

- A Tenth Part
- A Hundredth Part
- Decimal Place Value
- Writing and Reading Decimals
- Units of Measurement
- Locating and Comparing Decimals
- Zero Dilemma
- Estimating Sums and Differences

A Tenth Part

A tenth part means dividing a whole unit into 10 equal parts. Each part is called one tenth and is represented as $\frac{1}{10}$ or 0.1 in decimal form.

Formula Derivation:

Since 1 unit = 10 tenths, adding ten tenths equals one whole unit:

$$10 \times \frac{1}{10} = 1$$

Worked Illustration:

Length of a pencil is $3\frac{4}{10}$ units, which means 3 units and 4 tenths:

$$3 + \frac{4}{10} = 3.4$$

Solved Example:

Find the total length if a pencil is 34 tenths units long.

Solution:

$$34 \times \frac{1}{10} = \frac{34}{10} = 3 + \frac{4}{10} = 3.4 \text{ units}$$

Practice Set

- Level 1: Write 7 tenths as a decimal.
- Level 2: Convert 56 tenths into a mixed number and decimal.
- Level 3: A rope is 123 tenths meters long. Express its length in meters and centimeters.

Answer Key

- Level 1: 0.7
- Level 2: $5\frac{6}{10} = 5.6$
- Level 3: $12\frac{3}{10}$ meters = 12.3 meters = 1230 centimeters

Quick Reference

$$1 \text{ unit} = 10 \text{ tenths} = 10 \times \frac{1}{10}$$

Glossary

- **Tenth:** One part when a unit is divided into 10 equal parts.
- **Decimal:** A number expressed in the scale of tens, hundreds, etc., using a decimal point.

A Hundredth Part

A hundredth part is one part when a unit is divided into 100 equal parts. It is represented as $\frac{1}{100}$ or 0.01 in decimal form.

Formula Derivation:

Since 1 tenth = 10 hundredths, and 1 unit = 10 tenths, then:

$$1 \text{ unit} = 10 \times 10 = 100 \text{ hundredths}$$

Worked Illustration:

Folding a paper of length $8\frac{9}{10}$ units in half results in length:

$$\frac{1}{2} \times \left(8 + \frac{9}{10}\right) = 4 + \frac{9}{20} = 4 + \frac{4}{10} + \frac{1}{100} = 4.45 \text{ units}$$

Solved Example:

How many hundredths make one unit?

Solution:

Since 1 tenth = 10 hundredths and 1 unit = 10 tenths,

$$1 \text{ unit} = 10 \times 10 = 100 \text{ hundredths}$$

Practice Set

- Level 1: Write 45 hundredths as a decimal.
- Level 2: Express $7\frac{25}{100}$ as a decimal.
- Level 3: A ribbon is $12\frac{47}{100}$ meters long. Express it in meters and centimeters.

Answer Key

- Level 1: 0.45
- Level 2: 7.25
- Level 3: 12.47 meters = 1247 centimeters

Quick Reference

$$1 \text{ unit} = 100 \text{ hundredths} = 100 \times \frac{1}{100}$$

Glossary

- **Hundredth:** One part when a unit is divided into 100 equal parts.

- **Decimal Place Value:** The value of a digit based on its position relative to the decimal point.

Decimal Place Value

Decimal place value assigns values to digits based on their position relative to the decimal point. The first digit to the right of the decimal point is tenths, the second is hundredths, the third is thousandths, and so on.

Formula Derivation:

Each place value is $\frac{1}{10}$ times the place to its left:

$$\text{Value of digit at place } n = \frac{1}{10^n}$$

Solved Example:

Express 7.05 as sum of place values:

$$7.05 = 7 \times 1 + 0 \times \frac{1}{10} + 5 \times \frac{1}{100}$$

Practice Set

- Level 1: Write the place value of 3 in 5.36.
- Level 2: Express 12.407 as sum of place values.

- Level 3: Find the decimal place value of 9 in 0.009.

Answer Key

- Level 1: 3 is in hundredths place, value = $\frac{3}{100} = 0.03$
- Level 2: $12.407 = 1 \times 10 + 2 \times 1 + 4 \times \frac{1}{10} + 0 \times \frac{1}{100} + 7 \times \frac{1}{1000}$
- Level 3: 9 is in thousandths place, value = $\frac{9}{1000} = 0.009$

Quick Reference

Decimal place values decrease by powers of 10 moving right from the decimal point.

Glossary

- **Place Value:** The value of a digit depending on its position in a number.
- **Decimal Point:** The dot separating whole numbers from fractional parts.

Writing and Reading Decimals

Decimals are written with a decimal point separating the whole number part from the fractional part. Reading decimals involves stating the whole number, saying "point" for the decimal, then reading each digit individually.

Solved Example:

Write and read 5.6 and 0.09.

5.6 is read as "five point six".

0.09 is read as "zero point zero nine".

Practice Set

- Level 1: Write 3.14 in words.
- Level 2: Read 0.507 aloud.
- Level 3: Write the decimal for "seven point zero five".

Answer Key

- Level 1: Three point one four
- Level 2: Zero point five zero seven
- Level 3: 7.05

Quick Reference

Decimal numbers are read digit by digit after the decimal point.

Glossary

- **Decimal Number:** A number with a decimal point separating whole and fractional parts.

Units of Measurement

Units of measurement express physical quantities like length, mass, and volume. Metric units include millimeters (mm), centimeters (cm), meters (m), and kilometers (km).

Length Conversion:

$$1 \text{ m} = 100 \text{ cm} \quad \text{and} \quad 1 \text{ km} = 1000 \text{ m}$$

Weight Conversion:

$$1 \text{ kg} = 1000 \text{ g} \quad \text{and} \quad 1 \text{ pound} \approx 0.454 \text{ kg}$$

Rupee-Paise Conversion:

$$1 \text{ rupee} = 100 \text{ paise} \quad \text{and} \quad 1 \text{ paise} = 0.01 \text{ rupee}$$

Practice Set

- Level 1: Convert 5 km to meters.
- Level 2: Convert 2500 g to kilograms.
- Level 3: Convert 75 paise to rupees.

Answer Key

- Level 1: 5 km = 5000 m
- Level 2: 2500 g = 2.5 kg
- Level 3: 75 paise = 0.75 rupees

Quick Reference

Use multiplication or division by powers of 10 for metric conversions.

Glossary

- **Metric System:** A decimal-based system of measurement.
- **Conversion:** Changing a quantity from one unit to another.

Locating and Comparing Decimals

Decimals can be located on a number line by dividing the space between whole numbers into tenths, hundredths, etc. To compare decimals, compare digits from left to right; the first differing digit determines which is greater.

Solved Example:

Compare 3.45 and 3.41.

Since 4 tenths = 0.4 and 1 tenth = 0.1, $3.45 > 3.41$.

Practice Set

- Level 1: Which is greater: 2.3 or 2.7?
- Level 2: Arrange 0.56, 0.605, and 0.6 in ascending order.
- Level 3: Locate 1.4 on a number line between 1 and 2.

Answer Key

- Level 1: 2.7 is greater.
- Level 2: $0.56 < 0.6 < 0.605$
- Level 3: 1.4 is 4 tenths from 1 towards 2.

Quick Reference

Compare decimals digit-wise from left to right.

Glossary

- **Number Line:** A line representing numbers in order.
- **Decimal Comparison:** Determining which decimal is larger.

Zero Dilemma

Zeros after the last non-zero digit in a decimal do not change its value, but zeros before the first non-zero digit do affect the value.

Solved Example:

$$0.2 = 0.20 = 0.200 \text{ but } 0.07 < 0.7.$$

Practice Set

- Level 1: Are 0.5 and 0.50 equal?
- Level 2: Which is greater: 0.09 or 0.9?
- Level 3: Write 0.700 in simplest decimal form.

Answer Key

- Level 1: Yes, they are equal.
- Level 2: 0.9 is greater.
- Level 3: 0.7

Quick Reference

Trailing zeros after decimal do not change value; leading zeros do.

Glossary

- **Trailing Zero:** Zero after the last non-zero digit in a decimal.
- **Leading Zero:** Zero before the first non-zero digit in a decimal.

Estimating Sums and Differences

To estimate sums or differences of decimals, round the numbers to the nearest tenth or hundredth and then perform the operation.

Solved Example:

Estimate $2.36 + 4.78$:

Round to tenths: $2.4 + 4.8 = 7.2$

Practice Set

- Level 1: Estimate $5.12 + 3.45$ by rounding to tenths.
- Level 2: Estimate $7.89 - 2.34$ by rounding to hundredths.
- Level 3: Estimate $12.678 + 9.345$ by rounding to hundredths.

Answer Key

- Level 1: $5.1 + 3.5 = 8.6$
- Level 2: $7.89 - 2.34 = 5.55$
- Level 3: $12.68 + 9.35 = 22.03$

Quick Reference

Round decimals before adding or subtracting for quick estimates.

Glossary

- **Estimation:** Approximating a value by rounding.
- **Rounding:** Adjusting a number to a nearby value with fewer digits.

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