Chapter

Decimals

Learning Objectives

- Introduction
- Representation of Decimal on Number Line
- Place Value and Conversion of Like and Unlike
- 🚸 Decimal
- Operations on Decimals

Decimals

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Introduction

Deci means ten, therefore, a number which has base ten is called decimal number. A decimal number is separated by a dot mark (.) called decimal point. Numbers at the left from the dot (decimal) are called whole part of the number and numbers at the right side are called decimal part of the number. In the number 567.787, left part or whole part is 567 and right or decimal part is 786. The whole part of decimal number is read as, the extreme right or closest number from the decimal point is ones, and second, third, fourth, fifth, sixth, seventh, eighth and ninth are tens, hundreds, thousands, ten thousands, lakhs, ten lakhs, crores, ten crores, arabs.

The numbers from the right of decimal point (dot) are read as tenths, hundredths, thousandths, ten thousandths, etc.

Decimal numbers are also called simply decimals.

Representation of Decimals on Number Line

The following steps are the method for representation of decimal numbers on number line:

Step 1: Draw a horizontal line and mark a point 0 on it.

Step 2: Mark another point on the same horizontal at point 1, now divide the distance between them into ten equal parts. First point from zero is 0.1 and last point from zero is 1.

Illustrative EXAMPLE

Represent 0.7 on number line.

Step 1: Draw a horizontal line and mark a point 0 on it.

Step 2: Mark another point 1 on it and divide distance between them into 10 equal parts.

Step3: Represent 0.7, at 7th point from 0.

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7

Place value and Conversion of Like and Unlike Decimals

Place Value of Decimals

Place value of whole part of decimal numbers is read from extreme right to left from decimal point and decimal part is read from first right from decimal point to extreme right. In a decimal number 56.98, whole part of the number is 56 (Fifty six) and decimal part is 98 (Nine eight). The number 6 is at unit place and 5 at tens place. In the decimal part the number 9 is at tenth place and 8 is at hundredth place. Read the following place value of decimals:

Decimal number	5	6	•	9	8	
Place value	Tens	Unit	Dot	Tenths	Hundredth	

Illustrative EXAMPLE

What is the place value of 6 in the decimal 3787.367?

(a) Hundredths
(b) Thousandths
(c) Six hundredths
(d) None of these
(e) All of these
Answer: (c)
Explanation
Place value of 6 in 3787.367 is six hundredths.

Conversion of Fractions into Decimals

Conversion of fractions into decimal is the division of numerator by denominator. If numerator is greater than denominator then mixed (Some part of whole and decimal) decimal is obtained. If numerator is smaller

than denominator then decimal form of resulting decimal is obtained. In the fraction $\frac{2}{5}$, numerator is

greater than denominator, therefore, on division of 5 by 2, 2.5 is a decimal number, whereas 2 is whole and 0.5 is decimal part. In another fraction with smaller numerator 4, resulting decimal is 0.444, it has decimal

parts only. Decimal number is considered up to three decimal places. The conversion of $\frac{2}{2}$ into decimal is

0.222222 infinite, its up to three digits as 0.222 are considered.

Convert the fraction g into its decimal form.

(a) 0.777
 (b) 0.555
 (c) 0.666
 (d) None of these
 (e) All of these
 Answer: (c)
 Explanation

Decimal form of the fraction, $\frac{6}{9} = 0.666$.

Conversion of Decimals into Fractions

The following methods are used for conversion of decimals into fractions:

1. Rewrite decimal numbers into whole number by omitting decimal point.

2. Write 1 under converted whole number and put one zero for each decimal places.

3. Simplify them into its lowest term.

Let the number is 78.65, by omitting decimal, the number becomes 7865. There are two digits after the

decimal, therefore, 7865 should be divided by $100 = \frac{7865}{100}$, on simplification or reducing to its lowest term,

number becomes

 $\frac{1573}{20}$

Illustrative EXAMPLE

Convert the 0.100 into fraction.

(a) $\frac{1}{100}$

(b) $\frac{1}{10}$

(c) $\frac{1}{1000}$ (e) All of these

(d) None of these

Answer: (b)

Explanation

Like and Unlike Decimals

The decimals whose number of digits from decimal point is same are called like decimals. If total number of digits is not same then called unlike decimals. The following decimals have two digits at right hand side from decimal point 0.22, 0.29, 0.01, thus these are called like decimals. Number of digits from decimal point towards right side of the following decimals 0.345, 0.32, 0.45677 are not same, therefore, called unlike decimals.



Choose the like decimals from the following decimals: 23.01, 12.23, 14.9, 22.234.

(a) 14.9and22.234(c) 23.01 and 14.9(e) All of these

(b) 23.01andl2.23 (d) None of these

Answer: (b)

Explanation

Number of digit at decimal place of 23.01 and 12.23 is 2. Hence, these are like decimals.

Comparison of Decimals

Comparison of decimals is used to denote the greater and smaller decimals among two or more decimals. The greater decimal has greater whole part and smaller has smaller whole part. If two decimals have equal whole part then by comparing its first digit from right of decimal, the greater and smaller decimals can be obtained. If first digit of a decimal number is greater than the first digit of another decimal number then the greater decimal has greater digit and smaller has smaller digit. If first digit of decimal part is equal then by comparing second digit, greater and smaller number is obtained. If a decimal number has all parts equal to the same part of another decimal except second digit from right of decimal point is greater than the same place of other decimal number then the greater decimal has greater digit.

The decimal numbers are 34.56 and 45.67, the whole part (34) of 34.56 is smaller than the whole part o 45.67, therefore, 34.56 is smaller than 45.67. In the decimal numbers 56.78 and 56.79, the whole and first digit of decimal part of both the decimal numbers are equal therefore, by comparing its second digit from decimal parts, greater and smaller decimals can be obtained, thus the greater decimal is 56.79 because second digit or hundredths place of decimal part, 9 is greater than the hundredths place, 8 of decimal number, 56.78.

Illustrative EXAMPLE

Compare the following two decimals 34.45, 34.35 and choose the correct option from the options given below?

(a) 34.35 = 34.45
(c) 34.45 < 34.35
(e) All of these

(b) 34.45 > 34.35 (d) None of these

Answer: (b) Explanation

All the digits of both the decimal numbers, 34.45 and 34.35 are equal except digits at tenths place. Hence, the greater decimal has greater digit at tenths place.

Conversion of Unlike Decimals into Like Decimals

All operations on the decimals are performed by converting unlike decimals into like decimals. Two unlike decimals are 45.67 and 35.7. The decimal 45.67 cannot be converted just like the decimal 35.7 but the

decimal 35.7 is converted by putting one zero after 7, therefore, the number 35.7 is converted into 35.70. The value of the number does not change on putting 0 after the decimal. Now both the numbers 45.67 and 35.70 are like decimals.

Remember the following on putting 0 in decimals numbers:

1. Zero cannot be placed before the digits in the decimal part of the decimal number, it should be placed just after the digits.

2. Zero cannot be placed after the digits in the whole part of decimal number. It should be placed before the digits.

Illustrative EXAMPLE

Convert the following unlike decimals 23.34, 34.4, 67.456 and 99.1 into like decimals:

- (a) (23.340,34.040,67.456,99.100
- (b) 23.340,34.040,67.456,99.001
- (c) 23.340,34.400,67.456,99.100
- (d) None of these
- (e) All of these

Answer: (c)

Explanation

There are three decimal places of 67.456. Therefore, every decimal should be changed into three decimal places.

Operations on Decimals

Addition of Decimals

	45.56 + 23.5 = 45.56
Consider the following decimal numbers 45.56, 23.5. The addition of the decimals is	+23.50
	<u>69.06</u>

(Unlike decimal is first converted into like decimal)

Illustrative EXAMPLE

Add the following decimals: 34.45, 45.67, 32.1,

(a) 113.23	(b) 114.24
(c) 112.22	(d) None of these
(e) All of these	

Answer: (c)

Explanation

	34.45
	45.67
+	32.10
	112.22

Subtraction of Decimals

Consider the following decimal numbers 56.23 and 45.1. The subtraction of the decimal numbers is 56.23

- 45.10



Mariam had Rs 123 and 75 paise, she spent Rs 23 and 50 paise on purchasing fruits. How much money she has now?

(a) Rs 100 and 25 paise(c) Rs 99 and 50 paise(e) All of these

(b) Rs 99 and 25 paise(d) None of these

Answer: (a)

Explanation Rs 123.75 – Rs 23.50 = Rs 100 and 25 paisa.

Multiplication of Decimals

Consider the following decimals 34.48 and 12.24. Multiply by omitting decimal Point, $3448 \times 1224 = 4220352$, now, put the decimal before four digits (Each has Two decimal places) from the right of resulting product = 422.0352.

Illustrative

EXAMPLE

The product of the following fractions, 234.567 and 123.7 is?

(a) 29016.9372 (b) (c) 29015.9379 (d) (e) All of these

(b) 29015.9373 (d) None of these

Answer: (c) Explanation 234.569×123.7 = 234567×1237 = 29015.9379

Division of Decimals

Quotient of division of a whole number by a decimal number is obtained by placing number of zeroes in dividend for each decimal place digit of divisor. Division of 4565 by $334.5 = \frac{45650}{345} = 132.319$, one zero has been placed in dividend for one decimal place of divisor.

Quotient of division of a decimal number by a whole number is obtained by placing number of zero for each place digit of dividend in divisor. Division of 3.5 by a whole number $5 = \frac{3.5}{5} = \frac{35}{50} = \frac{7}{10}$, one zero has been placed in divisor for one decimal place of dividend.

Quotient of Division of a Decimal Number by a Decimal Number is Obtained by the following steps:

Step 1: Decimal point of the divisor is moved to right until it becomes a whole number.

Step 2: Decimal point of the dividend is moved to right as same as the number of places have been moved in divisor.

Step 3: Multiply both divisor and dividend by a number to get whole numbers if necessary.

Step 4: Put decimal point in the quotient by counting total number of decimal places for both dividend and divisor as shown below:

Division of 587.87 by

 $2.5 = \frac{5878.7}{25} \times \frac{10}{10} = \frac{58787}{250} = 235.148.$

Division of decimal number 456.78 by a whole number 67 by long division method.

Illustrative **EXAMPLE**

Rs 456.75 is equally divided among 7 people. How much money each person will receive? (a) Rs 65.25 (b) Rs 65.23 (c) Rs 65.26 (d) none of these (e) All of these

Answer: (a) Explanation

	-	
7)4	65 56	.25
42		
36		
$\frac{35}{17}$	-	
1/		
$\frac{14}{35}$	-	
35	-	
35		
00		

Commonly Asked

UESTIONS

An electric switch board contains 67876 switches. A small switch board is made up of 4 switches. Find the number of such switch boards which can be made from the total number of switches.

(a) 3456 (b) 16969 (c) 6785 (d) 11534 (e) None of these

Answer: (b) Explanation

The total number of switch board made by 67876 Switches= $\frac{67876}{4}$ =16969.

-	Three pieces of wire, 34 the wire is?	m 3 cm, 4 m 5 cm and 3 m 5 cm have been joined each other. The total length of
	(a) 41.13	(b) 41.23
	(c) 41 m	(d) all of these
	(e) none of these	



Simplify: $\frac{5}{6} + \frac{9}{7} + \frac{7}{3}$. (a) 4.452

(c) 4.134 (e) None of these (b) 4.321 (d) all of these

Answer (a)

Explanation $\frac{5}{6} + \frac{9}{7} + \frac{7}{30} = \frac{35 + 54 + 98}{42} = \frac{187}{42} = 4.452$



Simplify: 0.001 + 1 + 0.01 + 1.

(a) 2.142 (b) 2.011 (c) 2.9 (d) All of these Answer: (b) Explanation 0.001 +1 +0.01 +1 =2.011.

(e) None of these



Evaluate, 98.545÷4.5 (a) 21.898 (c) 13.134 (e) None of these

(b) 21.011 (d) All of these

Answer: (a) **Explanation**

 $98.545 \div 4.5 = \frac{98545}{4500} = 21.898$



Representation of decimal number 5.2 is obtained on number line by which one of the following?

- (a) By dividing distance between 5 to 6 into ten equal parts
- (b) By multiplying distance between two points on number line
- (c) By adding distance between two points on number line
- (d) All of these
- (e) None of these

Answer: (a)

Explanation

The position of 5.2 on the number line is obtained by dividing the distance between 5 and 6 into 10 equal parts.



Number line is divided into how many number of equal division if the decimal part of the decimal number is three digit number.

(a) 8	
(c) 11	
(e) None of these	

(b) 10 (d) All of these

Answer: (b)

Explanation

If the decimal part of a decimal number is three digits number then the number line will be divided into 10 equal parts.



Whole part of a decimal number is obtained from which one of the following parts of decimal number?

- (a) Among the digits
- (b) Left side from decimal
- (c) Right side from decimal
- (d) All of these
- (e) None of these

Answer: (b)

Explanation

The number at the left side of decimal point is the whole part of the decimal number.

Decimal part of a decimal num	ber is obtained from which one of the following parts of decimal number?
(c) Among the digits	(d) All of these
(e) None of these	
Answer: (a)	
Explanation	
The number at the right side of	f decimal point is the decimal part of the decimal number.

The decimal number 3.5 is exactly between which one of the following numbers on the number line? 0 1 2 3 4 5 (a) 3 and 4 (b) 4 and 5 (c) 1 and 2 (d) All of these (e) None of these

Answer: (a)

Explanation

3.5 is greater than 3 but less than 4. Therefore, it will come between 3 and 4



Answer: (b)

Explanation

The decimal number 00.43 has four tenths and three hundredths.



In which one of the following numerations system the place value of digit Is increase^ ten times from left to right?

- (a) Roman numeration
- (b) Alphabetical numeration
- (c) Decimal numeration
- (d) All of these
- (e) None of these

Answer: (c)

Explanation

The place value of digit at tens place is always ten times greater than the place value of digit at unit place and the place value of digit at hundreds place is 10 times greater than the place value of digit at hundreds place.

Write the shortest form of the following: $4000+500+8+0+\frac{7}{10}+\frac{6}{1000}$.

(a) 4508.706
(b) 4507.705
(c) 4509.707
(d) All of these

(e) None of these

Answer: (a)

Explanation

 $4000 + 500 + 8 + 0 + \frac{7}{10} + \frac{6}{1000}. = 4508.706$



Change the fraction $\frac{5}{7}$ into decimal.

(a) 0.01
(b) 0.001
(c) 0.714
(d) All of these
(e) None of these

Answer: (c)

Explanation

The decimal form of $\frac{5}{7} = 0.714$.



23 kg, 450 grams of rice is denoted by which one of the following options?

(a) 23.045kg

- (b) 23.450kg
- (c) 23.045kg
- (d) All of these
- (e) None of these

Answer: (b)

Explanation

The decimal form of 23 kg and 450 grams = 23.450 kg.

You Must

- The first decimal system was introduced by Sumerians.
- Decimal is the latin word.
- One decimal number may or may not have whole part.
- Decimal number system is used by most of the countries in the world.
- Decimal part of a decimal number may or may not have repeating decimal.

SUMMARY



- Right sided numbers from decimal point are always less than 1.
- Numbers written in decimals are called decimal numbers or decimal.
- Decimal points should be vertically allied while adding or subtracting two or more decimal numbers.
- The fractions, having denominators 10, 100 and 1000 etc. are converted into decimal numbers by placing decimal point among the numerator.
- Division of a decimal number by a whole number is performed by placing zero in divisor for each one decimal place of dividend.

Self Evaluation



1.	The cost of two toys, three pencils and five rubbers is Rs 234 and 50 paise. What will be cost of one rubber if the cost of two toys and three pencils is Rs 210?									
	(a) Rs 4.70	(b) Rs 4.90								
	(c) Rs 3.90	(d) All of these								
	(e) None of these									
2.	Lina spent Rs 34.60 on pu	rchasing a basket. How much money is left if she had Rs 100?								
	(a) Rs 65.40	(b) Rs 10.50								
	(c) Rs 65.10	(d) All of these								
	(e) None of these									
3.	The surface of a room is a surface?	13.50 cm long and 10.45 cm wide. What is the total length of all four sides of the								
	(a) 47.80cm	(b) 25.34cm								
	(c) 47.90cm	(d) All of these								
	(e) None of these									
4	Simplify: 0.456×12.34.									
	(a) 5.627	(b) 4.12								
	(c) 3.23	(d) All of these								
	(e) None of these									
5.	The total weight of veget of potatoes is 2 kg, 600 gr (a) 11 kg 200gms	ables, bought by Peter is 20 kg. If weight of pumpkins is 6 kg, 500 grams, weight rams and rest is onions. What is the weight of onions? (b) 12 kg. 300 gms								
	(c) 10 kg 900 gms	$(a) \Delta II of these$								
	(e) None of these									
6.	Mariam travelled 3 km, 2	220 m by auto and 1 km, 800 m she walked. Find the total distance travelled by								
	(d) \Im KIII 2011									
	(D) 4 KIII 50 III (c) E km 10m									
	(a) None of these									

7.	Express the length 0.30 me (a) 30cm (c) 50cm (e) None of these	tres into centimetres? (b) 40cm (d) All of these					
8.	Fill the blank from the follo	owing options: 0.090.3.					
	(a) >	(b) <					
	(c) =	(d) All of these					
	(e) None of these						
9.	A brick is broken down into two pieces in such a way that each is 0.937 m long. What would be the tot length of the brick?						
	(a) 1.784m	(b) 1.345m					
	(c) 1.874m	(d) All of these					
	(e) None of these						
10.	Simplify: 23.45+34.56-45	5.3×12.24÷12.12.					
	(a) 12.303	(b) 12.404					
	(c) 13.505	(d) All of these					
	(e) None of these						

Answers – Self Evaluation Test																		
1.	В	2.	А	3.	С	4.	А	5.	С	6.	А	7.	А	8.	В	9.	С	10. A

Self Evaluation



- 1. The cost of two toys, three pencils and five rubbers = Rs. 234.50. The cost of two toys and three pencils = Rs. 210. Hence, the cost of five rubbers = Rs. 234.50 - Rs. 210 = Rs. 24.50. Thus, the cost of one rubber $\frac{24.50}{5} = Rs. 4.90$
- **2.** The money will left = Rs. 100 Rs. 34.60 = Rs. 65.40.
- **3.** Total length = (13.50 x 2) + (10.45 x 2) = 27 + 20.90 = 47.90 cm
- **4.** 0.456 x 12.34 = 5.627
- 5. Total weight of potatoes and pumpkins = 6 kg 500 grams + 2 kg 600 grams = 9 kg 100 grams. Hence, the cost of onions = 20 kg 9 kg 100 grams = 10 kg 900 grams.
- 6. Total distance travelled by Mariam = 3 km 220 m + 1 km 800 m = 5 km 20 m
- **7.** 0.30 meter = 0.30 x 100 = 30 cm

9. 0.937 x 2 = 1.874 cm

10. 23.45 + 34.56 - 45.3 x 12.24 ÷ 12.12 = 12.303