Key Book

CAMBRIDGE SNC SERIES

Mathematics

Grade 7

Unit 1 Rational Numbers

Exercise 1.1

1. Draw a number line to represent the following integers.

(i) −5

Solution: First of all, draw the number line and write integers on it at equal distance.

(ii) −3

Solution: First of all, draw the number line and write integers on it at equal distance.

(iii) 6

Solution: First of all, draw the number line and write integers on it at equal distance.

(iv) 5

Solution: First of all, draw the number line and write integers on it at equal distance.

(v) 1

Solution: First of all, draw the number line and write integers on it at equal distance.

(vi) 7

Solution: First of all, draw the number line and write integers on it at equal distance.

(vii) −8

Solution: First of all, draw the number line and write integers on it at equal distance.

(viii) 9

Solution: First of all, draw the number line and write integers on it at equal distance.

(ix) 10

Solution: First of all, draw the number line and write integers on it at equal distance.

2. Find the absolute value of the following integers.

(i) 3

Solution: The absolute value of an integer is always non-negative.

$|3| = 3$

(ii) 7

Solution: The absolute value of an integer is always non-negative.

$|7| = 7$

(iii) −4

Solution: The absolute value of an integer is always non-negative.

$|-4| = 4$

(iv) −100

Solution: The absolute value of an integer is always non-negative.

$|-100| = 100$

(v) −312

Solution: The absolute value of an integer is always non-negative.

$|-312| = 312$

(vi) −12

Solution: The absolute value of an integer is always non-negative.

$|-12| = 12$

(vii) 8

Solution: The absolute value of an integer is always non-negative.

$|8| = 8$

(viii) −15

Solution: The absolute value of an integer is always non-negative.

$|-15| = 15$

(ix) −9

Solution: The absolute value of an integer is always non-negative.

$|-9| = 9$

3. Solve.

(i) $\frac{2}{3} + \frac{3}{4}$

Solution: To add unlike fractions (fractions with different denominators) take LCM of denominators.

$\frac{2}{3} + \frac{3}{4} = \frac{8+9}{12}$ LCM of 3 and 4 is 12.

$= \frac{17}{12}$

(ii) $\frac{3}{4} + \frac{1}{7}$

Solution: To add unlike fractions (fractions with different denominators) take LCM of denominators.

$\frac{3}{4} + \frac{1}{7} = \frac{21+4}{28}$ LCM of 4 and 7 is 28.

$= \frac{25}{28}$

(iii) $2\frac{1}{3} + 1\frac{1}{5}$

Solution: Change given mixed numbers into improper fractions and then add.

$2\frac{1}{3} = \frac{7}{3}$ and $1\frac{1}{5} = \frac{6}{5}$

Now to add $\frac{7}{3}$ and $\frac{6}{5}$ take LCM of denominators.

$\frac{7}{3} + \frac{6}{5} = \frac{35+18}{15}$ LCM of 3 and 5 is 15.

$= \frac{53}{15}$

(iv) $\frac{2}{7} - \frac{1}{11}$

Solution: To subtract unlike fractions (fractions with different denominators) take LCM of denominators.

$\frac{2}{7} - \frac{1}{11} = \frac{22-7}{77}$ LCM of 7 and 11 is 77.

$= \frac{15}{77}$

(v) $\frac{3}{5}-\frac{1}{4}$

Solution: To subtract unlike fractions (fractions with different denominators) take LCM of denominators.

$$\frac{3}{5}-\frac{1}{4}=\frac{12-5}{20} \qquad \text{LCM of } 5 \text{ and } 4 \text{ is } 20.$$

$$=\frac{7}{20}$$

(vi) $3\frac{1}{4}-1\frac{2}{3}$

Solution: Change given mixed numbers into improper fractions and then subtract.

$$3\frac{1}{4}=\frac{13}{4} \text{ and } 1\frac{2}{3}=\frac{5}{3}$$

Now to subtract $\frac{13}{4}$ and $\frac{5}{3}$ take LCM of denominators.

$$\frac{13}{4}-\frac{5}{3}=\frac{39-20}{12} \qquad \text{LCM of } 4 \text{ and } 3 \text{ is } 12.$$

$$=\frac{19}{12}$$

(vii) $\frac{2}{3}\times\frac{5}{4}$

Solution: To multiply two fractions, multiply numerator by numerator and denominator by denominator.

$$\frac{2}{3}\times\frac{5}{4}=\frac{2\times5}{3\times4}$$

$$=\frac{10}{12}$$

Now write it into simplest form

$$\frac{10}{12}=\frac{10\div2}{12\div2}=\frac{5}{6}$$

So,

$$\frac{2}{3}\times\frac{5}{4}=\frac{5}{6}$$

(viii) $\frac{1}{7}\times\frac{5}{2}$

Solution: To multiply two fractions, multiply numerator by numerator and denominator by denominator.

$$\frac{1}{7}\times\frac{5}{2}=\frac{1\times5}{7\times2}$$

$$=\frac{5}{14}$$

(ix) $\frac{2}{3}\times\frac{3}{2}$

Solution: To multiply two fractions, multiply numerator by numerator and denominator by denominator.

$$\frac{2}{3}\times\frac{3}{2}=\frac{2\times3}{3\times2}$$

$$=\frac{\cancel{6}}{\cancel{6}}$$

$$=1$$

(x) $\frac{3}{4}\div\frac{2}{3}$

Solution: To divide two fractions change the symbol of (÷) by (×) and take reciprocal of the second fraction.

$$\frac{3}{4}\div\frac{2}{3}=\frac{3}{4}\times\frac{3}{2}$$

Now multiply both fractions

$$=\frac{3\times3}{4\times2}$$

$$=\frac{9}{8}$$

Remember

Reciprocal of a fraction means change numerator by denominator.

Remember

To express a fraction in its lowest/simplest form, divide its numerator and denominator by a common divisor.

(xi) $\frac{1}{8} \div \frac{1}{2}$

Solution: To divide two fractions change the symbol of (÷) by (×) and take reciprocal of the second fraction.

$$\frac{1}{8} \div \frac{1}{2} = \frac{1}{4} \times \frac{2}{1}$$

Now multiply both fractions

$$= \frac{1 \times 2}{8 \times 1}$$

$$= \frac{2}{8} \text{ or } \frac{1}{4}$$

(xii) $2\frac{1}{3} \div 3\frac{1}{4}$

Solution: First of all, convert mixed numbers into improper fractions.

$2\frac{1}{3} = \frac{7}{3}$ and $3\frac{1}{4} = \frac{13}{4}$

Now, divide both fractions by changing the symbol of (÷) by (×) and take reciprocal of the second fraction.

$$\frac{7}{3} \div \frac{13}{4} = \frac{7}{3} \times \frac{4}{13}$$

Now multiply both fractions

$$= \frac{7 \times 4}{3 \times 13}$$

$$= \frac{28}{39}$$

4. Verify the commutative and associative property of rational numbers with respect to addition.

(i) $\frac{2}{3} + \frac{3}{4} = \frac{3}{4} + \frac{2}{3}$

Solution: To verify commutative property solve left-hand side and right-hand side separately.

LHS

$$\frac{2}{3} + \frac{3}{4} = \frac{8+9}{12}$$

LCM of 3 and 4 is 12.

$$= \frac{17}{12}$$

RHS

$$\frac{3}{4} + \frac{2}{3} = \frac{9+8}{12}$$

LCM of 4 and 3 is 12.

$$= \frac{17}{12}$$

As, LHS = RHS it verifies the commutative property with respect to addition.

(ii) $\frac{3}{5} + \frac{2}{7} = \frac{2}{7} + \frac{3}{5}$

Solution: To verify commutative property solve left-hand side and right-hand side separately.

LHS

$$\frac{3}{5} + \frac{2}{7} = \frac{21+10}{35}$$

LCM of 5 and 7 is 35.

$$= \frac{31}{35}$$

RHS

$$\frac{2}{7} + \frac{3}{5} = \frac{10+21}{35}$$

LCM of 7 and 5 is 35.

$$= \frac{31}{35}$$

As, LHS = RHS it verifies the commutative property with respect to addition.

(iii) $\frac{3}{5} + \frac{4}{7} = \frac{4}{7} + \frac{3}{5}$

Solution: To verify commutative property solve left-hand side and right-hand side separately.

LHS

$\frac{3}{5}+\frac{4}{7}=\frac{21+20}{35}$ LCM of 5 and 7 is 35.

$=\frac{41}{35}$ or $1\frac{6}{35}$

RHS

$\frac{4}{7}+\frac{3}{5}=\frac{20+21}{35}$ LCM of 7 and 5 is 35.

$=\frac{41}{35}$ or $1\frac{6}{35}$

As, LHS = RHS it verifies the commutative property with respect to addition.

(iv) $\frac{7}{8}+\frac{1}{7}=\frac{1}{7}+\frac{7}{8}$

Solution: To verify commutative property solve left-hand side and right-hand side separately.

LHS

$\frac{7}{8}+\frac{1}{7}=\frac{49+8}{56}$ LCM of 8 and 7 is 56.

$=\frac{57}{56}$

RHS

$\frac{1}{7}+\frac{7}{8}=\frac{8+49}{56}$ LCM of 7 and 8 is 56.

$=\frac{57}{56}$

As, LHS = RHS it verifies the commutative property with respect to addition.

(v) $\frac{3}{5}+\left(\frac{2}{7}+\frac{1}{4}\right)=\left(\frac{3}{5}+\frac{2}{7}\right)+\frac{1}{4}$

Solution: To verify associative property solve left-hand side and right-hand side separately.

LHS

First of all solve parentheses.

$\frac{3}{5}+\left(\frac{2}{7}+\frac{1}{4}\right)=\frac{3}{5}+\left(\frac{8+7}{28}\right)$ LCM of 7 and 4 is 28.

$=\frac{3}{5}+\frac{15}{28}$

$=\frac{84+75}{140}$ LCM of 5 and 28 is 140.

$=\frac{159}{140}$ or $1\frac{19}{140}$

RHS

First of all solve parentheses.

$\left(\frac{3}{5}+\frac{2}{7}\right)+\frac{1}{4}=\left(\frac{21+10}{35}\right)+\frac{1}{4}$ LCM of 5 and 7 is 35.

$=\frac{31}{35}+\frac{1}{4}$

$=\frac{124+35}{140}$ LCM of 35 and 4 is 140.

$=\frac{159}{140}$ or $1\frac{19}{140}$

As, LHS = RHS it verifies the commutative property with respect to addition.

(vi) $\frac{2}{9}+\left(\frac{3}{4}+\frac{1}{5}\right)=\left(\frac{2}{9}+\frac{3}{4}\right)+\frac{1}{5}$

Solution: To verify associative property solve left-hand side and right-hand side separately.

LHS

First of all solve parentheses.

$$\frac{2}{9}+\left(\frac{3}{4}+\frac{1}{5}\right)=\frac{2}{9}+\left(\frac{15+4}{20}\right) \quad \text{LCM of } 4 \text{ and } 5 \text{ is } 20.$$

$$=\frac{2}{9}+\frac{19}{20}$$

$$=\frac{40+171}{180} \quad \text{LCM of } 9 \text{ and } 20 \text{ is } 180.$$

$$=\frac{211}{180} \text{ or } 1\frac{31}{180}$$

RHS

First of all solve parentheses.

$$\left(\frac{2}{9}+\frac{3}{4}\right)+\frac{1}{5}=\left(\frac{8+27}{36}\right)+\frac{1}{5} \quad \text{LCM of } 9 \text{ and } 4 \text{ is } 36.$$

$$=\frac{35}{36}+\frac{1}{5}$$

$$=\frac{175+36}{180} \quad \text{LCM of } 36 \text{ and } 5 \text{ is } 180.$$

$$=\frac{211}{180} \text{ or } 1\frac{31}{180}$$

As, LHS = RHS it verifies the associative property with respect to addition.

(vii) $\frac{3}{5}+\left(\frac{1}{7}+\frac{2}{3}\right)=\left(\frac{3}{5}+\frac{1}{7}\right)+\frac{2}{3}$

Solution: To verify associative property solve left-hand side and right-hand side separately.

LHS

First of all solve parentheses.

$$\frac{3}{5}+\left(\frac{1}{7}+\frac{2}{3}\right)=\frac{3}{5}+\left(\frac{3+14}{21}\right) \quad \text{LCM of } 7 \text{ and } 3 \text{ is } 21.$$

$$=\frac{3}{5}+\frac{17}{21}$$

$$=\frac{63+85}{105} \quad \text{LCM of } 5 \text{ and } 21 \text{ is } 105.$$

$$=\frac{148}{105} \text{ or } 1\frac{43}{105}$$

RHS

First of all solve parentheses.

$$\left(\frac{3}{5}+\frac{1}{7}\right)+\frac{2}{3}=\left(\frac{21+5}{35}\right)+\frac{2}{3} \quad \text{LCM of } 5 \text{ and } 7 \text{ is } 35.$$

$$=\frac{26}{35}+\frac{2}{3}$$

$$=\frac{78+70}{105} \quad \text{LCM of } 35 \text{ and } 3 \text{ is } 105.$$

$$=\frac{148}{105} \text{ or } 1\frac{43}{105}$$

As, LHS = RHS it verifies the associative property with respect to addition.

5. Verify the commutative and associative property of rational numbers with respect to multiplication.

(i) $\frac{2}{3}\times\frac{3}{4}=\frac{3}{4}\times\frac{2}{3}$

Solution: To verify commutative property solve left-hand side and right-hand side separately.

LHS

$$\frac{2}{3}\times\frac{3}{4}=\frac{2\times 3}{3\times 4}$$

$$=\frac{\cancel{6}}{\cancel{12}}$$

$$=\frac{1}{2}$$

RHS

$$\frac{3}{4}\times\frac{2}{3}=\frac{3\times 2}{4\times 3}$$

$$=\frac{\cancel{6}}{\cancel{12}}$$

$$=\frac{1}{2}$$

As, LHS = RHS it verifies the commutative property with respect to multiplication.

(ii) $\frac{3}{5}\times\frac{5}{3}=\frac{5}{3}\times\frac{3}{5}$

Solution: To verify commutative property solve left-hand side and right-hand side separately.

LHS

$$\frac{3}{5}\times\frac{5}{3}=\frac{3\times 5}{5\times 3}$$
$$=\frac{\cancel{15}}{\cancel{15}}$$
$$=1$$

RHS

$$\frac{5}{3}\times\frac{3}{5}=\frac{5\times 3}{3\times 5}$$
$$=\frac{\cancel{15}}{\cancel{15}}$$
$$=1$$

As, LHS = RHS it verifies the commutative property with respect to multiplication.

(iii) $\frac{7}{8}\times\frac{11}{12}=\frac{11}{12}\times\frac{7}{8}$

Solution: To verify commutative property solve left-hand side and right-hand side separately.

LHS

$$\frac{7}{8}\times\frac{11}{12}=\frac{7\times 11}{8\times 12}$$
$$=\frac{77}{96}$$

RHS

$$\frac{11}{12}\times\frac{7}{8}=\frac{11\times 7}{12\times 8}$$
$$=\frac{77}{96}$$

As, LHS = RHS it verifies the commutative property with respect to multiplication.

(iv) $\frac{3}{5}\times\frac{4}{2}=\frac{4}{2}\times\frac{3}{5}$

Solution: To verify commutative property solve left-hand side and right-hand side separately.

LHS

$$\frac{3}{5}\times\frac{4}{2}=\frac{3\times 4}{5\times 2}$$
$$=\frac{\cancel{12}^{6}}{\cancel{10}_{5}}$$
$$=\frac{6}{5}$$

RHS

$$\frac{4}{2}\times\frac{3}{5}=\frac{4\times 3}{2\times 5}$$
$$=\frac{\cancel{12}^{6}}{\cancel{10}_{5}}$$
$$=\frac{6}{5}$$

As, LHS = RHS it verifies the commutative property with respect to multiplication.

(v) $\frac{3}{5}\times\left(\frac{2}{3}\times\frac{3}{7}\right)=\left(\frac{3}{5}\times\frac{2}{3}\right)\times\frac{3}{7}$

Solution: To verify associative property solve left-hand side and right-hand side separately.

LHS

$$\frac{3}{5}\times\left(\frac{2}{3}\times\frac{3}{7}\right)=\frac{3}{5}\times\left(\frac{2\times\cancel{3}}{\cancel{3}\times 7}\right)$$
$$=\frac{3}{5}\times\left(\frac{2}{7}\right)$$
$$=\frac{3\times 2}{5\times 7}$$
$$=\frac{6}{35}$$

RHS

$$\left(\frac{3}{5}\times\frac{2}{3}\right)\times\frac{3}{7}=\left(\frac{\cancel{3}\times 2}{5\times\cancel{3}}\right)\times\frac{3}{7}$$
$$=\left(\frac{2}{5}\right)\times\frac{3}{7}$$
$$=\frac{2\times 3}{5\times 7}$$
$$=\frac{6}{35}$$

As, LHS = RHS it verifies the associative property with respect to multiplication.

(vi) $\frac{1}{2}\times\left(\frac{3}{4}\times\frac{5}{7}\right)=\left(\frac{1}{2}\times\frac{3}{4}\right)\times\frac{5}{7}$

Solution: To verify associative property solve left-hand side and right-hand side separately.

LHS

$$\frac{1}{2}\times\left(\frac{3}{4}\times\frac{5}{7}\right)=\frac{1}{2}\times\left(\frac{3\times 5}{4\times 7}\right)$$
$$=\frac{1}{2}\times\left(\frac{15}{28}\right)$$
$$=\frac{1\times 15}{2\times 28}$$
$$=\frac{15}{56}$$

RHS

$$\left(\frac{1}{2}\times\frac{3}{4}\right)\times\frac{5}{7}=\left(\frac{1\times 3}{2\times 4}\right)\times\frac{5}{7}$$
$$=\left(\frac{3}{8}\right)\times\frac{5}{7}$$
$$=\frac{3\times 5}{8\times 7}$$
$$=\frac{15}{56}$$

As, LHS = RHS it verifies the associative property with respect to multiplication.

6. Verify the distributive property of multiplication over addition for rational numbers.

(i) $\frac{2}{3}\times\left(\frac{3}{4}+\frac{3}{7}\right)=\left(\frac{2}{3}\times\frac{3}{4}\right)+\left(\frac{2}{3}\times\frac{3}{7}\right)$

Solution: To verify distributive property of multiplication over addition solve left-hand side and right-hand side separately.

LHS

$$\frac{2}{3}\times\left(\frac{3}{4}+\frac{3}{7}\right)=\frac{2}{3}\times\left(\frac{21+12}{28}\right)\ \text{LCM of } 4 \text{ and } 7 \text{ is } 28.$$
$$=\frac{2}{3}\times\left(\frac{33}{28}\right)$$
$$=\frac{\cancel{2}}{\cancel{3}}\times\frac{\cancel{33}^{11}}{\cancel{28}_{14}}$$
$$=\frac{11}{14}$$

RHS

$$\left(\frac{2}{3}\times\frac{3}{4}\right)+\left(\frac{2}{3}\times\frac{3}{7}\right)=\left(\frac{2\times 3}{3\times 4}\right)+\left(\frac{2\times 3}{3\times 7}\right)$$
$$=\left(\frac{\cancel{2}\times\cancel{3}^{1}}{\cancel{3}\times\cancel{4}_{2}}\right)+\left(\frac{2\times\cancel{3}}{\cancel{3}\times 7}\right)$$
$$=\frac{1}{2}+\frac{2}{7}\ \text{LCM of } 2 \text{ and } 7 \text{ is } 14.$$
$$=\frac{7+4}{14}=\frac{11}{14}$$

As, LHS = RHS it verifies the distributive property of multiplication over addition.

(ii) $\frac{3}{4}\times\left(\frac{4}{5}+\frac{6}{7}\right)=\left(\frac{3}{4}\times\frac{4}{5}\right)+\left(\frac{3}{4}\times\frac{6}{7}\right)$

Solution: To verify distributive property of multiplication over addition solve left-hand side and right-hand side separately.

LHS

$$\frac{3}{4}\times\left(\frac{4}{5}+\frac{6}{7}\right)=\frac{3}{4}\times\left(\frac{28+30}{35}\right)\text{ LCM of 5 and 7 is 35.}$$
$$=\frac{3}{4}\times\left(\frac{58}{35}\right)$$
$$=\frac{3}{\cancel{4}_{2}}\times\frac{\cancel{58}^{29}}{35}$$
$$=\frac{3\times 29}{2\times 35}$$
$$=\frac{87}{70}$$

RHS

$$\left(\frac{3}{4}\times\frac{4}{5}\right)+\left(\frac{3}{4}\times\frac{6}{7}\right)=\left(\frac{3\times\cancel{4}}{\cancel{4}\times 5}\right)+\left(\frac{3\times\cancel{6}^{3}}{{}_{2}\cancel{4}\times 7}\right)$$
$$=\frac{3}{5}+\left(\frac{3\times 3}{2\times 7}\right)$$
$$=\frac{3}{5}+\frac{9}{14}$$
$$=\frac{42+45}{70}\text{ LCM of 5 and 14 is 70.}$$
$$=\frac{87}{70}$$

As, LHS = RHS it verifies the distributive property of multiplication over addition.

(iii) $\frac{5}{7}\times\left(\frac{3}{4}+\frac{2}{5}\right)=\left(\frac{5}{7}\times\frac{3}{4}\right)+\left(\frac{5}{7}\times\frac{2}{5}\right)$

Solution: To verify distributive property of multiplication over addition solve left-hand side and right-hand side separately.

LHS

$$\frac{5}{7}\times\left(\frac{3}{4}+\frac{2}{5}\right)=\frac{5}{7}\times\left(\frac{15+8}{20}\right)\text{ LCM of 4 and 5 is 20.}$$
$$=\frac{5}{7}\times\frac{23}{20}$$
$$=\frac{{}^{1}\cancel{5}}{7}\times\frac{23}{\cancel{20}_{4}}$$
$$=\frac{1\times 23}{7\times 4}$$
$$=\frac{23}{28}$$

RHS

$$\left(\frac{5}{7}\times\frac{3}{4}\right)+\left(\frac{5}{7}\times\frac{2}{5}\right)=\left(\frac{5\times 3}{7\times 4}\right)+\left(\frac{\cancel{5}\times 2}{7\times\cancel{5}}\right)$$
$$=\frac{15}{28}+\frac{2}{7}$$
$$=\frac{15+8}{28}\text{ LCM of 28 and 7 is 28.}$$
$$=\frac{23}{28}$$

As, LHS = RHS it verifies the distributive property of multiplication over addition.

(iv) $\frac{1}{7}\times\left(\frac{1}{3}+\frac{1}{2}\right)=\left(\frac{1}{7}\times\frac{1}{3}\right)+\left(\frac{1}{7}\times\frac{1}{2}\right)$

Solution: To verify distributive property of multiplication over addition solve left-hand side and right-hand side separately.

LHS

$$\frac{1}{7}\times\left(\frac{1}{3}+\frac{1}{2}\right)=\frac{1}{7}\times\left(\frac{2+3}{6}\right)\text{LCM of 3 and 2 is 6.}$$
$$=\frac{1}{7}\times\frac{5}{6}$$
$$=\frac{1\times5}{7\times6}$$
$$=\frac{5}{42}$$

RHS

$$\left(\frac{1}{7}\times\frac{1}{3}\right)+\left(\frac{1}{7}\times\frac{1}{2}\right)=\left(\frac{1\times1}{7\times3}\right)+\left(\frac{1\times1}{7\times2}\right)$$
$$=\frac{1}{21}+\frac{1}{14}$$
$$=\frac{2+3}{42}\text{LCM of 21 and 14 is 42.}$$
$$=\frac{5}{42}$$

As, LHS = RHS it verifies the distributive property of multiplication over addition.

(v) $\frac{3}{8}\times\left(\frac{2}{5}-\frac{3}{7}\right)=\left(\frac{3}{8}\times\frac{2}{5}\right)-\left(\frac{3}{8}\times\frac{3}{7}\right)$

Solution: To verify distributive property of multiplication over addition solve left-hand side and right-hand side separately.

LHS

$$\frac{3}{8}\times\left(\frac{2}{5}-\frac{3}{7}\right)=\frac{3}{8}\times\left(\frac{14-15}{35}\right)\text{LCM of 5 and 7 is 35.}$$
$$=\frac{3}{8}\times\left(-\frac{1}{35}\right)$$
$$=-\frac{3\times1}{8\times35}$$
$$=-\frac{3}{280}$$

RHS

$$\left(\frac{3}{8}\times\frac{2}{5}\right)-\left(\frac{3}{8}\times\frac{3}{7}\right)=\left(\frac{3\times\cancel{2}^{1}}{\cancel{8}_{4}\times5}\right)-\left(\frac{3\times3}{8\times7}\right)$$
$$=\frac{3}{20}-\frac{9}{56}$$
$$=\frac{42-45}{280}\text{LCM of 20 and 56 is 280.}$$
$$=-\frac{3}{280}$$

As, LHS = RHS it verifies the distributive property of multiplication over subtraction.

(vi) $\frac{5}{9}\times\left(\frac{3}{7}-\frac{2}{11}\right)=\left(\frac{5}{9}\times\frac{3}{7}\right)-\left(\frac{5}{9}\times\frac{2}{11}\right)$

Solution: To verify distributive property of multiplication over addition solve left-hand side and right-hand side separately.

LHS

$$\frac{5}{9}\times\left(\frac{3}{7}-\frac{2}{11}\right)=\frac{5}{9}\times\left(\frac{33-14}{77}\right)\text{LCM of 7 and 11 is 77.}$$
$$=\frac{5}{9}\times\frac{19}{77}$$
$$=\frac{5\times19}{9\times77}$$
$$=\frac{95}{693}$$

RHS

$$\left(\frac{5}{9}\times\frac{3}{7}\right)-\left(\frac{5}{9}\times\frac{2}{11}\right)=\left(\frac{5\times\cancel{3}^{1}}{\cancel{9}_{3}\times7}\right)-\left(\frac{5\times2}{9\times11}\right)$$
$$=\frac{5}{21}-\frac{10}{99}$$
$$=\frac{165-70}{693}\text{LCM of 21 and 99 is 693.}$$
$$=\frac{95}{693}$$

As, LHS = RHS it verifies the distributive property of multiplication over subtraction.

7. Reduce the following common fractions in lowest form.

(i) $\frac{12}{18}$

Solution: To reduce a fraction in the lowest form, divide its numerator and denominator by a common divisor until you get coprime numbers (in numerator and denominator).

$$\frac{12}{18} = \frac{12 \div 6}{18 \div 6}$$
$$= \frac{2}{3}$$

Hence, $\frac{2}{3}$ is the lowest form of $\frac{12}{18}$.

(ii) $\frac{18}{24}$

Solution: To reduce a fraction in the lowest form, divide its numerator and denominator by a common divisor until you get coprime numbers (in numerator and denominator).

$$\frac{18}{24} = \frac{18 \div 6}{24 \div 6}$$
$$= \frac{3}{4}$$

Hence, $\frac{3}{4}$ is the lowest form of $\frac{18}{24}$.

(iii) $\frac{15}{45}$

Solution: To reduce a fraction in the lowest form, divide its numerator and denominator by a common divisor until you get coprime numbers (in numerator and denominator).

$$\frac{15}{45} = \frac{15 \div 3}{45 \div 3} = \frac{5}{15}$$

Divide again by 5

$$\frac{5}{15} = \frac{5 \div 5}{15 \div 5} = \frac{1}{3}$$

Hence, $\frac{1}{3}$ is the lowest form of $\frac{15}{45}$.

(iv) $\frac{21}{63}$

Solution: To reduce a fraction in the lowest form, divide its numerator and denominator by a common divisor until you get coprime numbers (in numerator and denominator).

$$\frac{21}{63} = \frac{21 \div 3}{63 \div 3} = \frac{7}{21}$$

Divide again by 7

$$\frac{7}{21} = \frac{7 \div 7}{21 \div 7} = \frac{1}{3}$$

Hence, $\frac{1}{3}$ is the lowest form of $\frac{21}{63}$.

(v) $\frac{35}{15}$

Solution: To reduce a fraction in the lowest form, divide its numerator and denominator by a common divisor until you get coprime numbers (in numerator and denominator).

$$\frac{35}{15} = \frac{35 \div 5}{15 \div 5}$$
$$= \frac{7}{3}$$

Hence, $\frac{7}{3}$ is the lowest form of $\frac{35}{15}$.

(vi) $\frac{132}{99}$

Solution: To reduce a fraction in the lowest form, divide its numerator and denominator by a common divisor until you get coprime numbers (in numerator and denominator).

$$\frac{132}{99} = \frac{132 \div 3}{99 \div 3} = \frac{44}{33}$$

Divide again by 11

$$\frac{44}{33} = \frac{44 \div 11}{33 \div 11} = \frac{4}{3}$$

Hence, $\frac{4}{3}$ is the lowest form of $\frac{35}{15}$.

8. Convert the following unlike fractions into like fractions.

(i) $\frac{1}{7}, \frac{2}{3}$

Solution: To convert the given fractions into like fractions just make the same denominators of both fractions by multiplication.

Step-1 Take LCM of denominators 7 and 3.

LCM = 7 × 3 = 21

Step-2 Make denominators of both fractions as 21.

$\frac{1}{7} = \frac{1\times3}{7\times3} = \frac{3}{21}$ Multiply numerator and denominator by 3

$\frac{2}{3} = \frac{2\times7}{3\times7} = \frac{14}{21}$ Multiply numerator and denominator by 7

Hence, $\frac{3}{21}$ and $\frac{14}{21}$ are like fractions.

(ii) $\frac{3}{5}, \frac{2}{7}$

Solution: To convert the given fractions into like fractions just make the same denominators of both fractions by multiplication.

Step-1 Take LCM of denominators 5 and 7.

LCM = 5 × 7 = 35

Step-2 Make denominators of both fractions as 35.

$\frac{3}{5} = \frac{3\times7}{5\times7} = \frac{21}{35}$ Multiply numerator and denominator by 7

$\frac{2}{7} = \frac{2\times5}{7\times5} = \frac{10}{35}$ Multiply numerator and denominator by 5

Hence, $\frac{21}{35}$ and $\frac{10}{35}$ are like fractions.

(iii) $\frac{3}{14}, \frac{8}{21}$

Solution: To convert the given fractions into like fractions just make the same denominators of both fractions by multiplication.

Step-1 Take LCM of denominators 14 and 21.

LCM = 2 × 3 × 7 = 42

2	14, 21
3	7, 21
7	7, 7
	1, 1

Step-2 Make denominators of both fractions as 42.

$\frac{3}{14} = \frac{3\times3}{14\times3} = \frac{9}{42}$ Multiply numerator and denominator by 3

$\frac{8}{21} = \frac{8\times2}{21\times2} = \frac{16}{42}$ Multiply numerator and denominator by 2

Hence, $\frac{9}{42}$ and $\frac{16}{42}$ are like fractions.

(iv) $\frac{1}{3}, \frac{11}{12}$

Solution: To convert the given fractions into like fractions just make the same denominators of both fractions by multiplication.

Step-1 Take LCM of denominators 3 and 12.

LCM = 2 × 2 × 3 = 12

2	3, 12
2	3, 6
3	3, 3
	1, 1

Step-2 Make denominators of both fractions as 12.

$\frac{1}{3} = \frac{1\times4}{3\times4} = \frac{4}{12}$ Multiply numerator and denominator by 4

There is no need to change $\frac{11}{12}$.

Hence, $\frac{4}{12}$ and $\frac{11}{12}$ are like fractions.

(v) $\frac{12}{19}, \frac{13}{57}$

Solution: To convert the given fractions into like fractions just make the same denominators of both fractions by multiplication.

Step-1 Take LCM of denominators 19 and 57.

19	19, 57
3	1, 3
	1, 1

LCM = 19 × 3 = 57

Step-2 Make denominators of both fractions as 57.

$\frac{12}{19} = \frac{12\times3}{19\times3} = \frac{36}{57}$ Multiply numerator and denominator by 3

There is no need to change $\frac{13}{57}$.

Hence, $\frac{36}{57}$ and $\frac{13}{57}$ are like fractions.

(vi) $\frac{1}{5}, \frac{3}{11}$

Solution: To convert the given fractions into like fractions just make the same denominators of both fractions by multiplication.

Step-1 Take LCM of denominators 5 and 11.

LCM = 5 × 11 = 55

Step-2 Make denominators of both fractions as 55.

$\frac{1}{5} = \frac{1\times11}{5\times11} = \frac{11}{55}$ Multiply numerator and denominator by 11

$\frac{3}{11} = \frac{3\times5}{11\times5} = \frac{15}{55}$ Multiply numerator and denominator by 5

Hence, $\frac{11}{55}$ and $\frac{15}{55}$ are like fractions.

9. Convert the following mixed fractions into improper fractions.

(i) $2\frac{1}{3}$

Solution: To convert mixed fraction into improper fraction, multiply denominator by whole number part and add the answer in the numerator but denominator remains unchanged.

$$2\frac{1}{3} = \frac{(3\times 2)+1}{3}$$
$$= \frac{7}{3}$$

(ii) $3\frac{1}{4}$

Solution: To convert mixed fraction into improper fraction, multiply denominator by whole number part and add the answer in the numerator but denominator remains unchanged.

$$3\frac{1}{4} = \frac{(4\times 3)+1}{4}$$
$$= \frac{13}{4}$$

(iii) $4\frac{1}{3}$

Solution: To convert mixed fraction into improper fraction, multiply denominator by whole number part and add the answer in the numerator but denominator remains unchanged.

$$4\frac{1}{3} = \frac{(3\times 4)+1}{3}$$
$$= \frac{13}{3}$$

(iv) $5\frac{1}{2}$

Solution: To convert mixed fraction into improper fraction, multiply denominator by whole number part and add the answer in the numerator but denominator remains unchanged.

$$5\frac{1}{2} = \frac{(2\times 5)+1}{2}$$
$$= \frac{11}{2}$$

(v) $7\frac{1}{3}$

Solution: To convert mixed fraction into improper fraction, multiply denominator by whole number part and add the answer in the numerator but denominator remains unchanged.

$$7\frac{1}{3} = \frac{(3\times 7)+1}{3}$$
$$= \frac{22}{3}$$

(vi) $8\frac{1}{2}$

Solution: To convert mixed fraction into improper fraction, multiply denominator by whole number part and add the answer in the numerator but denominator remains unchanged.

$$8\frac{1}{2} = \frac{(2\times 8)+1}{2}$$
$$= \frac{17}{2}$$

10. Convert the following improper fractions into the mixed fractions.

(i) $\frac{12}{5}$

Solution: To convert improper fraction into mixed fraction divide the numerator by the denominator and write it as:

$$\text{Quotient}\ \frac{\text{Remainder}}{\text{Divisor}}$$

$$\frac{12}{5} = 2\frac{2}{5}$$

$$5\overline{)\,12}\ 2$$
$$-10$$
$$2$$

(ii) $\frac{17}{8}$

Solution: To convert improper fraction into mixed fraction divide the numerator by the denominator and write it as:

$$\text{Quotient}\ \frac{\text{Remainder}}{\text{Divisor}}$$

$$\frac{17}{8} = 2\frac{1}{8}$$

$$8\overline{)\,17}\ 2$$
$$-16$$
$$1$$

(iii) $\frac{25}{11}$

Solution: To convert improper fraction into mixed fraction divide the numerator by the denominator and write it as:

$$\text{Quotient}\ \frac{\text{Remainder}}{\text{Divisor}}$$

$$\frac{25}{11} = 2\frac{3}{11}$$

$$\begin{array}{r} 2 \\ 11\overline{)\ 25} \\ -22 \\ \hline 3 \end{array}$$

(iv) $\frac{18}{11}$

Solution: To convert improper fraction into mixed fraction divide the numerator by the denominator and write it as:

$$\text{Quotient}\ \frac{\text{Remainder}}{\text{Divisor}}$$

$$\frac{18}{11} = 1\frac{7}{11}$$

$$\begin{array}{r} 1 \\ 11\overline{)\ 18} \\ -11 \\ \hline 7 \end{array}$$

(v) $\frac{19}{14}$

Solution: To convert improper fraction into mixed fraction divide the numerator by the denominator and write it as:

$$\text{Quotient}\ \frac{\text{Remainder}}{\text{Divisor}}$$

$$\frac{19}{14} = 1\frac{5}{14}$$

$$\begin{array}{r} 1 \\ 14\overline{)\ 19} \\ -14 \\ \hline 5 \end{array}$$

(vi) $\frac{13}{7}$

Solution: To convert improper fraction into mixed fraction divide the numerator by the denominator and write it as:

$$\text{Quotient}\ \frac{\text{Remainder}}{\text{Divisor}}$$

$$\frac{13}{7} = 1\frac{6}{7}$$

$$\begin{array}{r} 1 \\ 7\overline{)\ 13} \\ -7 \\ \hline 6 \end{array}$$

Exercise 1.2

1. Compare the integers using the symbols '>', '<' or '='.

(i) $-312, -419$

Solution: In case of two negative integers, take the absolute value of both integers. The integer whose absolute value is greater will be smaller.

$$|-312| = 312, \quad |-419| = 419$$

Here 419 > 312

It means $-312 > -419$ or $-419 < -312$

(ii) 12134, 21213

Solution: In case of two positive integers, write both integers in place value chart.

T-Th	Th	H	T	O
1	2	1	3	4

T-Th	Th	H	T	O
2	1	2	1	3

Start comparing from most left place value.

Here 1 < 2 it shows 12134 < 21213

(iii) 78935, 78935

Solution: In case of two positive integers, write both integers in place value chart.

T-Th	Th	H	T	O
7	8	9	3	5

T-Th	Th	H	T	O
7	8	9	3	5

Start comparing from most left place value.

At ten thousand place 7 = 7 so compare next place value.

At thousands place 8 = 8 so compare next place value.

At hundreds place 9 = 9 so compare next place value.

At tens place 3 = 3 so compare next place value.

At ones place 5 = 5.

It means, 78935 = 78935.

(iv) −2123, 412

Solution: In the case of a positive integer and a negative integer, negative integer is always less than a positive integer.

It means, −2123 < 412 or 412 > −2123.

(v) −21345, −31405

Solution: In case of two negative integers, take the absolute value of both integers.

$|-21345| = 21345, \quad |-31405| = 31405$

write both integers in place value chart.

T-Th	Th	H	T	O
2	1	3	4	5

T-Th	Th	H	T	O
3	1	4	0	5

Start comparing from most left place value.

At ten thousand place 2 < 3 it shows 21345 < 31405.

So, −21345 > −31405

(vi) 87345, 97134

Solution: In case of two positive integers, write both integers in place value chart.

T-Th	Th	H	T	O
8	7	3	4	5

T-Th	Th	H	T	O
9	7	1	3	4

Start comparing from most left place value.

At ten thousand place 8 < 9 it shows 87345 < 97134.

2. Compare the following decimal numbers using the symbols '>', '<' or '='.

(i) 2.58, 2.59

Solution: In case of two decimal numbers, write both decimal numbers in the place value chart.

Ones	Decimal point	Tenths	Hundredths
2	.	5	8

Ones	Decimal point	Tenths	Hundredths
2	.	5	9

Start comparing from most left place values.

At ones place 2 = 2 so compare next place value.

At tenths place 5 = 5 so compare next place value.

At hundredths place 8 < 9.

It means, 2.58 < 2.59 or 2.59 > 2.58.

Remember
'>' Greater than
'<' Less than
'=' Equal

(ii) 3.45, 4.12

Solution: In case of two decimal numbers, write both decimal numbers in the place value chart.

Ones	Decimal point	Tenths	Hundredths
3	.	4	5

Ones	Decimal point	Tenths	Hundredths
4	.	1	2

Start comparing from most left place values.

At ones place 3 < 4.

It means, 3.45 < 4.12 or 4.12 > 3.45.

(iii) 7.28, 7.38

Solution: In case of two decimal numbers, write both decimal numbers in the place value chart.

Ones	Decimal point	Tenths	Hundredths
7	.	2	8

Ones	Decimal point	Tenths	Hundredths
7	.	3	8

Start comparing from most left place values.

At ones place 7 = 7 so compare next place value.

At tenths place 2 < 3.

It means, 7.28 < 7.38 or 7.38 > 7.28.

(iv) 0.23, 0.29

Solution: In case of two decimal numbers, write both decimal numbers in the place value chart.

Ones	Decimal point	Tenths	Hundredths
0	.	2	3

Ones	Decimal point	Tenths	Hundredths
0	.	2	9

Start comparing from most left place values.

At ones place 0 = 0 so compare next place value.

At tenths place 2 = 2 so compare next place value.

At hundredth place 3 < 9.

It means, 0.23 < 0.29 or 0.29 > 0.23.

(v) 1.08, 2.11

Solution: In case of two decimal numbers, write both decimal numbers in the place value chart.

Ones	Decimal point	Tenths	Hundredths
1	.	0	8

Ones	Decimal point	Tenths	Hundredths
2	.	1	1

Start comparing from most left place values.

At ones place 1 < 2 so there is no need to compare all other places.

It means, 1.08 < 2.11 or 2.11 > 1.08.

(vi) 5.78, 5.78

Solution: In case of two decimal numbers, write both decimal numbers in the place value chart.

Ones	Decimal point	Tenths	Hundredths
5	.	7	8

Ones	Decimal point	Tenths	Hundredths
5	.	7	8

Start comparing from most left place values.

At ones place 5 = 5 so compare next place value.

At tenths place 7 = 7 so compare next place value.

At hundredth place 8 = 8.

It means, 5.78 = 5.78.

3. Compare the following rational numbers using the symbols '>', '<' or '='.

(i) $\frac{8}{9}, \frac{9}{8}$

Solution: Here rational numbers are represented by unlike fractions. To compare two unlike fractions:

Step-1 Make like fractions by making same denominators.

$$\frac{8}{9} = \frac{8\times 8}{9\times 8} = \frac{64}{72}$$ Multiply numerator and denominator by 8

$$\frac{9}{8} = \frac{9\times 9}{8\times 9} = \frac{81}{72}$$ Multiply numerator and denominator by 9

Step-2 Compare numerators of like fractions.

In $\frac{64}{72}, \frac{81}{72}$ we see 64 < 81. It shows $\frac{64}{72} < \frac{81}{72}$ that means $\frac{8}{9} < \frac{9}{8}$.

(ii) $\frac{7}{12}, \frac{9}{14}$

Solution: Here rational numbers are represented by unlike fractions. To compare two unlike fractions:

Step-1 Make like fractions by making same denominators.

Take LCM of 12 and 14

2	12, 14
2	6, 7
3	3, 7
7	1, 7
	1, 1

LCM = 2 × 2 × 3 × 7 = 84

Step-2 Make denominators of both fractions as 84.

$\frac{7}{12} = \frac{7\times7}{12\times7} = \frac{49}{84}$ Multiply numerator and denominator by 7

$\frac{9}{14} = \frac{9\times6}{14\times6} = \frac{54}{84}$ Multiply numerator and denominator by 6

Step-3 Compare numerators of like fractions.

In $\frac{49}{84}, \frac{54}{84}$ we see 49 < 54. It shows $\frac{49}{84} < \frac{54}{84}$ that means $\frac{7}{12} < \frac{9}{14}$.

(iii) $\frac{11}{12}, \frac{13}{14}$

Solution: Here rational numbers are represented by unlike fractions. To compare two unlike fractions:

Step-1 Make like fractions by making same denominators.

Take LCM of 12 and 14

2	12, 14
2	6, 7
3	3, 7
7	1, 7
	1, 1

LCM = 2 × 2 × 3 × 7 = 84

Step-2 Make denominators of both fractions as 84.

$\frac{11}{12} = \frac{11\times7}{12\times7} = \frac{77}{84}$ Multiply numerator and denominator by 7

$\frac{13}{14} = \frac{13\times6}{14\times6} = \frac{78}{84}$ Multiply numerator and denominator by 6

Step-3 Compare numerators of like fractions.

In $\frac{77}{84}, \frac{78}{84}$ we see 77 < 78. It shows $\frac{77}{84} < \frac{78}{84}$ that means $\frac{11}{12} < \frac{13}{14}$.

(iv) $\frac{5}{8}, \frac{10}{16}$

Solution: Here rational numbers are represented by unlike fractions. To compare two unlike fractions:

Step-1 Make like fractions by making same denominators.

Take LCM of 8 and 16

2	8, 16
2	4, 8
2	2, 4
2	1, 2
	1, 1

LCM = 2 × 2 × 2 × 2 = 16

Step-2 Make denominators of both fractions as 16.

$$\frac{5}{8}=\frac{5\times2}{8\times2}=\frac{10}{16}$$ Multiply numerator and denominator by 2

Step-3 Compare numerators of like fractions.

In $\frac{10}{16},\frac{10}{16}$ we see 10 = 10. It shows $\frac{10}{16}=\frac{10}{16}$ that means $\frac{5}{8}=\frac{10}{16}$.

(v) $\frac{5}{7},\frac{7}{8}$

Solution: Here rational numbers are represented by unlike fractions. To compare two unlike fractions:

Step-1 Make like fractions by making same denominators.

Take LCM of 7 and 8

LCM = 7 × 2 × 2 × 2 = 56

7	7, 8
2	1, 8
2	1, 4
2	1, 2
	1, 1

Step-2 Make denominators of both fractions as 56.

$$\frac{5}{7}=\frac{5\times8}{7\times8}=\frac{40}{56}$$ Multiply numerator and denominator by 8

$$\frac{7}{8}=\frac{7\times7}{8\times7}=\frac{49}{56}$$ Multiply numerator and denominator by 7

Step-3 Compare numerators of like fractions.

In $\frac{40}{56},\frac{49}{56}$ we see 40 < 49. It shows $\frac{40}{56}<\frac{49}{56}$ that means $\frac{5}{7}<\frac{7}{8}$.

(vi) $\frac{1}{9},\frac{5}{18}$

Solution: Here rational numbers are represented by unlike fractions. To compare two unlike fractions:

Step-1 Make like fractions by making same denominators.

Take LCM of 9 and 18

LCM = 2 × 3 × 3 = 18

2	9, 18
3	9, 9
3	3, 3
	1, 1

Step-2 Make denominators of both fractions as 18.

$$\frac{1}{9}=\frac{1\times2}{9\times2}=\frac{2}{18}$$ Multiply numerator and denominator by 2

Step-3 Compare numerators of like fractions.

In $\frac{2}{18},\frac{5}{18}$ we see 2 < 5. It shows $\frac{2}{18}<\frac{5}{18}$ that means $\frac{1}{9}<\frac{5}{18}$.

4. Arrange the following integers in ascending and descending order.

(i) 2134, −3145, 4132, 2134

Solution: Arrangement of integers from smallest to largest is called ascending order. So first find the smallest and the largest number.

−3145 is the smallest integer because it is negative in all.

4132 is the largest integer because its ones place is largest.

Now compare 2134 and 2134 and both integers are equal.

Ascending Order: −3145, 2134, 2134, 4132 **Descending Order:** 4132, 2134, 2134, −3145

(ii) 5678, 2345, 135, −1367, −2134

Solution: Arrangement of integers from smallest to largest is called ascending order. So first find the smallest and the largest number.

Here two integers are negative so to compare them take absolute value of both.

$|-1367| = 1367, \quad |-2134| = 2134$ and 1367 < 2134 but −1367 > −2134

−2134 is the smallest integer and 5678 is the largest integer.

Now compare all other integers and arrange.

Ascending Order: −2134, −1367, 135, 2345, 5678 **Descending Order:** 5678, 2345, 135, −1367, −2134

(iii) 414, −5151, −6161, 212, 20

Solution: Arrangement of integers from smallest to largest is called ascending order. So first find the smallest and the largest number.

Here two integers are negative so to compare them take absolute value of both.

$|-5151| = 5151, \quad |-6161| = 6161$ and 5151 < 6161 but −5151 > −6161

−6161 is the smallest integer and 414 is the largest integer.

Now compare all other integers and arrange.

Ascending Order: −6161, −5151, 20, 212, 414 **Descending Order:** 414, 212, 20, −5151, −6161

5. Arrange the following decimal numbers ascending and descending order.

(i) 0.58, 2.35, 3.25, 3.28, 0.68

Solution: Arrangement of decimal numbers from largest to smallest is called descending order. So first find the largest and smallest decimal number.

Here, 3.28 > 3.25 > 2.35 > 0.68 > 0.58. So,

Ascending Order: 0.58, 0.68, 2.35, 3.25, 3.28 **Descending Order:** 3.28, 3.25, 2.35, 0.68, 0.58

(ii) 0.49, 2.31, 3.21, 4.78, 7.48

Solution: Arrangement of decimal numbers from largest to smallest is called descending order. So first find the largest and smallest decimal number.

Here, 7.48 > 4.78 > 3.21 > 2.31 > 0.49. So,

Ascending Order: 0.49, 2.31, 3.21, 4.78, 7.48 **Descending Order:** 7.48, 4.78, 3.21, 2.31, 0.49

(iii) 1.21, 3.12, 1.94, 2.34, −3.41

Solution: Arrangement of decimal numbers from largest to smallest is called descending order. So first find the largest and smallest decimal number.

Here, 3.12 > 2.34 > 1.94 > 1.21 > −3.41. So,

Ascending Order: −3.41, 1.21, 1.94, 2.34, 3.12 **Descending Order:** 3.12, 2.34, 1.94, 1.21, −3.41

6. Arrange the following rational numbers in ascending and descending order.

(i) $\frac{5}{7}, \frac{7}{5}, \frac{3}{2}, \frac{3}{4}, \frac{7}{6}$

Solution: To arrange rational numbers in ascending order:

Step-1 Make like fractions by making same denominators.

Take LCM of denominators 7, 5, 2, 4, 6.

2	7, 5, 2, 4, 6
2	7, 5, 1, 2, 3
3	7, 5, 1, 1, 3
5	7, 5, 1, 1, 1
7	7, 1, 1, 1, 1
	1, 1, 1, 1, 1

LCM = 2 × 2 × 3 × 5 × 7 = 420

Step-2 Make denominators of all fractions as 420.

$\frac{5}{7} = \frac{5\times60}{7\times60} = \frac{300}{420}$ Multiply numerator and denominator by 60

$\frac{7}{5} = \frac{7\times84}{5\times84} = \frac{588}{420}$ Multiply numerator and denominator by 84

$\frac{3}{2} = \frac{3\times210}{2\times210} = \frac{630}{420}$ Multiply numerator and denominator by 210

$\frac{3}{4} = \frac{3\times105}{4\times105} = \frac{315}{420}$ Multiply numerator and denominator by 105

$\frac{7}{6} = \frac{7\times70}{6\times70} = \frac{490}{420}$ Multiply numerator and denominator by 70

Step-3 Compare numerators of like fractions.

In $\frac{300}{420}, \frac{588}{420}, \frac{630}{420}, \frac{315}{420}, \frac{490}{420}$ we see 300 < 315 < 490 < 588 < 630.

It shows $\frac{300}{420} < \frac{315}{420} < \frac{490}{420} < \frac{588}{420} < \frac{630}{420}$ that means $\frac{5}{7} < \frac{3}{4} < \frac{7}{6} < \frac{7}{5} < \frac{3}{2}$.

Ascending Order: $\frac{5}{7}, \frac{3}{4}, \frac{7}{6}, \frac{7}{5}, \frac{3}{2}$ **Descending Order:** $\frac{3}{2}, \frac{7}{5}, \frac{7}{6}, \frac{3}{4}, \frac{5}{7}$

(ii) $\frac{5}{7}, \frac{4}{5}, \frac{3}{10}, \frac{4}{3}$

Solution: To arrange rational numbers in ascending order:

Step-1 Make like fractions by making same denominators.

Take LCM of denominators 7, 5, 10, 3.

LCM = 2 × 3 × 5 × 7 = 210

2	7, 5, 10, 3
3	7, 5, 5, 3
5	7, 5, 5, 1
7	7, 1, 1, 1
	1, 1, 1, 1, 1

Step-2 Make denominators of all fractions as 210.

$\frac{5}{7}=\frac{5\times30}{7\times30}=\frac{150}{210}$ Multiply numerator and denominator by 30

$\frac{4}{5}=\frac{4\times42}{5\times42}=\frac{168}{210}$ Multiply numerator and denominator by 42

$\frac{3}{10}=\frac{3\times21}{10\times21}=\frac{63}{210}$ Multiply numerator and denominator by 21

$\frac{4}{3}=\frac{4\times70}{3\times70}=\frac{280}{210}$ Multiply numerator and denominator by 70

Step-3 Compare numerators of like fractions.

In $\frac{150}{210},\frac{168}{210},\frac{63}{210},\frac{280}{210}$ we see 63 < 150 < 168 < 280.

It shows $\frac{63}{210}<\frac{150}{210}<\frac{168}{210}<\frac{280}{210}$ that means $\frac{3}{10}<\frac{5}{7}<\frac{4}{5}<\frac{4}{3}$.

Ascending Order: $\frac{3}{10},\frac{5}{7},\frac{4}{5},\frac{4}{3}$ **Descending Order:** $\frac{4}{3},\frac{4}{5},\frac{5}{7},\frac{3}{10}$

(iii) $\frac{11}{12},\frac{3}{2},\frac{4}{5},\frac{5}{4}$

Solution: To arrange rational numbers in ascending order:

Step-1 Make like fractions by making same denominators.

Take LCM of denominators 12, 2, 5, 4.

LCM = 2 × 2 × 3 × 5 = 60

2	12, 2, 5, 4
2	6, 1, 5, 2
3	3, 1, 5, 1
5	1, 1, 5, 1
	1, 1, 1, 1

Step-2 Make denominators of all fractions as 60.

$\frac{11}{12}=\frac{11\times5}{12\times5}=\frac{55}{60}$ Multiply numerator and denominator by 5

$\frac{3}{2}=\frac{3\times30}{2\times30}=\frac{90}{60}$ Multiply numerator and denominator by 30

$\frac{4}{5}=\frac{4\times12}{5\times12}=\frac{48}{60}$ Multiply numerator and denominator by 12

$\frac{5}{4}=\frac{5\times15}{4\times15}=\frac{75}{60}$ Multiply numerator and denominator by 15

Step-3 Compare numerators of like fractions.

In $\frac{55}{60},\frac{90}{60},\frac{48}{60},\frac{75}{60}$ we see 48 < 55 < 75 < 90.

It shows $\frac{48}{60}<\frac{55}{60}<\frac{75}{60}<\frac{90}{60}$ that means $\frac{4}{5}<\frac{11}{12}<\frac{5}{4}<\frac{3}{2}$.

Ascending Order: $\frac{4}{5},\frac{11}{12},\frac{5}{4},\frac{3}{2}$ **Descending Order:** $\frac{3}{2},\frac{5}{4},\frac{11}{12},\frac{4}{5}$

Exercise 1.3

1. Round off the given rational numbers to 3 decimal places.

(i) $\frac{11}{7}$

Solution: To round off given rational number divide the numerator by the denominator.

$$7\overline{)\,11.0000}\;1.5714$$

-7, 40, -35, 50, -49, 10, -7, 30, -28, 2

Now, $\frac{11}{7} = 1.5714$

If we round off it to 3-decimal places.

$\frac{11}{7} = 1.571$

As 4 < 5 so, we do not round up number 1.

(ii) $\frac{13}{4}$

Solution: To round off given rational number divide the numerator by the denominator.

$$4\overline{)\,13.00}\;3.25$$

-12, 10, -8, 20, -20, 0

Now, $\frac{13}{4} = 3.25$

If we round off it to 3-decimal places.

$\frac{13}{4} = 3.250$

There are 2 digits after decimal point so put a zero as last place.

(iii) $\frac{71}{3}$

Solution: To round off given rational number divide the numerator by the denominator.

$$3\overline{)\,71.0000}\;23.6666$$

-6, 11, -9, 20, -18, 20, -18, 20, -18, 2

Now, $\frac{71}{3} = 23.6666$

If we round off it to 3-decimal places.

$\frac{71}{3} = 23.667$

As 6 > 5 so, we round up the last number 6.

(iv) $\frac{81}{7}$

Solution: To round off given rational number divide the numerator by the denominator.

$$7\overline{)\,81.0000}\;11.5714$$

-7, 11, -7, 40, -35, 50, -49, 10, -7, 30, -28, 2

Now, $\frac{81}{7} = 11.5714$

If we round off it to 3-decimal places.

$\frac{81}{7} = 11.571$

As 4 < 5 so, we do not round up the last number.

(v) $\frac{91}{6}$

Solution: To round off given rational number divide the numerator by the denominator.

Now, $\frac{91}{6} = 15.1666$

If we round off it to 3-decimal places.

$\frac{91}{6} = 15.167$

As 6 > 5 so, we round up the last number 6.

$$
\begin{array}{r}
15.1666 \\
6\overline{)\,91.0000} \\
-6 \\
\hline
31 \\
-30 \\
\hline
10 \\
-6 \\
\hline
40 \\
-36 \\
\hline
40 \\
-36 \\
\hline
40 \\
-36 \\
\hline
4
\end{array}
$$

(vi) $\frac{10}{3}$

Solution: To round off given rational number divide the numerator by the denominator.

Now, $\frac{10}{3} = 3.3333$

If we round off it to 3-decimal places.

$\frac{10}{3} = 3.333$

As 3 < 5 so, we do not round up the last number.

$$
\begin{array}{r}
3.3333 \\
3\overline{)\,10.0000} \\
-9 \\
\hline
10 \\
-9 \\
\hline
10 \\
-9 \\
\hline
10 \\
-9 \\
\hline
10 \\
-9 \\
\hline
1
\end{array}
$$

Remember

- All non-zero digits are significant.
- Any zero between significant digits are also significant.
- Trailing zeros to the right of a decimal point are significant.

2. Round off the given rational numbers to 3 significant figures.

(i) $\frac{33}{21}$

Solution: First of all, divide numerator by denominator.

Now, $\frac{33}{21} = 1.571$

If we round off it to 3-significant figures.

$\frac{33}{21} = 1.57$

$$
\begin{array}{r}
1.571 \\
21\overline{)\,33.000} \\
-21 \\
\hline
120 \\
-105 \\
\hline
150 \\
-147 \\
\hline
30 \\
-21 \\
\hline
9
\end{array}
$$

(ii) $\frac{52}{16}$

Solution: First of all, divide numerator by denominator.

Now, $\frac{52}{16} = 3.25$

It is already rounded off it to the nearest 3-significant figures. So,

$\frac{52}{16} = 3.25$

$$
\begin{array}{r}
3.25 \\
16\overline{)\,52.00} \\
-48 \\
\hline
40 \\
-32 \\
\hline
80 \\
-80 \\
\hline
0
\end{array}
$$

(iii) $\frac{20}{3}$

Solution: First of all, divide numerator by denominator.

Now, $\frac{20}{3} = 6.666$

If we round off it to 3-decimal places.

$\frac{20}{3} = 6.67$

As 6 > 5 so, we round up the last number 6.

$$
\begin{array}{r|l}
3 & 6.666 \\
\hline
 & 20.000 \\
 & -18 \\
\hline
 & 20 \\
 & -18 \\
\hline
 & 20 \\
 & -18 \\
\hline
 & 20 \\
 & -18 \\
\hline
 & 2
\end{array}
$$

(iv) $\frac{40}{7}$

Solution: First of all, divide numerator by denominator.

Now, $\frac{40}{7} = 5.714$

If we round off it to 3-decimal places.

$\frac{40}{7} = 5.71$

$$
\begin{array}{r|l}
7 & 5.714 \\
\hline
 & 40.000 \\
 & -35 \\
\hline
 & 50 \\
 & -49 \\
\hline
 & 10 \\
 & -7 \\
\hline
 & 30 \\
 & -28 \\
\hline
 & 2
\end{array}
$$

(v) $\frac{11}{12}$

Solution: First of all, divide numerator by denominator.

Now, $\frac{11}{12} = 0.9166$

Zero before decimal point is not significant digit. If we round off it to 3-decimal places.

$\frac{11}{12} = 0.917$

$$
\begin{array}{r|l}
12 & 0.9166 \\
\hline
 & 11.0000 \\
 & -108 \\
\hline
 & 20 \\
 & -12 \\
\hline
 & 80 \\
 & -72 \\
\hline
 & 80 \\
 & -72 \\
\hline
 & 8
\end{array}
$$

(vi) $\frac{12}{11}$

Solution: First of all, divide numerator by denominator.

Now, $\frac{12}{11} = 1.090909$

Zero between two significant digits is also significant. If we round off it to 3-decimal places.

$\frac{12}{11} = 1.091$

$$
\begin{array}{r|l}
11 & 1.090909 \\
\hline
 & 12.000000 \\
 & -11 \\
\hline
 & 100 \\
 & -99 \\
\hline
 & 100 \\
 & -99 \\
\hline
 & 100 \\
 & -99 \\
\hline
 & 1
\end{array}
$$

3. Round off the given decimal numbers to 3 decimal places.

(i) 0.02357

Solution: To round off a decimal number to 3 decimal places observe the fourth digit after decimal point.
In 0.02357 fourth digit is 5 so round up the previous digit.
It means, $0.02357 \approx 0.024$

(ii) 0.49873

Solution: To round off a decimal number to 3 decimal places observe the fourth digit after decimal point.
In 0.49873 fourth digit is 7 so round up the previous digit.
It means, $0.49873 \approx 0.499$

(iii) 1.2345

Solution: To round off a decimal number to 3 decimal places observe the fourth digit after decimal point.
In 1.2345 fourth digit is 5 so round up the previous digit.
It means, $1.2345 \approx 1.235$

(iv) 0.7234

Solution: To round off a decimal number to 3 decimal places observe the fourth digit after decimal point.
In 0.7234 fourth digit is 4 so do not round up the previous digit.
It means, 0.7234 ≈ 0.723

(v) 0.2939

Solution: To round off a decimal number to 3 decimal places observe the fourth digit after decimal point.
In 0.2939 fourth digit is 9 so round up the previous digit.
It means, 0.2939 ≈ 0.294

(vi) 0.4568

Solution: To round off a decimal number to 3 decimal places observe the fourth digit after decimal point.
In 0.4568 fourth digit is 8 so round up the previous digit.
It means, 0.4568 ≈ 0.457

4. Round off the given decimal numbers to 3 significant figures.

(i) 0.2345

Solution: Be remember the rules for significant figures. Here 3 significant figures are 234 and we want to round off 0.2345 to 3 significant figures.
In 0.2345 fourth digit is 5 so round up the previous digit.
It means, 0.2345 ≈ 0.235

(ii) 2.345

Solution: Be remember the rules for significant figures. Here 3 significant figures are 234 and next digit is 5, also we want to round off 2.345 to 3 significant figures.
In 2.345 fourth digit is 5 so round up the previous digit.
It means, 2.345 ≈ 2.35

(iii) 1.4598

Solution: Be remember the rules for significant figures. Here 3 significant figures are 145 and next digit is 9, also we want to round off 1.4598 to 3 significant figures.
In 1.4598 fourth digit is 9 so round up the previous digit.
It means, 1.4598 ≈ 1.46

(iv) 1.2398

Solution: Be remember the rules for significant figures. Here 3 significant figures are 123 and next digit is 9, also we want to round off 1.2398 to 3 significant figures.
In 1.2398 fourth digit is 9 so round up the previous digit.
It means, 1.2398 ≈ 1.24

(v) 2.3478

Solution: Be remember the rules for significant figures. Here 3 significant figures are 234 and next digit is 7, also we want to round off 2.3478 to 3 significant figures.
In 2.3478 fourth digit is 7 so round up the previous digit.
It means, 2.3478 ≈ 2.35

(vi) 5.7282

Solution: Be remember the rules for significant figures. Here 3 significant figures are 572 and next digit is 8, also we want to round off 5.7282 to 3 significant figures.

In 5.7282 fourth digit is 8 so round up the previous digit.

It means, $5.7282 \approx 5.73$

5. Find the estimated sum of the following by rounding off the numbers to 2-decimal places. Also, find approximate error to check the reasonableness of the sum.

(i) 0.234 + 3.456

Solution: To find the estimated sum and approximate error follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means, $0.234 \approx 0.23$ and $3.456 \approx 3.46$

Step 2: Calculate approximated sum.
Approximated sum = 0.23 + 3.46
= 3.69

Step 3: Calculate actual sum.
Actual sum = 0.234 + 3.456
= 3.690

Step 4: Calculate approximate error.

$$\text{Aprroximate error} = |\text{Actual sum} - \text{Approximate sum}|$$
$$= |3.690 - 3.69|$$
$$= |0|$$
$$= 0$$

Since, the error is '0' so estimated solution is reasonable.

(ii) 2.345 + 5.123

Solution: To find the estimated sum and approximate error follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means, $2.345 \approx 2.35$ and $5.123 \approx 5.12$

Step 2: Calculate approximated sum.
Approximated sum = 2.35 + 5.12
= 7.47

Step 3: Calculate actual sum.
Actual sum = 2.345 + 5.123
= 7.468

Step 4: Calculate approximate error.

$$\text{Aprroximate error} = |\text{Actual sum} - \text{Approximate sum}|$$
$$= |7.468 - 7.47|$$
$$= |-0.002|$$
$$= 0.002$$

Since, the error is very small so estimated solution is reasonable.

(iii) 2.345 + 4.278

Solution: To find the estimated sum and approximate error follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means, $2.345 \approx 2.35$ and $4.278 \approx 4.28$

Step 2: Calculate approximated sum.
Approximated sum = 2.35 + 4.28
= 6.63

Step 3: Calculate actual sum.
Actual sum = 2.345 + 4.278
= 6.623

Step 4: Calculate approximate error.

$$\text{Aprroximate error} = |\text{Actual sum} - \text{Approximate sum}|$$
$$= |6.623 - 6.63|$$
$$= |-0.007|$$
$$= 0.007$$

Since, the error is very small so estimated solution is reasonable.

(iv) 1.239 + 2.382

Solution: To find the estimated sum and approximate error follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means, $1.239 \approx 1.24$ and $2.382 \approx 2.38$

Step 2: Calculate approximated sum.
Approximated sum = 1.24 + 2.38
= 3.62

Step 3: Calculate actual sum.
Actual sum = 1.239 + 2.382
= 3.621

Step 4: Calculate approximate error.

$$\text{Aprroximate error} = |\text{Actual sum} - \text{Approximate sum}|$$
$$= |3.621 - 3.62|$$
$$= |0.001|$$
$$= 0.001$$

Since, the error is very small so estimated solution is reasonable.

(v) 1.234 + 5.345

Solution: To find the estimated sum and approximate error follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means, $1.234 \approx 1.23$ and $5.345 \approx 5.35$

Step 2: Calculate approximated sum.
Approximated sum = 1.23 + 5.35
= 6.58

Step 3: Calculate actual sum.
Actual sum = 1.234 + 5.345
= 6.579

Step 4: Calculate approximate error.

$$\text{Aprroximate error} = |\text{Actual sum} - \text{Approximate sum}|$$
$$= |6.579 - 6.58|$$
$$= |-0.001|$$
$$= 0.001$$

Since, the error is very small so estimated solution is reasonable.

(vi) 1.929 + 2.382

Solution: To find the estimated sum and approximate error follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means, $1.929 \approx 1.93$ and $2.382 \approx 2.38$

Step 2: Calculate approximated sum.
Approximated sum = 1.93 + 2.38
= 4.31

Step 3: Calculate actual sum.
Actual sum = 1.929 + 2.382
= 4.311

Step 4: Calculate approximate error.

$$\text{Aprroximate error} = |\text{Actual sum} - \text{Approximate sum}|$$
$$= |4.311 - 4.31|$$
$$= |0.001|$$
$$= 0.001$$

Since, the error is very small so estimated solution is reasonable.

6. Find the estimated difference of the following by rounding off the numbers to 2-decimal places. Also, find approximate error to check the reasonableness of the difference.

(i) 7.234 – 2.121

Solution: To find the estimated difference and approximate error follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means,
$7.234 \approx 7.23$ and $2.121 \approx 2.12$

Step 2: Calculate approximated difference.
Approximated difference = 7.23 – 2.12
= 5.11

Step 3: Calculate actual difference.
Actual difference = 7.234 − 2.121
= 5.113

Step 4: Calculate approximate error.

$$\text{Aprroximate error} = |\text{Actual difference} - \text{Approximate difference}|$$
$$= |5.113 - 5.11|$$
$$= |0.003|$$
$$= 0.003$$

Since, the error is very small so the estimated solution is reasonable.

(ii) 6.234 – 2.134

Solution: To find the estimated difference and approximate error follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means,
$6.234 \approx 6.23$ and $2.134 \approx 2.13$

Step 2: Calculate approximated difference.
Approximated difference = 6.23 – 2.13
= 4.10

Step 3: Calculate actual difference.
Actual difference = 6.234 − 2.134
= 4.100

Step 4: Calculate approximate error.

$$\text{Aprroximate error} = |\text{Actual difference} - \text{Approximate difference}|$$
$$= |4.100 - 4.10|$$
$$= |0|$$
$$= 0$$

Since, the error is very small so the estimated solution is reasonable.

(iii) 1.234 – 0.171

Solution: To find the estimated difference and approximate error follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means,
$1.234 \approx 1.23$ and $0.171 \approx 0.17$

Step 2: Calculate approximated difference.
Approximated difference = 1.23 – 0.17
= 1.06

Step 3: Calculate actual difference.
Actual difference = 1.234 – 0.171
= 1.063

Step 4: Calculate approximate error.

$$\text{Aprroximate error} = |\text{Actual difference} - \text{Approximate difference}|$$
$$= |1.063 - 1.06|$$
$$= |0.003|$$
$$= 0.003$$

Since, the error is very small so the estimated solution is reasonable.

(iv) 2.789 – 1.234

Solution: To find the estimated difference and approximate error follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means,
$2.789 \approx 2.79$ and $1.234 \approx 1.23$

Step 2: Calculate approximated difference.
Approximated difference = 2.79 – 1.23
= 1.56

Step 3: Calculate actual difference.
Actual difference = 2.789 – 1.234
= 1.555

Step 4: Calculate approximate error.
$$\text{Aprroximate error} = |\text{Actual difference} - \text{Approximate difference}|$$
$$= |1.555 - 1.56|$$
$$= |-0.005|$$
$$= 0.005$$

Since, the error is very small so the estimated solution is reasonable.

(v) 1.111 – 0.101

Solution: To find the estimated difference and approximate error follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means,
$1.111 \approx 1.11$ and $0.101 \approx 0.10$

Step 2: Calculate approximated difference.
Approximated difference = 1.11 – 0.10
= 1.01

Step 3: Calculate actual difference.
Actual difference = 1.111 – 0.101
= 1.01

Step 4: Calculate approximate error.
$$\text{Aprroximate error} = |\text{Actual difference} - \text{Approximate difference}|$$
$$= |1.01 - 1.01|$$
$$= |0|$$
$$= 0$$

Since, the error is very small so the estimated solution is reasonable.

(vi) 1.239 – 0.121

Solution: To find the estimated difference and approximate error follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means,
$1.239 \approx 1.24$ and $0.121 \approx 0.12$

Step 2: Calculate approximated difference.
Approximated difference = 1.24 – 0.12
= 1.12

Step 3: Calculate actual difference.
Actual difference = 1.239 – 0.121
= 1.118

Step 4: Calculate approximate error.
$$\text{Aprroximate error} = |\text{Actual difference} - \text{Approximate difference}|$$
$$= |1.118 - 1.12|$$
$$= |-0.002|$$
$$= 0.002$$

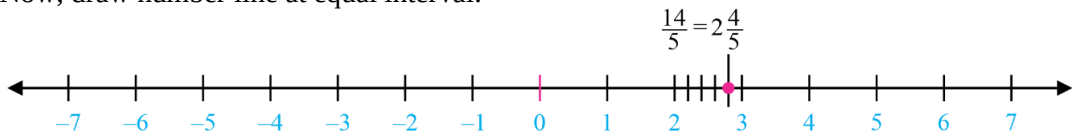
Since, the error is very small so the estimated solution is reasonable.

7. Represent the following rational numbers on number lines.

(i) $\frac{14}{5}$

Solution: Express the given improper fraction into mixed fraction. It means, $\frac{14}{5} = 2\frac{4}{5}$

Now, draw number line at equal interval.

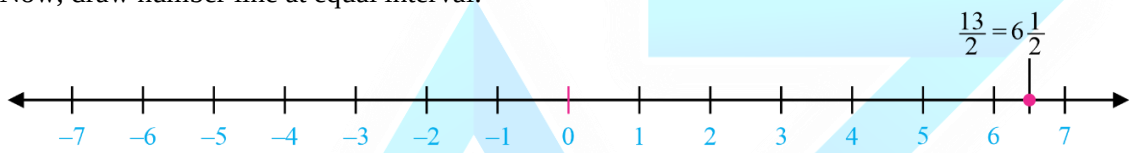


Divide the section (2 - 3) into five equal parts and point out $2\frac{4}{5}$.

(ii) $\frac{13}{2}$

Solution: Express the given improper fraction into mixed fraction. It means, $\frac{13}{2} = 6\frac{1}{2}$

Now, draw number line at equal interval.

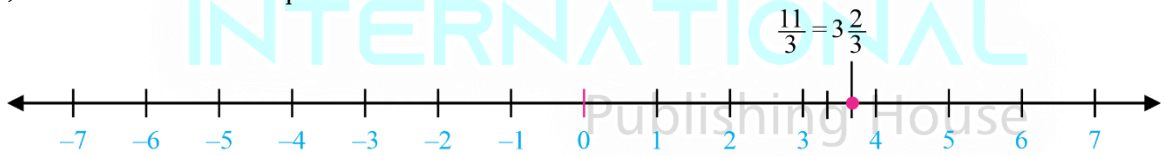


Divide the section (6 - 7) into two equal parts and point out $6\frac{1}{2}$.

(iii) $\frac{11}{3}$

Solution: Express the given improper fraction into mixed fraction. It means, $\frac{11}{3} = 3\frac{2}{3}$

Now, draw number line at equal interval.

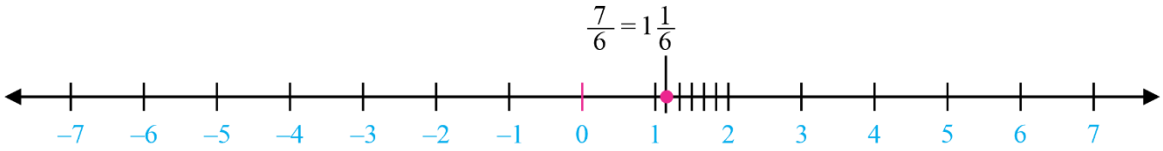


Divide the section (3 - 4) into three equal parts and point out $3\frac{2}{3}$.

(iv) $\frac{7}{6}$

Solution: Express the given improper fraction into mixed fraction. It means, $\frac{7}{6} = 1\frac{1}{6}$

Now, draw number line at equal interval.

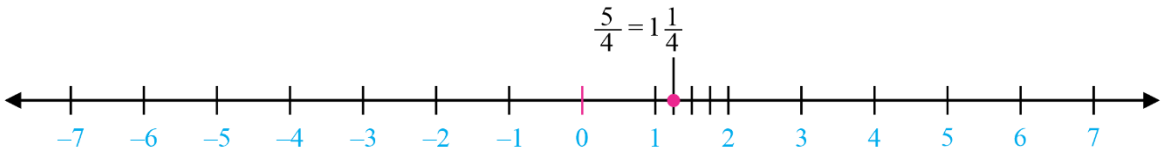


Divide the section (1 - 2) into six equal parts and point out $1\frac{1}{6}$.

(v) $\frac{5}{4}$

Solution: Express the given improper fraction into mixed fraction. It means, $\frac{5}{4} = 1\frac{1}{4}$

Now, draw number line at equal interval.

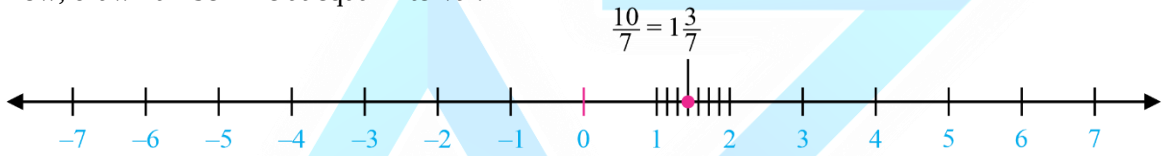


Divide the section (1 - 2) into four equal parts and point out $1\frac{1}{4}$.

(vi) $\frac{10}{7}$

Solution: Express the given improper fraction into mixed fraction. It means, $\frac{10}{7} = 1\frac{3}{7}$

Now, draw number line at equal interval.



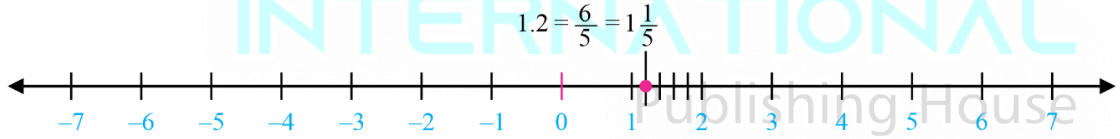
Divide the section (1 - 2) into seven equal parts and point out $1\frac{3}{7}$.

8. Represent the following decimal numbers on number lines.

(i) 1.2

Solution: Express the given decimal number in lowest form of fraction and then into mixed fraction.

It means, $1.2 = \frac{12}{10}$ or $\frac{6}{5}$ or $1\frac{1}{5}$. Now, draw number line at equal interval.

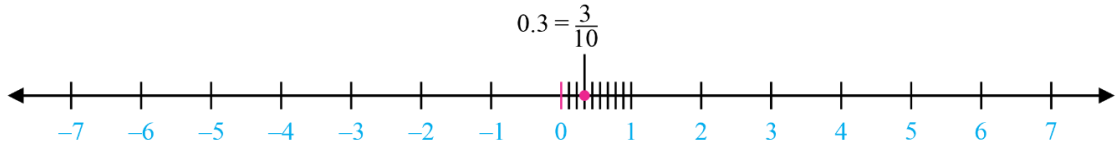


Divide the section (1 - 2) into five equal parts and point out $1\frac{1}{5}$ which is equal to 1.2.

(ii) 0.3

Solution: Express the given decimal number in lowest form of fraction and then into mixed fraction.

It means, $0.3 = \frac{3}{10}$. Now, draw number line at equal interval.

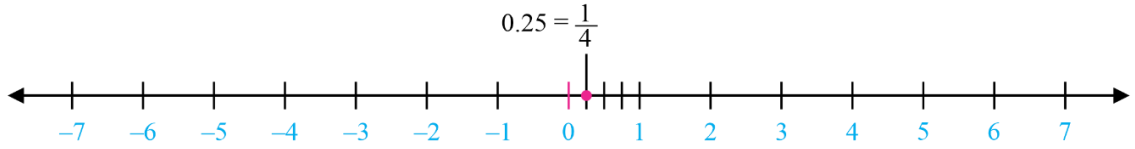


Divide the section (0 - 1) into ten equal parts and point out $\frac{3}{10}$ which is equal to 0.3.

(iii) 0.25

Solution: Express the given decimal number in lowest form of fraction and then into mixed fraction.

It means, $0.25 = \frac{25}{100}$ or $\frac{1}{4}$. Now, draw number line at equal interval.

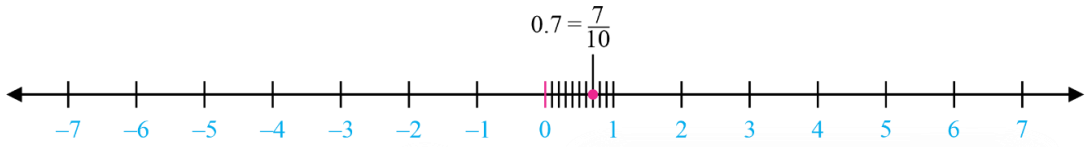


Divide the section (0 - 1) into four equal parts and point out $\frac{1}{4}$ which is equal to 0.25.

(iv) 0.7

Solution: Express the given decimal number in lowest form of fraction and then into mixed fraction.

It means, $0.7 = \frac{7}{10}$. Now, draw number line at equal interval.

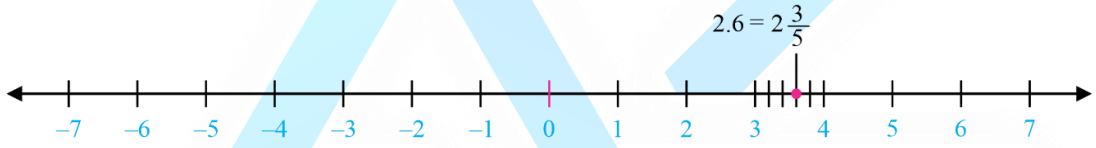


Divide the section (0 - 1) into ten equal parts and point out $\frac{7}{10}$ which is equal to 0.7.

(v) 2.6

Solution: Express the given decimal number in lowest form of fraction and then into mixed fraction.

It means, $2.6 = \frac{26}{10}$ or $\frac{13}{5}$ or $2\frac{3}{5}$. Now, draw number line at equal interval.

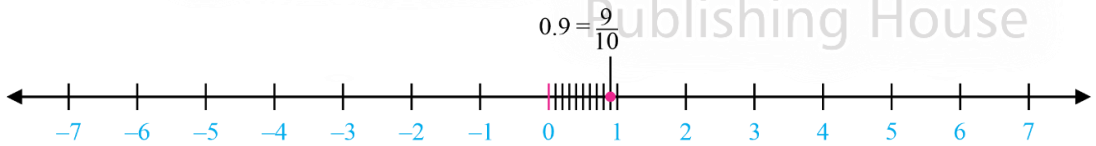


Divide the section (2 - 3) into five equal parts and point out $2\frac{3}{5}$ which is equal to 2.6.

(vi) 0.9

Solution: Express the given decimal number in lowest form of fraction and then into mixed fraction.

It means, $0.9 = \frac{9}{10}$. Now, draw number line at equal interval.



Divide the section (0 - 1) into ten equal parts and point out $\frac{9}{10}$ which is equal to 0.9.

9. Fatima used $\frac{1}{2}$ cup of milk and $\frac{1}{8}$ cup of sugar to make ice cream. How many cups she used to make the ice cream?

Solution:

Use quantity of milk = $\frac{1}{2}$ cup

Used quantity of sugar = $\frac{1}{8}$ cup

Total number of cups = $\frac{1}{2} + \frac{1}{8} = \frac{4+1}{8} = \frac{5}{8}$

Hence, Fatima used $\frac{5}{8}$ cups to make ice cream.

10. Wareesha made $\frac{4}{3}$ litre cold drink. She used $\frac{1}{12}$ litre, how much cold drink left?

Solution:

Total quantity of cold drink = $\frac{4}{3}$ litre Used cold drink = $\frac{1}{12}$ litre

How much cold drink left = ?

Left cold drink = $\frac{4}{3}-\frac{1}{12}=\frac{16-1}{12}=\frac{15}{12}$ or $\frac{5}{4}$

Hence, Wareesha left with $\frac{5}{4}$ litre cold drink.

Review Exercise 1

1. Choose the correct option.

(i) Which one is proper fraction?

(a) $\frac{7}{5}$ (b) $\frac{11}{3}$ (c) $\frac{3}{5}$ (d) $1\frac{1}{3}$

(ii) The lowest form of the common fraction $\frac{18}{24}$ is:

(a) $\frac{6}{8}$ (b) $\frac{9}{12}$ (c) $\frac{3}{4}$ (d) $\frac{12}{16}$

(iii) The place value of the digit 6 of 4673 is:

(a) 60 (b) 6000 (c) 60000 (d) 600

(iv) 4827 rounded off to the nearest hundred is:

(a) 4900 (b) 4800 (c) 5000 (d) 4700

(v) 4.249 rounded off to 2 decimal places.

(a) 4.24 (b) 4.25 (c) 4.2 (d) 4.3

2. Arrange the following decimal numbers in ascending order.

(i) 0.23, 0.13, 0.27, 0.2, 0.4

Solution: First of all, compare given decimal numbers and find the smallest and the greatest number.

0.13 0.2 0.23 0.27 0.4

Smallest ⟶ Greatest

(ii) 3.23, 1.13, 1.23, 4.73

Solution: First of all, compare given decimal numbers and find the smallest and the greatest number.

1.13 1.23 3.23 4.73

Smallest ⟶ Greatest

(iii) 2.1, 1.12, 3.12, 1.1

Solution: First of all, compare given decimal numbers and find the smallest and the greatest number.

1.1 1.12 2.1 3.12

Smallest ⟶ Greatest

3. Arrange the following decimal numbers in descending order.

(i) 0.28, 0.58, 0.78, 0.12, 0.1, 0.21

Solution: First of all, compare given decimal numbers and find the greatest and the smallest number.

0.78 0.58 0.28 0.21 0.12 0.1

Greatest ⟶ Smallest

(ii) 0.73, 0.43, 0.53, 0.13, 0.23

Solution: First of all, compare given decimal numbers and find the greatest and the smallest number.

0.73 0.53 0.43 0.23 0.13

Greatest ⟶ Smallest

(iii) 0.11, 0.22, 0.13, 0.28, 0.73

Solution: First of all, compare given decimal numbers and find the greatest and the smallest number.

0.73 0.28 0.22 0.13 0.11

Greatest ⟶ Smallest

4. Arrange the following rational numbers in ascending and descending order.

(i) $\frac{7}{5}, \frac{8}{7}, \frac{3}{35}, \frac{5}{14}$

Solution: Convert the given fractions to decimal numbers.

$\frac{7}{5} = 1.4,\ \frac{8}{7} = 1.14,\ \frac{3}{35} = 0.09,\ \frac{5}{14} = 0.36$

Now, compare these decimal numbers and arrange from the smallest to the largest decimal number.

$0.09 < 0.36 < 1.14 < 1.4$ Or $\frac{3}{35} < \frac{5}{14} < \frac{8}{7} < \frac{7}{5}$

Ascending order: $\frac{3}{35}, \frac{5}{14}, \frac{8}{7}, \frac{7}{5}$ **Descending order:** $\frac{7}{5}, \frac{8}{7}, \frac{5}{14}, \frac{3}{35}$

(ii) $\frac{3}{2}, \frac{5}{3}, \frac{7}{6}, \frac{11}{12}$

Solution: Convert the given fractions to decimal numbers.

$\frac{3}{2} = 1.5,\ \frac{5}{3} = 1.67,\ \frac{7}{6} = 1.17,\ \frac{11}{12} = 0.92$

Now, compare these decimal numbers and arrange from the smallest to the largest decimal number.

$0.92 < 1.17 < 1.5 < 1.67$ Or $\frac{11}{12} < \frac{7}{6} < \frac{3}{2} < \frac{5}{3}$

Ascending order: $\frac{11}{12}, \frac{7}{6}, \frac{3}{2}, \frac{5}{3}$ **Descending order:** $\frac{5}{3}, \frac{3}{2}, \frac{7}{6}, \frac{11}{12}$

(iii) $\frac{3}{4}, \frac{5}{6}, \frac{2}{3}, \frac{1}{2}, \frac{4}{5}$

Solution: Convert the given fractions to decimal numbers.

$\frac{3}{4} = 0.75,\ \frac{5}{6} = 0.83,\ \frac{2}{3} = 0.67,\ \frac{1}{2} = 0.5,\ \frac{4}{5} = 0.8$

Now, compare these decimal numbers and arrange from the smallest to the largest decimal number.

$0.5 < 0.67 < 0.75 < 0.8 < 0.83$ Or $\frac{1}{2} < \frac{2}{3} < \frac{3}{4} < \frac{4}{5} < \frac{5}{6}$

Ascending order: $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}$ **Descending order:** $\frac{5}{6}, \frac{4}{5}, \frac{3}{4}, \frac{2}{3}, \frac{1}{2}$

5. Round off given rational numbers to 3 decimal places.

(i) $\frac{7}{2}$

Solution: To round off given rational number divide the numerator by the denominator.

Now, $\frac{7}{2} = 3.5$

If we round off it to 3-decimal places.

$\frac{7}{2} = 3.500$

We can put zeros after decimal point to complete places.

$$
\begin{array}{r|l}
2 & 7.0 \quad 3.5 \\
 & -6 \\
\hline
 & 10 \\
 & -10 \\
\hline
 & 0
\end{array}
$$

(ii) $\frac{9}{7}$

Solution: To round off given rational number divide the numerator by the denominator.

Now, $\frac{9}{7} = 1.2857$

If we round off it to 3-decimal places.

$\frac{9}{7} = 1.286$

As 7 > 5 so, we round up the last number 5.

$$
\begin{array}{r|l}
7 & 9.0000 \quad 1.2857 \\
 & -7 \\
\hline
 & 20 \\
 & -14 \\
\hline
 & 60 \\
 & -56 \\
\hline
 & 40 \\
 & -35 \\
\hline
 & 50 \\
 & -49 \\
\hline
 & 1
\end{array}
$$

(iii) $\frac{11}{3}$

Solution: To round off given rational number divide the numerator by the denominator.

Now, $\frac{11}{3} = 3.6666$

If we round off it to 3-decimal places.

$\frac{11}{3} = 3.667$

As 6 > 5 so, we round up the last number 6.

$$
\begin{array}{r|l}
3 & 11.0000 \quad 3.6666 \\
 & -9 \\
\hline
 & 20 \\
 & -18 \\
\hline
 & 20 \\
 & -18 \\
\hline
 & 20 \\
 & -18 \\
\hline
 & 2
\end{array}
$$

(iv) $\frac{13}{3}$

Solution: To round off given rational number divide the numerator by the denominator.

Now, $\frac{13}{3} = 4.3333$

If we round off it to 3-decimal places.

$\frac{13}{3} = 4.333$

As 3 < 5 so, we do not round up the last number.

$$
\begin{array}{r|l}
3 & 13.0000 \quad 4.3333 \\
 & -12 \\
\hline
 & 10 \\
 & -9 \\
\hline
 & 10 \\
 & -9 \\
\hline
 & 10 \\
 & -9 \\
\hline
 & 10 \\
 & -9 \\
\hline
 & 1
\end{array}
$$

(v) $\frac{15}{7}$

Solution: To round off given rational number divide the numerator by the denominator.

$$7\overline{)\,15.0000}\quad 2.1428$$
$$-14$$
$$10$$
$$-7$$
$$30$$
$$-28$$
$$20$$
$$-14$$
$$60$$
$$-56$$
$$4$$

Now, $\frac{15}{7} = 2.1428$

If we round off it to 3-decimal places.

$\frac{15}{7} = 2.143$

As 8 > 5 so, we round up the last number 2.

(vi) $\frac{18}{7}$

Solution: To round off given rational number divide the numerator by the denominator.

$$7\overline{)\,18.0000}\quad 2.5714$$
$$-14$$
$$40$$
$$-35$$
$$50$$
$$-49$$
$$10$$
$$-7$$
$$30$$
$$-28$$
$$2$$

Now, $\frac{18}{7} = 2.5714$

If we round off it to 3-decimal places.

$\frac{18}{7} = 2.571$

As 4 < 5 so, we do not round up the last number.

6. Find the estimated sum by rounding off the numbers to two decimal places.

(i) 0.5723 + 0.2345

Solution: To find the estimated sum follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means, 0.5723 ≈ 0.57 and 0.2345 ≈ 0.23

Step 2: Calculate estimated sum.
Estimated sum = 0.57 + 0.23
= 0.80

So, the estimated sum is 0.80.

(ii) 0.3579 + 0.2382

Solution: To find the estimated sum follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means, 0.3579 ≈ 0.36 and 0.238 ≈ 0.24

Step 2: Calculate estimated sum.
Estimated sum = 0.36 + 0.24
= 0.60

So, the estimated sum is 0.60.

(iii) 0.5789 + 0.2321

Solution: To find the estimated sum follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means, 0.5789 ≈ 0.58 and 0.2321 ≈ 0.23

Step 2: Calculate estimated sum.
Estimated sum = 0.58 + 0.23
= 0.81

So, the estimated sum is 0.81.

(iv) **0.7812 + 0.2348**

Solution: To find the estimated sum follow the mentioned steps.

Step 1: Round off both decimal numbers to 2-decimal places.
It means, 0.7812 ≈ 0.78 and 0.2348 ≈ 0.23

Step 2: Calculate estimated sum.
Estimated sum = 0.78 + 0.23
= 1.01

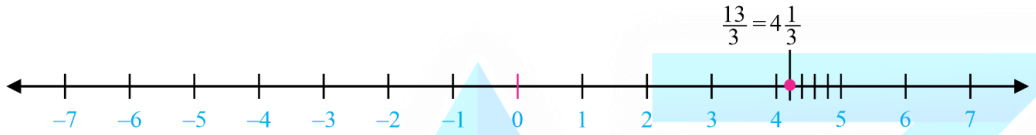
So, the estimated sum is 1.01.

7. Represent the following rational numbers on number lines.

(i) $\frac{13}{3}$

Solution: Express given improper fraction as mixed number $\frac{13}{3} = 4\frac{1}{3}$.

Now, draw the number line at equal intervals.

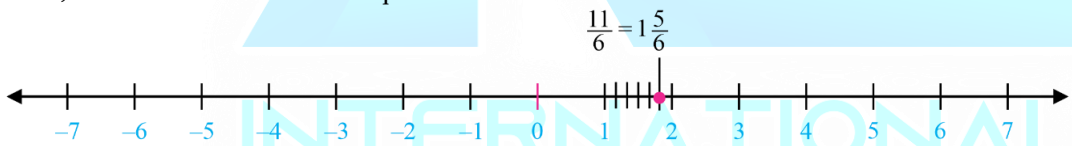


Divide the section (4 - 5) into three equal parts and point out $\frac{13}{3}$ which is equal to $4\frac{1}{3}$.

(ii) $\frac{11}{6}$

Solution: Express given improper fraction as mixed number $\frac{11}{6} = 1\frac{5}{6}$.

Now, draw the number line at equal intervals.

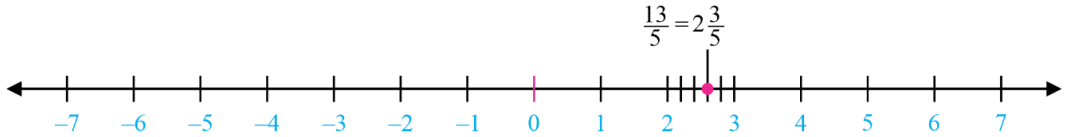


Divide the section (1 - 2) into six equal parts and point out $\frac{11}{6}$ which is equal to $1\frac{5}{6}$.

(iii) $\frac{13}{5}$

Solution: Express given improper fraction as mixed number $\frac{13}{5} = 2\frac{3}{5}$.

Now, draw the number line at equal intervals.

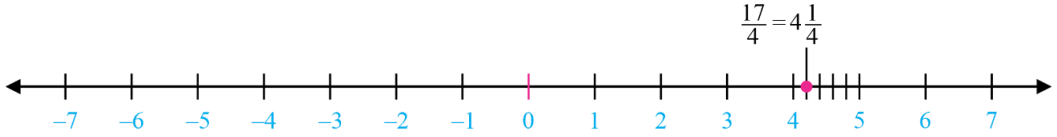


Divide the section (2 - 3) into five equal parts and point out $\frac{13}{5}$ which is equal to $2\frac{3}{5}$.

(iv) $\frac{17}{4}$

Solution: Express given improper fraction as mixed number $\frac{17}{4} = 4\frac{1}{4}$.

Now, draw the number line at equal intervals.



Divide the section (4 - 5) into four equal parts and point out $\frac{17}{4}$ which is equal to $4\frac{1}{4}$.

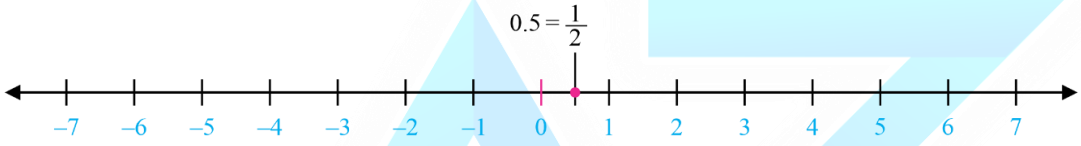
8. Represent the following decimal numbers on number lines.

(i) 0.5

Solution: Express the given decimal number in lowest form of fraction and then into mixed fraction.

It means, $0.5 = \frac{5}{10}$ or $\frac{1}{2}$.

Now, draw number line at equal interval.



Divide the section (1 - 2) into two equal parts and point out $\frac{1}{2}$ which is equal to 0.5.

(ii) 1.25

Solution: Express the given decimal number in lowest form of fraction and then into mixed fraction.

It means, $1.25 = \frac{125}{100}$ or $\frac{5}{4}$ or $1\frac{1}{4}$.

Now, draw number line at equal interval.

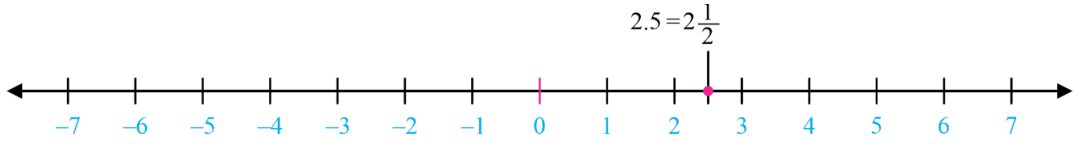
Divide the section (1 - 2) into four equal parts and point out $1\frac{1}{4}$ which is equal to 1.25.

(iii) 2.5

Solution: Express the given decimal number in lowest form of fraction and then into mixed fraction.

It means, $2.5 = \frac{25}{10}$ or $\frac{5}{2}$ or $2\frac{1}{2}$.

Now, draw number line at equal interval.

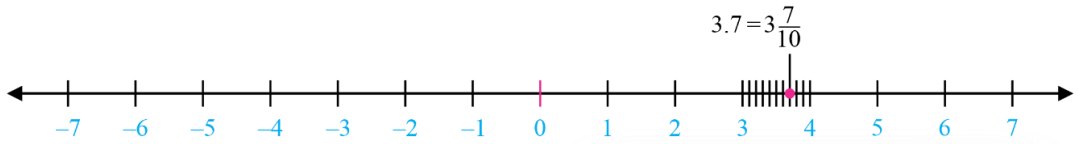


Divide the section (2 - 3) into two equal parts and point out $2\frac{1}{2}$ which is equal to 2.5.

(iv) 3.7

Solution: Express the given decimal number in lowest form of fraction and then into mixed fraction.

It means, $3.7 = \frac{37}{10}$ or $3\frac{7}{10}$. Now, draw number line at equal interval.

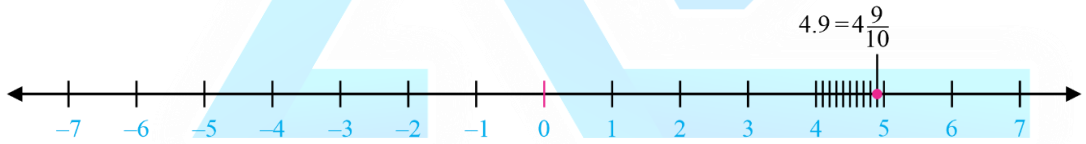


Divide the section (3 - 4) into ten equal parts and point out $3\frac{7}{10}$ which is equal to 3.7.

(v) 4.9

Solution: Express the given decimal number in lowest form of fraction and then into mixed fraction.

It means, $4.9 = \frac{49}{10}$ or $4\frac{9}{10}$. Now, draw number line at equal interval.



Divide the section (4 - 5) into ten equal parts and point out $4\frac{9}{10}$ which is equal to 4.9.

9. Azka bought two litres cold drink. She drank $\frac{2}{3}$ litres cold drink, how much cold drink left?

Solution:

Total quantity of cold drink = 2 litres

Azka drank = $\frac{2}{3}$ litres

How much cold drink left = $2\,\text{litres} - \frac{2}{3}\,\text{litres}$

$$= \frac{6\ \text{litres} - 2\,\text{litres}}{3}$$

$$= \frac{4}{3}\,\text{litres}$$

Hence, Azka left with $\frac{4}{3}$ litres of cold drink.