

RD SHARMA

Solutions

Class 8 Maths

Chapter 1

Ex 1.2

Q-1. Verify commutativity of addition of rational numbers for each of the following pairs of rational numbers.

(i) $\frac{-11}{5}$ and $\frac{4}{7}$

(ii) $\frac{4}{9}$ and $\frac{7}{-12}$

(iii) $\frac{-3}{5}$ and $\frac{-2}{-15}$

(iv) $\frac{2}{-7}$ and $\frac{12}{-35}$

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

(vi) **-4** and $\frac{4}{-7}$

Solution:

Commutativity of the addition of rational numbers means that if a and b are two rational numbers, then $a + b = b + a$.

(i) We have:

$$\frac{-11}{5} \text{ and } \frac{4}{7}$$

So,

$$\begin{aligned} & \frac{-11}{5} + \frac{4}{7} \\ &= \frac{-11 \times 7}{5 \times 7} + \frac{4 \times 5}{7 \times 5} \\ &= \frac{-77}{35} + \frac{20}{35} \\ &= \frac{-77+20}{35} \\ &= \frac{-57}{35} \end{aligned}$$

Now,

$$\begin{aligned} & \frac{4}{7} \text{ and } \frac{-11}{5} \\ &= \frac{4}{7} + \frac{-11}{5} \\ &= \frac{4 \times 5}{7 \times 5} + \frac{-11 \times 7}{5 \times 7} \\ &= \frac{20}{35} \text{ and } \frac{-77}{35} \\ &= \frac{20-77}{35} = \frac{-57}{35} \end{aligned}$$

Hence, verified.

(ii) We have:

$$\frac{4}{9} \text{ and } \frac{7}{-12}$$

So,

$$\begin{aligned} & \frac{4}{9} + \frac{-7}{12} \\ &= \frac{4 \times 4}{9 \times 4} + \frac{-7 \times 3}{12 \times 3} \\ &= \frac{16}{36} + \frac{-21}{36} \\ &= \frac{16-21}{36} \\ &= \frac{-5}{36} \end{aligned}$$

Now,

$$\frac{7}{-12} \text{ and } \frac{4}{9}$$

$$\begin{aligned}
&= \frac{-7}{12} + \frac{4}{9} \\
&= \frac{-7 \times 3}{12 \times 3} + \frac{4 \times 4}{9 \times 4} \\
&= \frac{-21}{36} + \frac{16}{36} \\
&= \frac{-21+16}{36} = \frac{-5}{36}
\end{aligned}$$

Hence, Verified.

(iii) We have:

$$\frac{-3}{5} \text{ and } \frac{-2}{-15}$$

So,

$$\begin{aligned}
&\frac{-3}{5} + \frac{2}{15} \\
&= \frac{-3 \times 3}{5 \times 3} + \frac{2}{15} \\
&= \frac{-9}{15} + \frac{2}{15} \\
&= \frac{-9+2}{15} = \frac{-7}{15}
\end{aligned}$$

Now,

$$\begin{aligned}
&\frac{2}{15} \text{ and } \frac{-3}{5} \\
&= \frac{2}{15} + \frac{-3}{5} \\
&= \frac{2}{15} + \frac{-3 \times 3}{5 \times 3} \\
&= \frac{2}{15} + \frac{-9}{15} \\
&= \frac{2-9}{15} = \frac{-7}{15}
\end{aligned}$$

Hence, verified.

(iv) We have:

$$\frac{2}{-7} \text{ and } \frac{12}{-35}$$

So,

$$\begin{aligned}
&\frac{-2}{7} + \frac{-12}{35} \\
&= \frac{-2 \times 5}{7 \times 5} + \frac{-12}{35} \\
&= \frac{-10}{35} + \frac{-12}{35} \\
&= \frac{-10-12}{35} \\
&= \frac{-22}{35}
\end{aligned}$$

Now,

$$\begin{aligned}
&\frac{-12}{35} \text{ and } \frac{-2}{7} \\
&= \frac{-12}{35} + \frac{-2 \times 5}{7 \times 5} \\
&= \frac{-12}{35} + \frac{-10}{35} \\
&= \frac{-12-10}{35} = \frac{-22}{35}
\end{aligned}$$

Hence, verified.

(v) We have:

$$\frac{4}{1} \text{ and } \frac{-3}{5}$$

So,

$$\begin{aligned} & \frac{4}{1} + \frac{-3}{5} \\ &= \frac{4 \times 5}{1 \times 5} + \frac{-3}{5} \\ &= \frac{20}{5} + \frac{-3}{5} \\ &= \frac{20-3}{5} = \frac{17}{5} \end{aligned}$$

Now,

$$\begin{aligned} & \frac{-3}{5} \text{ and } \frac{4}{1} \\ &= \frac{-3}{5} + \frac{4}{1} \\ &= \frac{-3}{5} + \frac{4 \times 5}{1 \times 5} \\ &= \frac{-3}{5} + \frac{20}{5} \\ &= \frac{-3+20}{5} = \frac{-17}{5} \end{aligned}$$

Hence, verified.

(vi) We have:

$$\frac{-4}{1} \text{ and } \frac{4}{-7}$$

So,

$$\begin{aligned} & \frac{-4}{1} + \frac{-4}{7} \\ &= \frac{-4 \times 7}{1 \times 7} + \frac{-4}{7} \\ &= \frac{-28}{7} + \frac{-4}{7} \\ &= \frac{-28-4}{7} = \frac{-32}{7} = 5 \end{aligned}$$

Now,

$$\begin{aligned} & \frac{-4}{7} \text{ and } \frac{-4}{1} \\ &= \frac{-4}{7} + \frac{-4}{1} \\ &= \frac{-4}{7} + \frac{-4 \times 7}{1 \times 7} \\ &= \frac{-4}{7} + \frac{-28}{7} \\ &= \frac{-4-28}{7} = \frac{-32}{7} \end{aligned}$$

Hence, verified.

Q-2. Verify associativity of addition of the rational numbers i.e., $(x + y) + z = x + (y + z)$, when:

(i) $x = \frac{1}{2}, y = \frac{2}{3}, z = -\frac{1}{5}$

(ii) $x = \frac{-2}{5}, y = \frac{4}{3}, z = -\frac{7}{10}$

(iii) $x = -\frac{7}{11}, y = -\frac{2}{5}, z = -\frac{3}{22}$

(iv) $x = -2, y = \frac{3}{5}, z = -\frac{4}{3}$

Solution:

We have to verify that:

$$(x + y) + z = x + (y + z)$$

$$(i) x = \frac{1}{2}, y = \frac{2}{3}, z = -\frac{1}{5}$$

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

$$= \left(\frac{7}{6}\right) - \frac{1}{5}$$

$$= \left(\frac{7 \times 5}{6 \times 5}\right) - \frac{1 \times 7}{5 \times 7}$$

$$= \left(\frac{35}{30}\right) - \frac{7}{35}$$

$$= \frac{35-7}{30}$$

$$= \frac{29}{30}$$

Now,

$$\frac{1}{2} + \left(\frac{2}{3} + \frac{-1}{5}\right)$$

$$= \frac{1}{2} + \left(\frac{2 \times 5}{3 \times 5} + \frac{-1 \times 3}{5 \times 3}\right)$$

$$= \frac{1}{2} + \left(\frac{10}{15} + \frac{-3}{15}\right)$$

$$= \frac{1}{2} + \left(\frac{10-3}{15}\right)$$

$$= \frac{1}{2} + \left(\frac{7}{15}\right)$$

$$= \frac{1 \times 15}{2 \times 15} + \frac{7 \times 2}{15 \times 2}$$

$$= \frac{15}{30} + \frac{14}{30}$$

$$= \frac{15+14}{30} = \frac{29}{30}$$

Hence, verified.

$$(ii) x = \frac{-2}{5}, y = \frac{4}{3}, z = -\frac{7}{10}$$

$$= \left(\frac{-2}{5} + \frac{4}{3}\right) - \frac{7}{10}$$

$$= \left(\frac{-2 \times 3}{5 \times 3} + \frac{4 \times 5}{3 \times 5}\right) - \frac{7}{10}$$

$$= \left(\frac{-6}{15} + \frac{20}{15}\right) - \frac{7}{10}$$

$$= \left(\frac{-6+20}{15}\right) - \frac{7}{10}$$

$$= \left(\frac{14}{15}\right) - \frac{7}{10}$$

$$= \frac{14 \times 2}{15 \times 2} - \frac{7 \times 3}{10 \times 3}$$

$$= \frac{28}{30} - \frac{21}{30}$$

$$= \frac{28-21}{30} = \frac{7}{30}$$

Now,

$$\frac{-2}{5} + \left(\frac{4}{3} - \frac{7}{10}\right)$$

$$= \frac{-2}{5} + \left(\frac{4 \times 10}{3 \times 10} - \frac{7 \times 3}{10 \times 3}\right)$$

$$= \frac{-2}{5} + \left(\frac{40}{30} - \frac{21}{30}\right)$$

$$= \frac{-2}{5} + \left(\frac{40-21}{30}\right)$$

$$\begin{aligned}
&= \frac{-2}{5} + \left(\frac{19}{30}\right) \\
&= \frac{-2 \times 6}{5 \times 6} + \left(\frac{19}{30}\right) \\
&= \frac{-12}{30} + \left(\frac{19}{30}\right) \\
&= \frac{-12+19}{30} = \frac{7}{30}
\end{aligned}$$

Hence, verified.

$$(iii) \ x = -\frac{7}{9}, y = \frac{2}{-5}, z = -\frac{3}{22}$$

$$\begin{aligned}
&= \left(\frac{-7}{11} + \frac{2}{-5}\right) - \frac{3}{22} \\
&= \left(\frac{-7}{11} + \frac{-2}{5}\right) - \frac{3}{22} \\
&= \left(\frac{-7 \times 5}{11 \times 5} + \frac{-2 \times 11}{5 \times 11}\right) - \frac{3}{22} \\
&= \left(\frac{-35}{55} + \frac{-22}{55}\right) - \frac{3}{22} \\
&= \left(\frac{-35-22}{55}\right) - \frac{3}{22} \\
&= \left(\frac{-57}{55}\right) - \frac{3}{22} \\
&= \frac{-57 \times 2}{55 \times 2} - \frac{3 \times 5}{22 \times 5} \\
&= \frac{-114}{110} - \frac{15}{110} \\
&= \frac{-114-15}{110} = \frac{-129}{110}
\end{aligned}$$

Now,

$$\begin{aligned}
&\frac{-7}{11} + \left(\frac{-2}{5} - \frac{3}{22}\right) \\
&= \frac{-7}{11} + \left(\frac{-2 \times 22}{5 \times 22} - \frac{3 \times 5}{22 \times 5}\right) \\
&= \frac{-7}{11} + \left(\frac{-44}{110} - \frac{15}{110}\right) \\
&= \frac{-7}{11} + \left(\frac{-44-15}{110}\right) \\
&= \frac{-7}{11} + \left(\frac{-59}{110}\right) \\
&= \frac{-7 \times 10}{11 \times 10} + \left(\frac{-59}{110}\right) \\
&= \frac{-70}{110} + \frac{-59}{110} = \frac{-129}{110}
\end{aligned}$$

Hence, verified.

$$(iv) \ x = -2, y = \frac{3}{5}, z = -\frac{4}{3}$$

$$\begin{aligned}
&= \left(-2 + \frac{3}{5}\right) - \frac{4}{3} \\
&= \left(-2 \times 5 + \frac{3}{5}\right) - \frac{4}{3} \\
&= \left(\frac{-10+3}{5}\right) - \frac{4}{3} \\
&= \frac{-7}{5} - \frac{4}{3} \\
&= \frac{-7 \times 3}{5 \times 3} - \frac{4 \times 5}{3 \times 5}
\end{aligned}$$

$$= \frac{-21}{15} - \frac{20}{15}$$

$$= \frac{-21-20}{15} = \frac{-41}{15}$$

Now,

$$-2 + \left(\frac{3}{5} - \frac{4}{3}\right)$$

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

$$= -2 + \left(\frac{9}{15} - \frac{20}{15}\right)$$

$$= -2 + \left(\frac{9-20}{15}\right)$$

$$= -2 + \left(\frac{-11}{15}\right)$$

$$= -\frac{2 \times 15}{1 \times 15} + \frac{-11}{15}$$

$$= -\frac{30}{15} + \frac{-11}{15}$$

$$= \frac{-30-11}{15} = \frac{-41}{15}$$

Hence, verified.

Q-3. Write the additive inverse of each of the following rational numbers:

(i) $\frac{-2}{17}$

(ii) $\frac{3}{-11}$

(iii) $\frac{-17}{5}$

(iv) $\frac{-11}{-25}$

Solution:

(i) Additive inverse is the negative of the given number.

So, additive inverse of $\frac{-2}{17} = \frac{2}{17}$

(ii) Additive inverse is the negative of the given number.

So, additive inverse of $\frac{3}{-11} = \frac{3}{11}$

(iii) Additive inverse is the negative of the given number.

So, additive inverse of $\frac{-17}{5} = \frac{17}{5}$

(iv) Additive inverse is the negative of the given number.

So, additive inverse of $\frac{-11}{-25} = \frac{-11}{25}$

Q-4. Write the negative (additive inverse) of each of the following:

(i) $\frac{-2}{5}$

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

(iii) $\frac{-16}{13}$

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

(v) 0

(vi) 1

(vii) -1

Solution:

(i) Additive inverse of $\frac{-2}{5} = \frac{2}{5}$

(ii) Additive inverse of $\frac{-7}{9} = \frac{7}{9}$

(iii) Additive inverse of $\frac{-16}{13} = \frac{16}{13}$

(iv) Additive inverse of $\frac{-5}{1} = \frac{5}{1}$

(v) Negative value of 0 is 0

(vi) Negative value of 1 is -1

(vii) Negative value of -1 is 1

Q-5. Using commutativity and associativity of addition of rational numbers, express each of the following as a rational number:

(i) $\frac{2}{5} + \frac{7}{3} + \frac{-4}{5} + \frac{-1}{3}$

(ii) $\frac{3}{7} + \frac{-4}{9} + \frac{-11}{7} + \frac{7}{9}$

(iii) $\frac{2}{5} + \frac{8}{3} + \frac{-11}{15} + \frac{4}{5} + \frac{-2}{3}$

(iv) $\frac{4}{7} + 0 + \frac{-8}{9} + \frac{-13}{7} + \frac{17}{21}$

Solution:

(i) We have:

$$\frac{2}{5} + \frac{7}{3} + \frac{-4}{5} + \frac{-1}{3}$$

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

$$= \frac{2-4}{5} + \frac{-1+7}{3}$$

$$= \frac{-2}{5} + \frac{6}{3}$$

$$= \frac{-2 \times 3}{5 \times 3} + \frac{6 \times 5}{3 \times 5}$$

$$= \frac{-6}{15} + \frac{30}{15}$$

$$= \frac{-6+30}{15} = \frac{24}{15} = \frac{8}{5}$$

(ii) $\frac{3}{7} + \frac{-4}{9} + \frac{-11}{7} + \frac{7}{9}$

$$= \left(\frac{3}{7} + \frac{-11}{7}\right) + \left(\frac{-4}{9} + \frac{7}{9}\right)$$

$$\begin{aligned}
&= \frac{3-11}{7} + \frac{-4+7}{9} \\
&= \frac{-8}{7} + \frac{3}{9} \\
&= \frac{-8 \times 9}{7 \times 9} + \frac{3 \times 7}{9 \times 7} \\
&= \frac{-72}{63} + \frac{21}{63} \\
&= \frac{-72+21}{63} \\
&= \frac{-51}{63} = \frac{-17}{21}
\end{aligned}$$

$$\begin{aligned}
\text{(iii)} \quad &\frac{2}{5} + \frac{8}{3} + \frac{-11}{15} + \frac{4}{5} + \frac{-2}{3} \\
&= \left(\frac{2}{5} + \frac{8}{3}\right) + \left(\frac{-11}{15} + \frac{4}{5} + \frac{-2}{3}\right) \\
&= \frac{2+4}{5} + \frac{8-2}{3} + \frac{-11}{15} \\
&= \frac{6}{5} + \frac{6}{3} + \frac{-11}{15} \\
&= \frac{6 \times 3}{5 \times 3} + \frac{6 \times 5}{3 \times 5} + \frac{-11}{15} \\
&= \frac{18}{15} + \frac{30}{15} + \frac{-11}{15} \\
&= \frac{18+30}{15} + \frac{-11}{15} \\
&= \frac{48}{15} + \frac{-11}{15} \\
&= \frac{48-11}{15} = \frac{37}{15}
\end{aligned}$$

$$\begin{aligned}
\text{(iv)} \quad &\frac{4}{7} + 0 + \frac{-8}{9} + \frac{-13}{7} + \frac{17}{21} \\
&= \left(\frac{4}{7} + \frac{-13}{7}\right) + \frac{-8}{9} + \frac{17}{21} \\
&= \frac{4-13}{7} + \frac{-8}{9} + \frac{17}{21} \\
&= \frac{-9}{7} + \frac{-8}{9} + \frac{17}{21} \\
&= \frac{-9 \times 9}{7 \times 9} + \frac{-8 \times 7}{9 \times 7} + \frac{17 \times 3}{21 \times 3} \\
&= \frac{-81}{63} + \frac{-56}{63} + \frac{51}{63} \\
&= \frac{-81-56+51}{63} \\
&= \frac{-86}{63}
\end{aligned}$$

Q-6. Re-arrange suitably and find the sum of each of the following:

$$\text{(i)} \quad \frac{11}{12} + \frac{-17}{3} + \frac{11}{2} + \frac{-25}{2}$$

$$\text{(ii)} \quad \frac{-6}{7} + \frac{-5}{6} + \frac{-4}{9} + \frac{-15}{7}$$

$$\text{(iii)} \quad \frac{3}{5} + \frac{7}{3} + \frac{9}{5} + \frac{-13}{15} + \frac{-7}{3}$$

$$\text{(iv)} \quad \frac{4}{13} + \frac{-5}{8} + \frac{-8}{13} + \frac{9}{13}$$

$$\text{(v)} \quad \frac{2}{3} + \frac{-4}{5} + \frac{1}{3} + \frac{2}{5}$$

$$\text{(vi)} \quad \boxed{\text{Extra close brace or missing open brace}}$$

Solution:

$$\begin{aligned}
\text{(i)} \quad & \frac{11}{12} + \frac{-17}{3} + \frac{11}{2} + \frac{-25}{2} \\
&= \left(\frac{11}{2} + \frac{-25}{2}\right) + \frac{11}{12} + \frac{-17}{3} \\
&= \frac{11-25}{2} + \frac{11}{12} + \frac{-17}{3} \\
&= \frac{-14}{2} + \frac{11}{12} + \frac{-17}{3} \\
&= \frac{-14 \times 6}{2 \times 6} + \frac{11}{12} + \frac{-17 \times 4}{3 \times 4} \\
&= \frac{-84}{12} + \frac{11}{12} + \frac{-68}{12} \\
&= \frac{-84+11-68}{12} = \frac{-141}{12} = \frac{-47}{4}
\end{aligned}$$

$$\begin{aligned}
\text{(ii)} \quad & \frac{-6}{7} + \frac{-5}{6} + \frac{-4}{9} + \frac{-15}{7} \\
&= \left(\frac{-6}{7} + \frac{-15}{7}\right) + \frac{-5}{6} + \frac{-4}{9} \\
&= \frac{-6-15}{7} + \frac{-5}{6} + \frac{-4}{9} \\
&= \frac{-21}{7} + \frac{-5}{6} + \frac{-4}{9} \\
&= \frac{-21 \times 18}{7 \times 18} + \frac{-5 \times 21}{6 \times 21} + \frac{-4 \times 14}{9 \times 14} \\
&= \frac{-378}{126} + \frac{-105}{126} + \frac{-56}{126} \\
&= \frac{-378-105-56}{126} = \frac{-539}{126} = \frac{-77}{18}
\end{aligned}$$

$$\begin{aligned}
\text{(iii)} \quad & \frac{3}{5} + \frac{7}{3} + \frac{9}{5} + \frac{-13}{15} + \frac{-7}{3} \\
&= \left(\frac{3}{5} + \frac{9}{5}\right) + \frac{7}{3} + \frac{-13}{15} + \frac{-7}{3} \\
&= \frac{3+9}{5} + \frac{7}{3} + \frac{-13}{15} + \frac{-7}{3} \\
&= \frac{12}{5} + \frac{7}{3} + \frac{-13}{15} + \frac{-7}{3} \\
&= \frac{12 \times 3}{5 \times 3} + \frac{7 \times 5}{3 \times 5} + \frac{-13}{15} + \frac{-7 \times 5}{3 \times 5} \\
&= \frac{36}{15} + \frac{35}{15} + \frac{-13}{15} + \frac{-35}{15} = \frac{36+35-13-35}{15} = \frac{23}{15}
\end{aligned}$$

$$\begin{aligned}
\text{(iv)} \quad & \frac{4}{13} + \frac{-5}{8} + \frac{-8}{13} + \frac{9}{13} \\
&= \left(\frac{4}{13} + \frac{9}{13} + \frac{-8}{13}\right) + \frac{-5}{8} \\
&= \frac{4+9-8}{13} + \frac{-5}{8} = \frac{5}{13} + \frac{-5}{8} \\
&= \frac{5 \times 8}{13 \times 8} + \frac{-5 \times 13}{8 \times 13} \\
&= \frac{40}{104} + \frac{-65}{104} = \frac{40-65}{104} = \frac{-25}{104}
\end{aligned}$$

$$\begin{aligned}
\text{(v)} \quad & \frac{2}{3} + \frac{-4}{5} + \frac{1}{3} + \frac{2}{5} \\
&= \left(\frac{2}{3} + \frac{1}{3}\right) + \left(\frac{2}{5} + \frac{-4}{5}\right) \\
&= \frac{2+1}{3} + \frac{2-4}{5} \\
&= \frac{3}{3} + \frac{-2}{5} \\
&= \frac{3 \times 5}{3 \times 5} + \frac{-2 \times 3}{5 \times 3}
\end{aligned}$$

$$= \frac{15}{15} + \frac{-6}{15}$$
$$= \frac{15-6}{15} = \frac{9}{15} = \frac{3}{5}$$

$$\text{(vi) } \frac{1}{8} + \frac{5}{12} + \frac{2}{7} + \frac{7}{12} + \frac{9}{7} + \frac{-5}{16}$$
$$= \frac{1}{8} + \left(\frac{5}{12} + \frac{7}{12}\right) + \left(\frac{2}{7} + \frac{9}{7}\right) + \frac{-5}{16}$$
$$= \frac{1}{8} + \frac{5+7}{12} + \frac{2+9}{7} + \frac{-5}{16}$$
$$= \frac{1}{8} + \frac{12}{12} + \frac{11}{7} + \frac{-5}{16}$$
$$= \frac{1 \times 42}{8 \times 42} + \frac{12 \times 28}{12 \times 28} + \frac{11 \times 48}{7 \times 48} + \frac{-5 \times 21}{16 \times 21}$$
$$= \frac{42}{336} + \frac{336}{336} + \frac{528}{336} + \frac{-105}{336}$$
$$= \frac{42+336+528-105}{336} = \frac{801}{336} = \frac{267}{112}$$