Introduction to Decimals

Decimals are a way to represent fractions with denominators of powers of 10, such as 10, 100, 1000, etc. For example, 5 rupees and 75 paise can be written as ₹5.75, where the dot represents the decimal point separating the whole number part from the fractional part.

Understanding decimals is essential for representing money, measurements, and other quantities precisely.

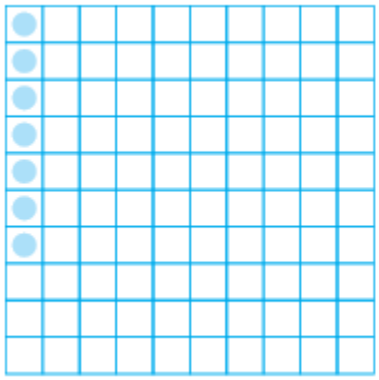
Comparing Decimals

To compare decimals, first compare the whole number parts. If they are equal, compare the tenths place, then the hundredths place, and so on.

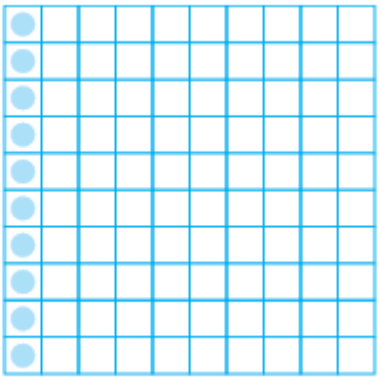
For example, to compare 0.07 and 0.1:

- 0.07 = $\frac{7}{100}$
- 0.1 = $\frac{1}{10} = \frac{10}{100}$

Since $\frac{10}{100} > \frac{7}{100}$, 0.1 > 0.07.



$$0.07 = \frac{7}{100}$$



$$0.1 = \frac{1}{10} = \frac{10}{100}$$

Example 1:

- (a) Compare 1 and 0.99: 1 > 0.99 because the whole part 1 > 0.
- (b) Compare 1.09 and 1.093: Both have 1 as whole part and 0 as tenths, but 1.093 has 3 thousandths which is greater than 0 in 1.09, so 1.093 > 1.09.

Using Decimals

Money

Since 100 paise = ₹1, 1 paise = ₹0.01.

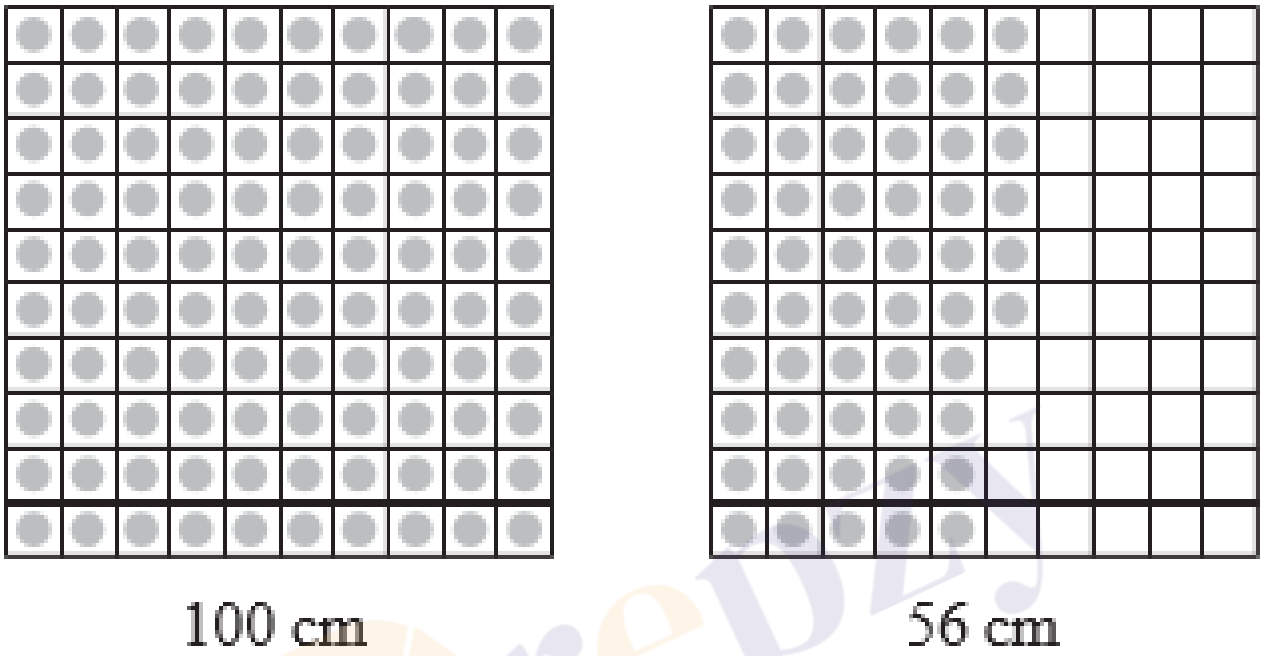
Examples:

- 65 paise = ₹0.65
- 5 paise = ₹0.05
- 105 paise = ₹1.05

Length

1 cm = 0.01 m.

Example: 156 cm = 1 m + 56 cm = 1 + $\frac{56}{100}$ m = 1.56 m.



Try These:

1. Write 4 mm in cm using decimals.
2. Write 7 cm 5 mm in cm using decimals.
3. Write 52 m, 340 m, and 2008 m in km using decimals.

Weight

1000 g = 1 kg, so 1 g = 0.001 kg.

Example: Total weight of vegetables = 500 + 250 + 700 + 500 + 100 + 300 = 2350 g = 2.350 kg.

Addition of Numbers with Decimals

Decimals are added by aligning the decimal points and adding digits place by place, starting from the rightmost digit.

Example: Add 0.35 and 0.42

Ones	Tenths	Hundredths	
0	3	5	
+	0	4	2
0	7	7	

Calculation:

- Hundredths: 5 + 2 = 7
- Tenths: 3 + 4 = 7
- Ones: 0 + 0 = 0

Sum = 0.77

Example: Add 0.68 and 0.54

Ones	Tenths	Hundredths	
0	6	8	
+	0	5	4
1	2	2	

Calculation with carrying:

- Hundredths: 8 + 4 = 12, write 2 carry 1
- Tenths: 6 + 5 + 1 = 12, write 2 carry 1
- Ones: 0 + 0 + 1 = 1

Sum = 1.22

Example 2: Lata spent ₹9.50 on a pen and ₹2.50 on a pencil. Total spent = ₹12.00.

Example 3: Samson travelled 5.052 km by bus, 2.265 km by car, and 1.030 km on foot. Total distance = 8.347 km.

Example 4: Rahul bought fruits weighing 4.090 kg, 2.060 kg, and 5.300 kg. Total weight = 11.450 kg.

Subtraction of Decimals

Subtract decimals by aligning decimal points and subtracting digits place by place, borrowing when necessary.

Example: Subtract 1.32 from 2.58

Ones	Tenths	Hundredths	
2	5	8	
-	1	3	2
1	2	6	

Calculation:

- Hundredths: 8 - 2 = 6
- Tenths: 5 - 3 = 2
- Ones: 2 - 1 = 1

Difference = 1.26

Example: Subtract 1.74 from 3.5 (written as 3.50)

Ones	Tenths	Hundredths	
3	5	0	
-	1	7	4
1	7	6	

Borrowing steps:

- Hundredths: 0 - 4 cannot subtract, borrow 1 from tenths (5 becomes 4), hundredths becomes 10, 10 - 4 = 6
- Tenths: 4 - 7 cannot subtract, borrow 1 from ones (3 becomes 2), tenths becomes 14, 14 - 7 = 7
- Ones: 2 - 1 = 1

Difference = 1.76

Try These:

1. Subtract 1.85 from 5.46
2. Subtract 5.25 from 8.28
3. Subtract 0.95 from 2.29
4. Subtract 2.25 from 5.68

Example 5: Abhishek had ₹7.45 and bought toffees for ₹5.30. Balance = ₹2.15.

Example 6: Urmila's school is 5.350 km from home. She walks 1.070 km. Distance by bus = 4.280 km.

Example 7: Kanchan bought a watermelon weighing 5.200 kg and gave away 2.750 kg. Remaining weight = 2.450 kg.

Summary and Glossary

1. Every decimal can be written as a fraction with denominator 10, 100, 1000, etc.
2. Decimals are compared by comparing whole parts, then tenths, hundredths, and so on.
3. Decimals are used in money, length, weight, and other measurements.
4. Addition and subtraction of decimals are done by aligning decimal points and operating digit-wise with borrowing and carrying.

Quick Reference

Decimal	Fraction
0.07	$\frac{7}{100}$
0.1	$\frac{1}{10} = \frac{10}{100}$
1.56 m	$1 + \frac{56}{100}$ m
2.350 kg	$2 + \frac{350}{1000}$ kg
Sum example	$0.35 + 0.42 = 0.77$
Difference example	$3.50 - 1.74 = 1.76$

Glossary

- **Decimal Point:** The dot separating the whole number part from the fractional part in a decimal number.
- **Tenths:** The first digit after the decimal point, representing parts out of 10.
- **Hundredths:** The second digit after the decimal point, representing parts out of 100.
- **Carrying:** Adding 1 to the next left digit when sum exceeds 9 in addition.
- **Borrowing:** Taking 1 from the next left digit when the digit is smaller than the digit to subtract in subtraction.