Rational Numbers
Exercise 4A

Q1

Answer :

The numbers that are in the form of $\frac{p}{q}$, where p and q are integers and q ≠0, are called rational numbers.

For example:

Five positive rational numbers:

$\frac{5}{7}, \frac{-3}{-4}, \frac{7}{8}, \frac{-14}{-15}, \frac{5}{9}$

Five negative rational numbers:

$\frac{-3}{7}, \frac{-3}{8}, \frac{8}{-9}, \frac{-19}{25}, \frac{8}{-25}$

Yes, there is a rational number that is neither positive nor negative, i.e. zero (0).

Q3

Answer :

(i) $\frac{8}{19}$
Numerator = 8
Denominator =19

(ii) $\frac{5}{-8}$
Numerator = 5
Denominator = −8

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

Numerator = −13
Denominator =15

(iv) $\frac{-8}{-11}$

Numerator = −8
Denominator = −11

(v) 9
i.e $\frac{9}{1}$
Numerator = 9
Denominator = 1

Q4

Answer :

(i) 5
The rational number will be $\frac{5}{1}$.
Numerator = 5
Denominator = 1

(ii) -3
The rational number will be $\frac{-3}{1}$.
Numerator = -3
Denominator = 1

(iii)1
The rational number will be $\frac{1}{1}$.
Numerator = 1
Denominator = 1

(iv) 0
The rational number will be $\frac{0}{1}$.
Numerator =0
Denominator = 1

(v) -23
The rational number will be $\frac{-23}{1}$.
Numerator = -23
Denominator = 1

Q5

Answer :

Positive rational numbers:
(iii) $\frac{-5}{-8}$

(iv) $\frac{37}{53}$
(vi) 8 because 8 can be written as $\frac{8}{1}$, where $1 \neq 0$.

0 is neither positive nor negative.

Q6

Answer :

Negative rational numbers:

(iii) $\frac{-5}{7}$

(iv) $\frac{4}{-9}$

(v) -6

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

Q7

Answer :

(i) Following are the four rational numbers that are equivalent to $\frac{6}{11}$.

$\frac{6\times2}{11\times2}, \frac{6\times3}{11\times3}, \frac{6\times4}{11\times4}$ and $\frac{6\times5}{11\times5}$

i.e. $\frac{12}{22}, \frac{18}{33}, \frac{24}{44}$ and $\frac{30}{55}$

(ii) Following are the four rational numbers that are equivalent to $\frac{-3}{8}$.

$\frac{-3\times2}{8\times2}, \frac{-3\times3}{8\times3}, \frac{-3\times4}{8\times4}$ and $\frac{-3\times5}{8\times5}$

i.e. $\frac{-6}{16}, \frac{-9}{24}, \frac{-12}{32}$ and $\frac{-15}{40}$

(iii) Following are the four rational numbers that are equivalent to $\frac{7}{-15}$.

$\frac{7\times2}{-15\times2}, \frac{7\times3}{-15\times3}, \frac{7\times4}{-15\times4}$ and $\frac{7\times5}{-15\times5}$

(iv) Following are the four rational numbers that are equivalent to 8, i.e. $\frac{8}{1}$.

$\frac{8\times2}{1\times2}, \frac{8\times3}{1\times3}, \frac{8\times4}{1\times4}$ and $\frac{8\times5}{1\times5}$

i.e. $\frac{16}{2}, \frac{24}{3}, \frac{32}{4}$ and $\frac{40}{5}$

(v) Following are the four rational numbers that are equivalent to -1, i.e. $\frac{1}{1}$.

$\frac{1\times2}{1\times2}, \frac{1\times3}{1\times3}, \frac{1\times4}{1\times4}$ and $\frac{1\times5}{1\times5}$

i.e. $\frac{2}{2}, \frac{3}{3}, \frac{4}{4}$ and $\frac{5}{5}$

(vi) Following are the four rational numbers that are equivalent to -1, i.e. $\frac{-1}{1}$.

$\frac{-1\times2}{1\times2}, \frac{-1\times3}{1\times3}, \frac{-1\times4}{1\times4}$ and $\frac{-1\times5}{1\times5}$

i.e. $\frac{-2}{2}, \frac{-3}{3}, \frac{-4}{4}$ and $\frac{-5}{5}$

Q8

Answer :

(i) $\frac{12\times(-1)}{(-17)\times(-1)} = \frac{-12}{17}$

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

(iii) $\frac{-8}{-19} = \frac{-8\times(-1)}{(-19)\times(-1)} = \frac{8}{19}$

(iv) $\frac{11\times(-1)}{-6\times(-1)} = \frac{-11}{6}$

Q9

Answer :

(i) Numerator of $\frac{5}{8}$ is 5.

5 should be multiplied by 3 to get 15.

Multiplying both the numerator and the denominator by 3:

$\frac{5\times3}{8\times3} = \frac{15}{24}$

$\frac{5}{8} = \frac{15}{24}$

(ii) Numerator of $\frac{5}{8}$ is 5.

5 should be multiplied by −2 to get −10.

Multiplying both the numerator and the denominator by −2:

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

$\frac{5}{8} = \frac{-10}{-16}$

Q10

Answer :

(i) Denominator of $\frac{4}{7}$ is 7.

7 should be multiplied by 3 to get 21.

Multiplying both the numerator and the denominator by 3:

$$\frac{4\times3}{7\times3}=\frac{12}{21}$$

$$\frac{4\times3}{7\times3}=\frac{4}{7}$$

(ii)

Denominator of $\frac{4}{7}$ is 7.

7 should be multiplied by -5 to get -35.

Multiplying both the numerator and the denominator by -5:

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

$$\frac{4}{7}=\frac{-20}{-35}$$

Q11

Answer :

(i) Numerator of $\frac{-12}{13}$ is -12.

-12 should be multiplied by 4 to get 48.

Multiplying both the numerator and the denominator by 4:

$$\frac{-12\times4}{13\times4}=\frac{-48}{52}$$

$$\frac{-12}{13}=\frac{-48}{52}$$

(ii) Numerator of $\frac{-12}{13}$ is -12.

-12 should be multiplied by -5 to get 60

Multiplying its numerator and denominator by -5:

$$\frac{-12\times(-5)}{13\times(-5)}=\frac{60}{-65}$$

$$\frac{-12}{13}=\frac{60}{-65}$$

Q12

Answer :

(i) Denominator of $\frac{-8}{11}$ is 11.

Clearly, $11\times2=22$

Multiplying both the numerator and the denominator by 2:

$$\frac{-8\times2}{11\times2}=\frac{-16}{22}$$

$$\frac{-8}{11}=\frac{-16}{22}$$

(ii) Denominator of $\frac{-8}{11}$ is 11.

Clearly, $11\times5=55$

Multiplying both the numerator and the denominator by 5:

$$\frac{-8\times5}{11\times5}=\frac{-40}{55}$$

$$\frac{-8}{11}=\frac{-40}{55}$$

Q13

Answer :

(i) Numerator of $\frac{14}{-5}$ is 14.

Clearly, 14×4=56

Multiplying both the numerator and the denominator by 4:

$\frac{14\times4}{-5\times4}=\frac{56}{-20}$

$\frac{14}{-5}=\frac{56}{-20}$

(ii) −70

Numerator of $\frac{14}{-5}$ is 14.

Clearly, 14×(−5)=−70

Multiplying both the numerator and the denominator by -5:

$\frac{14\times(-5)}{(-5)\times(-5)}=\frac{-70}{25}$

$\frac{14}{-5}=\frac{-70}{25}$

Q14

Answer :

(i) Denominator of $\frac{13}{-8}$ is −8.

Clearly, (−8)×5= −40

Multiplying both the numerator and the denominator by 5:

$\frac{13\times5}{-8\times5}=\frac{65}{-40}$

$\frac{13}{-8}=\frac{65}{-40}$

(ii) Denominator of $\frac{13}{-8}$ is −8.

Clearly, (−8)×(−4)= 32

Multiplying both the numerator and the denominator by −4:

$\frac{13\times(-4)}{-8\times(-4)}=\frac{-52}{32}$

$\frac{13}{-8}=\frac{-52}{32}$

Q15

Answer :

(i) Numerator of $\frac{-36}{24}$ is −36.

Clearly, (−36) ÷ 4= (−9)

Dividing both the numerator and the denominator by 4:

$\frac{-36\div4}{24\div4}=\frac{-9}{6}$

(ii) Numerator of $\frac{-36}{24}$ is −36.

Clearly, (−36) ÷ (−6) = 6

Dividing both the numerator and the denominator by -6:

$\frac{-36\div(-6)}{24\div(-6)}=\frac{6}{-4}$

$\frac{-36}{24}=\frac{6}{-4}$

Q16

Answer :

(i) Denominator of $\frac{84}{-147}$ is -147.

$\therefore -147 \div (-21) = 7$

Dividing both the numerator and the denominator by -21:

$$\frac{84 \div (-21)}{-147 \div (-21)} = \frac{-4}{7}$$

$$\frac{84}{-147} = \frac{-4}{7}$$

(ii)Denominator of $\frac{84}{-147}$ is -147.

$-147 \div 3 = -49$

Dividing both the numerator and the denominator by 3:

$$\frac{84 \div 3}{-147 \div 3} = \frac{28}{-49}$$

$$\frac{84}{-147} = \frac{28}{-49}$$

Q17

Answer :

(i) $\frac{35}{49}$

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

$$\begin{array}{r} 35\overline{)49}(1 \\ -35 \\ \hline 14\overline{)35}(2 \\ -28 \\ \hline 7\overline{)14}(2 \\ -14 \\ \hline \times \end{array}$$

Dividing the numerator and the denominator by 7:

$$\frac{35 \div 7}{49 \div 7} = \frac{5}{7}$$

So, $\frac{35}{49}$ **is equal to** $\frac{5}{7}$ in the standard form.

(ii) $\frac{8}{-36}$

Denominator is -36, which is negative.

Multiplying both the numerator and the denominator by -1:

$$\frac{8 \times (-1)}{-36 \times (-1)} = \frac{-8}{36}$$

$$\begin{array}{r} 8\overline{)36}(4 \\ -32 \\ \hline 4\overline{)8}(2 \\ -8 \\ \hline \times \end{array}$$

H.C.F. of 8 and 36 is 4.

Dividing its numerator and denominator by 4:

$$\frac{-8 \div 4}{36 \div 4} = \frac{-2}{9}$$

So, $\frac{8}{-36}$ **is equal to** $\frac{-2}{9}$ in the standard form.

(iii) $\frac{-27}{45}$

$$
\begin{array}{r|l}
27 & 45 \ (1 \\
-27 & \\
\hline
18 & 27 \ (1 \\
-18 & \\
\hline
9 & 18 \ (2 \\
-18 & \\
\hline
\times &
\end{array}
$$

H.C.F. of 27 and 45 is 9.

Dividing its numerator and denominator by 9:

$\frac{-27 \div 9}{45 \div 9} = \frac{-3}{5}$

Hence, $\frac{-27}{45}$ is equal to $\frac{-3}{5}$ in the standard form.

(iv) $\frac{-14}{-49}$

The denominator is negative.

Multiplying its numerator and denominator by -1:

$\frac{-14 \times (-1)}{-49 \times (-1)} = \frac{14}{49}$

$$
\begin{array}{r|l}
14 & 49 \ (3 \\
-42 & \\
\hline
7 & 14 \ (2 \\
-14 & \\
\hline
\times &
\end{array}
$$

H.C.F. of 14 and 49 is 7.

Dividing both the numerator and the denominator by 7.

$\frac{14 \div 7}{49 \div 7} = \frac{2}{7}$

Hence, $\frac{-14}{-49}$ is equal to $\frac{2}{7}$ in the standard form.

(v) $\frac{91}{-78}$

The denominator is negative.

Multiplying its denominator and denominator by -1:

$\frac{91 \times (-1)}{-78 \times (-1)} = \frac{-91}{78}$

$$
\begin{array}{r|l}
78 & 91 \ (1 \\
-78 & \\
\hline
13 & 78 \ (6 \\
-78 & \\
\hline
\times &
\end{array}
$$

H.C.F. of 91 and 78 is 13.

Dividing both the numerator and the denominator by 13:

$\frac{-91 \div 13}{78 \div 13} = \frac{-7}{6}$

Hence, $\frac{91}{-78}$ is equal to $\frac{-7}{6}$ in the standard form.

(vi) $\frac{-68}{119}$

$$
\begin{array}{r|l}
68 & 119 \ (1 \\
-68 & \\
\hline
51 & 68 \ (1 \\
-51 & \\
\hline
17 & 51 \ (3 \\
-51 & \\
\hline
\times &
\end{array}
$$

H.C.F. of 68 and 119 is 17.

Dividing both the numerator and the denominator by 17:

$\frac{-68 \div 17}{119 \div 17} = \frac{-4}{7}$

Hence, $\frac{-68}{119}$ is equal to $\frac{-4}{7}$ in the standard form.

(vii) $\frac{-87}{116}$

$$
\begin{array}{r}
87\overline{)116}(1 \\
-87 \\
\hline
29\overline{)87}(3 \\
-87 \\
\hline
\times
\end{array}
$$

H.C.F. of 87 and 116 is 29.

Dividing both the numerator and the denominator by 29:

$\frac{-87 \div 29}{116 \div 29} = \frac{-3}{4}$

Hence, $\frac{-87}{116}$ is equal to $\frac{-3}{4}$ in the standard form.

1

(viii) $\frac{299}{-161}$

The denominator is negative.

Multiplying both the numerator and denominator by -1:

$\frac{299 \times (-1)}{-161 \times (-1)} = \frac{-299}{161}$

$$
\begin{array}{r}
161\overline{)299}(1 \\
-161 \\
\hline
138\overline{)161}(1 \\
-138 \\
\hline
23\overline{)138}(6 \\
-138 \\
\hline
\times
\end{array}
$$

H.C.F. of 299 and 161 is 23.

Dividing both the numerator and the denominator by 23:

$\frac{-299 \div 23}{161 \div 23} = \frac{-13}{7}$

Hence, $\frac{299}{-161}$ is equal to $\frac{-13}{7}$ in the standard form.

Q18

Answer :

(i)

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

$\frac{-9 \times (-3)}{5 \times (-3)} = \frac{27}{-15}$

$\frac{-9 \times 5}{5 \times 5} = \frac{-45}{25}$

$\therefore \frac{-9}{5} = \frac{-36}{20} = \frac{27}{-15} = \frac{-45}{25}$

(ii)

$\frac{-6 \times 3}{11 \times 3} = \frac{-18}{33}$

$\frac{-6 \times 4}{11 \times 4} = \frac{-24}{44}$

$\therefore \frac{-6}{11} = \frac{-18}{33} = \frac{-24}{44}$

Q19

Answer :

(i) $\frac{-13}{7}, \frac{39}{-21}$

We have:

$(-13)\times(-21) = 273$

And $7\times39=273$

$(-13) \times (-21) = 7 \times 39$

or $\frac{-13}{7} = \frac{39}{-21}$

Hence, $\frac{-13}{7}$ and $\frac{39}{21}$ are equivalent rational numbers.

(ii) $\frac{3}{-8}, \frac{-6}{16}$

We have:

$3\times16=48$

And $(-8)\times(-6) = 48$

$\therefore 3\times16 = (-8)\times(-6)$

$\frac{3}{-8} = \frac{-6}{16}$

(iii) $\frac{9}{4}, \frac{-36}{-16}$

We have:

$9\times(-16) = -144$

And $4\times(-36) = -144$

$9\times(-16) = 4\times(-36)$

$\frac{9}{4} = \frac{-36}{-16}$

Therefore, they are equivalent rational numbers.

(iv) $\frac{7}{15}, \frac{-28}{60}$

We have:

$7\times60 = 420$

And $15\times(-28) = -420$

$\therefore 7\times60 \neq 15\times(-28)$

Therefore, the rational numbers are not equivalent.

(v) $\frac{3}{12}, \frac{-1}{4}$

We have:
$3 \times 4 = 12$
And $12 \times (-1) = -12$
$12 \neq -12$
Therefore, the rational numbers are not equivalent.

(vi) $\frac{2}{3}, \frac{3}{2}$

We have:

$2 \times 2 = 4$

And $3 \times 3 = 9$

$2 \times 2 \neq 3 \times 3$

Therefore, the rational numbers are not equivalent.

Q20

Answer :

(i) $\frac{-1}{5} = \frac{8}{x}$

$\Rightarrow -x = 5 \times 8$
$\Rightarrow x = -40$

(ii) $\frac{7}{-3} = \frac{x}{6}$
$\Rightarrow (-3)x = 7 \times 6$

$\Rightarrow x = \frac{(7 \times 6)}{(-3)}$
$\Rightarrow x = -14$

(iii) $\frac{3}{5} = \frac{x}{-25}$
$\Rightarrow 5x = 3 \times (-25)$

$\Rightarrow x = \frac{3 \times (-25)}{5}$
$\Rightarrow x = (-15)$

(iv) $\frac{13}{6} = \frac{-65}{x}$

$\Rightarrow 13x = 6 \times (-65)$

$\Rightarrow x = \frac{6 \times (-65)}{13}$

$\Rightarrow x = 6 \times (-5)$

$\Rightarrow x = -30$

(v) $\frac{16}{x} = -4$
$\Rightarrow \mathbf{x} = \frac{16}{(-4)}$
$\Rightarrow x = (-4)$

vi) $\frac{-48}{x} = 2$
$\Rightarrow \frac{-48}{2} = \frac{x}{1}$
$\Rightarrow 2x = (-48) \times 1$
$\Rightarrow x = \frac{-48}{2}$
$x = (-24)$

Q21

Answer :

(i) $\frac{8}{-12}$ and $\frac{-10}{15}$

$8\times15 = 120$
And $(-10)\times(-12) = 120$

$8\times15 = (-10)\times(-12)$

$\therefore \frac{8}{-12} = \frac{-10}{15}$

Therefore, the rational numbers are equal.

ii) $\frac{-3}{9}, \frac{7}{-21}$

$(-3)\times(-21) = 63$
And $7\times 9 = 63$

$\therefore (-3)\times(-21) = 7\times9$

$\frac{-3}{9} = \frac{7}{-21}$

Therefore, the rational numbers are equal.

(iii) $\frac{-8}{-14}, \frac{15}{21}$

$(-8)\times 21 = -168$
And $15\times(-14) = -210$

$(-8)\times 21 \neq 15\times 14$

Therefore, the rational numbers are not equal.

Q22

Answer :

(i) False
For example, −1 is smaller than zero and is a rational number.
(ii)True
All integers can be written with the denominator 1.
(iii) False
Though 0 is an integer, when the denominator is 0, it is not a rational number.
For example, $\frac{1}{0}$ is not a rational number.
(iv)True
(v) False
−1 is a rational number but not a fraction.

Rational Numbers
Exercise 4B

Q2

Answer :

(i) $\frac{5}{6}$. This is because 0 can be written as $\frac{0}{6}$ and $\frac{0}{6} < \frac{5}{6}$.

(ii) $\frac{-3}{5} < 0$. This is because 0 can be written as $\frac{0}{5}$ and $-3 < 0$.

(iii) $\frac{5}{8} > \frac{3}{8}$. This is because $5 > 3$.

(iv) $\frac{7}{9} > \frac{5}{9}$. This is because $7 > 5$.

(v) $\frac{-6}{11} < \frac{-5}{11}$. This is because $-6 < -5$.

(vi) $\frac{-15}{4} > \frac{-17}{4}, -15 > -17$

Q3

Answer :

(i) $\frac{5}{9}, \frac{-3}{-8}$

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

L. C. M. of 9 and 8 *is* 72.

$\frac{5\times8}{9\times8} = \frac{40}{72}$

$\frac{3\times9}{8\times9} = \frac{27}{72}$

$27 < 40$

$\frac{-3}{-8} < \frac{5}{9}$

So, $\frac{5}{9}$ is greater.

3	9,8
3	3,8
2	1,8
2	1,4
2	1,2
	1,1

(ii)

$\frac{4}{-3}, \frac{-8}{7}$

We will convert each negative denominator into positive.

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

L. C. M. of 3 and 7 is 21.

$\frac{-4\times(7)}{(3)\times(7)} = \frac{-28}{21}$

$\frac{(-8)\times3}{7\times3} = \frac{-24}{21}$

$(-24) > (-28)$

$\frac{-8}{7} > \frac{4}{(-3)}$

So, $\frac{-8}{7}$ is greater.

(iii)

$\frac{-12}{5}, -3$

L. C. M. of 5 and 1 is 5.

$\frac{-12\times1}{5\times1} = \frac{-12}{5}$

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

$-12 > -15$

$\frac{-12}{5} > -3$

$\frac{-12}{5}$ is greater.

(iv)

$\frac{-7}{9}, \frac{-5}{8}$

L. C. M. of 9 and 8 is 72.

3	9,8
3	3,8
2	1,8
2	1,4
2	1,2
	1,1

$\frac{-7\times8}{9\times8} = \frac{-56}{72}$

$\frac{-5\times9}{8\times9} = \frac{-45}{72}$

$-56 < -45$

$\frac{-7}{9} < \frac{-5}{8}$

(v) $\frac{4}{-5}, \frac{-7}{8}$

We will convert each negative denominator into positive.

$\frac{4\times-1}{-5\times-1} = \frac{-4}{5}$

L. C. M. of 5 and 8 is 40.

2	5,8
2	5,4
2	5,2
5	5,1
	1,1

$\frac{-4\times8}{5\times8} = \frac{-32}{40}$

$\frac{-7\times5}{8\times5} = \frac{-35}{40}$

$-32 > -35$

$\frac{-4}{5} > \frac{-7}{8}$

(vi) $\frac{9}{-13}, \frac{7}{-12}$

We will convert each negative denominator into positive.

$\frac{9\times-1}{-13\times-1} = \frac{-9}{13}$

$\frac{7\times-1}{-12\times-1} = \frac{-7}{12}$

L. C. M. of 13 and 12 is 156.

$\frac{-9\times12}{13\times(-12)} = \frac{-108}{156}$

$\frac{-7\times13}{(-12)\times13} = \frac{-91}{156}$

$-108 < -91$

$\frac{9}{-13} < \frac{7}{-12}$

Q4

Answer :

(i) $\frac{-3}{7} > \frac{-6}{13}$

L. C. M. of 7 and 13 is 91.

$\frac{-3\times13}{7\times13} = \frac{-39}{91}$

$\frac{-6\times7}{13\times7} = \frac{-42}{91}$

$\frac{-39}{91} > \frac{-42}{91}$

(ii) $\frac{5}{-13} = \frac{-35}{91}$

L. C. M. of 13 and 91 is 91.

$\frac{5\times(-7)}{-13\times(-7)} = \frac{-35}{91}$

13	13,91
7	1,7
	1,1

(iii) $-2 > \frac{-13}{5}$

L. C. M of 1 and 5 is 5.

$\frac{-2\times5}{1\times5} = \frac{-10}{5}$

$\frac{-13\times1}{5\times1} = \frac{-13}{5}$

$\frac{-10}{5} > \frac{-13}{5}$

(iv) $\frac{-2}{3} < \frac{-5}{8}$

L. C. M. of 8 and 3 is 24.

$\frac{-2\times8}{3\times8} = \frac{-16}{24}$

$\frac{-5\times3}{8\times3} = \frac{-15}{24}$

$\frac{-16}{24} < \frac{-15}{24}$

2	8,3
2	4,3
2	2,3
3	1,3
	1,1

(v) $0 < \frac{3}{5}$

L. C. M. of 1 and 5 is 5.

$\frac{0\times1}{1\times5} = \frac{0}{5}$

$\frac{3\times1}{5\times1} = \frac{3}{5}$

$\frac{0}{5} < \frac{3}{5}$

(vi) $\frac{-8}{9} > \frac{-9}{10}$

L. C. M. of 9 and 10 *is* 90.

$\frac{-8\times10}{9\times10} = \frac{-80}{90}$

$\frac{-9\times9}{10\times9} = \frac{-81}{90}$

$\frac{-80}{90} > \frac{-81}{90}$

3	9,10
3	3,10
5	1,10
2	1,2
	1,1

Q5

Answer :

(i) $\frac{2}{5}, \frac{7}{10}, \frac{8}{15}, \frac{13}{30}$

L. C. M. of 5, 10, 15 and 30 is 30

5	5,10,15,30
2	1,2,3,6
3	1,1,3,3
	1,1,1,1

$\frac{2\times6}{5\times6} = \frac{12}{30}$

$\frac{7\times3}{10\times3} = \frac{21}{30}$

$\frac{8\times2}{15\times2} = \frac{16}{30}$

$\frac{13\times1}{30\times1} = \frac{13}{30}$

Required order: $\frac{2}{5} < \frac{13}{30} < \frac{8}{15} < \frac{7}{10}$

(ii) $\frac{-3}{4}, \frac{5}{-12}, \frac{-7}{16}, \frac{9}{-24}$

First, we need to convert each negative denominator into positive.

$\frac{-3}{4}, \frac{5\times-1}{-12\times-1}, \frac{-7}{16}, \frac{9\times-1}{-24\times-1}$

$\frac{-3}{4}, \frac{-5}{12}, \frac{-7}{16}, \frac{-9}{24}$

2	4,12,16,24
2	2,6,8,12
2	1,3,4,6
2	1,3,2,3
3	1,3,1,3
	1,1,1,1

L. C. M. of 4, 12, 16 and 24 is 48.

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

$\frac{-5\times4}{12\times4} = \frac{-20}{48}$

$\frac{-7\times3}{16\times3} = \frac{-21}{48}$

$\frac{-9\times2}{24\times2} = \frac{-18}{48}$

Required order: $\frac{-3}{4} < \frac{-7}{16} < \frac{-5}{12} < \frac{-9}{24}$

(iii) $\frac{-3}{10}, \frac{7}{-15}, \frac{-11}{20}, \frac{17}{-30}$

First, we need to convert the negative denominators to make them positive.

$\frac{-3}{10}, \frac{7\times-1}{-15\times-1}, \frac{-11}{20}, \frac{17\times-1}{-30\times-1}$

$\frac{-3}{10}, \frac{-7}{15}, \frac{-11}{20}, \frac{-17}{30}$

5	10,15,20,30
2	2,3,4,6
3	1,3,2,3
3	1,3,1,3
	1,1,1,1

L. C. M of $10, 15, 20, 30 = 60$

$\frac{-3\times6}{10\times6} = \frac{-18}{60}$

$\frac{-7\times4}{15\times4} = \frac{-28}{60}$

$\frac{-11\times3}{20\times3} = \frac{-33}{60}$

$\frac{-17\times2}{30\times2} = \frac{-34}{60}$

Therefore, $\frac{-34}{60} < \frac{-33}{60} < \frac{-28}{60} < \frac{-18}{60}$

i.e. $\frac{-17}{30} < \frac{-11}{20} < \frac{-7}{15} < \frac{-3}{10}$

(iv) $\frac{2}{3}, \frac{3}{4}, \frac{5}{-6}, \frac{-7}{12}$

First, we need to convert the negative denominators to positive ones.

$\frac{2}{3}, \frac{3}{4}, \frac{5\times-1}{-6\times-1}, \frac{-7}{12}$

$\frac{2}{3}, \frac{3}{4}, \frac{-5}{6}, \frac{-7}{12}$

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

L. C. M of $3, 4, 6, 12 = 12$

$\frac{2\times4}{3\times4} = \frac{8}{12}$

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

$\frac{-5\times2}{6\times2} = \frac{-10}{12}$

$\frac{-7\times1}{12\times1} = \frac{-7}{12}$

Therefore, the correct order is $\frac{-5}{6} < \frac{-7}{12} < \frac{2}{3} < \frac{3}{4}$.

Q6

Answer :

(i) $\frac{-2}{5}, \frac{7}{-10}, \frac{-11}{15}, \frac{19}{-30}$

First, we need to convert each negative denominator into positive.

$\frac{-2}{5}, \frac{7\times-1}{-10\times-1}, \frac{-11}{15}, \frac{19\times-1}{-30\times-1}$

$\frac{-2}{5}, \frac{-7}{10}, \frac{-11}{15}, \frac{-19}{30}$

5	5,10,15,30
2	1,2,3,6
3	1,1,3,3
	1,1,1,1

L. C. M. of 5, 10, 15 and 30 is 30.

$\frac{-2\times6}{5\times6} = \frac{-12}{30}$,

$\frac{-7\times3}{10\times3} = \frac{-21}{30}$,

$\frac{-11\times2}{15\times2} = \frac{-22}{30}$,

$\frac{-19\times1}{30\times1} = \frac{-19}{30}$,

Correct order: $\frac{-2}{5} > \frac{19}{-30} > \frac{7}{-10} > \frac{-11}{15}$

(ii) $-2, \frac{-13}{6}, \frac{8}{-3}, \frac{1}{3}$

First, we need to convert each negative denominator into positive.

$-2, \frac{-13}{6}, \frac{8\times-1}{-3\times-1}, \frac{1}{3}$

$-2, \frac{-13}{6}, \frac{-8}{3}, \frac{1}{3}$

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

L. C. M. of 6, 3 and 3 is 6.

$\frac{-2\times6}{1\times6} = \frac{-12}{6}$,

$\frac{-13\times1}{6\times1} = \frac{-13}{6}$,

$\frac{-8\times2}{3\times2} = \frac{-16}{6}$,

$\frac{1\times2}{3\times2} = \frac{2}{6}$,

Correct order: $\frac{1}{3} > -2 > \frac{-13}{6} > \frac{-8}{3}$

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

First, we need to convert each negative denominator into positive.

$\frac{-4}{9}, \frac{5\times-1}{-12\times-1}, \frac{-7}{18}, \frac{2\times-1}{-3\times-1}$

$\frac{-4}{9}, \frac{-5}{12}, \frac{-7}{18}, \frac{-2}{3}$

3	9,12,18,3
3	3,4,6,1
2	1,4,2,1
2	1,2,1,1
	1,1,1,1

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

$\frac{-4\times4}{9\times4} = \frac{-16}{36}$,

$\frac{-5\times3}{12\times3} = \frac{-15}{36}$,

$\frac{-7\times2}{18\times2} = \frac{-14}{36}$,

$\frac{-2\times12}{3\times12} = \frac{-24}{36}$

Correct order: $\frac{-7}{18} > \frac{-5}{12} > \frac{-4}{9} > \frac{-2}{3}$

(iv) $\frac{17}{-30}, \frac{11}{-15}, \frac{-7}{10}, \frac{3}{5}$

First, we need to convert each negative denominator into positive.

$\frac{17\times-1}{-30\times-1}, \frac{11\times-1}{-15\times-1}, \frac{-7}{10}, \frac{3}{5}$

$\frac{-17}{30}, \frac{-11}{15}, \frac{-7}{10}, \frac{3}{5}$

5	5,10,15,30
2	1,2,3,6
3	1,1,3,3
	1,1,1,1

L. C. M. of 30, 15, 10 and 5 is 30.

$\frac{-17\times1}{30\times1} = \frac{-17}{30}$,

$\frac{-11\times2}{15\times2} = \frac{-22}{30}$,

$\frac{-7\times3}{10\times3} = \frac{-21}{30}$,

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

Correct order: $\frac{3}{5} > \frac{17}{-30} > \frac{-7}{10} > \frac{11}{-15}$

Q8

Answer :

L. C. M. of 2 and 3 is 6.

$-3 = \frac{-3\times6}{1\times6} = \frac{-18}{6}$

$-2 = \frac{-2\times6}{1\times6} = \frac{-12}{6}$

Therefore , $\frac{-17}{6}, \frac{-16}{6}, \frac{-15}{6}, \frac{-14}{6}$ and $\frac{-13}{6}$ are the five rational number between -3 and -2.

Q9.

Answer :

$-1 = \frac{-1\times5}{1\times5}$, $1 = \frac{1\times5}{1\times5}$

$\frac{-5}{5}$ and $\frac{5}{5}$

Hence, the five rational numbers between -1 and 1 are $\frac{-4}{5}, \frac{-3}{5}, \frac{-2}{5}, \frac{-1}{5}$ and $\frac{1}{5}$.

Q10

Answer :

$\frac{-3}{5}$ and $\frac{-1}{2}$

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

$\frac{-3\times2}{5\times2} = \frac{-6\times4}{10\times4} = \frac{-24\times2}{40\times2} = \frac{-48}{80}$,

$\frac{-1\times5}{2\times5} = \frac{-5\times4}{10\times4} = \frac{-20\times2}{40\times2} = \frac{-40}{80}$,

Hence, the five rational numbers between $\frac{-3}{5}$ and $\frac{-1}{2}$ are $\frac{-45}{80}, \frac{-44}{80}, \frac{-43}{80}, \frac{-42}{80}$ and $\frac{-41}{80}$.

Rational Numbers
Exercise 4C

Q1

Answer :

(i)

$\frac{12}{7} + \frac{3}{7} = \frac{12+3}{7} = \frac{15}{7}$

(ii)

$\frac{-2}{5} + \frac{1}{5} = \frac{-2+1}{5} = \frac{-1}{5}$

(iii)

$\frac{3}{-8} \times \frac{-1}{-1} = \frac{-3}{8}$

$\frac{-3}{8} + \frac{1}{8} = \frac{-3+1}{8} = \frac{-2}{8}$

(iv)

$\frac{7}{-11} \times \frac{-1}{-1} = \frac{-7}{11}$

$\frac{-5}{11} + \frac{-7}{11} = \frac{-5+(-7)}{11} = \frac{-5-7}{11} = \frac{-12}{11}$

(v)

$\frac{-11}{-13} \times \frac{-1}{-1} = \frac{11}{13}$

$= \frac{-9}{13} + \frac{11}{13} = \frac{-9+11}{13} = \frac{2}{13}$

(vi)

$\frac{-2}{9} + \frac{-5}{9} = \frac{-2-5}{9} = \frac{-7}{9}$

(vii)

$\frac{(-17)}{9} + \frac{(-11)}{9} = \frac{-17-11}{9} = \frac{-28}{9}$

(viii)

$\frac{5}{-7} \times \frac{-1}{-1} = \frac{-5}{7}$

$\frac{-3}{7} + \frac{(-5)}{7} = \frac{-3-5}{7} = \frac{-8}{7}$

Q2

Answer :

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

The denominators of the given rational numbers are 5 and 4.

$L.C.M.$ of 5 and 4 is 20.

$\frac{-2}{5} = \frac{(-2)\times 4}{5\times 4} = \frac{-8}{20}$

$\frac{3}{4} = \frac{3\times 5}{4\times 5} = \frac{15}{20}$

Now, $\frac{(-8)}{20} + \frac{15}{20} = \frac{-8+15}{20} = \frac{7}{20}$

(ii) $\frac{-5}{9}+\frac{2}{3}$

The denominators of the given rational numbers are 9 and 3.

3	9,3
3	3,1
	1,1

L.C.M. of 9 and 3 is 9.

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

$\frac{2}{3}=\frac{2\times 3}{3\times 3}=\frac{6}{9}$

Now, $\frac{(-5)}{9}+\frac{6}{9}$

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

$=\frac{1}{9}$

(iii) $-4+\frac{1}{2}$

The denominators of the given rational numbers are 1 and 2.

L.C.M. of 1 and 2 is 2.

$\frac{-4}{1}=\frac{(-4)\times 2}{1\times 2}=\frac{-8}{2}$

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

Now, $\frac{(-8)}{2}+\frac{1}{2}$

$=\frac{-8+1}{2}$

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

(iv)
$\frac{-7}{27}+\frac{5}{18}$

The denominators of the given rational numbers are 27 and 18.

3	27,18
3	9,6
3	3,2
2	1,2
	1,1

L.C.M. of 27 and 18 is 54.

$\frac{-7}{27}=\frac{(-7)\times 2}{27\times 2}=\frac{-14}{54}$

$\frac{5}{18}=\frac{5\times 3}{18\times 3}=\frac{15}{54}$

Now, $\frac{(-14)}{54}+\frac{15}{54}=\frac{-14+15}{54}$

$=\frac{1}{54}$

(v) $\frac{-5}{36}+\left(\frac{-7}{12}\right)$

3	36,12
2	12,4
2	6,2
3	3,1
	1,1

The denominators of the given rational numbers are 36 and 12.

L.C.M. of 36 and 12 is 36.

$\frac{-5}{36}=\frac{(-5)\times 1}{36\times 1}=\frac{-5}{36}$

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

Now, $\frac{(-5)}{36}+\frac{(-21)}{36}=\frac{-5-21}{36}$

$\frac{-26}{36}=\frac{-13}{18}$ (26 and 36 are divided by 2 .)

(vi)
$\frac{1}{-9}+\left(\frac{4}{-27}\right)$

We need a positive denominator.

$\frac{1}{-9}\times\frac{-1}{-1}=\frac{-1}{9}$ and $\frac{4}{-27}\times\frac{-1}{-1}=\frac{-4}{27}$

The denominators of the given rational numbers are 9 and 27

3	9,27
3	3,9
3	1,3
	1,1

L.C.M. of 9 and 27 is 27

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

$\frac{-4}{27}=\frac{-4\times 1}{27\times 1}=\frac{-4}{27}$

$\frac{(-3)}{27}+\frac{(-4)}{27}=\frac{-3-4}{27}$

$=\frac{-7}{27}$

(vii)

$\frac{-9}{24}+\left(\frac{-1}{18}\right)$

The denominators of the given numbers are 24 and 18

3	24,18
2	8,6
2	4,3
2	2,3
3	1,3
	1,1

L.C.M. of 24 and 18 is 72.

$\therefore \frac{-9}{24}=\frac{-9\times3}{24\times3}=\frac{-27}{72}$

$\frac{-1}{18}=\frac{-1\times4}{18\times4}=\frac{-4}{72}$

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

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

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

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

(viii) $\frac{27}{-4}+\left(\frac{-15}{8}\right)$

We need a positive denominator.

$\frac{27}{-4}\times\frac{-1}{-1}=\frac{-27}{4}$

The denominators of the given rational numbers are 4 and 8.

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

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

$\frac{-27}{4}=\frac{-27\times2}{4\times2}=\frac{-54}{8}$

$\frac{(-15)}{8}=\frac{(-15)\times1}{8\times1}=\frac{-15}{8}$

Now, $\frac{-54}{8}+\frac{(-15)}{8}$

$=\frac{-54-15}{8}$

$=\frac{-69}{8}$

Q3

Answer :

(*i*)

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

L.C.M. of the given rational number is 5.

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

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

$=\frac{-4+7}{5}$

$=\frac{3}{5}$

(ii)

$\frac{-12}{7}+\frac{3}{7}+\frac{-2}{7}$

$=\frac{(-12)}{7}+\frac{3}{7}+\frac{(-2)}{7}$

$=\frac{-12+3-2}{7}$

$=\frac{-14+3}{7}$

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

(iii) $\frac{11}{-12}+\frac{3}{-8}+\frac{1}{4}$

We need a positive denominator.

$\frac{11}{-12}\times\frac{-1}{-1}=\frac{-11}{12}$ and $\frac{3}{-8}\times\frac{-1}{-1}=\frac{-3}{8}$

L.C.M. of the denominators 12, 8 and 4 is 24.

2	12,8,4
2	6,4,2
2	3,2,1
3	3,1,1
	1,1,1

$\therefore \frac{-11\times2}{12\times2}=\frac{-22}{24}$

$\frac{-3\times3}{8\times3}=\frac{-9}{24}$

$\frac{1\times6}{4\times6}=\frac{6}{24}$

Now, $\frac{(-22)}{24}+\frac{(-9)}{24}+\frac{6}{24}$

$=\frac{-22-9+6}{24}$

$=\frac{-31+6}{24}$

$=\frac{-25}{24}$

(iv) $\frac{-16}{9}+\frac{-5}{12}+\frac{7}{18}$

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

3	9,12,18
3	3,4,6
2	1,4,2
2	1,2,1
	1,1,1

$\frac{-16\times4}{9\times4}=\frac{-64}{36}$

$\frac{-5\times3}{12\times3}=\frac{-15}{36}$

$\frac{7\times2}{18\times2}=\frac{14}{36}$

Now, $\frac{(-64)}{36}+\frac{(-15)}{36}+\frac{14}{36}$

$=\frac{-64-15+14}{36}$

$\frac{-79+14}{36}$

$=\frac{-65}{36}$

(v) $-3+\frac{1}{8}=\frac{-2}{5}$

L.C.M. of the denominators 1, 8 and 5 is 40.

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

$\frac{-3\times40}{1\times40}=\frac{-120}{40}$

$\frac{1\times5}{8\times5}=\frac{5}{40}$

$\frac{-2\times8}{5\times8}=\frac{-16}{40}$

Now, $\frac{(-120)}{40}+\frac{5}{40}+\frac{(-16)}{40}$

$=\frac{-120+5-16}{40}$

$=\frac{-136+5}{40}=\frac{-131}{40}$

(vi) $\frac{-13}{8}+\frac{5}{16}+\frac{-1}{4}$

L.C.M. of the denominator 8, 16 and 4 is 16.

$\frac{-13\times2}{8\times2}=\frac{-26}{16}$

$\frac{5\times1}{16\times1}=\frac{5}{16}$

$\frac{-1\times4}{4\times4}=\frac{-4}{16}$

Now, $\frac{(-26)}{16}+\frac{5}{16}+\frac{(-4)}{16}$

$=\frac{-26+5-4}{16}$

Now, $\frac{-30+5}{16}=\frac{-25}{16}$

Q4.

Answer :

(i)

$\frac{-8}{15}+\frac{2}{-3}$

We need a positive denominator.

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

Now, L.C.M. of 15 and 3 is 15.

$\frac{-8}{15}=\frac{-8\times1}{15\times1}=\frac{-8}{15}$

$\frac{-2}{3}=\frac{-2\times5}{3\times5}=\frac{-10}{15}$

3	15,3
5	5,1
	1,1

Now, $\frac{-8}{15}+\frac{-10}{15}$

$=\frac{-8-10}{15}$

$=\frac{-18}{15}$

$=\frac{-6}{5}$

(ii)

$\frac{-7}{10}+\frac{13}{-15}+\frac{27}{20}$

We need a positive denominator.

$\frac{13}{-15}\times\frac{-1}{-1}=\frac{-13}{15}$

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

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

$\frac{-13}{15}=\frac{-13\times4}{15\times4}=\frac{-52}{60}$

$\frac{27}{20}=\frac{27\times3}{20\times3}=\frac{81}{60}$

5	10,15,20
2	2,3,4
2	1,3,2
3	1,3,1
	1,1,1

Now, $\frac{-42}{60}+\frac{-52}{60}+\frac{81}{60}$

$=\frac{(-42)+(-52)+(81)}{60}$

$=\frac{-94+81}{60}$

$=\frac{-13}{60}$

(iii)

$-1+\frac{7}{-9}+\frac{11}{12}$

We need a positive denominator.

$\frac{7}{-9}\times\frac{-1}{-1}=\frac{-7}{9}$

Now, L.C.M. of 1, 9 and 12 is 36.

$\frac{-1}{1}=\frac{-1\times36}{1\times36}=\frac{-36}{36}$

$\frac{-7}{9}=\frac{-7\times4}{9\times4}=\frac{-28}{36}$

$\frac{11}{12}=\frac{11\times3}{12\times3}=\frac{33}{36}$

3	9,12
3	3,4
2	1,4
2	1,2
	1,1

$\frac{-36}{36}+\frac{-28}{36}+\frac{33}{36}$

$=\frac{-36-28+33}{36}$

$=\frac{-64+33}{36}$

$=\frac{-31}{36}$

$=\frac{-5}{4}$

(iv)

$\frac{-11}{39}+\frac{5}{26}+\frac{2}{1}$

L.C.M. of 39, 26 and 1 is 78.

13	39,26
3	3,2
2	1,2
	1,1

$\frac{-11}{39}=\frac{-11\times2}{39\times2}=\frac{-22}{78}$

$\frac{5}{26}=\frac{5\times3}{26\times3}=\frac{15}{78}$

$\frac{2}{1}=\frac{2\times78}{1\times78}=\frac{156}{78}$

Now , $\frac{-22}{78}+\frac{15}{78}+\frac{156}{78}$

$=\frac{-22+171}{78}$

$=\frac{149}{78}$

(v)

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

L.C.M. of 2 and 4 is 4.

$2=\frac{2\times4}{1\times4}=\frac{8}{4}$

$\frac{-1}{2}=\frac{-1\times2}{2\times2}=\frac{-2}{4}$

$\frac{-3}{4}=\frac{-3\times1}{4\times1}=\frac{-3}{4}$

$\frac{8}{4}+\frac{(-2)}{4}+\frac{(-3)}{4}$

$=\frac{8-2-3}{4}$

$=\frac{3}{4}$

2	2,4
2	1,2
	1,1

(vi) $\frac{-9}{11}+\frac{2}{3}+\frac{-3}{4}$

L.C.M. of 11, 3 and 4 is 132.

$\frac{-9}{11}=\frac{-9\times12}{11\times12}=\frac{-108}{132}$

$\frac{2}{3}=\frac{2\times44}{3\times44}=\frac{88}{132}$

$\frac{-3}{4}=\frac{-3\times33}{4\times33}=\frac{-99}{132}$

$\frac{-108}{132}+\frac{88}{132}+\frac{(-99)}{132}$

$=\frac{-108+88-99}{132}$

$=\frac{-207+88}{132}=\frac{-119}{132}$

2	11,3,4
2	11,3,2
11	11,3,1
3	1,3,1
	1,1,1

Q5.

Answer :

(i) $\frac{12}{5}=2\frac{2}{5}=2+\frac{2}{5}$

(ii) $\frac{-11}{7}=\left(-\frac{11}{7}\right)=\left(-1\frac{4}{7}\right)=-1+\left(\frac{-4}{7}\right)$

(iii) $\frac{-25}{9}=\left(\frac{-25}{9}\right)=-\left(2\frac{7}{9}\right)=-2+\left(\frac{-7}{9}\right)$

(iv) $\frac{-103}{20}=-\left(\frac{103}{20}\right)=-\left(5\frac{3}{20}\right)=-5+\left(\frac{-3}{20}\right)$

Rational Numbers
Exercise 4D

Q1

Answer :

(i) Additive inverse of 5 is −5.

(ii) Additive inverse of −9 is 9.

(iii) Additive inverse of $\frac{3}{14}$ is $\frac{-3}{14}$.

(iv) Additive inverse of $\frac{-11}{15}$ is $\frac{11}{15}$.

(v) Additive inverse of $\frac{15}{-4} = \frac{15\times(-1)}{(-4)\times(-1)}$

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

$= \frac{15}{4}$

(vi) Additive inverse of $\frac{-18}{-13} = \frac{-18\times(-1)}{(-13)\times(-1)}$

$= \frac{18}{13}$

$= \frac{-18}{13}$

(vii) Additive inverse of 0 is 0.

(viii) Additive inverse of $\frac{1}{-6} = \frac{1\times(-1)}{(-6)\times(-1)}$

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

$= \frac{1}{6}$

Q2

Answer :

(i)

$\frac{1}{3}-\frac{3}{4}=\frac{1}{3}+\left(\text{additive inverse of } \frac{3}{4}\right)$

L.C.M. of 3 and 4 is 12.

$\frac{1}{3}+\left(-\frac{3}{4}\right)=\frac{4+(-9)}{12}=\frac{-5}{12}$

(ii)

$\frac{1}{3}-\frac{(-5)}{6}=\frac{1}{3}+\left(\text{additive inverse of } \frac{-5}{6}\right)$

$=\frac{1}{3}+\frac{5}{6}$

L.C.M. of 3 and 6 is 6.

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

$=\frac{7}{6}$

(iii)

$\frac{(-3)}{5}-\left(\frac{-8}{9}\right)=\frac{(-3)}{5}+\left(\text{additive inverse of } \frac{-8}{9}\right)$

$=\frac{(-3)}{5}+\frac{8}{9}$

L. C. M. of 5 and 9 is 45.

$=\frac{-27+40}{45}$

$=\frac{13}{45}$

(iv)

$\frac{(-1)}{1}-\frac{(-9)}{7}=\frac{(-1)}{1}+\left(\text{additive inverse of } \frac{-9}{7}\right)$

$=\frac{(-1)}{1}+\frac{9}{7}$

$L.C.M.$ of 7 and 1 is 7.

$=\frac{-7+9}{7}$

$=\frac{2}{7}$

(v)

$\frac{1}{1}-\frac{(-18)}{11}=\frac{1}{1}+\left(\text{additive inverse of } \frac{-18}{11}\right)$

$=\frac{(1)}{1}+\frac{18}{11}$

$=\frac{11+18}{11}$

$=\frac{29}{11}$

(vi)

$0-\left(\frac{-13}{9}\right)=0+\left(\text{additive inverse of } \frac{-13}{9}\right)$

$=0+\frac{13}{9}$

$=\frac{13}{9}$

(vii)

$\frac{(-6)}{5}-\frac{(-32)}{13}=\frac{(-6)}{5}+\left(\text{additive inverse of } \frac{-32}{13}\right)$

$=\frac{-6}{5}+\frac{32}{13}$

$L.C.M.$ of 5 and 13 is 65

$=\frac{-78+160}{65}$

$=\frac{82}{65}$

(viii)

$\frac{-4}{7} - \frac{(-7)}{1} = \frac{-4}{7} + \left(\text{additive inverse of } \frac{-7}{1}\right)$

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

L.C.M. of 7 and 1 is 7.

$= \frac{-4+49}{7}$

$= \frac{45}{7}$

(ix)

$\frac{-2}{3} - \frac{5}{9} = \frac{-2}{3} + \left(\text{additive inverse of } \frac{5}{9}\right)$

$= \frac{-2}{3} - \frac{5}{9}$

L.C.M. of 3 and 9 is 9.

$= \frac{-6-5}{9}$

$= \frac{-11}{9}$

(x)

$\frac{-3}{5} - \frac{5}{1} = \frac{-3}{5} + \left(\text{additive inverse of } \frac{5}{1}\right)$

$= \frac{-3}{5} - \frac{5}{1}$

L.C.M. of 5 and 1 is 5.

$= \frac{-3-25}{5}$

$= \frac{-28}{5}$

Q3

Answer :

(i)

$\frac{3}{4} - \frac{4}{5}$

$= \frac{3}{4} - \frac{4}{5} = \frac{3}{4} + \left(\text{additive inverse of } \frac{4}{5}\right)$

L. C. M. 4 and 5 is 20.

$= \frac{15-16}{20}$

$= \frac{-1}{20}$

(ii)

$\frac{-3}{1} - \frac{4}{7} = \frac{-3}{1} + \left(\text{additive inverse of } \frac{4}{7}\right)$

$= \frac{-3}{1} - \frac{4}{7}$

$= \frac{-21-4}{7}$

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

(iii)

$\frac{7}{24}-\frac{19}{36}=\frac{7}{24}+\left(\text{additive inverse of } \frac{19}{36}\right)$

$=\frac{7}{24}-\frac{19}{36}$

L. C. M. of 24 and 36 is 72.

$=\frac{21-38}{72}$

$=\frac{-17}{72}$

(*iv*)

$\frac{14}{15}-\frac{13}{20}=\frac{14}{15}+\left(\text{additive inverse of } \frac{13}{20}\right)$

$=\frac{14}{15}-\frac{13}{20}$

L. C. M. of 15 and 20 is 60.

$=\frac{56-39}{60}$

$=\frac{17}{60}$

(v)

$\frac{4}{9}-\frac{2}{(-3)}$

We need a positive denominator.

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

$\frac{4}{9}-\frac{(-2)}{3}=\frac{4}{9}+\left(\text{additive inverse of } \frac{-2}{3}\right)$

L. C. M. of 3 and 9 is 9.

$=\frac{4+6}{9}$

$=\frac{10}{9}$

(vi)

$\frac{7}{11}-\frac{(-4)}{(-11)}$

We need a positive denominator.

$\frac{-4}{-11}\times\frac{(-1)}{(-1)}=\frac{4}{11}$

$\frac{7}{11}-\frac{4}{11}=\frac{7}{11}+\left(\text{additive inverse of}\frac{4}{11}\right)$

$=\frac{7-4}{11}$

$=\frac{3}{11}$

(vii) $\frac{-5}{14} - \frac{-2}{7} = \frac{-5}{14} + \left(\text{additive inverse of } \frac{-2}{7}\right)$

$\frac{-5}{14} + \frac{2}{7}$

L. C. M. of 14 and 7 is 14.

$\frac{-5+4}{14}$

$= \frac{-1}{14}$

(*viii*)

$\left(\frac{-5}{-8}\right) - \left(\frac{-3}{4}\right)$

We need a positive denominator.

$\frac{-5}{-8} \times \frac{-1}{-1} = \frac{5}{8}$ [L.C.M. of 8 and 4 is 8.]

$\frac{5}{8} - \frac{(-3)}{4} = \frac{5}{8} + \left(\text{additive inverse of } \frac{-3}{4}\right)$

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

$= \frac{5+6}{8}$

$= \frac{11}{8}$

Q4

Answer :

First we will find the sum of $\frac{-36}{11}$ and $\frac{49}{22}$.

$\frac{-36}{11} + \frac{49}{22}$

L. C. M. of 11 and 22 is 22.

$= \frac{-72+49}{22}$

$= \frac{-23}{22}$

Now. we have to find the sum of $\frac{33}{8}$ and $\frac{-19}{4}$.

$\frac{33}{8} + \frac{(-19)}{4}$

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

$= \frac{33-38}{8}$

$= \frac{-5}{8}$

Now, $\frac{(-5)}{8} - \frac{(-23)}{22}$

$= \frac{-5}{8} + \frac{23}{22}$

L. C. M. of 8 and 22 is 88.

$= \frac{-55+92}{88}$

$= \frac{37}{88}$

Q5

Answer :

Let the other number that be x.

$\frac{5}{7} + x = \frac{4}{21}$

$=> x = \frac{4}{21} - \frac{5}{7}$

L. C. M. of 21 and 7 is 21.

$=> x = \frac{4-15}{21}$

$=> x = \frac{-11}{21}$

Hence, the required number is $\frac{-11}{21}$.

Q6

Answer :

Let the other number be x.

$$\frac{3}{16} + x = \frac{-3}{8}$$

$$\Rightarrow x = \frac{-3}{8} - \frac{3}{16}$$

L.C.M. of 8 and 16 is 16.

$$\Rightarrow x = \frac{-6-3}{16}$$

$$\Rightarrow x = \frac{-9}{16}$$

Q7

Answer :

Let the other number be x.

$$\frac{-15}{7} + x = -3$$

$$\Rightarrow x = -3 - \frac{(-15)}{7}$$

$$\Rightarrow x = \frac{-21+15}{7}$$

$$\Rightarrow x = \frac{-6}{7}$$

Hence, the required number is $\frac{-6}{7}$

Q8

Answer :

Let the required number be x.

$$-5 + x = \frac{-4}{3}$$

$$\Rightarrow x = \frac{-4}{3} + 5$$

$$\Rightarrow x = \frac{-4+15}{3}$$

$$\Rightarrow x = \frac{11}{3}$$

Hence, the requied number is $\frac{11}{3}$.

Q9

Answer :

Let the required number be x.

$$\frac{-3}{8} + x = \frac{5}{12}$$

$$\Rightarrow x = \frac{5}{12} - \frac{(-3)}{8}$$

$$\Rightarrow x = \frac{10+9}{24}$$

$$\Rightarrow x = \frac{19}{24}$$

Hence, the required number is $\frac{19}{24}$.

Q10

Answer :

Let the number that is to be added be x.

$$\frac{-12}{5} + x = 3$$

$$\Rightarrow x = 3 - \frac{(-12)}{5}$$

$$\Rightarrow x = \frac{15+12}{5}$$

$$\Rightarrow x = \frac{27}{5}$$

Hence, the required number is $\frac{27}{5}$.

Q11

Answer :

Let the number that is to be added be *x*.

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

$\Rightarrow x=\frac{-2}{3}-\frac{(-5)}{7}$

L. C. M. of 3 and 7 is 21.

$\Rightarrow x=\frac{-14+15}{21}$

$\Rightarrow x=\frac{1}{21}$

Hence, the required number is $\frac{1}{21}$.

Q12

Answer :

Let the number that is to be added be *x*.

$\frac{2}{9}+x=-1$

$\Rightarrow x=-1-\frac{2}{9}$

$\Rightarrow x=\frac{-9-2}{9}$

$\Rightarrow x=\frac{-11}{9}$

Hence, the required number is $\frac{-11}{9}$.

Q13

Answer :

Let the required number that is to be added be x.

$\left(\frac{-13}{4}+\frac{-3}{8}\right)+x=1$

$\Rightarrow x=1-\left(\frac{-13}{4}+\frac{(-3)}{8}\right)$

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

$=1-\left(\frac{-26-3}{8}\right)$

$=1-\left(\frac{-29}{8}\right)$

$=1+\frac{29}{8}$

$=\frac{8+29}{8}$

$=\frac{37}{8}$

Hence, the required number is $\frac{37}{8}$.

Q14

Answer :

Let the required number that is to be subtracted be x.

$\frac{-3}{4}-x=\frac{5}{6}$

$\Rightarrow -x=\frac{5}{6}-\frac{(-3)}{4}$

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

$\Rightarrow -x=\frac{10+9}{12}$

$\Rightarrow -x=\frac{19}{12}$

$\Rightarrow -x\times(-1)=\frac{19}{12}\times(-1)$

$\Rightarrow x=-\frac{19}{12}$

Hence, the required number is $\frac{-19}{12}$.

Q15

Answer :

Let the required number that is to be subtracted be x.

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

$\Rightarrow -x = \frac{-5}{6} - \frac{(-2)}{3}$

L.C.M. of 6 and 3 is 6.

$\Rightarrow -x = \frac{-5+4}{6}$

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

$\Rightarrow x = \frac{1}{6}$

Q16

Answer :

Let the required number that is to be subtracted be x.

$\frac{-3}{4} - x = 1$

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

$\Rightarrow -x = \frac{4+3}{4}$

$\Rightarrow -x = \frac{7}{4}$

$\Rightarrow x = -\frac{7}{4}$

Rational Numbers
Exercise 4E

Q1

Answer :

(i) $\frac{3}{4} \times \frac{5}{7} = \frac{(3\times5)}{(4\times7)} = \frac{15}{28}$

(ii) $\frac{\cancel{8}^{3}}{\cancel{8}_{1}} \times \frac{\cancel{3}\cdot\cancel{2}^{4}}{\cancel{3}_{1}} = \frac{(3\times4)}{(1\times1)} = 12$

(iii) $\frac{7}{\cancel{6}_{1}} \times \frac{\cancel{2}\cdot\cancel{4}^{4}}{1} = 7 \times 4 = 28$

(iv) $\frac{-2}{\cancel{3}_{1}} \times \frac{\cancel{6}^{2}}{7} = \frac{(-2\times2)}{7} = \frac{-4}{7}$

(v) We need a positive denominator.

$\therefore \frac{10}{-3} \times \frac{-1}{-1} = \frac{-10}{3}$

$= \frac{-\cancel{1}\cdot\cancel{2}^{4}}{\cancel{5}_{1}} \times \frac{-\cancel{1}\cdot\cancel{0}^{2}}{\cancel{3}_{1}}$

$= (-4) \times (-2)$

$= 8$

(vi) $\frac{\cancel{2}\cdot\cancel{5}^{5}}{-\cancel{9}_{3}} \times \frac{\cancel{3}^{1}}{-\cancel{1}\cdot\cancel{0}_{2}} = \frac{5}{3} \times \frac{1}{2} = \frac{5}{6}$

(vii) $\frac{-\cancel{7}^{1}}{\cancel{1}\cdot\cancel{0}_{1}} \times \frac{-\cancel{4}\cdot\cancel{0}^{4}}{\cancel{2}\cdot\cancel{1}_{3}} = \frac{4}{3}$

(viii) $\frac{-\cancel{3}\cdot\cancel{6}^{12}}{\cancel{5}_{1}} \times \frac{\cancel{2}\cdot\cancel{0}^{4}}{-\cancel{3}_{1}} = 12 \times 4 = 48$

(ix) $\frac{-\cancel{1}\cdot\cancel{3}^{1}}{\cancel{1}\cdot\cancel{5}_{2}} \times \frac{-\cancel{2}\cdot\cancel{5}^{5}}{\cancel{2}\cdot\cancel{6}_{2}} = \frac{-1}{3} \times \frac{-5}{2} = \frac{5}{6}$

Q2

Answer :

(i)

$\frac{3}{\cancel{20}_{5}} \times \frac{\cancel{4}^{1}}{5}$

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

$= \frac{3}{25}$

(ii)

$\frac{\cancel{-7}^{1}}{\cancel{30}_{6}} \times \frac{\cancel{5}^{1}}{\cancel{14}_{2}}$

$= \frac{-1 \times 1}{6 \times 2}$

$= \frac{-1}{12}$

(iii)

$\frac{\cancel{5}^{1}}{\cancel{-18}_{2}} \times \frac{\cancel{-9}^{1}}{\cancel{20}_{4}}$

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

$= \frac{-1}{-8} = \frac{1}{8}$

(iv)

$\frac{\cancel{-9}^{3}}{\cancel{8}_{1}} \times \frac{\cancel{-16}^{2}}{\cancel{3}_{1}}$

$= (-3) \times (-2)$

$= 6$

(v)

$\frac{-32}{1} \times \frac{-7}{36}$

$= \frac{\cancel{-32}^{8} \times (-7)}{1 \times \cancel{36}_{9}}$

$= \frac{-8 \times (-7)}{9}$

$= \frac{56}{9}$

(vi)

We need a positive denominator.

$\therefore \frac{16}{-21} \times \frac{-1}{-1} = \frac{-16}{21}$

Now, $\frac{-16}{\cancel{21}_{3}} \times \frac{\cancel{-14}^{2}}{5}$

$= \frac{(-16) \times (-2)}{3 \times 5}$

$= \frac{32}{15}$

Q3

Answer :

(i)

$\frac{7}{\cancel{24}_{1}} \times \left(\cancel{-48}^{2}\right)$

$= 7 \times (-2)$

$= -14$

(ii)

$\frac{-19}{\cancel{36}_{9}} \times \cancel{16}^{4}$

$= \frac{-19}{9} \times 4$

$= \frac{-76}{9}$

(iii)

$\frac{\cancel{-3}^{1}}{\cancel{4}_{1}} \times \frac{\cancel{4}^{1}}{\cancel{3}_{1}}$

$= -1$

(iv)

$-13 \times \frac{17}{26}$

$= \frac{-\cancel{13}^{1} \times 17}{\cancel{26}^{2}}$

$= \frac{-17}{2}$

(v)

$\frac{-13}{\cancel{5}_{1}} \times \left(\frac{-\cancel{10}^{2}}{}\right)$

$= 26$

(vi)

$\frac{\left(-\cancel{9}^{1}\right)}{\cancel{16}_{1}} \times \frac{\left(-\cancel{64}^{4}\right)}{\cancel{27}_{3}}$

$= \frac{4}{3}$

Q4

Answer :

(i)

$\left(\frac{\cancel{13}^{1}}{\cancel{8}_{2}} \times \frac{\cancel{12}^{3}}{\cancel{13}_{1}}\right) + \left(\frac{-\cancel{4}^{2}}{\cancel{9}_{3}} \times \frac{\cancel{3}^{1}}{\cancel{-2}_{1}}\right)$

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

L. C. M. of 2 and 3 is 6.

$= \frac{9+4}{6}$

$\frac{13}{6}$

(ii)

$\left(\frac{16}{15} \times \frac{-25}{8}\right) + \left(\frac{-14}{27} \times \frac{6}{7}\right)$

$= \left(\frac{\cancel{16}^{2}}{\cancel{15}_{3}} \times \frac{-\cancel{25}^{5}}{\cancel{8}_{1}}\right) + \left(\frac{-\cancel{14}^{2}}{27} \times \frac{6}{\cancel{7}_{1}}\right)$

$= \left[\frac{2}{3} \times \frac{(-5)}{1}\right] + \left[\frac{(-2)}{27} \times \frac{6}{1}\right]$

$= \frac{(-10)}{3} + \frac{\left(-\cancel{12}^{4}\right)}{\cancel{27}^{9}}$

$= \frac{-10}{3} + \frac{-4}{9}$

L. C. M. of 3 and 9 is 9.

$= \frac{-30-4}{9}$

$= \frac{-34}{9}$

(iii)

$$\left(\frac{6}{55}\times\frac{-22}{9}\right)-\left(\frac{26}{125}\times\frac{-10}{39}\right)$$

$$=\left(\frac{\cancel{6}^{2}}{\cancel{5}\cancel{5}_{5}}\times\frac{\cancel{-2}\cancel{2}^{2}}{\cancel{9}_{3}}\right)-\left(\frac{\cancel{2}\cancel{6}^{2}}{\cancel{1}\cancel{2}\cancel{5}_{25}}\times\frac{\cancel{-1}\cancel{0}^{2}}{\cancel{3}\cancel{9}_{3}}\right)$$

$$=\left[\frac{(-4)}{15}-\frac{(-4)}{75}\right]$$

$$=\frac{-4}{15}+\frac{4}{75}$$

L. C. M. of 15 and 75 is 75.

$$=\frac{-20+4}{75}$$

$$=\frac{-16}{75}$$

(iv)

$$\left(\frac{\cancel{-12}^{4}}{\cancel{7}_{1}}\times\frac{\cancel{-14}^{2}}{\cancel{27}_{9}}\right)-\left(\frac{\cancel{-8}^{1}}{\cancel{45}_{5}}\times\frac{\cancel{9}^{1}}{\cancel{16}_{2}}\right)$$

$$=\left[\frac{(-4)}{1}\times\frac{(-2)}{9}\right]-\left[\frac{-1}{5}\times\frac{1}{2}\right]$$

$$=\frac{8}{9}+\frac{1}{10}$$

L. C. M. of 9 and 10 is 90.

$$=\frac{80+9}{90}$$

$$=\frac{89}{90}$$

Q5

Answer :

Cost of 1 meter cloth $= \text{Rs } 40\frac{1}{2}$

Cost of $3\frac{1}{2}$ meter cloth $= \text{Rs}\left(40\frac{1}{2}\times 3\frac{1}{2}\right)$

$= \text{Rs}\left(\frac{81}{2}\times\frac{7}{2}\right)$

$= \text{Rs } \frac{567}{4}$

$= \text{Rs } 141.75$

Q6

Answer :

Distance covered in 1 hour $= 46\frac{2}{3}$ km

Distance coverd in $2\frac{2}{5}$ hours $= \left(46\frac{2}{3}\times 2\frac{2}{5}\right)$

$$=\left(\frac{\cancel{140}^{28}}{\cancel{3}}\times\frac{\cancel{12}^{4}}{\cancel{5}^{1}}\right)$$

$= (28\times 4)$

$= 112$ km

Hence, the required distance is 112 km.

Rational Numbers
Exercise 4F

Q1

Answer :

(i) Multiplicative inverse of $18 = \frac{1}{18}$

ii) Multiplicative inverse of $-16 = \frac{-1}{16}$

iii) Multiplicative inverse of $\frac{13}{25} = \frac{25}{13}$

iv) Multiplicative inverse of $\frac{-17}{12} = \frac{12}{-17}$

v) Multiplicative inverse of $\frac{-6}{19} = \frac{19}{-6}$

vi) Multiplicative inverse of $\frac{-3}{-5} = \frac{-5}{-3} = \frac{5}{3}$

vii) Multiplicative inverse of $-1 = \frac{1}{-1} = -1$

viii) Multiplicative inverse of $0 = \frac{1}{0} = \text{infinity}$

Hence, it does not exist.

Q2

Answer :

(i) $\frac{4}{9} \div \left(\frac{-5}{12}\right)$

$= \frac{4}{9_3} \times \frac{12^4}{(-5)}$

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

$= \frac{-16}{15}$

(ii) $-8 \div \left(\frac{-5}{16}\right)$

$= -8 \times \frac{-16}{5}$

$= \frac{128}{5}$

(iii) $\frac{-12}{7} \div (-18)$

$= \frac{-12^2}{7} \times \left(\frac{-1}{18_3}\right)$

$= \frac{2}{21}$

(iv) $\frac{-1}{10} \div \left(\frac{-8}{5}\right)$

$= \frac{-1}{10^2} \times \left(\frac{5}{-8}\right)$

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

$= \frac{-1}{-16}$

$= \frac{1}{16}$

(v) $\frac{-16}{35} \div \left(\frac{-15}{14}\right)$

$= \frac{-16}{35_5} \times \frac{14^2}{(-15)}$

$= \frac{-32}{-75}$

$= \frac{32}{75}$

(vi) $\left(\frac{-65}{14}\right) \div \left(\frac{13}{-7}\right)$

$= \left(\frac{-65^5}{14_2}\right) \times \frac{(-7)}{13}$

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

$= \frac{5}{2}$

Q3

Answer :

(i) $(\ldots?..) \div \frac{-7}{5} = \frac{10}{19}$

$(\ldots?..) = \frac{10}{19} \times \frac{-7}{5}$

$(\ldots?..) = \frac{-14}{19}$

(ii) $(..?..) \div (-3) = \frac{-4}{15}$

$(\ldots?..) = \frac{-4}{15} \times (-3)$

$(\ldots?..) = \frac{4}{5}$

(iii) $\frac{9}{8} \div (..?..) = \frac{-3}{2}$

$\frac{9}{8} \div (..?..) = \frac{(-3)}{2}$

$(..?..) = \frac{9}{8} \times \frac{2}{(-3)}$

$(..?..) = \frac{-3}{4}$

(iv) $(-12) \div (..?..) = \frac{-6}{5}$

$(..?..) = (-12) \times \left(\frac{5}{-6}\right)$

$(..?..) = 10$

Q4

Answer :

Sum $= \frac{65}{12} + \frac{8}{3} = \frac{65+32}{12} = \frac{97}{12}$

Difference $= \frac{65}{12} - \frac{8}{3} = \frac{65-32}{12} = \frac{33}{12}$

$\frac{97}{12} \div \frac{33}{12}$

$= \frac{97}{\cancel{12}_{1}} \times \frac{\cancel{12}^{1}}{33}$

$= \frac{97}{33}$

Q5

Answer :

Let the required number be x.

$\frac{-44}{9} \div x = \frac{-11}{3}$

$\Rightarrow x = \frac{\cancel{-44}^{4}}{\cancel{9}_{3}} \times \frac{\cancel{3}}{\cancel{-11}}$

$\Rightarrow x = \frac{4}{3}$

Q6

Answer :

Let the required number be x.

$x \times \left(\frac{-8}{15}\right) = 24$

$x = 24 \div \frac{-8}{15}$

$= \cancel{2 \cdot 4}^{3} \times \left(\frac{15}{\cancel{-8}_{1}}\right)$

$= \frac{45 \times (-1)}{-1 \times (-1)}$

$= -45$

Q7

Answer :

Let the other number be x.

$x \times -8 = 10$

$\Rightarrow x = 10 \div (-8)$

$= 10 \times \frac{1}{-8}$

$= \cancel{1 \cdot 0}^{5} \times \frac{1}{\cancel{-8}_{4}}$

$\therefore$ Other number $= \frac{-5}{4}$

Q8

Answer :

Let the other number be x.

$x \times (-12) = -9$

$\Rightarrow x = -9 \div (-12)$

$= -9 \times \left(\frac{1}{-12}\right)$

$= -9 \times \left(\frac{-1}{12}\right)$

$= \frac{\cancel{9}^{3}}{\cancel{12}_{4}}$

Hence, the other number is $\frac{3}{4}$.

Q9

Answer :

Let the other number be x.

$x \times \left(\frac{-4}{3}\right) = \frac{-16}{9}$

$\Rightarrow x = \frac{-16}{9} \div \left(\frac{-4}{3}\right)$

$= \frac{\cancel{-16}^{4}}{\cancel{9}_{3}} \times \left(\frac{\cancel{3}^{1}}{\cancel{-4}_{1}}\right)$

$= \frac{4}{3}$

Hence, the other number is $\frac{4}{3}$.

Q10

Answer :

Let the required number be x.

$x \times \left(\frac{-8}{39}\right) = \frac{5}{26}$

$\Rightarrow x = \frac{5}{26} \div \left(\frac{-8}{39}\right)$

$= \frac{5}{\cancel{26}_{2}} \times \left(\frac{\cancel{-39}^{3}}{-8}\right)$

$= \frac{15 \times -1}{-16 \times -1} = \frac{-15}{16}$

Hence, the required number is $\frac{-15}{16}$.

Q11

Answer :

Length of the cloth required to prepare 24 trousers $= 54$ m

Length of the cloth required for each pair of trousers $= 54 \div 24$

$= \frac{\cancel{54}^{9}}{\cancel{24}_{4}}$

$= \frac{9}{4} = 2\frac{1}{4}$ m

Hence, $2\frac{1}{4}$ m length of cloth is required for each pair of trousers.

Q12

Answer :

Length of a rope $= 30$ m

Number of pieces $= 30 \div 3\frac{3}{4} = 30 \div \frac{15}{4}$

$= \cancel{30}^{2} \times \frac{4}{\cancel{15}}$

$= 8$

Hence, the number of pieces would be 8.

Q13

Answer :

Cost of $2\frac{1}{2}$ m cloth $=$ Rs $78\frac{3}{4}$

Cost of cloth per meter $= 78\frac{3}{4} \div 2\frac{1}{2}$

$= \frac{315}{4} \div \frac{5}{2}$

$= \frac{\cancel{315}^{63}}{\cancel{4}_{2}} \times \frac{\cancel{2}^{1}}{\cancel{5}_{1}}$

$=$ Rs $\frac{63}{2} = Rs\ 31\frac{1}{2}$

$\therefore$ Cost of the cloth (per metre) $=$ Rs $31\frac{1}{2}$

Rational Numbers
Exercise 4G

Q1

Answer :

(b) $\frac{-3}{5}$

$$
\begin{array}{r}
33\overline{)\,55\,(1} \\
-33 \\
\hline
22\overline{)\,33\,(1} \\
-22 \\
\hline
11\overline{)\,22\,(2} \\
-22 \\
\hline
\times
\end{array}
$$

H. C. F. of 33 and 55 is 11

$\frac{-33 \div 11}{55 \div 11} = \frac{-3}{5}$

Q2

Answer :

(b) $\frac{-6}{7}$

$$
\begin{array}{r}
102\overline{)\,119\,(1} \\
-102 \\
\hline
17\overline{)\,102\,(6} \\
-102 \\
\hline
\times
\end{array}
$$

H. C. F. of 102 and 119 is 17

$\frac{-102 \div 17}{119 \div 17} = \frac{-6}{7}$

The standard form of $\frac{-102}{119}$ is $\frac{-6}{7}$

Q3

Answer :

The correct option is (a).
The value of x is -14.
$\left[x = \frac{7\times6}{-3} = \frac{\cancel{-4}\cancel{-2}^{14}}{\cancel{-3}_{1}} = -14\right]$

Q4

Answer :

The correct option is (c).
$\frac{14}{9}$ should be added to $\frac{-5}{9}$ to get 1.
Let the required number be x.
$x + \left(\frac{-5}{9}\right) = 1$
$x = 1 - \frac{(-5)}{9} = \frac{9+5}{9} = \frac{14}{9}$

Q5

Answer :

The correct option is (b).
Let the number that is to be subtracted be x.

$\frac{-3}{4} - x = \frac{5}{6}$
$\Rightarrow -x = \frac{5}{6} - \left(\frac{-3}{4}\right)$
$\Rightarrow -x = \frac{5}{6} + \frac{3}{4}$
$\Rightarrow -x = \frac{(5\times2)+(3\times3)}{12}$
$\Rightarrow x = -\frac{19}{12}$
Hence, $-\frac{19}{12}$ should be subtracted from $\frac{-3}{4}$ to get $\frac{5}{6}$.

Q6

Answer :

The correct option is (a).
$\frac{5\times-1}{-6\times-1} = \frac{-5}{6}$
L.C.M. of 6 and 12 is 12.
$\therefore \frac{-5\times2}{6\times2} = \frac{-10}{12}$ and $\frac{-7\times1}{12\times1} = \frac{-7}{12}$
Hence, $\frac{5}{-6}$ is smaller than $\frac{-7}{12}$.

Q7

Answer :

The correct option is (a).
$\frac{2\times-1}{-3\times-1} = \frac{-2}{3}$
L.C.M. of 3 and 5 is 15.
$\therefore \frac{-2\times5}{3\times5} = \frac{-10}{15}$ and $\frac{-4\times3}{5\times3} = \frac{-12}{15}$
Thus, $\frac{2}{-3}$ is greater than $\frac{-4}{5}$.

Q8

Answer :

The correct option is (c).
Reciprocal of -6 is $\frac{-1}{6}$.

Q9

Answer :

The correct option is (b).
Multiplicative inverse of $\frac{-2}{3}$ is $\frac{-3}{2}$.

Q10

Answer :

The correct option is (a).

$-2\frac{1}{9} - 6$

$= \frac{-19}{9} - 6 = \frac{-19-54}{9}$

$= \frac{-73}{9} = -8\frac{1}{9}$

Q11

Answer :

The correct option is (c).

$\frac{-6}{13} - \frac{[-7]}{15}$

L.C.M. of 13 and 15 is 195.

$= \frac{-6}{13} - \frac{[-7]}{15}$

$= \frac{-90+91}{195}$

$= \frac{1}{195}$

Q12

Answer :

The correct option is (b).

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

$= \frac{-7}{3} + \frac{23}{5}$

L.C.M. of 5 and 5 is 15.

$= \frac{-35+69}{15}$

$= \frac{34}{15}$

$= 2\frac{4}{15}$

Q13

Answer :

The correct option is (b).

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

$= \frac{2}{3} - \frac{12}{7}$

L.C.M. of 3 and 7 is 21.

$= \frac{14-36}{21}$

$= \frac{-22}{21}$

$= -1\frac{1}{21}$

Q14

Answer :

The correct option is (b).

$\frac{-5}{12}$ is greater than $\frac{-4}{9}$.

L.C.M. of 9 and 12 is 36.

$\frac{-5\times3}{12\times3} = \frac{-15}{36}$

$\frac{-4\times4}{12\times4} = \frac{-16}{36}$

$(-15) > (-16)$

$\frac{-5}{12} > \frac{-4}{9}$

Q15

Answer :

The correct option is (b).

$\frac{-9}{14} + ? = -1$

$\therefore ? = -1 - \frac{(-9)}{14}$

$? = \frac{-14+9}{14}$

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

Q16

Answer :

(a) $\frac{3}{4}$

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

L. C. M. of 4, 6 and 3 is 12.

$= \frac{15-14+8}{12}$

$= \frac{23-14}{12}$

$= \frac{\cancel{9}^{3}}{\cancel{12}_{4}} = \frac{3}{4}$

Q17

Answer :

(b) 2

$1 \div \frac{1}{2}$

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

$= 2$

Q18

Answer :

(a) $\frac{-35}{18}$

$? = \frac{5}{12} \div \frac{(-3)}{14}$

$= \frac{5}{12} \times \frac{14}{(-3)}$

$= \frac{70}{-36}$

$= \frac{35 \times -1}{-18 \times -1}$

$? = \frac{-35}{18}$

Q19

Answer :

(c) 0

$0 \div \frac{-7}{5} = 0$

Q20

Answer :

(d) Not defined

This is because $\frac{-3}{8} \div 0$ is not defined.