frac{7}{100}$ or 0.07)
- 8 is in the Thousandths place ($\frac{8}{1000}$ or 0.008)

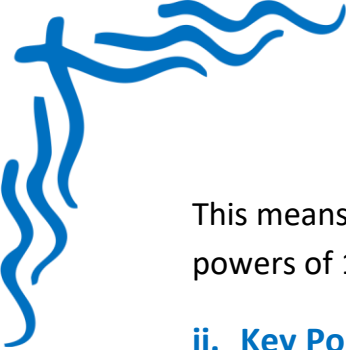
What are Units of Measurement?

Units of measurement are standard amounts used to measure quantities like length, mass, and volume. In science and most of the world, we use the Metric System (or SI Units).

- **Length:** Measures distance. The base unit is the meter (m).
- **Mass:** Measures the amount of matter in an object. The base unit is the gram (g).
- **Volume/Capacity:** Measures the amount of space an object takes up or can hold. The base unit is the liter (L).

The Connection: Why We Learn These Together

The Metric System is a base-10 system, just like our decimal place value system. Each metric unit is 10 times bigger or 10 times smaller than the next unit.



This means converting between metric units is as simple as multiplying or dividing by powers of 10, which we can do by just moving the decimal point!

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.
- **Metric System:** A measurement system based on the number 10.
- **Base Unit:** The main unit of measurement (meter, gram, or liter).
- **Prefix:** A word part added to the beginning of a base unit to change its value.

Key Metric Prefixes (from largest to smallest):

Prefix	Symbol	Value (compared to base)
Kilo-	k	1000 times
Hecto-	h	100 times
Deca-	da	10 times
(Base Unit)	(m, g, L)	1
Deci-	d	0.1 times ($\frac{1}{10}$)
Centi-	c	0.01 times ($\frac{1}{100}$)
Milli-	m	0.001 times ($\frac{1}{1000}$)
Prefix	Symbol	Value (compared to base)
Kilo-	k	1000 times

iii. Detailed Examples with Solutions

Example 1: Convert 3.75 kilometers (km) to meters (m).

Identify: We are going from a bigger unit (kilo) to a smaller unit (base).

Method: On the ladder, we go from Kilo to Base, which is 3 steps down.

Action: Move the decimal point 3 places to the right.



Solution: $3.75 \rightarrow 37.5 \rightarrow 375. \rightarrow 3750.$

We need to add a zero as a placeholder.

Answer: $3.75 \text{ km} = 3750 \text{ m}$

Example 2: Convert 450 milliliters (mL) to liters (L).

Identify: We are going from a smaller unit (milli) to a bigger unit (base).

Method: On the ladder, we go from Milli to Base, which is 3 steps up.

Action: Move the decimal point 3 places to the left. (Remember, a whole number has a decimal at the end: 450.)

Solution: $450. \rightarrow 45.0 \rightarrow 4.50 \rightarrow .450$

Answer: $450 \text{ mL} = 0.45 \text{ L}$

Example 3: A student's pencil is 14 cm long. How long is this in meters (m)?

Identify: We are going from a smaller unit (centi) to a bigger unit (base).

Method: On the ladder, we go from Centi to Base, which is 2 steps up.

Action: Move the decimal point 2 places to the left.

Solution: $14. \rightarrow 1.4 \rightarrow .14$

Answer: $14 \text{ cm} = 0.14 \text{ m}$

iv. Summary of Main Concepts

- Decimal place value and the metric system are both base-10.
- The position of a digit after the decimal point represents a fraction (Tenths, Hundredths, etc.).
- The metric system uses prefixes (Kilo-, Centi-, Milli-, etc.) to show multiples or fractions of a base unit (meter, gram, liter).
- To convert between metric units, you simply move the decimal point.
- Bigger unit to Smaller unit \rightarrow Move decimal RIGHT.
- Smaller unit to Bigger unit \rightarrow Move decimal LEFT.
- Use the mnemonic "King Henry Died By Drinking Chocolate Milk" to remember the order of prefixes.