

Decimals

Chapter - VIII

Introduction

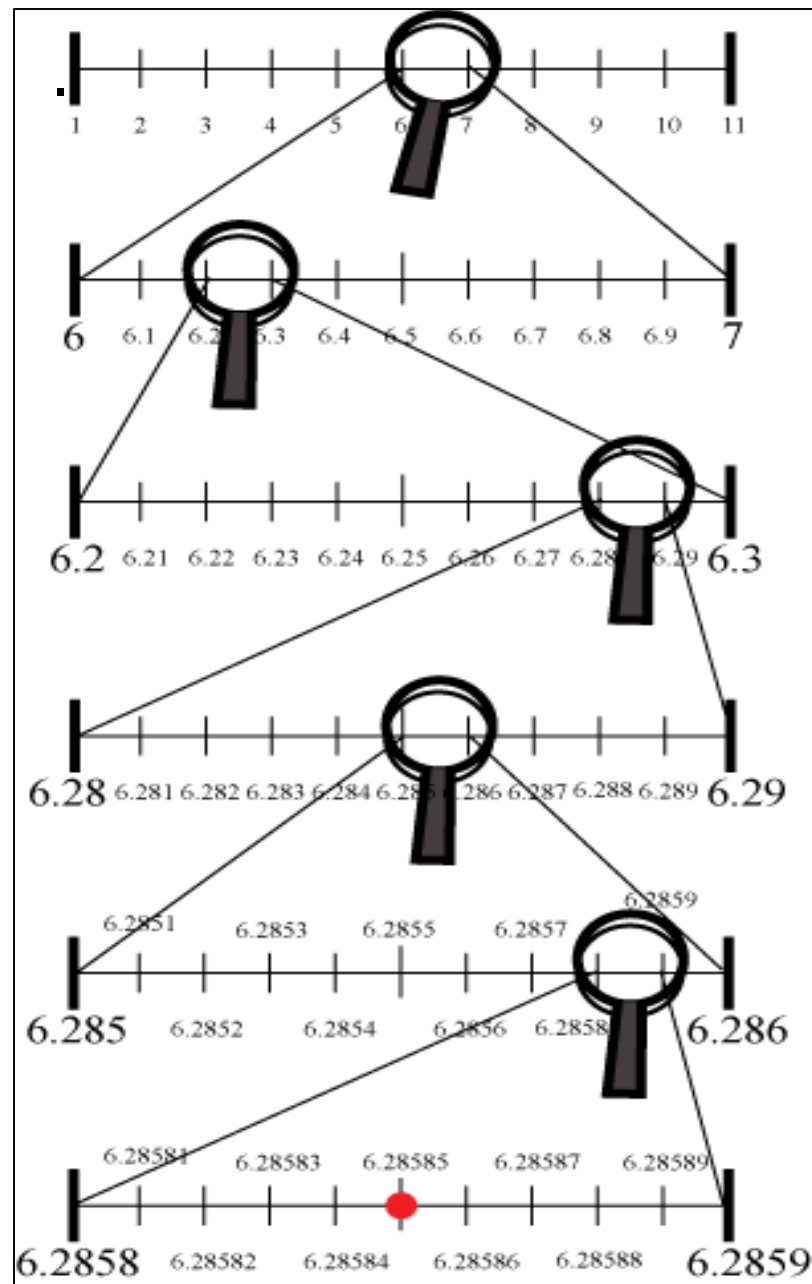
- In this chapter we shall learn about another kind of numbers called **decimals**.
- This has close links with the previous chapter on fractions, as we shall soon see.
- We denote one tenth of the whole as $\frac{1}{10}$ or as 0.1 in decimal system.
- We denote one hundredth part as 0.01 in decimal system.
- Thus if we wish to write 32 and four-tenths in decimals we shall write it as 32.4 !

Points to notice

- Like we don't give value to the zeros added to the left of integers, zeros added to the right of decimals have no value !
- Example, $0.1 = 0.10 = 0.100 = \dots\dots 0.100000000\dots$
- But Zeros added immediately after the decimal point, are to be given importance .
- For example, 0.1 is not same as 0.01 !
- If there is a zero before the decimal point, it is dropped in the notation ! Example 0.123 can be written as .123 !

Number Line

- Like integers and fractions, decimals can also be represented in the number line.
- We first decide into how many parts should we divide the successive points in the number line.
- If there are 2 digits after the decimal point, we make 100 divisions, if there are 3 digits then we make 1000 divisions and so on.
- We can go on magnifying the number line to get more and more decimals .



Fractions as decimals

- It is clear that each fraction can be written as a **decimal** and vice versa.
- We can convert a fraction into decimal by counting the zeros in denominator , and moving the decimal dot those many places before the numerator, from right to left equal to the number of zeros in denominator .

Fractions as decimals

- For example $4/10$ can be written in its decimal form, by moving decimal dot one place, on 4, from right to left (since there is only one zero in denominator) i.e. $4/10 = 0.4$.
- Similarly $23/100$ can be converted into decimal form, by moving the decimal dot two places (Since 100 has two zeros) on numerator from right to left .
- Moving the decimal dot once, on 23, from right to left makes it 2.3, and if we move another time, it ends up as 0.23.
- Hence $23/100 = 0.23$.

Decimals to Fractions

- We can also interconvert decimals into fractions, by removing the decimal dot, and adding as many zeroes in the denominator after 1, equal to the number of decimal digits after the dot .
- For example, 0.456, can be converted into fraction, by removing the dot in the numerator, and adding 3 zeros after 1 in the denominator.
- i.e. $0.456 = 456/1000$, similarly $0.5456 = 5456/10000$.

Recall !

- Now think of the property of decimals , i.e. Why is $0.1=0.10=0.100=0.1000....$?
- We know that, we can write decimals as fractions, as follows $0.1= 1/10$, $0.10=10/100$, $0.100=100/1000,...$
- If you cancel all the zeros in numerator and denominator you get $1/10$, which is equal to 0.1 .

Comparing Decimals

- Like integers and fractions, we can compare decimals also.
- For comparison we first compare the **whole parts** and then the **decimal parts**.
- For example $3.14 > 2.71$ and $35.1 < 35.2$ etc.

Addition of decimals

- Like integers and fractions, we can add and subtract decimals also. For this we first do the decimal part operation and then move on to the whole parts. So line up the numbers and proceed .

The diagram illustrates the addition of two decimal numbers, 1.2 and 15.3. On the left, the numbers are written vertically: 1.2 above + 15.3. A green arrow points from this representation to a second representation on the right. In the second representation, the numbers are aligned by their decimal points. Above the numbers, the place values are labeled: 'tens' above the 1 of 15.3, 'ones' above the 5 of 15.3, and 'tenths' above the 2 of 1.2. The addition is shown as 1.2 above + 15.3, with a horizontal line below 15.3 and the sum 16.5 below that line.

$$\begin{array}{r} 1.2 \\ + 15.3 \\ \hline 16.5 \end{array}$$

Subtraction of decimals

- As we did in the case of addition, we can do the same for subtraction. For this we first do the decimal part operation and then move on to the whole parts.

Line up the decimal points	Line up the decimal points
	
76.3	4.321
- 34.1	- 4.1
42.2	0.221

Uses

- Decimals are widely used in our day to day lives.
- For example while using weights, heights, money etc we knowingly or unknowingly use decimals.

This has introduced you to the key concepts in chapter-VIII , you are now encouraged to read the text book in detail and solve the problems there !

Thank you !