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:

$$\frac{4 \times 3}{7 \times 3} = \frac{12}{21}$$

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

(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:

$$\frac{-12 \times 4}{13 \times 4} = \frac{-48}{52}$$

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

(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, $11 \times 2 = 22$

Multiplying both the numerator and the denominator by 2:

$$\frac{-8 \times 2}{11 \times 2} = \frac{-16}{22}$$

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

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

Clearly, $11 \times 5 = 55$

Multiplying both the numerator and the denominator by 5:

$$\frac{-8 \times 5}{11 \times 5} = \frac{-40}{55}$$

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

Q13

Answer :

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

Clearly, 14×4=56

Multiplying both the numerator and the denominator by 4:
$$\frac{14 \times 4}{-5 \times 4} = \frac{56}{-20}$$

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

(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:
$$\frac{13 \times 5}{-8 \times 5} = \frac{65}{-40}$$

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

(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:

$$\frac{-36 \div 4}{24 \div 4} = \frac{-9}{6}$$

(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.

```
35 ) 49 ( 1
     −35
     ‾‾‾‾
     14 ) 35 ( 2
          −28
          ‾‾‾‾
          7 ) 14 ( 2
              −14
              ‾‾‾‾
              ×
```

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:

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

```
8 ) 36 ( 4
    −32
    ‾‾‾‾
    4 ) 8 ( 2
        −8
        ‾‾‾
        ×
```

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

$$27\overline{)45}(1$$
$$\underline{-27}$$
$$18\overline{)27}(1$$
$$\underline{-18}$$
$$9\overline{)18}(2$$
$$\underline{-18}$$
$$\times$$

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:

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

$$14\overline{)49}(3$$
$$\underline{-42}$$
$$7\overline{)14}(2$$
$$\underline{-14}$$
$$\times$$

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.

*M*ultiplying its denominator and denominator by -1:

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

$$78\overline{)91}(1$$
$$\underline{-78}$$
$$13\overline{)78}(6$$
$$\underline{-78}$$
$$\times$$

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

$$68\overline{)119}(1$$
$$\underline{-68}$$
$$51\overline{)68}(1$$
$$\underline{-51}$$
$$17\overline{)51}(3$$
$$\underline{-51}$$
$$\times$$

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

$$87\overline{)116}(1$$
$$\underline{-87}$$
$$29\overline{)87}(3$$
$$\underline{-87}$$
$$\times$$

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:

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

$$161\overline{)299}(1$$
$$\underline{-161}$$
$$138\overline{)161}(1$$
$$\underline{-138}$$
$$23\overline{)138}(6$$
$$\underline{-138}$$
$$\times$$

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 $7 \times 39 = 273$

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

$3 \times 16 = 48$

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

$\therefore 3 \times 16 = (-8) \times (-6)$

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

(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:

$7 \times 60 = 420$
And $15 \times (-28) = -420$

$\therefore 7 \times 60 \neq 15 \times (-28)$

Therefore, the rational numbers are not equivalent.

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

We have:

3 ×4=12

And 12×(−1)= −12

12 ≠ −12

Therefore, the rational numbers are not equivalent.

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

We have:

2×2=4

And 3×3=9

2×2≠3×3

Therefore, the rational numbers are not equivalent.

Q20

Answer :

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

=> −x =5×8
=> x= −40

(ii) $\frac{7}{-3} = \frac{x}{6}$
=> (−3)x=7×6

=> x=$\frac{(7×6)}{(-3)}$
=> x=−14

(iii) $\frac{3}{5} = \frac{x}{-25}$
=> 5x=3×(−25)

=> x=$\frac{3×(-25)}{5}$
=>x =(−15)

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

=> 13x=6×(−65)

=> x=$\frac{6×(-65)}{13}$

=> x= 6×(−5)

=> x =−30

(v) $\frac{16}{x} = -4$
=> x = $\frac{16}{(-4)}$
=> x= (−4)

vi) $\frac{-48}{x} =2$
=> $\frac{-48}{12} = \frac{x}{1}$
=>2x = (−48) × 1
=>x = $\frac{-48}{2}$
x= (−24)

Q21

Answer :

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

$8 \times 15 = 120$
And $(-10) \times (-12) = 120$

$8 \times 15 = (-10) \times (-12)$

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

Therefore, the rational numbers are equal.

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

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

$\therefore (-3) \times (-21) = 7 \times 9$

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

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.

$\frac{5 \times 8}{9 \times 8} = \frac{40}{72}$

$\frac{3 \times 9}{8 \times 9} = \frac{27}{72}$

$27 < 40$

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

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.

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

$\frac{(-8) \times 3}{7 \times 3} = \frac{-24}{21}$

$(-24) > (-28)$

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

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

(iii)

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

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

$\frac{-12 \times 1}{5 \times 1} = \frac{-12}{5}$

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

$-12 > -15$

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

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

(iv)

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

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

$\frac{-7 \times 8}{9 \times 8} = \frac{-56}{72}$

$\frac{-5 \times 9}{8 \times 9} = \frac{-45}{72}$

$-56 < -45$

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

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

(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.

$\frac{-4 \times 8}{5 \times 8} = \frac{-32}{40}$

$\frac{-7 \times 5}{8 \times 5} = \frac{-35}{40}$

$-32 > -35$

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

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

(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.

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

$\frac{-7 \times 13}{(-12) \times 13} = \frac{-91}{156}$

$-108 < -91$

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

Q4

Answer :

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

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

$\frac{-3 \times 13}{7 \times 13} = \frac{-39}{91}$

$\frac{-6 \times 7}{13 \times 7} = \frac{-42}{91}$

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

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

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

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

$$\begin{array}{c|c} 13 & 13,91 \\ \hline 7 & 1,7 \\ \hline & 1,1 \end{array}$$

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

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

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

$\frac{-13 \times 1}{5 \times 1} = \frac{-13}{5}$

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

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

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

$\frac{-2 \times 8}{3 \times 8} = \frac{-16}{24}$

$\frac{-5 \times 3}{8 \times 3} = \frac{-15}{24}$

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

$$\begin{array}{c|c} 2 & 8,3 \\ \hline 2 & 4,3 \\ \hline 2 & 2,3 \\ \hline 3 & 1,3 \\ \hline & 1,1 \end{array}$$

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

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

$\frac{0 \times 1}{1 \times 5} = \frac{0}{5}$

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

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

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

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

$\frac{-8 \times 10}{9 \times 10} = \frac{-80}{90}$

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

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

$$\begin{array}{c|c} 3 & 9,10 \\ \hline 3 & 3,10 \\ \hline 5 & 1,10 \\ \hline 2 & 1,2 \\ \hline & 1,1 \end{array}$$

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

$$\begin{array}{c|c} 5 & 5,10,15,30 \\ \hline 2 & 1,2,3,6 \\ \hline 3 & 1,1,3,3 \\ \hline & 1,1,1,1 \end{array}$$

$\frac{2 \times 6}{5 \times 6} = \frac{12}{30}$

$\frac{7 \times 3}{10 \times 3} = \frac{21}{30}$

$\frac{8 \times 2}{15 \times 2} = \frac{16}{30}$

$\frac{13 \times 1}{30 \times 1} = \frac{13}{30}$

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

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

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

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

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

```
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.

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

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

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

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

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

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

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

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

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

```
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 $10, 15, 20, 30 = 60$

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

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

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

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

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

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

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

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

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

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

```
2 | 3,4,6,12
2 | 1,2,3,6
3 | 1,1,3,3
  | 1,1,1,1
```

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

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

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

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

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

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

Q6

Answer :

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

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

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

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

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.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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.

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

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

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

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

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

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

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.

$\frac{-17 \times 1}{30 \times 1} = \frac{-17}{30},$

$\frac{-11 \times 2}{15 \times 2} = \frac{-22}{30},$

$\frac{-7 \times 3}{10 \times 3} = \frac{-21}{30},$

$\frac{3 \times 6}{5 \times 6} = \frac{18}{30},$

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.

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

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

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 :

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

$\frac{-5}{5}$ 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.

$\frac{-3 \times 2}{5 \times 2} = \frac{-6 \times 4}{10 \times 4} = \frac{-24 \times 2}{40 \times 2} = \frac{-48}{80},$

$\frac{-1 \times 5}{2 \times 5} = \frac{-5 \times 4}{10 \times 4} = \frac{-20 \times 2}{40 \times 2} = \frac{-40}{80},$

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) $\dfrac{-5}{9} + \dfrac{2}{3}$

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

$$
\begin{array}{c|cc}
3 & 9, & 3 \\
\hline
3 & 3, & 1 \\
\hline
 & 1, & 1 \\
\end{array}
$$

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

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

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

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

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

$= \dfrac{1}{9}$

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

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

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

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

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

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

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

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

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

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

(vi)

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

We need a positive denominator.

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

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.

$$\therefore \frac{-9}{24} = \frac{-9 \times 3}{24 \times 3} = \frac{-27}{72}$$

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

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.

$$\frac{-27}{4} = \frac{-27 \times 2}{4 \times 2} = \frac{-54}{8}$$

$$\frac{(-15)}{8} = \frac{(-15) \times 1}{8 \times 1} = \frac{-15}{8}$$

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.

$\therefore \frac{-11 \times 2}{12 \times 2} = \frac{-22}{24}$

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

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

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

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

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

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

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

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

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

$\frac{-16 \times 4}{9 \times 4} = \frac{-64}{36}$

$\frac{-5 \times 3}{12 \times 3} = \frac{-15}{36}$

$\frac{7 \times 2}{18 \times 2} = \frac{14}{36}$

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

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

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

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

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

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

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

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

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

$\frac{-2 \times 8}{5 \times 8} = \frac{-16}{40}$

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

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

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

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

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

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

$\frac{-13 \times 2}{8 \times 2} = \frac{-26}{16}$

$\frac{5 \times 1}{16 \times 1} = \frac{5}{16}$

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

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.

$\frac{-8}{15} = \frac{-8 \times 1}{15 \times 1} = \frac{-8}{15}$

$\frac{-2}{3} = \frac{-2 \times 5}{3 \times 5} = \frac{-10}{15}$

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

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

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

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

3	15,3
5	5,1
	1,1

(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.

$\therefore \frac{-7}{10} = \frac{-7 \times 6}{10 \times 6} = \frac{-42}{60}$

$\frac{-13}{15} = \frac{-13 \times 4}{15 \times 4} = \frac{-52}{60}$

$\frac{27}{20} = \frac{27 \times 3}{20 \times 3} = \frac{81}{60}$

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.

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

$\frac{-7}{9} = \frac{-7 \times 4}{9 \times 4} = \frac{-28}{36}$

$\frac{11}{12} = \frac{11 \times 3}{12 \times 3} = \frac{33}{36}$

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.

$$\frac{-11}{39} = \frac{-11 \times 2}{39 \times 2} = \frac{-22}{78}$$

$$\frac{5}{26} = \frac{5 \times 3}{26 \times 3} = \frac{15}{78}$$

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

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

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

$$= \frac{149}{78}$$

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

(v)

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

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

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

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

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

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

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

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

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.

$$\frac{-9}{11} = \frac{-9 \times 12}{11 \times 12} = \frac{-108}{132}$$

$$\frac{2}{3} = \frac{2 \times 44}{3 \times 44} = \frac{88}{132}$$

$$\frac{-3}{4} = \frac{-3 \times 33}{4 \times 33} = \frac{-99}{132}$$

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

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

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

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

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

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.]

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

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.

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

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

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

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

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

Q7

Answer :

Let the other number be x.

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

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

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

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

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

Q8

Answer :

Let the required number be x.

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

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

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

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

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

Q9

Answer :

Let the required number be x.

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

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

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

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

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

Q10

Answer :

Let the number that is to be added be x.

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

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

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

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

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

Q11

Answer:

Let the number that is to be added be x.

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

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

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

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

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

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

Q12

Answer:

Let the number that is to be added be x.

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

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

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

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

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

Q13

Answer:

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

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

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

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.

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

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

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

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

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

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

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

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

Q15

Answer:

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

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

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

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

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

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

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

Q16

Answer:

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

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

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

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

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

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

Q1

Answer :

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

(ii) $\frac{\cancel{9}^3}{\cancel{8}_1} \times \frac{\cancel{-32}^4}{\cancel{-3}_1} = \frac{(3\times4)}{(1\times1)} = 12$

(iii) $\frac{7}{\cancel{-6}_1} \times \frac{\cancel{-24}^4}{1} = 7 \times 4 = 28$

(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.

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

$= \frac{\cancel{-12}^4}{\cancel{-5}_1} \times \frac{\cancel{-10}^2}{\cancel{-3}_1}$

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

$= 8$

(vi) $\frac{\cancel{-25}^5}{\cancel{-9}_3} \times \frac{\cancel{-3}^1}{\cancel{-10}_2} = \frac{5}{3} \times \frac{1}{2} = \frac{5}{6}$

(vii) $\frac{\cancel{-7}^1}{\cancel{-10}_1} \times \frac{\cancel{-10}^4}{\cancel{-21}_3} = \frac{4}{3}$

(viii) $\frac{\cancel{-36}^{12}}{\cancel{-5}_1} \times \frac{\cancel{-20}^4}{\cancel{-3}_1} = 12 \times 4 = 48$

(ix) $\frac{\cancel{-13}^1}{\cancel{-15}_3} \times \frac{\cancel{-25}^5}{\cancel{-26}_2} = \frac{-1}{3} \times \frac{-5}{2} = \frac{5}{6}$

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, $\dfrac{-16}{\cancel{21}_3} \times \dfrac{-\cancel{14}^2}{5}$

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

$$= \frac{32}{15}$$

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)

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

$$= 26$$

(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)

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

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

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)

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

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

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

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

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

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

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

(iv)

$$\left(\frac{-12}{7} \times \frac{-14}{27}\right) - \left(\frac{-8}{45} \times \frac{9}{16}\right)$$

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

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

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

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

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

Q5

Answer:

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

Cost of $3\frac{1}{2}$ meter cloth $= $ 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 $= \left(46\frac{2}{3} \times 2\frac{2}{5}\right)$

$$= \left(\frac{148}{3} \times \frac{12}{5}\right)$$

$$= (28 \times 4)$$

$$= 112 \text{ km}$$

Hence, the required distance is 112 km.

Rational Numbers
Exercise 4F

Q1

Answer :

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

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

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

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

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

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

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

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

Hence, it does not exist.

Q2

Answer :

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

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

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

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

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

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

$= \frac{128}{5}$

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

$= \frac{-\cancel{12}^2}{7} \times \left(\frac{-1}{\cancel{18}_3}\right)$

$= \frac{2}{21}$

(iv) $\frac{-1}{10} \div \left(\frac{-8}{5}\right)$

$= \frac{-1}{\cancel{10}^2} \times \left(\frac{\cancel{5}}{-8}\right)$

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

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

$= \frac{1}{16}$

(v) $\frac{-16}{35} \div \left(\frac{-15}{14}\right)$

$= \frac{-16}{\cancel{35}_5} \times \frac{\cancel{14}^2}{(-15)}$

$= \frac{-32}{-75}$

$= \frac{32}{75}$

(vi) $\left(\frac{-65}{14}\right) \div \left(\frac{13}{-7}\right)$

$= \left(\frac{-\cancel{65}^5}{\cancel{14}_2}\right) \times \frac{(-\cancel{7})}{\cancel{13}}$

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

$= \frac{5}{2}$

Q3

Answer :

(i) $(\ldots?\ldots) \div \frac{-7}{5} = \frac{10}{19}$

$\quad (\ldots?\ldots) = \frac{10}{19} \times \frac{-7}{5}$

$\quad (\ldots?\ldots) = \frac{-14}{19}$

(ii) $(\ldots?\ldots) \div (-3) = \frac{-4}{15}$

$\quad (\ldots?\ldots) = \frac{-4}{15} \times (-3)$

$\quad (\ldots?\ldots) = \frac{4}{5}$

(iii) $\frac{9}{8} \div (\ldots?\ldots) = \frac{-3}{2}$

$\quad \frac{9}{8} \div (\ldots?\ldots) = \frac{(-3)}{2}$

$\quad (\ldots?\ldots) = \frac{9}{8} \times \frac{2}{(-3)}$

$\quad (\ldots?\ldots) = \frac{-3}{4}$

(iv) $(-12) \div (\ldots?\ldots) = \frac{-6}{5}$

$\quad (\ldots?\ldots) = (-12) \times \left(\frac{5}{-6}\right)$

$\quad (\ldots?\ldots) = 10$

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.

$x \times \left(\frac{-8}{15}\right) = 24$

$x = 24 \div \frac{-8}{15}$

$= \cancel{24}^3 \times \left(\frac{15}{\cancel{-8}_1}\right)$

$= \frac{45 \times (-1)}{-1 \times (-1)}$

$= -45$

Q7

Answer :

Let the other number be x.

$x \times -8 = 10$

$\Rightarrow x = 10 \div (-8)$

$= 10 \times \frac{1}{-8}$

$= \cancel{10}^5 \times \frac{1}{\cancel{-8}_4}$

$\therefore$ 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 $= 54\,\text{m}$
Length of the cloth required for each pair of trousers $= 54 \div 24$
$$= \frac{\cancel{54}^{9}}{\cancel{24}_{4}}$$
$$= \frac{9}{4} = 2\frac{1}{4}\,\text{m}$$

Hence, $2\frac{1}{4}$ m length of cloth is required for each pair of trousers.

Q12

Answer:

Length of a rope $= 30\,\text{m}$
Number of pieces $= 30 \div 3\frac{3}{4} = 30 \div \frac{15}{4}$
$$= {}^{2}\cancel{30} \times \frac{4}{\cancel{15}}$$
$$= 8$$

Hence, the number of pieces would be 8.

Q13

Answer:

Cost of $2\frac{1}{2}$ m cloth $= \text{Rs } 78\frac{3}{4}$
Cost of cloth per meter $= 78\frac{3}{4} \div 2\frac{1}{2}$
$$= \frac{315}{4} \div \frac{5}{2}$$
$$= \frac{\cancel{315}^{63}}{\cancel{4}_{2}} \times \frac{\cancel{2}^{1}}{\cancel{5}_{1}}$$
$$= \text{Rs } \frac{63}{2} = \text{Rs } 31\frac{1}{2}$$

$\therefore$ Cost of the cloth (per metre) $= \text{Rs } 31\frac{1}{2}$

Q1

Answer :

(b) $\frac{-3}{5}$

$$33\overline{)55}(1$$
$$\underline{-33}$$
$$22\overline{)33}(1$$
$$\underline{-22}$$
$$11\overline{)22}(2$$
$$\underline{-22}$$
$$\times$$

H.C.F. of 33 and 55 is 11

$\frac{-33 \div 11}{55 \div 11} = \frac{-3}{5}$

Q2

Answer :

(b) $\frac{-6}{7}$

$$102\overline{)119}(1$$
$$\underline{-102}$$
$$17\overline{)102}(6$$
$$\underline{-102}$$
$$\times$$

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.

$$\left[x = \frac{7 \times 6}{-3} = \frac{\cancel{42}^{14}}{\cancel{-3}_1} = -14\right]$$

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.

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

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

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

$$\Rightarrow -x = \frac{(5 \times 2) + (3 \times 3)}{12}$$

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

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.

$$\therefore \frac{-5 \times 2}{6 \times 2} = \frac{-10}{12} \text{ and } \frac{-7 \times 1}{12 \times 1} = \frac{-7}{12}$$

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.

$$\therefore \frac{-2 \times 5}{3 \times 5} = \frac{-10}{15} \text{ and } \frac{-4 \times 3}{5 \times 3} = \frac{-12}{15}$$

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.

$\frac{-5 \times 3}{12 \times 3} = \frac{-15}{36}$

$\frac{-4 \times 4}{12 \times 4} = \frac{-16}{36}$

$(-15) > (-16)$

$\frac{-5}{12} > \frac{-4}{9}$

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.