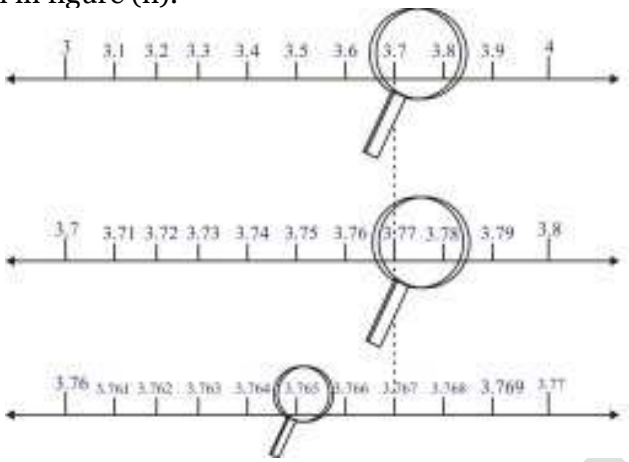
Number Systems: Exercise 1.4

Q.1 Visualise 3.765 on the number line, using successive magnification.

Sol. Since, 3.765 lie between 3 and 4, i.e. in the interval [3, 4] to have a rough idea where it is.
Now, divide the interval [3, 4] into 10 equal parts and look at the interval [3.7, 3.8] through a magnifying glass and realize that 3.765 lies between 3.7 and 3.8 as shown in figure (i).
Now, imagine that each of the new intervals [3.1, 3.2], [3.2, 3.3],.... [3.9, 4] has been sub divided into 10 equal parts. As before, now we can visualize through the magnify glass that 3.765 lies in the interval [3.76, 3.77] as shown in figure (ii).



So, it is possible by sufficient successive magnifications to visualize the position of any real number with a terminating decimal expansion on the number line.
In this way, we can look at appropriate intervals through a magnifying glass and by successive magnifications visualize the position of the number on the number line.

Q.2 Visualise $4.\overline{26}$ on the number line, upto 4 decimal places.

Sol. We can use successive magnifications, and successively decrease the lengths of the intervals in which $4.\overline{26}$ is located.

$4.\overline{26}$ is located in the interval [4, 5] of length 1. Now, we further locate $4.\overline{26}$ in the interval [4.2, 4.3] of length 0.1.

For getting more accurate representation, divide even this interval into 10 equal parts and use a magnifying glass to visualize that $4.\overline{26}$ lies in the interval [4.26, 4.27] of length 0.01.

To visualize $4.\overline{26}$ in an interval of length 0.001, now again divide each of the new intervals into 10 equal parts and visualize the representation of $4.\overline{26}$ in the interval [4.262, 4.263] of length 0.001.

$4.\overline{26}$ is located closer to 4.263 than to 4.262.