CHAPTER 4

Rational Numbers

EXERCISE 4.1

1. $\frac{0}{3}$; numerator = 0
denominator = 3

$\frac{-1}{3}$; numerator = – 1
denominator = 3

$\frac{-5}{17}$; numerator = – 5
denominator = 17

$\frac{-4}{-3}$; numerator = – 4
denominator = – 3

$\frac{7}{-8}$; numerator = 7
denominator = – 8

2. $\frac{4}{0}$ is not a rational number.
Since, denominator = 0.

3. (*i*) Numerator = 3, Denominator = – 7

$\therefore$ Rational number = $\frac{3}{-7}$

(*ii*) Denominator = – 4, Numerator = – 3.

$\therefore$ Rational number = $\frac{-3}{-4}$.

(*iii*) Numerator = 15 – 7 = 8
Denominator = 13 – 6 = 7

$\therefore$ Rational number = $\frac{8}{7}$

(*iv*) Numerator = 7 + 6 = 13
Denominator = 17 × (–2) = – 34

$\therefore$ Rational number = $\frac{13}{-34}$

4. (*i*) $\frac{-4}{-7} = \frac{-4\times4}{-7\times4} = \frac{-16}{-28}$

(*ii*) $\frac{-4}{-7} = \frac{-4\times(-5)}{-7\times(-5)} = \frac{20}{35}$

(*iii*) $\frac{-4}{-7} = \frac{-4\times(-1)}{-7\times(-1)} = \frac{4}{7}$

5. (*i*) $\frac{6}{-11} = \frac{6\times(-1)}{-11\times(-1)} = \frac{-6}{11}$

(*ii*) $\frac{6}{-11} = \frac{6\times5}{-11\times5} = \frac{30}{-55}$

(*iii*) $\frac{6}{-11} = \frac{6\times(-4)}{-11\times(-4)} = \frac{-24}{44}$

6. $\frac{-25}{60} = \frac{-25\div(-5)}{60\div(-5)} = \frac{5}{-12}$

7. (*i*) $\frac{7}{-13} = \frac{7\times(-3)}{-13\times(-3)} = \frac{-21}{39}$

(*ii*) $\frac{7}{-13} = \frac{7\times2}{-13\times2} = \frac{14}{-26}$

8. $\frac{6}{-7} = \frac{6\times(-1)}{-7\times(-1)} = \frac{-6}{7}$

$\frac{-3}{-5} = \frac{-3\times(-1)}{-5\times(-1)} = \frac{3}{5}$

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

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

9. (*i*) $\frac{-7\times2}{8\times2} = \frac{-14}{16}; \frac{-7\times3}{8\times3} = \frac{-21}{24}; \frac{-7\times4}{8\times4} = \frac{-28}{32}$

$\therefore$ Three equivalent rational numbers of $\frac{-7}{8}$ are $\frac{-14}{16}$, $\frac{-21}{24}$ and $\frac{-28}{32}$.

(*ii*) $\frac{11\times2}{-6\times2} = \frac{22}{-12}; \frac{11\times3}{-6\times3} = \frac{33}{-18}; \frac{11\times4}{-6\times4} = \frac{44}{-24}$

$\therefore$ Three equivalent rational numbers of $\frac{11}{-6}$ are $\frac{22}{-12}$, $\frac{33}{-18}$ and $\frac{44}{-24}$.

(*iii*) $\frac{18\div2}{12\div2} = \frac{9}{6}; \frac{18\div3}{12\div3} = \frac{6}{4}; \frac{18\div6}{12\div6} = \frac{3}{2}$

∴ Three equivalent rational numbers of $\frac{18}{12}$ are $\frac{3}{2}$, $\frac{6}{4}$ and $\frac{9}{6}$.

10. (*i*) $\frac{3}{8}, \frac{5}{7}$

L.C.M. of 8 and 7 is 56.

$\frac{3}{8} = \frac{3\times7}{8\times7} = \frac{21}{56}$ and $\frac{5}{7} = \frac{5\times8}{7\times8} = \frac{40}{56}$

Hence, $\frac{21}{56}$ and $\frac{40}{56}$ are the equivalent forms of $\frac{3}{8}$ and $\frac{5}{7}$ respectively, having a common denominator.

(*ii*) $\frac{3}{4}, \frac{-7}{8}$

L.C.M. of 4 and 8 is 8.

$\frac{3}{4} = \frac{3\times2}{4\times2} = \frac{6}{8}, \frac{-7}{8}$

Hence, $\frac{6}{8}$ and $\frac{-7}{8}$ are the equivalent forms of $\frac{3}{4}$ and $\frac{-7}{8}$ respectively, having a common denominator.

(*iii*) $\frac{7}{-6}, \frac{3}{4}$

L.C.M. of 6 and 4 is 12.

$\frac{7}{-6} = \frac{7\times(-2)}{-6\times(-2)} = \frac{-14}{12}$

$\frac{3}{4} = \frac{3\times3}{4\times3} = \frac{9}{12}$

Hence, $\frac{-14}{12}$ and $\frac{9}{12}$ are the equivalent forms of $\frac{7}{-6}$ and $\frac{3}{4}$ respectively, having a common denominator.

True/ False (Pg : 66)

1. True **2.** False **3.** True **4.** True

EXERCISE 4.2

1. (*i*) $\frac{-30}{-45}$

H.C.F. of 30 and 45 is 15.

$30\overline{)45}(1$, -30, $15\overline{)30}(2$, -30, 0

$\therefore \frac{-30}{-45} = \frac{(-30)\div15}{(-45)\div15} = \frac{-2}{-3} = \frac{-2\times(-1)}{(-3)\times(-1)} = \frac{2}{3}$

(*ii*) $\frac{24}{-42}$

H.C.F. of 24 and 42 is 6.

$24\overline{)42}(1$, -24, $18\overline{)24}(1$, -18, $6\overline{)18}(3$, -18, 0

$\therefore \frac{24}{-42} = \frac{24\div6}{(-42)\div6} = \frac{4}{-7}$

$= \frac{4\times(-1)}{(-7)\times(-1)} = \frac{-4}{7}$

(*iii*) $\frac{-35}{49}$

H.C.F. of 35 and 49 is 7.

$\therefore \frac{-35}{49} = \frac{(-35)\div7}{49\div7} = \frac{-5}{7}$.

(*iv*) $\frac{39}{-24}$

H.C.F. of 39 and 24 is 3.

$\frac{39}{-24} = \frac{39\div3}{(-24)\div3} = \frac{13}{-8} = \frac{13\times(-1)}{(-8)\times(-1)} = \frac{-13}{8}$

(*v*) $\frac{-72}{-99}$

H.C.F. of 72 and 99 is 9.

$\therefore \frac{-72}{-99} = \frac{(-72)\div9}{(-99)\div9} = \frac{-8}{-11} = \frac{(-8)\times(-1)}{(-11)\times(-1)} = \frac{8}{11}$

(*vi*) $\frac{-216}{144}$

H.C.F. of 216 and 144 is 72.

$144\overline{)216}(1$, -144, $72\overline{)144}(2$, -144, 0

$\therefore \frac{-216}{144} = \frac{-216\div72}{144\div72} = \frac{-3}{2}$

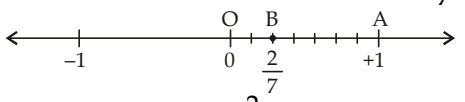
(*vii*) $\frac{-195}{520}$

H.C.F. of 195 and 520 is 65.

$195\overline{)520}(2$, -390, $130\overline{)195}(1$, -130, $65\overline{)130}(2$, -130, 0

$\therefore \frac{-195}{520} = \frac{-195\div65}{520\div65} = \frac{-3}{8}$

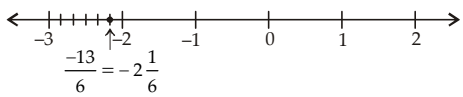
2. (*i*) $\frac{2}{7}$; Draw a line and take a point O on it to represent zero. Take a point A such that OA = +1 unit. Divide OA into seven equal parts, each part represents $\frac{1}{7}$.



Point B represents $\frac{2}{7}$ on the number line.

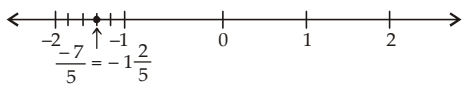
(*ii*) $\frac{-13}{6} = -2\frac{1}{6}$

$\frac{-13}{6} = -2\frac{1}{6}$ lies between –2 and –3. Divide the unit length between –2 and –3 into six equal parts. Each part represents $\frac{-1}{6}$.



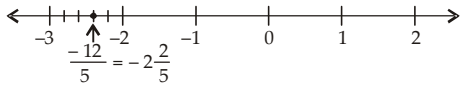
(*iii*) $\frac{-7}{5} = -1\frac{2}{5}$

$\frac{-7}{5} = -1\frac{2}{5}$ lies between –1 and –2.



(*iv*) $\frac{12}{-5} = \frac{12\times(-1)}{-5\times(-1)} = \frac{-12}{5} = -2\frac{2}{5}$

$\frac{12}{-5} = -2\frac{2}{5}$ lies between –2 and –3.



3. (*i*) L.C.M. of 6 and 8 is 24.

$\frac{5}{6} = \frac{5\times4}{6\times4} = \frac{20}{24}$

$\frac{7}{8} = \frac{7\times3}{8\times3} = \frac{21}{24}$

Since, denominators are same and 21 > 20.

$\therefore \quad \frac{21}{24} > \frac{20}{24} \Rightarrow \frac{7}{8} > \frac{5}{6}$

(*ii*) $\frac{4}{-5} = -\frac{4}{5}$ (standard form)

Every positive rational number is greater than every negative rational number.

$\therefore \quad \frac{11}{20} > \frac{-4}{5}$

(*iii*) L.C.M. of 16 and 9 is 144.

$\frac{-3}{16} = \frac{-3\times9}{16\times9} = \frac{-27}{144}$

$\frac{5}{-9} = \frac{5\times(-16)}{-9\times(-16)} = \frac{-80}{144}$

$\because$ Denominators are same and –27 > –80,

$\therefore \frac{-27}{144} > \frac{-80}{144} \Rightarrow \frac{-3}{16} > \frac{5}{-9}$

4. (*i*) $\frac{-35}{-20} = \frac{-35\div(-5)}{-20\div(-5)} = \frac{7}{4}$

Hence, $\frac{7}{4}$ and $\frac{-35}{-20}$ represent the same rational number.

(*ii*) $\frac{-24}{42} = \frac{-24\div(-6)}{42\div(-6)} = \frac{4}{-7}$

Hence, $\frac{-24}{42}$ and $\frac{4}{-7}$ represent the same rational number.

(*iii*) $\frac{5}{-8} = \frac{5\times(-2)}{-8\times(-2)} = \frac{-10}{16}$

$\because \quad -10 \neq -15$

Hence, $\frac{5}{-8}$ and $\frac{-15}{16}$ do not represent the same rational number.

5. (*i*) $\frac{-7}{4}, \frac{5}{-12}, \frac{-3}{16}, \frac{3}{-8}$

L.C.M. of 4, 12, 16 and 8 is 48.

$\frac{-7}{4} = \frac{-7\times12}{4\times12} = \frac{-84}{48}$

$\frac{5}{-12} = \frac{5\times(-4)}{-12\times(-4)} = \frac{-20}{48}$

$\frac{-3}{16} = \frac{-3\times3}{16\times3} = \frac{-9}{48}$

$\frac{3}{-8} = \frac{3\times(-6)}{-8\times(-6)} = \frac{-18}{48}$

$\therefore \frac{-84}{48}, \frac{-20}{48}, \frac{-18}{48}, \frac{-9}{48}$ are in ascending order.

$\Rightarrow \frac{-7}{4}, \frac{5}{-12}, \frac{3}{-8}, \frac{-3}{16}$ are in ascending order.

(*ii*) $\frac{11}{-15}, \frac{-7}{10}, \frac{-3}{20}, \frac{7}{-30}$

L.C.M. of 15, 10, 20 and 30 is 60.

$\frac{11}{-15} = \frac{11\times(-4)}{-15\times(-4)} = \frac{-44}{60}$

$\frac{-7}{10} = \frac{-7\times6}{10\times6} = \frac{-42}{60}$

$\frac{-3}{20} = \frac{-3\times3}{20\times3} = \frac{-9}{60}$

$\frac{7}{-30} = \frac{7\times(-2)}{-30\times(-2)} = \frac{-14}{60}$

$\therefore \frac{-44}{60}, \frac{-42}{60}, \frac{-14}{60}, \frac{-9}{60}$ are in ascending order.

$\Rightarrow \frac{11}{-15}, \frac{-7}{10}, \frac{7}{-30}, \frac{-3}{20}$ are in ascending order.

(*iii*) $\frac{3}{5}, \frac{-2}{-3}, 0, \frac{1}{2}, \frac{-7}{6}$

L.C.M. of 5, 3, 2, and 6 is 30.

$\frac{3}{5} = \frac{3\times6}{5\times6} = \frac{18}{30}$

$\frac{-2}{-3} = \frac{-2\times(-10)}{-3\times(-10)} = \frac{20}{30}$

$0 = \frac{0\times30}{1\times30} = \frac{0}{30}, \frac{1}{2} = \frac{1\times15}{2\times15} = \frac{15}{30}$

$\frac{-7}{6} = \frac{-7\times5}{6\times5} = \frac{-35}{30}$

$\therefore \frac{-35}{30}, \frac{0}{30}, \frac{15}{30}, \frac{18}{30}, \frac{20}{30}$ are in ascending order.

$\Rightarrow \frac{-7}{6}, 0, \frac{1}{2}, \frac{3}{5}, \frac{-2}{-3}$ are in ascending order.

6. (*i*) $\frac{2}{-9}, \frac{-4}{3}, \frac{7}{-12}, \frac{-5}{18}$

L.C.M. of 9, 3, 12 and 18 is 36.

$\frac{2}{-9} = \frac{2\times(-4)}{-9\times(-4)} = \frac{-8}{36}$

$\frac{-4}{3} = \frac{-4\times12}{3\times12} = \frac{-48}{36}$

$\frac{7}{-12} = \frac{7\times(-3)}{-12\times(-3)} = \frac{-21}{36}$

$\frac{-5}{18} = \frac{-5\times2}{18\times2} = \frac{-10}{36}$

$\frac{-8}{36}, \frac{-10}{36}, \frac{-21}{36}, \frac{-48}{36}$ are in descending order.

$\Rightarrow \frac{2}{-9}, \frac{-5}{18}, \frac{7}{-12}, \frac{-4}{3}$ are in descending order.

(*ii*) $-3, \frac{-3}{5}, \frac{8}{-3}, \frac{1}{3}$

L.C.M. of 1, 5, 3 and 3 is 15.

$-3 = \frac{-3}{1} = \frac{-3\times15}{1\times15} = \frac{-45}{15}$

$\frac{-3}{5} = \frac{-3\times3}{5\times3} = \frac{-9}{15}$

$\frac{8}{-3} = \frac{8\times(-5)}{-3\times(-5)} = \frac{-40}{15}$

$\frac{1}{3} = \frac{1\times5}{3\times5} = \frac{5}{15}$

$\frac{5}{15}, \frac{-9}{15}, \frac{-40}{15}, \frac{-45}{15}$ are in descending order.

$\Rightarrow \frac{1}{3}, \frac{-3}{5}, \frac{8}{-3}, -3$ are in descending order.

(*iii*) $\frac{-5}{9}, \frac{7}{-12}, \frac{4}{-18}, \frac{-2}{-3}$

L.C.M. of 9, 12, 18 and 3 is 36.

$\frac{-5}{9} = \frac{-5\times4}{9\times4} = \frac{-20}{36}$

$\frac{7}{-12} = \frac{7\times(-3)}{-12\times(-3)} = \frac{-21}{36}$

$\frac{4}{-18} = \frac{4\times(-2)}{-18\times(-2)} = \frac{-8}{36}$

$\frac{-2}{-3} = \frac{-2\times(-12)}{-3\times(-12)} = \frac{24}{36}$

$\frac{24}{36}, \frac{-8}{36}, \frac{-20}{36}, \frac{-21}{36}$ are in descending order.

$\Rightarrow \frac{-2}{-3}, \frac{4}{-18}, \frac{-5}{9}, \frac{7}{-12}$ are in descending order.

7. (*i*) $\frac{-3}{13}$ and $\frac{5}{13}$

$\frac{-3}{13} < \underline{\frac{-2}{13} < \frac{-1}{13} < 0} < \frac{5}{13}$

Hence, three rational numbers between $\frac{-3}{13}$ and $\frac{5}{13}$ are $\frac{-2}{13}$, $\frac{-1}{13}$ and 0.

(*ii*) $\frac{3}{9}$ and $\frac{3}{7}$

L.C.M. of 9 and 7 is 63.

$\frac{3}{9} = \frac{3\times7}{9\times7} = \frac{21}{63}$, $\frac{3}{7} = \frac{3\times9}{7\times9} = \frac{27}{63}$

Now, $\frac{21}{63} < \underline{\frac{22}{63} < \frac{23}{63} < \frac{24}{63}} < \frac{27}{63}$

Hence, three rational numbers between $\frac{3}{9}$ and $\frac{3}{7}$ are $\frac{22}{63}$, $\frac{23}{63}$ and $\frac{24}{63}$.

8. The L.C.M. of 7 and 5 is 35.

$\frac{-2}{7} = \frac{-2\times5}{7\times5} = \frac{-10}{35}$, $\frac{3}{-5} = \frac{3\times(-7)}{-5\times(-7)} = \frac{-21}{35}$

Now, $\frac{-21}{35} < \underline{\frac{-13}{35} < \frac{-12}{35} < \frac{-11}{35}} < \frac{-10}{35}$

Hence, three required rational numbers are $\frac{-11}{35}, \frac{-12}{35}$ and $\frac{-13}{35}$.

9. (*i*) $\frac{-7}{11} \boxed{<} 0$ $(\because -7 < 0)$

(*ii*) $\frac{-16}{-24} = \frac{-16\div(-8)}{-24\div(-8)} = \frac{2}{3}$

Hence, $\frac{-16}{-24} \boxed{=} \frac{2}{3}$

(*iii*) $\frac{7}{1} = \frac{7\times(-12)}{1\times(-12)} = \frac{-84}{-12}$

Hence, $7 \boxed{=} \frac{-84}{-12}$

(*iv*) $\frac{-5}{21} = \frac{-5\times2}{21\times2} = \frac{-10}{42}$

$\frac{-10}{42} < \frac{-7}{42}$ $(\because -10 < -7)$

Hence, $\frac{-5}{21} \boxed{<} \frac{-7}{42}$

(*v*) $\frac{-16}{-7} = \frac{-16\times(-1)}{-7\times(-1)} = \frac{16}{7}$

$\frac{-13}{7} < \frac{16}{7}$ $(\because -13 < 16)$

Hence, $\frac{-13}{7} \boxed{<} \frac{-16}{-7}$

(*vi*) $\frac{5}{1} = \frac{5\times4}{1\times4} = \frac{20}{4}$

$\frac{15}{-4} = \frac{15\times(-1)}{-4\times(-1)} = \frac{-15}{4}$

$\frac{20}{4} > \frac{-15}{4}$ $(\because 20 > -15)$

Hence, $5 \boxed{>} \frac{15}{-4}$

10. (*i*) L.C.M. of 15 and 10 is 30.

$\frac{4}{-15} = \frac{4\times(-2)}{-15\times(-2)} = \frac{-8}{30}$

$\frac{-1}{10} = \frac{-1\times3}{10\times3} = \frac{-3}{30}$

$\therefore \quad \frac{-8}{30} < \frac{-3}{30} \quad \Rightarrow \frac{4}{-15} < \frac{-1}{10}$

Hence, $\frac{4}{-15}$ is smaller.

(*ii*) L.C.M. of 2 and 4 is 4.

$\frac{-7}{2} = \frac{-7\times2}{2\times2} = \frac{-14}{4}$

$\therefore \quad \frac{-14}{4} < \frac{-1}{4} \quad \Rightarrow \frac{-7}{2} < \frac{-1}{4}$

Hence, $\frac{-7}{2}$ is smaller.

(*iii*) L.C.M. of 36 and 9 is 36.

$$\frac{5}{-9}=\frac{5\times(-4)}{-9\times(-4)}=\frac{-20}{36}$$

$$\therefore \quad \frac{-20}{36}<\frac{-13}{36} \qquad \Rightarrow \quad \frac{5}{-9}<\frac{-13}{36}$$

Hence, $\frac{5}{-9}$ is smaller.

EXERCISE 4.3

1. (*i*) $\frac{3}{7}+\left(\frac{-6}{7}\right)=\frac{3+(-6)}{7}=\frac{-3}{7}$

(*ii*) $\frac{-13}{4}+\frac{7}{4}=\frac{-13+7}{4}=\frac{-6}{4}=\frac{-3}{2}$

(*iii*) $\frac{-8}{13}+\left(\frac{-4}{13}\right)=\frac{(-8)+(-4)}{13}=\frac{-8-4}{13}=\frac{-12}{13}$

(*iv*) $\frac{-5}{11}+\left(\frac{-6}{11}\right)=\frac{(-5)+(-6)}{11}=\frac{-5-6}{11}=\frac{-11}{11}=-1$

2. (*i*) $1+\left(\frac{5}{-12}\right)=1+\frac{5\times(-1)}{-12\times(-1)}=\frac{1}{1}+\left(\frac{-5}{12}\right)$

$$=\frac{12\times1+(-5)}{12}=\frac{12-5}{12}=\frac{7}{12}$$

(*ii*) $\frac{-2}{9}+\frac{8}{27}=\frac{(-2)\times3+8\times1}{27}=\frac{-6+8}{27}=\frac{2}{27}$

(*iii*) $\frac{-5}{12}+\frac{5}{8}=\frac{-5\times2}{12\times2}+\frac{5\times3}{8\times3}=\frac{-10}{24}+\frac{15}{24}$

$$=\frac{-10+15}{24}=\frac{5}{24}$$

(*iv*) $\frac{-3}{4}+\left(\frac{-5}{6}\right)=\frac{-3\times3}{4\times3}+\frac{(-5)\times2}{6\times2}$

$$=\frac{-9}{12}+\left(\frac{-10}{12}\right)=\frac{-9-10}{12}=\frac{-19}{12}$$

3. (*i*) $\frac{-9}{24}+\left(\frac{-1}{18}\right)=\frac{-9\times3}{24\times3}+\frac{(-1)\times4}{18\times4}$

($\because$ L.C.M. of 24 and 18 is 72.)

$$=\frac{-27}{72}+\left(\frac{-4}{72}\right)$$

$$=\frac{-27-4}{72}=\frac{-31}{72}$$

(*ii*) $\frac{-6}{27}+\frac{5}{18}=\frac{-6\times2}{27\times2}+\frac{5\times3}{18\times3}$

($\because$ L.C.M. of 27 and 18 is 54.)

$$=\frac{-12}{54}+\frac{15}{54}=\frac{-12+15}{54}=\frac{3}{54}=\frac{1}{18}$$

(*iii*) $\frac{-7}{36}+\left(\frac{-5}{12}\right)=\frac{(-7)\times1+(-5)\times3}{36}$

$$=\frac{-7-15}{36}=\frac{-22}{36}=\frac{-11}{18}$$

(*iv*) $\frac{3}{-7}+\left(\frac{-4}{-21}\right)=\frac{3\times(-1)}{(-7)\times(-1)}+\frac{(-4)\times(-1)}{(-21)\times(-1)}$

(Making denominator positive)

$$=\frac{-3}{7}+\frac{4}{21}=\frac{(-3)\times3+4\times1}{21}=\frac{-9+4}{21}=\frac{-5}{21}$$

(*v*) $-4+\frac{1}{3}=\frac{-4}{1}+\frac{1}{3}=\frac{(-4)\times3+1}{3}=\frac{-12+1}{3}$

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

(*vi*) $\frac{4}{-15}+\frac{1}{12}=\frac{4\times(-1)}{-15\times(-1)}+\frac{1}{12}=\frac{-4}{15}+\frac{1}{12}$

(Making denominator positive)

$$=\frac{(-4)\times4+1\times5}{60}$$

($\because$ L.C.M. of 15 and 12 is 60.)

$$=\frac{-16+5}{60}=\frac{-11}{60}$$

(*vii*) $\frac{-11}{8}+\frac{7}{36}=\frac{-11\times9}{8\times9}+\frac{7\times2}{36\times2}$

($\because$ L.C.M. of 8 and 36 is 72.)

$$=\frac{-99}{72}+\frac{14}{72}=\frac{-99+14}{72}=\frac{-85}{72}$$

(*viii*) $\frac{5}{-26}+\frac{8}{39}=\frac{5\times(-1)}{-26\times(-1)}+\frac{8}{39}=\frac{-5}{26}+\frac{8}{39}$

(Making denominator positive)

$$= \frac{(-5)\times 3 + 8\times 2}{78}$$

($\because$ L.C.M. of 26 and 39 is 78.)

$$= \frac{-15+16}{78} = \frac{1}{78}$$

4. (*i*) $\frac{8}{-5} + \left(\frac{4}{-3}\right) + \frac{1}{3} = \frac{-8}{5} + \left(\frac{-4}{3}\right) + \frac{1}{3}$

(Making denominator positive)

$$= \frac{-8\times 3}{5\times 3} + \frac{(-4)\times 5}{3\times 5} + \frac{1\times 5}{3\times 5}$$

$$= \frac{-24}{15} + \left(\frac{-20}{15}\right) + \frac{5}{15}$$

($\because$ L.C.M. of 5, 3 and 3 is 15.)

$$= \frac{-24-20+5}{15} = \frac{-39}{15} = \frac{-13}{5}$$

(*ii*) $\frac{9}{-26} + \frac{14}{39} + \left(\frac{-5}{-13}\right) = \frac{-9}{26} + \frac{14}{39} + \frac{5}{13}$

(Making denominator positive)

$$= \frac{-9\times 3 + 14\times 2 + 5\times 6}{78} = \frac{-27+28+30}{78} = \frac{31}{78}$$

(*iii*) $\frac{24}{5} + \left(\frac{-1}{10}\right) + 2 = \frac{24\times 2 + (-1) + 2\times 10}{10}$

$$= \frac{48-1+20}{10} = \frac{67}{10}$$

(*iv*) $3 + \left(\frac{5}{-9}\right) + \left(\frac{-5}{-3}\right) = \frac{3}{1} + \left(\frac{-5}{9}\right) + \frac{5}{3}$

(Making denominator positive)

$$= \frac{3\times 27}{1\times 27} + \frac{(-5)\times 3}{9\times 3} + \frac{5\times 9}{3\times 9}$$

$$= \frac{81}{27} + \left(\frac{-15}{27}\right) + \frac{45}{27}$$

($\because$ L.C.M. of 9 and 3 is 27.)

$$= \frac{81-15+45}{27} = \frac{111}{27} = \frac{37}{9}$$

EXERCISE 4.4

1. (*i*) $\frac{4}{11} - \left(\frac{-6}{11}\right) = \frac{4-(-6)}{11} = \frac{4+6}{11} = \frac{10}{11}$

(*ii*) $\frac{-8}{13} - \left(\frac{-7}{13}\right) = \frac{(-8)-(-7)}{13} = \frac{-8+7}{13} = -\frac{1}{13}$

(*iii*) $\frac{4}{17} - \left(\frac{-9}{17}\right) = \frac{4-(-9)}{17} = \frac{4+9}{17} = \frac{13}{17}$

(*iv*) $\frac{-6}{8} - \left(\frac{-4}{9}\right) = \frac{(-6)\times 9 - (-4)\times 8}{72}$

$$= \frac{-54+32}{72} = \frac{-22}{72} = \frac{-11}{36}$$

(*v*) $\left(\frac{-4}{39}\right) - \left(\frac{-6}{13}\right) = \frac{(-4)\times 1 - (-6)\times 3}{39}$

$$= \frac{-4+18}{39} = \frac{14}{39}$$

(*vi*) $\frac{4}{21} - \left(\frac{-3}{7}\right) = \frac{4\times 1 - (-3)\times 3}{21} = \frac{4+9}{21} = \frac{13}{21}$

(*vii*) $\frac{8}{19} - \left(\frac{-6}{19}\right) = \frac{8-(-6)}{19} = \frac{8+6}{19} = \frac{14}{19}$

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

2. (*i*) $\frac{5}{7} - \frac{3}{8} = \frac{5\times 8 - 3\times 7}{56}$

($\because$ L.C.M. of 7 and 8 is 56.)

$$= \frac{40-21}{56} = \frac{19}{56}$$

(*ii*) $\frac{7}{8} - \frac{5}{9} = \frac{7\times 9 - 5\times 8}{72}$

($\because$ L.C.M. of 8 and 9 is 72.)

$$= \frac{63-40}{72} = \frac{23}{72}$$

(*iii*) $\frac{2}{7} - \left(\frac{-5}{6}\right) = \frac{2\times 6 - (-5)\times 7}{42}$

($\because$ L.C.M. of 7 and 6 is 42.)

$$= \frac{12+35}{42} = \frac{47}{42}$$

(*iv*) $\frac{5}{3} - \frac{14}{5} = \frac{5\times 5 - 14\times 3}{15}$

($\because$ L.C.M. of 3 and 5 is 15.)

$$= \frac{25-42}{15} = \frac{-17}{15} =$$

(*v*) $-\frac{11}{5} - 6 = -\frac{11}{5} - \frac{6}{1} = \frac{-11\times 1 - 6\times 5}{5}$

$$= \frac{-11-30}{5} = \frac{-41}{5}$$

(*vi*) $\frac{5}{63}-\left(\frac{-6}{21}\right) = \frac{5\times1-(-6)\times3}{63} = \frac{5+18}{63}$

($\because$ L.C.M. of 63 and 21 is 63.)

$$= \frac{23}{63}$$

(*vii*) $\frac{2}{3}-\left(\frac{7}{-9}\right) = \frac{2}{3}-\frac{7\times(-1)}{(-9)\times(-1)}$

$$=\frac{2}{3}-\left(\frac{-7}{9}\right)=\frac{2\times3-(-7)\times1}{9}=\frac{6+7}{9}=\frac{13}{9}$$

(*viii*) $\frac{1}{-4}-\frac{1}{5} = \frac{1\times(-1)}{(-4)\times(-1)}-\frac{1}{5}$

$$=\left(\frac{-1}{4}\right)-\frac{1}{5}=\frac{(-1)\times5-1\times4}{20}=\frac{-5-4}{20}=\frac{-9}{20}$$

($\because$ L.C.M. of 4 and 5 is 20.)

3. Let the number to be subtracted be x. Then,

$$\frac{-3}{2} - x = \frac{-31}{14}$$

$$\Rightarrow \frac{-3}{2}-x+\frac{31}{14} = \frac{-31}{14}+\frac{31}{14}$$

(Adding $\frac{31}{14}$ on both sides)

$$\Rightarrow \frac{-3}{2} + \frac{31}{14} = x$$

$$\Rightarrow x = \frac{(-3)\times7+31\times1}{14}$$

(L.C.M. of 2 and 14 is 14.)

$$\Rightarrow x = \frac{-21+31}{14} = \frac{10}{14} = \frac{5}{7}$$

Hence, $\frac{5}{7}$ should be subtracted from $\frac{-3}{2}$ to get $\frac{-31}{14}$.

4. Let the number to be added be x. Then,

$$\frac{5}{6} + x = \frac{41}{24}$$

$$\Rightarrow \frac{5}{6}+x-\frac{41}{24}=\frac{41}{24}-\frac{41}{24}$$

(Subtracting $\frac{41}{24}$ from both sides)

$$\Rightarrow x = \frac{41}{24} - \frac{5}{6}$$

$$\Rightarrow x = \frac{41-5\times4}{24} = \frac{41-20}{24}$$

$$= \frac{21}{24} = \frac{7}{8}$$

Hence, $\frac{7}{8}$ should be added to $\frac{5}{6}$ to get $\frac{41}{24}$.

5. The sum of $\frac{-2}{7}$ and $\frac{3}{14} = \frac{-2}{7}+\frac{3}{14}$

$$= \frac{(-2)\times2+3\times1}{14}=\frac{-4+3}{14} = \frac{-1}{14}$$

And, the sum of $\frac{11}{14}$ and $\frac{15}{42}=\frac{11}{14}+\frac{15}{42}$

$$= \frac{11\times3+15\times1}{42}=\frac{33+15}{42} = \frac{48}{42}= \frac{16}{14}$$

Now, $\frac{16}{14}-\left(\frac{-1}{14}\right)=\frac{16-(-1)}{14} = \frac{17}{14}$

6. Other number $= \frac{-7}{13}-\left(\frac{-5}{39}\right)$

$$=\frac{(-7)\times3-(-5)\times1}{39} =\frac{-21+5}{39} = \frac{-16}{39}$$

Hence, other rational number is $\frac{-16}{39}$.

7. Let the number to be added be x. Then,

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

$$x = 1 - \left(\frac{(-3)\times3+(-5)\times5}{15}\right)$$

($\therefore$ L.C.M. of 5 and 3 is 15.)

$$x = 1 - \left(\frac{-9-25}{15}\right) = \frac{1}{1}-\left(\frac{-34}{15}\right)$$

$$x = \frac{1\times15-(-34)\times1}{15}= \frac{15+34}{15} = \frac{49}{15}$$

Hence, the required number is $\frac{49}{15}$.

8. Let the number to be subtracted be x. Then,

$$\frac{-2}{5} - x = \frac{11}{35}$$

$$\Rightarrow \quad x = \frac{-2}{5} - \frac{11}{35}$$

$$= \frac{(-2)\times 7 - 11\times 1}{35} = \frac{-14-11}{35}$$

$$= \frac{-25}{35} = \frac{-5}{7}$$

Hence, the required number is $\frac{-5}{7}$.

9. Let the number to be subtracted be x. Then,

$$\left(\frac{-5}{18}+\frac{5}{12}\right) - x = \frac{-11}{72}$$

$$\Rightarrow \quad \left(\frac{-5\times 2+5\times 3}{36}\right) - x = \frac{-11}{72}$$

$$\Rightarrow \quad \frac{-10+15}{36} - x = \frac{-11}{72}$$

$$\Rightarrow \quad \frac{5}{36} - x = \frac{-11}{72}$$

$$\Rightarrow \quad x = \frac{5}{36} + \frac{11}{72}$$

$$= \frac{5\times 2+11\times 1}{72}$$

$$= \frac{10+11}{72}$$

$$= \frac{21}{72} = \frac{7}{24}$$

Hence, the required number is $\frac{7}{24}$.

10. Other rational number $= \frac{3}{2} - \frac{9}{10}$

$$= \frac{3\times 5 - 9\times 1}{10} = \frac{15-9}{10} = \frac{6}{10} = \frac{3}{5}$$

Hence, the other number is $\frac{3}{5}$.

EXERCISE 4.5

1. (*i*) $\frac{-3}{\cancel{5}_{1}} \times \frac{\cancel{5}^{1}}{7} = \frac{-3}{7}$

(*ii*) $\frac{-2}{7} \times \left(\frac{-3}{1}\right) = \frac{(-2)\times(-3)}{7} = \frac{6}{7}$

(*iii*) $(-2) \times \frac{3}{11} = \frac{-2\times 3}{11} = \frac{-6}{11}$

(*iv*) $\left(\frac{-\cancel{3}^{1}}{\cancel{7}_{1}}\right) \times \left(\frac{-\cancel{21}^{3}}{\cancel{24}_{8}}\right) = \frac{(-1)\times(-3)}{1\times 8} = \frac{3}{8}$

(*v*) $\frac{-2}{9} \times (-5) = \frac{(-2)\times(-5)}{9} = \frac{10}{9}$

(*vi*) $\frac{-3}{\cancel{2}_{1}} \times \frac{\cancel{4}^{2}}{7} = \frac{(-3)\times 2}{1\times 7} = \frac{-6}{7}$

(*vii*) $\frac{-\cancel{8}^{4} \times \cancel{25}^{\cancel{5}^{1}}}{\cancel{15}_{3} \times \cancel{10}_{\cancel{2}_{1}}} = \frac{(-4)\times 1}{3\times 1} = \frac{-4}{3}$

(*viii*) $\frac{-5}{8} \times \left(\frac{-7}{3}\right) = \frac{(-5)\times(-7)}{8\times 3} = \frac{35}{24}$

2. (*i*) $\frac{3}{7} \times \left(\frac{-3}{5}\right) = \frac{3\times(-3)}{7\times 5} = \frac{-9}{35}$

(*ii*) $-8 \times \left(\frac{-21}{4}\right) = \left(\frac{-\cancel{8}^{2}}{1}\right) \times \left(\frac{-21}{\cancel{4}_{1}}\right)$

$$= \frac{(-2)\times(-21)}{1\times 1} = 42$$

(*iii*) $\frac{-2}{3} \times \frac{7}{8} = \frac{-\cancel{2}^{1}}{3} \times \frac{7}{\cancel{8}_{4}} = \frac{(-1)\times 7}{3\times 4} = \frac{-7}{12}$

(*iv*) $\frac{-6}{11} \times \frac{9}{5} = \frac{(-6)\times 9}{11\times 5} = \frac{-54}{55}$

(*v*) $\frac{-7}{12} \times \left(-2\frac{6}{7}\right) = \frac{-\cancel{7}^{1}}{\cancel{12}_{3}} \times \left(\frac{-\cancel{20}^{5}}{\cancel{7}_{1}}\right)$

$$= \frac{(-1)\times(-5)}{3\times 1} = \frac{5}{3}$$

(*vi*) $-1\frac{2}{9}\times\left(\frac{21}{-44}\right)=-\frac{\cancel{11}^{1}}{\cancel{9}_{3}}\times\left(\frac{\cancel{21}^{7}}{-\cancel{44}_{4}}\right)$

$=\frac{(-1)\times 7}{3\times(-4)}=\frac{-7}{-12}=\frac{7}{12}$

(*vii*) $-15\times 1\frac{2}{5}=\frac{-\cancel{15}^{3}}{1}\times\frac{7}{\cancel{5}_{1}}=\frac{-3\times 7}{1\times 1}=-21$

(*viii*) $-1\frac{1}{9}\times\left(-5\frac{8}{11}\right)=-\frac{10}{\cancel{9}_{1}}\times\left(\frac{-\cancel{63}^{7}}{11}\right)$

$=\frac{(-10)\times(-7)}{1\times 11}=\frac{70}{11}=6\frac{4}{11}$

3. $x=\frac{-3}{2}, y=\frac{4}{3}$ and $z=-1$

L.H.S. $= x\times(y+z)$

$=\frac{-3}{2}\times\left[\frac{4}{3}+(-1)\right]=\frac{-3}{2}\times\left[\frac{4+(-1)\times 3}{3}\right]$

$=\frac{-3}{2}\times\left(\frac{4-3}{3}\right)=\frac{-\cancel{3}^{1}}{2}\times\frac{1}{\cancel{3}_{1}}=\frac{-1}{2}$

R.H.S. $=(x\times y)+(x\times z)$

$=\left(\frac{-\cancel{3}^{1}}{\cancel{2}_{1}}\times\frac{\cancel{4}^{2}}{\cancel{3}_{1}}\right)+\left(\frac{-3}{2}\times(-1)\right)$

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

$=\frac{(-2)\times 2+3\times 1}{2}=\frac{-4+3}{2}=\frac{-1}{2}$

Hence, L.H.S. = R.H.S.

4. (*i*) $\frac{-5}{3}\times\left[\frac{-1}{2}+\left(\frac{-3}{5}\right)\right]$

$=\frac{-5}{3}\times\left[\frac{(-1)\times 5+(-3)\times 2}{10}\right]=\frac{-5}{3}\times\left[\frac{-5-6}{10}\right]$

$=\frac{-\cancel{5}^{1}}{3}\times\left(\frac{-11}{\cancel{10}_{2}}\right)=\frac{(-1)\times(-11)}{3\times 2}=\frac{11}{6}$

(*ii*) $\frac{-2}{9}\times\left(\frac{3}{7}+\frac{4}{5}\right)=\frac{-2}{9}\times\left(\frac{3\times 5+4\times 7}{35}\right)$

$=\frac{-2}{9}\times\left(\frac{15+28}{35}\right)=\frac{-2}{9}\times\frac{43}{35}$

$=\frac{(-2)\times 43}{9\times 35}=\frac{-86}{315}$

5. (*i*) $\left(2\times\frac{3}{4}\right)+\left[\frac{4}{5}+\left(\frac{3}{-2}\right)\right]$

$=\left(\cancel{2}^{1}\times\frac{3}{\cancel{4}_{2}}\right)+\left[\frac{4}{5}+\left(\frac{-3}{2}\right)\right]$

(Making denominator positive)

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

$=\frac{3}{2}+\left(\frac{8-15}{10}\right)=\frac{3}{2}+\left(\frac{-7}{10}\right)$

$=\frac{3\times 5+(-7)\times 1}{10}=\frac{15-7}{10}$

$=\frac{\cancel{8}^{4}}{\cancel{10}^{5}}=\frac{4}{5}$

(*ii*) $\left[\frac{20}{8}\times\left(\frac{-24}{15}\right)\right]-\left[8\times\left(\frac{1}{-2}\right)\right]$

$=\left[\frac{\cancel{20}^{4}}{\cancel{8}_{1}}\times\left(\frac{-\cancel{24}^{\cancel{8}^{1}}}{\cancel{15}_{\cancel{5}_{1}}}\right)\right]-\left[\cancel{8}^{4}\times\left(\frac{-1}{\cancel{2}_{1}}\right)\right]$

$=\frac{4\times(-1)}{1\times 1}-\frac{4\times(-1)}{1}$

$=-4-(-4)=-4+4=0$

6. (*i*) $\frac{-3}{5}\times\boxed{-1}=\frac{3}{5}$

(*ii*) $\frac{-5}{7}\times\boxed{\frac{7}{5}}=-1$

(*iii*) $\boxed{0}\times\frac{-9}{11}=0$

(*iv*) $\frac{6}{27}\times\boxed{\frac{27}{6}}=1$

(*v*) $\frac{-9}{13}\times\boxed{\frac{-3}{3}}=\frac{27}{39}$

(*vi*) $\frac{-36}{7}\times\boxed{\frac{7}{2}}=-18$

7. The cost of 1 m of cloth = ₹ $42\frac{2}{3}$

$\therefore$ The cost of $5\frac{3}{4}$ m of cloth

$= ₹\left(42\frac{2}{3}\times 5\frac{3}{4}\right) = ₹\left(\frac{\cancel{128}^{32}}{3}\times\frac{23}{\cancel{4}_{1}}\right)$

$= ₹\left(\frac{32\times 23}{3\times 1}\right) = ₹\frac{736}{3} = ₹\ 245\frac{1}{3}$

Hence, the cost of $5\frac{3}{4}$ m of cloth is ₹ $245\frac{1}{3}$.

8. Length = $13\frac{1}{2}$ m, breadth = $11\frac{2}{3}$ m

Area of rectangular park
= length × breadth

$= \left(13\frac{1}{2}\times 11\frac{2}{3}\right)$ sq. m

$= \left(\frac{\cancel{27}^{9}}{2}\times\frac{35}{\cancel{3}_{1}}\right)$ sq. m $= \left(\frac{9\times 35}{2}\right)$ sq. m

$= \frac{315}{2}$ sq. m $= 157\frac{1}{2}$ sq. m

Hence, area of rectangular park is $157\frac{1}{2}$ sq. m.

EXERCISE 4.6

1. (*i*) $\frac{2}{5}\times\frac{3}{7} = \frac{2\times 3}{5\times 7} = \frac{6}{35}$

Reciprocal of $\frac{6}{35} = \frac{1}{6/35} = \frac{35}{6}$

(*ii*) Reciprocal of $\frac{-7}{25} = \frac{1}{-7/25} = \frac{-25}{7}$

(*iii*) Reciprocal of $\frac{-1}{13} = \frac{1}{-1/13} = \frac{13}{-1} = -13$

(*iv*) $\frac{-\cancel{7}^{1}}{\cancel{9}_{3}}\times\frac{\cancel{3}^{1}}{\cancel{14}_{2}} = \frac{(-1)\times 1}{3\times 2} = \frac{-1}{6}$

Reciprocal of $\left(\frac{-7}{9}\times\frac{3}{14}\right)$ or $\frac{-1}{6} = \frac{1}{-1/6}$

$= \frac{6}{-1} = -6$

2. (*i*) $\frac{25}{11}\div\frac{5}{22} = \frac{\cancel{25}^{5}}{\cancel{11}_{1}}\times\frac{\cancel{22}^{2}}{\cancel{5}_{1}}$

(Reciprocal of $\frac{5}{22}$ is $\frac{22}{5}$)

$= \frac{5\times 2}{1\times 1} = 10$

(*ii*) $\frac{13}{7}\div\frac{26}{21} = \frac{\cancel{13}^{1}}{\cancel{7}_{1}}\times\frac{\cancel{21}^{3}}{\cancel{26}_{2}}$

(Reciprocal of $\frac{26}{21}$ is $\frac{21}{26}$)

$= \frac{1\times 3}{1\times 2} = \frac{3}{2}$

(*iii*) $(-6)\div\frac{3}{11} = (-\cancel{6}^{2})\times\frac{11}{\cancel{3}_{1}}$

(Reciprocal of $\frac{3}{11}$ is $\frac{11}{3}$)

$= \frac{(-2)\times 11}{1} = -22$

(*iv*) $\frac{-3}{8}\div\frac{5}{8} = \frac{-3}{\cancel{8}_{1}}\times\frac{\cancel{8}^{1}}{5} = \frac{(-3)\times 1}{1\times 5} = \frac{-3}{5}$

(Reciprocal of $\frac{5}{8}$ is $\frac{8}{5}$)

3. (*i*) $\frac{4}{5}\div\frac{9}{7} = \frac{4}{5}\times\frac{7}{9}$ (Reciprocal of $\frac{9}{7}$ is $\frac{7}{9}$)

$= \frac{28}{45}$

(*ii*) $\frac{6}{13}\div\left(\frac{-2}{65}\right) = \frac{\cancel{6}^{3}}{\cancel{13}_{1}}\times\left(\frac{-\cancel{65}^{5}}{\cancel{2}_{1}}\right)$

(Reciprocal of $\frac{-2}{65}$ is $\frac{-65}{2}$)

$= \frac{3\times(-5)}{1} = -15$

(*iii*) $\frac{-6}{21} \div \frac{4}{63} = \frac{-\cancel{6}^{3}}{\cancel{21}_{1}} \times \frac{\cancel{63}^{3}}{\cancel{4}_{2}}$

(Reciprocal of $\frac{4}{63}$ is $\frac{63}{4}$)

$= \frac{(-3) \times 3}{1 \times 2} = \frac{-9}{2}$

(*iv*) $\frac{-5}{7} \div \left(\frac{-15}{28}\right) = \frac{-\cancel{5}^{1}}{\cancel{7}_{1}} \times \left(\frac{-\cancel{28}^{4}}{\cancel{15}_{3}}\right)$

(Reciprocal of $\frac{-15}{28}$ is $\frac{-28}{15}$)

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

4. Other number $= \frac{-13}{9} \div \left(\frac{-26}{7}\right)$

$= \frac{-\cancel{13}^{1}}{9} \times \left(\frac{-7}{\cancel{26}_{2}}\right)$

(Reciprocal of $\frac{-26}{7}$ is $\frac{-7}{26}$)

$= \frac{(-1) \times (-7)}{9 \times 2} = \frac{7}{18}$

Hence, the other number is $\frac{7}{18}$.

5. The required number $= \frac{-3}{10} \div \left(\frac{-2}{3}\right)$

$= \frac{-3}{10} \times \left(\frac{-3}{2}\right)$

(Reciprocal of $\frac{-2}{3}$ is $\frac{-3}{2}$)

$= \frac{(-3) \times (-3)}{20} = \frac{9}{20}$

Hence, the required rational number is $\frac{9}{20}$.

6. Sum of $\frac{65}{9}$ and $\frac{-11}{-3} = \frac{65}{9} + \frac{11}{3}$

(Making denominator positive)

$= \frac{65 \times 1 + 11 \times 3}{9} = \frac{65 + 33}{9} = \frac{98}{9}$

And, product of $\frac{7}{6}$ and $\frac{5}{-3} = \frac{7}{6} \times \left(\frac{5}{-3}\right) = \frac{35}{-18}$

Now, $\frac{98}{9} \div \left(\frac{35}{-18}\right) = \frac{\cancel{98}^{14}}{\cancel{9}_{1}} \times \left(\frac{-\cancel{18}^{2}}{\cancel{35}_{5}}\right) = \frac{-28}{5}$

(Reciprocal of $\frac{35}{-18}$ is $\frac{-18}{35}$)

7. The required number $= \frac{-9}{20} \div \left(\frac{-3}{2}\right)$

$= \frac{-\cancel{9}^{3}}{\cancel{20}_{10}} \times \left(\frac{-\cancel{2}^{1}}{\cancel{3}_{1}}\right) = \frac{-3 \times (-1)}{10 \times 1} = \frac{3}{10}$

Hence, the required rational number is $\frac{3}{10}$.

8. Distance covered by car in one hour

$= \left(189\frac{1}{3} \div 4\frac{4}{9}\right)$ km

$= \left(\frac{568}{3} \div \frac{40}{9}\right)$ km

$= \left(\frac{\cancel{568}^{71}}{\cancel{3}_{1}} \times \frac{\cancel{9}^{3}}{\cancel{40}_{5}}\right)$ km

$= \left(\frac{71 \times 3}{1 \times 5}\right)$ km $= \frac{213}{5}$ km $= 42\frac{3}{5}$ km

Hence, the car covers a distance of $42\frac{3}{5}$ km in 1 hour.

MULTIPLE CHOICE QUESTIONS

1. 0 is neither positive nor negative.
Hence, option (*a*) is correct.

2. $\frac{27}{-81} = \frac{27 \div (-27)}{-81 \div (-27)} = \frac{-1}{3}$

Hence, option (*b*) is correct.

3. $\frac{x}{6}=\frac{4}{-3}$

$\Rightarrow \frac{x}{6}=\frac{4\times(-2)}{-3\times(-2)}$

$\Rightarrow \frac{x}{6}=\frac{-8}{6}$

$\Rightarrow x = -8$

Hence, option (*b*) is correct.

4. $\left|\frac{-3}{2}\right|=\frac{3}{2}$

Hence, option (*c*) is correct.

5. The reciprocal of $\frac{19}{7} = \frac{1}{19/7} = \frac{7}{19}$

Hence, option (*c*) is correct.

6. $\frac{-4}{9} + x = 1$

$\Rightarrow \quad x = 1 - \left(\frac{-4}{9}\right)$

$= \frac{1\times9-(-4)\times1}{9} = \frac{9+4}{9} = \frac{13}{9}$

Hence, option (*b*) is correct.

7. Other number $= -6 \div \left(\frac{-3}{2}\right)$

$= -\cancel{6}^{2}\times\left(\frac{-2}{\cancel{3}_{1}}\right) = \frac{(-2)\times(-2)}{1} = 4$

Hence, option (*b*) is correct.

8. $-4 + \left(\frac{-3}{5}\right) = \frac{-4}{1}+\left(\frac{-3}{5}\right)$

$=\frac{(-4)\times5+(-3)\times1}{5} = \frac{-20-3}{5} = \frac{-23}{5}$

Hence, option (*a*) is correct.

9. $\frac{-3}{7} - x = \frac{-2}{7} \Rightarrow x = \frac{-3}{7}-\left(\frac{-2}{7}\right)$

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

Hence, option (*b*) is correct.

10. $5\frac{2}{3} \div$ Rational number $= 3\frac{2}{5}$

$\Rightarrow \frac{17}{3} \div$ Rational number $= \frac{17}{5}$

$\Rightarrow$ Rational number $= \frac{17}{3} \div \frac{17}{5}$

$= \frac{\cancel{17}^{1}}{3}\times\frac{5}{\cancel{17}_{1}} = \frac{1\times5}{3\times1} = \frac{5}{3}$

Hence, option (*a*) is correct.

MENTAL MATHS CORNER

1. $\frac{-2}{7} + x = -1$

$\Rightarrow \quad x = -1 - \left(\frac{-2}{7}\right)=\frac{(-1)\times7-(-2)\times1}{7}$

$= \frac{-7+2}{7} = \frac{-5}{7}$

Hence, $\frac{-2}{7} + \left(\frac{\mathbf{-5}}{\mathbf{7}}\right) = -1.$

2. $\frac{-2}{9} - \frac{4}{18} = \frac{(-2)\times2-4\times1}{18} = \frac{-4-4}{18}$

$= \frac{-8}{18} = \frac{-4}{9}$

Hence, $\frac{-2}{9}-\frac{4}{18} = \mathbf{\frac{-4}{9}}$.

3. $\mathbf{-1} \times \left(\frac{-7}{11}\right) = \frac{7}{11}$.

4. $\frac{4}{7} \div x = -1$

$\Rightarrow \quad x = \frac{4}{7} \div (-1) \Rightarrow x = -\frac{4}{7}$

Hence, $\frac{4}{7} \div \left(-\frac{\mathbf{4}}{\mathbf{7}}\right) = -1.$

5. $1 \div \left(\frac{3}{-5}\right) = 1 \times \left(\frac{-5}{3}\right) = \frac{-5}{3}$

Hence, $1 \div \left(\frac{3}{-5}\right) = \mathbf{\frac{-5}{3}}$

6. $\left|\frac{5}{7}\right| - \left|\frac{-5}{7}\right| + \frac{5}{7} = \frac{5}{7}-\frac{5}{7}+\frac{5}{7} = \frac{5-5+5}{7} = \frac{5}{7}$

Hence, $\left|\frac{5}{7}\right| - \left|\frac{-5}{7}\right| + \frac{5}{7} = \mathbf{\frac{5}{7}}$.

REVIEW EXERCISE

1. (*i*) $\frac{-3}{-15} = \frac{-3 \div (-3)}{(-15) \div (-3)} = \frac{1}{5}$

(*ii*) $\frac{24}{-36} = \frac{24 \div (-12)}{-36 \div (-12)} = \frac{-2}{3}$

(*iii*) $\frac{35}{-75} = \frac{35 \div (-5)}{-75 \div (-5)} = \frac{-7}{15}$

(*iv*) $\frac{-21}{49} = \frac{-21 \div 7}{49 \div 7} = \frac{-3}{7}$

2. (*i*) $\frac{4}{-5} = \frac{4 \times (-6)}{-5 \times (-6)} = \frac{-24}{30}$

$\frac{-2}{3} = \frac{-2 \times 10}{3 \times 10} = \frac{-20}{30}$

Therefore,

$\frac{-24}{30} < \underline{\frac{-23}{30} < \frac{-22}{30} < \frac{-21}{30}} < \frac{-20}{30}$

$\Rightarrow \quad \frac{4}{-5} < \underline{\frac{-23}{30} < \frac{-11}{15} < \frac{-7}{10}} < \frac{-2}{3}$

Hence, three rational numbers between $\frac{4}{-5}$ and $\frac{-2}{3}$ are $\frac{-23}{30}$, $\frac{-11}{15}$ and $\frac{-7}{10}$.

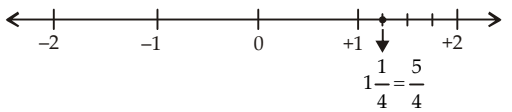
(*ii*) $\frac{1}{3} = \frac{1 \times 3}{3 \times 3} = \frac{3}{9}$ and $\frac{1}{-9} = \frac{1 \times (-1)}{-9 \times (-1)} = \frac{-1}{9}$

$\frac{3}{9} > \frac{2}{9} > \frac{1}{9} > 0 > \frac{-1}{9}$

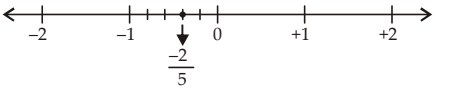
or $\frac{-1}{9} < \underline{0 < \frac{1}{9} < \frac{2}{9}} < \frac{3}{9}$

Hence, three rational numbers between $\frac{1}{3}$ and $\frac{1}{-9}$ are 0, $\frac{1}{9}$ and $\frac{2}{9}$.

3. (*i*) $\frac{5}{4}$



(*ii*) $\frac{-2}{5}$



4. L.C.M. of 7, 35 and 21 is 105.

$\frac{-2}{7} = \frac{-2 \times 15}{7 \times 15} = \frac{-30}{105}$

$\frac{5}{7} = \frac{5 \times 15}{7 \times 15} = \frac{75}{105}$

$\frac{24}{35} = \frac{24 \times 3}{35 \times 3} = \frac{72}{105}$

$\frac{11}{-21} = \frac{11 \times (-5)}{-21 \times (-5)} = \frac{-55}{105}$

$\therefore \frac{75}{105} > \frac{72}{105} > \frac{-30}{105} > \frac{-55}{105}$ are in descending order.

$\Rightarrow \quad \frac{5}{7}, \frac{24}{35}, \frac{-2}{7}, \frac{11}{-21}$ are in descending order.

5. $\because \quad \frac{-3}{7}$ and $\frac{p}{-28}$ are equivalent rational numbers.

$\therefore \quad \frac{-3}{7} = \frac{p}{-28}$

$\Rightarrow \quad \frac{-3 \times -4}{7 \times -4} = \frac{p}{-28}$

$\Rightarrow \quad \frac{12}{-28} = \frac{p}{-28}$

$\Rightarrow \quad \boxed{p = 12}$

6. (*i*) $\frac{-7}{16} + \frac{8}{24} = \frac{-7 \times 3 + 8 \times 2}{48} = \frac{-21 + 16}{48} = \frac{-5}{48}$

(*ii*) $\frac{-3}{10} - \left(\frac{-4}{7}\right) = \frac{-3 \times 7 - (-4) \times 10}{70} = \frac{-21 + 40}{70} = \frac{19}{70}$

(*iii*) $\frac{-7}{6} \times \left(\frac{24}{-42}\right) = \frac{-\cancel{7}^{1} \times \cancel{24}^{4}}{\cancel{6}_{1} \times -\cancel{42}_{3}} = \frac{2}{3}$

(*iv*) $-7 \div \left(\frac{1}{-9}\right) = -7 \times (-9) = 63$

7. The required number $= 8 \div \left(\frac{-16}{5}\right)$

$$= \cancel{8}^{1} \times \left(\frac{-5}{\cancel{16}_{2}}\right) = \frac{1\times(-5)}{2} = \frac{-5}{2}$$

Hence, the required rational number is $\frac{-5}{2}$.

8. The required number $= \frac{-8}{13} \div \frac{16}{3}$

$$= \frac{-\cancel{8}^{1}}{13} \times \frac{3}{\cancel{16}_{2}}$$

$$= \frac{(-1)\times 3}{13\times 2} = \frac{-3}{26}$$

Hence, the required rational number is $\frac{-3}{26}$.

BRAIN TEASER

1. Let the two numbers be x and y. Therefore,
$x + y = 10$ and $xy = 20$ (Given)
Now, $x + y = 10$

$$\Rightarrow \quad \frac{x}{xy} + \frac{y}{xy} = \frac{10}{xy}$$

$$\Rightarrow \quad \frac{x}{xy} + \frac{y}{xy} = \frac{10}{20}$$

$$\Rightarrow \quad \frac{1}{y} + \frac{1}{x} = \frac{1}{2}$$

Here, $\frac{1}{x}$ and $\frac{1}{y}$ are the reciprocals of numbers x and y respectively.
We see that, the sum of the reciprocals of two numbers is $\frac{1}{2}$.

2. $a = \frac{2}{5}$, $b = \frac{3}{2}$ (Given)

$$a + b = \frac{2}{5} + \frac{3}{2} = \frac{2\times 2 + 3\times 5}{10} = \frac{4+15}{10} = \frac{19}{10}$$

(L.C.M. of 5 and 2 is 10.)

and $a - b = \frac{2}{5} - \frac{3}{2} = \frac{2\times 2 - 3\times 5}{10}$

$$= \frac{4-15}{10} = \frac{-11}{10}$$

Now, $(a + b) \div (a - b) = \frac{19}{10} \div \left(\frac{-11}{10}\right)$

$$= \frac{19}{\cancel{10}_{1}} \times \left(\frac{-\cancel{10}^{1}}{11}\right)$$

(Reciprocal of $\frac{-11}{10}$ is $\frac{-10}{11}$)

$$= \frac{19\times(-1)}{1\times 11} = \frac{-19}{11}$$