

EXERCISE 1.1**PAGE NO: 1.5****1. Add the following rational numbers:****(i) $-5/7$ and $3/7$** **(ii) $-15/4$ and $7/4$** **(iii) $-8/11$ and $-4/11$** **(iv) $6/13$ and $-9/13$** **Solution:**

Since the denominators are of same positive numbers we can add them directly

$$(i) -5/7 + 3/7 = (-5+3)/7 = -2/7$$

$$(ii) -15/4 + 7/4 = (-15+7)/4 = -8/4$$

Further dividing by 4 we get,

$$-8/4 = -2$$

$$(iii) -8/11 + -4/11 = (-8 + (-4))/11 = (-8-4)/11 = -12/11$$

$$(iv) 6/13 + -9/13 = (6 + (-9))/13 = (6-9)/13 = -3/13$$

2. Add the following rational numbers:**(i) $3/4$ and $-5/8$** **Solution:** The denominators are 4 and 8

By taking LCM for 4 and 8 is 8

We rewrite the given fraction in order to get the same denominator

$$3/4 = (3 \times 2) / (4 \times 2) = 6/8 \text{ and}$$

$$-5/8 = (-5 \times 1) / (8 \times 1) = -5/8$$

Since the denominators are same we can add them directly

$$6/8 + -5/8 = (6 + (-5))/8 = (6-5)/8 = 1/8$$

(ii) $5/-9$ and $7/3$ **Solution:** Firstly we need to convert the denominators to positive numbers.

$$5/-9 = (5 \times -1) / (-9 \times -1) = -5/9$$

The denominators are 9 and 3 By taking LCM for 9 and 3 is 9

We rewrite the given fraction in order to get the same denominator

$$-5/9 = (-5 \times 1) / (9 \times 1) = -5/9 \text{ and } 7/3 = (7 \times 3) / (3 \times 3) = 21/9$$

Since the denominators are same we can add them directly -

$$-5/9 + 21/9 = (-5+21)/9 = 16/9$$

(iii) -3 and $3/5$ **Solution:** The denominators are 1 and 5

By taking LCM for 1 and 5 is 5

We rewrite the given fraction in order to get the same denominator -

$$3/1 = (-3 \times 5) / (1 \times 5) = -15/5 \text{ and}$$

$$3/5 = (3 \times 1) / (5 \times 1) = 3/5$$

Now, the denominators are same we can add them directly

$$-15/5 + 3/5 = (-15+3)/5 = -12/5$$

(iv) $-7/27$ and $11/18$

Solution: The denominators are 27 and 18

By taking LCM for 27 and 18 is 54

We rewrite the given fraction in order to get the same denominator -

$$7/27 = (-7 \times 2) / (27 \times 2) = -14/54 \text{ and}$$

$$11/18 = (11 \times 3) / (18 \times 3) = 33/54$$

Now, the denominators are same we can add them directly $-14/54 +$

$$33/54 = (-14+33)/54 = 19/54$$

(v) $31/-4$ and $-5/8$

Solution: Firstly we need to convert the denominators to positive numbers.

$$31/-4 = (31 \times -1) / (-4 \times -1) = -31/4$$

The denominators are 4 and 8

By taking LCM for 4 and 8 is 8

We rewrite the given fraction in order to get the same denominator -

$$31/4 = (-31 \times 2) / (4 \times 2) = -62/8 \text{ and}$$

$$-5/8 = (-5 \times 1) / (8 \times 1) = -5/8$$

Since the denominators are same we can add them directly

$$-62/8 + (-5)/8 = (-62 + (-5))/8 = (-62-5)/8 = -67/8$$

(vi) $5/36$ and $-7/12$

Solution: The denominators are 36 and 12

By taking LCM for 36 and 12 is 36

We rewrite the given fraction in order to get the same denominator

$$5/36 = (5 \times 1) / (36 \times 1) = 5/36 \text{ and } -7/12 = (-7 \times 3) / (12 \times 3) = -21/36$$

Now, the denominators are same we can add them directly

$$5/36 + -21/36 = (5 + (-21))/36 = 5-21/36 = -16/36 = -4/9$$

(vii) $-5/16$ and $7/24$

Solution: The denominators are 16 and 24

By taking LCM for 16 and 24 is 48

We rewrite the given fraction in order to get the same denominator -

$$5/16 = (-5 \times 3) / (16 \times 3) = -15/48 \text{ and}$$

$$7/24 = (7 \times 2) / (24 \times 2) = 14/48$$

Now, the denominators are same we can add them directly -

$$15/48 + 14/48 = (-15 + 14)/48 = -1/48$$

(viii) 7/-18 and 8/27

Solution: Firstly we need to convert the denominators to positive numbers.

$$7/-18 = (7 \times -1) / (-18 \times -1) = -7/18$$

The denominators are 18 and 27 By taking LCM for 18 and 27 is 54

We rewrite the given fraction in order to get the same denominator -

$$7/18 = (-7 \times 3) / (18 \times 3) = -21/54 \text{ and}$$

$$8/27 = (8 \times 2) / (27 \times 2) = 16/54$$

Since the denominators are same we can add them directly -

$$21/54 + 16/54 = (-21 + 16)/54 = -5/54$$

3.Simplify:

(i) 8/9 + -11/6

Solution: let us take the LCM for 9 and 6 which is 18

$$(8 \times 2) / (9 \times 2) + (-11 \times 3) / (6 \times 3) = 16/18 + -33/18$$

Since the denominators are same we can add them directly

$$(16-33)/18 = -17/18$$

(ii) 3 + 5/-7

Solution: Firstly convert the denominator to positive number

$$5/-7 = (5 \times -1) / (-7 \times -1) = -5/7 \quad 3/1 + -5/7$$

Now let us take the LCM for 1 and 7 which is 7 $(3 \times 7) / (1 \times 7) + (-5 \times 1) / (7 \times 1)$

$$21/7 + -5/7$$

Since the denominators are same we can add them directly $(21-5)/7 = 16/7$

(iii) 1/-12 + 2/-15

Solution: Firstly convert the denominator to positive number

$$1/-12 = (1 \times -1) / (-12 \times -1) = -1/12 \quad 2/-15 = (2 \times -1) / (-15 \times -1) = -2/15$$

$$-1/12 + -2/15$$

Now let us take the LCM for 12 and 15 which is 60 (-

$$1 \times 5)/(12 \times 5) + (-2 \times 4)/(15 \times 4)$$

$$-5/60 + -8/60$$

Since the denominators are same we can add them directly

$$(-5-8)/60 = -13/60$$

(iv) $-8/19 + -4/57$

Solution: let us take the LCM for 19 and 57 which is 57

$$(-8 \times 3)/(19 \times 3) + (-4 \times 1)/(57 \times 1) -24/57 + -4/57$$

Since the denominators are same we can add them directly

$$(-24-4)/57 = -28/57$$

(v) $7/9 + 3/-4$

Solution: Firstly convert the denominator to positive number

$$3/-4 = (3 \times -1)/(-4 \times -1) = -3/4 \quad 7/9 + -3/4$$

Now let us take the LCM for 9 and 4 which is 36

$$(7 \times 4)/(9 \times 4) + (-3 \times 9)/(4 \times 9)$$

$$28/36 + -27/36$$

Since the denominators are same we can add them directly

$$(28-27)/36 = 1/36$$

(vi) $5/26 + 11/-39$

Solution: Firstly convert the denominator to positive number

$$11/-39 = (11 \times -1)/(-39 \times -1) = -11/39 \quad 5/26 + -11/39$$

Now let us take the LCM for 26 and 39 which is 78

$$(5 \times 3)/(26 \times 3) + (-11 \times 2)/(39 \times 2)$$

$$15/78 + -22/78$$

Since the denominators are same we can add them directly

$$(15-22)/78 = -7/78$$

(vii) $-16/9 + -5/12$

Solution: let us take the LCM for 9 and 12 which is 108

$$(-16 \times 12)/(9 \times 12) + (-5 \times 9)/(12 \times 9) -192/108 + -45/108$$

Since the denominators are same we can add them directly

$$(-192-45)/108 = -237/108$$

Further divide the fraction by 3 we get, $-237/108 = -79/36$

(viii) $-13/8 + 5/36$

Solution: let us take the LCM for 8 and 36 which is 72 (-

$$13 \times 9)/(8 \times 9) + (5 \times 2)/(36 \times 2)$$

$$-117/72 + 10/72$$

Since the denominators are same we can add them directly (-

$$117+10)/72 = -107/72$$

(ix) $0 + -3/5$

Solution: We know that anything added to 0 results in the same.

$$0 + -3/5 = -3/5$$

(x) $1 + -4/5$

Solution: let us take the LCM for 1 and 5 which is 5

$$(1 \times 5)/(1 \times 5) + (-4 \times 1)/(5 \times 1)$$

$$5/5 + -4/5$$

Since the denominators are same we can add them directly

$$(5-4)/5 = 1/5$$

4. Add and express the sum as a mixed fraction:

(i) $-12/5$ and $43/10$

Solution: let us add the given fraction

$$-12/5 + 43/10$$

let us take the LCM for 5 and 10 which is 10 (-

$$12 \times 2)/(5 \times 2) + (43 \times 1)/(10 \times 1)$$

$$-24/10 + 43/10$$

Since the denominators are same we can add them directly (-

$$24+43)/10 = 19/10$$

19/10 can be written as $1 \frac{9}{10}$ in mixed fraction.

(ii) $24/7$ and $-11/4$

Solution: let us add the given fraction

$$24/7 + -11/4$$

let us take the LCM for 7 and 4 which is 28

$$(24 \times 4)/(7 \times 4) + (-11 \times 7)/(4 \times 7)$$

$$96/28 + -77/28$$

Since the denominators are same we can add them directly $(96-77)/28 = 19/28$

(iii) $-31/6$ and $-27/8$

Solution: let us add the given fraction

$$-31/6 + -27/8$$

let us take the LCM for 6 and 8 which is 24 $(-31 \times 4)/(6 \times 4) + (-27 \times 3)/(8 \times 3)$

$$-124/24 + -81/24$$

Since the denominators are same we can add them directly $(-124-81)/24 = -205/24$

$-205/24$ can be written as $-8 \frac{13}{24}$ in mixed fraction.

(iv) $101/6$ and $7/8$

Solution: let us add the given fraction

$$101/6 + 7/8$$

let us take the LCM for 6 and 8 which is 24 $(101 \times 4)/(6 \times 4) + (7 \times 3)/(8 \times 3)$

$$404/24 + 21/24$$

Since the denominators are same we can add them directly $(404+21)/24 = 425/24$

$425/24$ can be written as $17 \frac{17}{24}$ in mixed fraction.

EXERCISE 1.2**PAGE NO: 1.14****1. Verify commutativity of addition of rational numbers for each of the following pairs of rational numbers:****(i) $-11/5$ and $4/7$** **Solution:** By using the commutativity law, the addition of rational numbers is commutative $\therefore a/b + c/d = c/d + a/b$ In order to verify the above property let us consider the given fraction -
 $11/5$ and $4/7$ as

$$-11/5 + 4/7 \text{ and } 4/7 + -11/5$$

The denominators are 5 and 7

By taking LCM for 5 and 7 is 35

We rewrite the given fraction in order to get the same denominator

$$\text{Now, } -11/5 = (-11 \times 7) / (5 \times 7) = -77/35$$

$$4/7 = (4 \times 5) / (7 \times 5) = 20/35$$

Since the denominators are same we can add them directly -

$$77/35 + 20/35 = (-77+20)/35 = -57/35$$

$$4/7 + -11/5$$

The denominators are 7 and 5 By taking LCM for 7 and 5 is 35

We rewrite the given fraction in order to get the same denominator

$$\text{Now, } 4/7 = (4 \times 5) / (7 \times 5) = 20/35$$

$$-11/5 = (-11 \times 7) / (5 \times 7) = -77/35$$

Since the denominators are same we can add them directly

$$20/35 + -77/35 = (20 + (-77))/35 = (20-77)/35 = -57/35$$

 $\therefore -11/5 + 4/7 = 4/7 + -11/5$ is satisfied.**(ii) $4/9$ and $7/-12$** **Solution:** Firstly we need to convert the denominators to positive numbers.

$$7/-12 = (7 \times -1) / (-12 \times -1) = -7/12$$

By using the commutativity law, the addition of rational numbers is commutative.

$$\therefore a/b + c/d = c/d + a/b$$

In order to verify the above property let us consider the given fraction

 $4/9$ and $-7/12$ as

$$4/9 + -7/12 \text{ and } -7/12 + 4/9$$

The denominators are 9 and 12

By taking LCM for 9 and 12 is 36

We rewrite the given fraction in order to get the same denominator

$$\text{Now, } 4/9 = (4 \times 4) / (9 \times 4) = 16/36$$

$$-7/12 = (-7 \times 3) / (12 \times 3) = -21/36$$

Since the denominators are same we can add them directly

$$16/36 + (-21)/36 = (16 + (-21))/36 = (16-21)/36 = -5/36$$

$$-7/12 + 4/9$$

The denominators are 12 and 9 By taking LCM for 12 and 9 is 36

We rewrite the given fraction in order to get the same denominator

$$\text{Now, } -7/12 = (-7 \times 3) / (12 \times 3) = -21/36$$

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

Since the denominators are same we can add them directly

$$-21/36 + 16/36 = (-21 + 16)/36 = -5/36$$

$\therefore 4/9 + -7/12 = -7/12 + 4/9$ is satisfied.

(iii) **-3/5 and -2/-15 Solution:**

By using the commutativity law, the addition of rational numbers is commutative.

$$\therefore a/b + c/d = c/d + a/b$$

In order to verify the above property let us consider the given fraction

$-3/5$ and $-2/-15$ as

$$-3/5 + -2/-15 \text{ and } -2/-15 + -3/5 \quad -2/-15 = 2/15$$

The denominators are 5 and 15

By taking LCM for 5 and 15 is 15

We rewrite the given fraction in order to get the same denominator

$$\text{Now, } -3/5 = (-3 \times 3) / (5 \times 3) = -9/15$$

$$2/15 = (2 \times 1) / (15 \times 1) = 2/15$$

Since the denominators are same we can add them directly

$$-9/15 + 2/15 = (-9 + 2)/15 = -7/15$$

$$-2/-15 + -3/5 \quad -2/-15 = 2/15$$

The denominators are 15 and 5 By taking LCM for 15 and 5 is 15

We rewrite the given fraction in order to get the same denominator

$$\text{Now, } 2/15 = (2 \times 1) / (15 \times 1) = 2/15 \quad -3/5 = (-3 \times 3) / (5 \times 3) = -9/15$$

Since the denominators are same we can add them directly

$$2/15 + -9/15 = (2 + (-9))/15 = (2-9)/15 = -7/15$$

$\therefore -3/5 + -2/15 = -2/15 + -3/5$ is satisfied.

(iv) 2/-7 and 12/-35

Solution: Firstly we need to convert the denominators to positive numbers.

$$2/-7 = (2 \times -1) / (-7 \times -1) = -2/7 \quad 12/-35 = (12 \times -1) / (-35 \times -1) = -12/35$$

By using the commutativity law, the addition of rational numbers is commutative.

$$\therefore a/b + c/d = c/d + a/b$$

In order to verify the above property let us consider the given fraction -

2/7 and -12/35 as

$$-2/7 + -12/35 \text{ and } -12/35 + -2/7$$

The denominators are 7 and 35

By taking LCM for 7 and 35 is 35

We rewrite the given fraction in order to get the same denominator

$$\text{Now, } -2/7 = (-2 \times 5) / (7 \times 5) = -10/35$$

$$-12/35 = (-12 \times 1) / (35 \times 1) = -12/35$$

Since the denominators are same we can add them directly $-10/35 +$

$$(-12)/35 = (-10 + (-12))/35 = (-10-12)/35 = -22/35$$

$$-12/35 + -2/7$$

The denominators are 35 and 7 By taking LCM for 35 and 7 is 35

We rewrite the given fraction in order to get the same denominator

$$\text{Now, } -12/35 = (-12 \times 1) / (35 \times 1) = -12/35$$

$$-2/7 = (-2 \times 5) / (7 \times 5) = -10/35$$

Since the denominators are same we can add them directly $-12/35 + -$

$$10/35 = (-12 + (-10))/35 = (-12-10)/35 = -22/35$$

$\therefore -2/7 + -12/35 = -12/35 + -2/7$ is satisfied.

(v) 4 and -3/5

Solution: By using the commutativity law, the addition of rational numbers is commutative.

$$\therefore a/b + c/d = c/d + a/b$$

In order to verify the above property let us consider the given fraction

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

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

The denominators are 1 and 5

By taking LCM for 1 and 5 is 5

We rewrite the given fraction in order to get the same denominator

Now, $\frac{4}{1} = \frac{(4 \times 5)}{(1 \times 5)} = \frac{20}{5}$

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

Since the denominators are same we can add them directly

$\frac{20}{5} + -\frac{3}{5} = \frac{(20 + (-3))}{5} = \frac{(20-3)}{5} = \frac{17}{5}$

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

The denominators are 5 and 1 By taking LCM for 5 and 1 is 5

We rewrite the given fraction in order to get the same denominator

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

$\frac{4}{1} = \frac{(4 \times 5)}{(1 \times 5)} = \frac{20}{5}$

Since the denominators are same we can add them directly

$-\frac{3}{5} + \frac{20}{5} = \frac{(-3 + 20)}{5} = \frac{17}{5}$

$\therefore \frac{4}{1} + -\frac{3}{5} = -\frac{3}{5} + \frac{4}{1}$ is satisfied.

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

Solution: Firstly we need to convert the denominators to positive numbers.

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

By using the commutativity law, the addition of rational numbers is commutative.

$\therefore \frac{a}{b} + \frac{c}{d} = \frac{c}{d} + \frac{a}{b}$

In order to verify the above property let us consider the given fraction -

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

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

The denominators are 1 and 7

By taking LCM for 1 and 7 is 7

We rewrite the given fraction in order to get the same denominator

Now, $-\frac{4}{1} = \frac{(-4 \times 7)}{(1 \times 7)} = -\frac{28}{7}$

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

Since the denominators are same we can add them directly

$-\frac{28}{7} + -\frac{4}{7} = \frac{(-28 + (-4))}{7} = \frac{(-28-4)}{7} = -\frac{32}{7}$

$$-4/7 + -4/1$$

The denominators are 7 and 1 By taking LCM for 7 and 1 is 7

We rewrite the given fraction in order to get the same denominator

$$\text{Now, } -4/7 = (-4 \times 1) / (7 \times 1) = -4/7$$

$$-4/1 = (-4 \times 7) / (1 \times 7) = -28/7$$

Since the denominators are same we can add them directly -

$$4/7 + -28/7 = (-4 + (-28))/7 = (-4-28)/7 = -32/7$$

$\therefore -4/1 + -4/7 = -4/7 + -4/1$ is satisfied.

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

(i) $x = 1/2, y = 2/3, z = -1/5$

Solution: As the property states $(x + y) + z = x + (y + z)$ Use the values as such,

$$(1/2 + 2/3) + (-1/5) = 1/2 + (2/3 + (-1/5))$$

Let us consider LHS $(1/2 + 2/3) + (-1/5)$

Taking LCM for 2 and 3 is 6

$$(1 \times 3)/(2 \times 3) + (2 \times 2)/(3 \times 2)$$

$$3/6 + 4/6$$

Since the denominators are same we can add them directly, $3/6 + 4/6 = 7/6$

$$7/6 + (-1/5)$$

Taking LCM for 6 and 5 is 30

$$(7 \times 5)/(6 \times 5) + (-1 \times 6)/(5 \times 6)$$

$$35/30 + (-6)/30$$

Since the denominators are same we can add them directly,

$$(35+(-6))/30 = (35-6)/30 = 29/30$$

Let us consider RHS $1/2 + (2/3 + (-1/5))$

Taking LCM for 3 and 5 is 15

$$(2/3 + (-1/5)) = (2 \times 5)/(3 \times 5) + (-1 \times 3)/(5 \times 3)$$

$$= 10/15 + (-3)/15$$

Since the denominators are same we can add them directly,

$$10/15 + (-3)/15 = (10-3)/15 = 7/15$$

$$1/2 + 7/15$$

Taking LCM for 2 and 15 is 30

$$1/2 + 7/15 = (1 \times 15)/(2 \times 15) + (7 \times 2)/(15 \times 2)$$

$$= 15/30 + 14/30$$

Since the denominators are same we can add them directly, =

$$(15 + 14)/30 = 29/30$$

∴ LHS = RHS associativity of addition of rational numbers is verified.

(ii) $x = -2/5, y = 4/3, z = -7/10$

Solution: As the property states $(x + y) + z = x + (y + z)$

Use the values as such,

$$(-2/5 + 4/3) + (-7/10) = -2/5 + (4/3 + (-7/10))$$

Let us consider LHS $(-2/5 + 4/3) + (-7/10)$

Taking LCM for 5 and 3 is 15

$$(-2 \times 3)/(5 \times 3) + (4 \times 5)/(3 \times 5)$$

$$-6/15 + 20/15$$

Since the denominators are same we can add them directly,

$$-6/15 + 20/15 = (-6+20)/15 = 14/15$$

$$14/15 + (-7/10)$$

Taking LCM for 15 and 10 is 30

$$(14 \times 2)/(15 \times 2) + (-7 \times 3)/(10 \times 3) = 28/30 + (-21)/30$$

Since the denominators are same we can add them directly,

$$(28+(-21))/30 = (28-21)/30 = 7/30$$

Let us consider RHS $-2/5 + (4/3 + (-7/10))$

Taking LCM for 3 and 10 is 30

$$(4/3 + (-7/10)) = (4 \times 10)/(3 \times 10) + (-7 \times 3)/(10 \times 3) = 40/30 + (-21)/30$$

Since the denominators are same we can add them directly,

$$40/30 + (-21)/30 = (40-21)/30 = 19/30$$

$$-2/5 + 19/30$$

Taking LCM for 5 and 30 is 30

$$-2/5 + 19/30 = (-2 \times 6)/(5 \times 6) + (19 \times 1)/(30 \times 1) = -12/30 + 19/30$$

Since the denominators are same we can add them directly, =

$$(-12 + 19)/30 = 7/30$$

∴ LHS = RHS associativity of addition of rational numbers is verified.

(iii) $x = -7/11, y = 2/-5, z = -3/22$

Solution: Firstly convert the denominators to positive numbers

$$2/-5 = (2 \times -1) / (-5 \times -1) = -2/5$$

As the property states **$(x + y) + z = x + (y + z)$** Use the values as such,

$$(-7/11 + -2/5) + (-3/22) = -7/11 + (-2/5 + (-3/22))$$

Let us consider LHS $(-7/11 + -2/5) + (-3/22)$

Taking LCM for 11 and 5 is 55 (-

$$7 \times 5) / (11 \times 5) + (-2 \times 11) / (5 \times 11) = -35/55 + -22/55$$

Since the denominators are same we can add them directly, -

$$-35/55 + -22/55 = (-35-22)/55 = -57/55$$

$$-57/55 + (-3/22)$$

Taking LCM for 55 and 22 is 110

$$(-57 \times 2) / (55 \times 2) + (-3 \times 5) / (22 \times 5) =$$

$$-114/110 + (-15)/110$$

Since the denominators are same we can add them directly, (-

$$114 + (-15)) / 110 = (-114-15) / 110 = -129/110$$

Let us consider RHS $-7/11 + (-2/5 + (-3/22))$

Taking LCM for 5 and 22 is 110

$$(-2/5 + (-3/22)) = (-2 \times 22) / (5 \times 22) + (-3 \times 5) / (22 \times 5) =$$

$$-44/110 + (-15)/110$$

Since the denominators are same we can add them directly, -

$$-44/110 + (-15)/110 = (-44-15) / 110 = -59/110$$

$$-7/11 + -59/110$$

Taking LCM for 11 and 110 is 110

$$-7/11 + -59/110 = (-7 \times 10) / (11 \times 10) + (-59 \times 1) / (110 \times 1) =$$

$$-70/110 + -59/110$$

Since the denominators are same we can add them directly, =

$$(-70 - 59) / 110 = -129/110$$

\therefore LHS = RHS associativity of addition of rational numbers is verified.

(iv) $x = -2$, $y = 3/5$, $z = -4/3$

Solution: As the property states **$(x + y) + z = x + (y + z)$**

Use the values as such,

$$(-2/1 + 3/5) + (-4/3) = -2/1 + (3/5 + (-4/3))$$

Let us consider LHS $(-2/1 + 3/5) + (-4/3)$

$$\text{Taking LCM for 1 and 5 is 5 } (-2 \times 5) / (1 \times 5) + (3 \times 1) / (5 \times 1)$$

$$-10/5 + 3/5$$

Since the denominators are same we can add them directly, -

$$10/5 + 3/5 = (-10+3)/5 = -7/5$$

$$-7/5 + (-4/3)$$

Taking LCM for 5 and 3 is 15

$$(-7 \times 3)/(5 \times 3) + (-4 \times 5)/(3 \times 5) = -21/15 + (-20)/15$$

Since the denominators are same we can add them directly, (-

$$21+(-20))/15 = (-21-20)/15 = -41/15$$

Let us consider RHS $-2/1 + (3/5 + (-4/3))$

Taking LCM for 5 and 3 is 15

$$(3/5 + (-4/3)) = (3 \times 3)/(5 \times 3) + (-4 \times 5)/(3 \times 5) \\ = 9/15 + (-20)/15$$

Since the denominators are same we can add them directly,

$$9/15 + (-20)/15 = (9-20)/15 = -11/15$$

$$-2/1 + -11/15$$

Taking LCM for 1 and 15 is 15

$$-2/1 + -11/15 = (-2 \times 15)/(1 \times 15) + (-11 \times 1)/(15 \times 1) = -30/15 + -11/15$$

Since the denominators are same we can add them directly, =

$$(-30 - 11)/15 = -41/15$$

\therefore LHS = RHS associativity of addition of rational numbers is verified.

3. Write the additive of each of the following rational numbers:

(i) $-2/17$

(ii) $3/-11$

(iii) $-17/5$

(iv) $-11/-25$ Solution:

(i) The additive inverse of $-2/17$ is $2/17$

(ii) The additive inverse of $3/-11$ is $3/11$

(iii) The additive inverse of $-17/5$ is $17/5$

(iv) The additive inverse of $-11/-25$ is $-11/25$

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

(i) $-2/5$

(ii) $7/-9$

(iii) $-16/13$

(iv) $-5/1$

(v) 0

(vi) 1 **Solution:**

(i) The negative (additive) inverse of $-2/5$ is $2/5$

(ii) The negative (additive) inverse of $7/-9$ is $7/9$

(iii) The negative (additive) inverse of $-16/13$ is $16/13$

(iv) The negative (additive) inverse of $-5/1$ is 5

(v) The negative (additive) inverse of 0 is 0

(vi) The negative (additive) inverse of 1 is -1

(vii) The negative (additive) inverse of -1 is 1

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

(i) $2/5 + 7/3 + -4/5 + -1/3$

Solution: Firstly group the rational numbers with same denominators

$$2/5 + -4/5 + 7/3 + -1/3$$

Now the denominators which are same can be added directly.

$$(2+(-4))/5 + (7+(-1))/3$$

$$(2-4)/5 + (7-1)/3$$

$$-2/5 + 6/3$$

By taking LCM for 5 and 3 we get, 15 $(-2 \times 3)/(5 \times 3) + (6 \times 5)/(3 \times 5)$

$$-6/15 + 30/15$$

Since the denominators are same can be added directly $(-6+30)/15 = 24/15$

Further can be divided by 3 we get,

$$24/15 = 8/5$$

(ii) $3/7 + -4/9 + -11/7 + 7/9$

Solution: Firstly group the rational numbers with same denominators

$$3/7 + -11/7 + -4/9 + 7/9$$

Now the denominators which are same can be added directly. $(3+ (-11))/7 + (-4+ 7)/9$

$$(3-11)/7 + (-4+7)/9$$

$$-8/7 + 3/9$$

$$-8/7 + 1/3$$

By taking LCM for 7 and 3 we get, 21

$$(-8 \times 3)/(7 \times 3) + (1 \times 7)/(3 \times 7)$$

$$-24/21 + 7/21$$

Since the denominators are same can be added directly (-
 $24+7)/21 = -17/21$

(iii) $2/5 + 8/3 + -11/15 + 4/5 + -2/3$

Solution: Firstly group the rational numbers with same denominators

$$2/5 + 4/5 + 8/3 + -2/3 + -11/15$$

Now the denominators which are same can be added directly. (2
 $+ 4)/5 + (8 + (-2))/3 + -11/15$

$$6/5 + (8-2)/3 + -11/15$$

$$6/5 + 6/3 + -11/15$$

$$6/5 + 2/1 + -11/15$$

By taking LCM for 5, 1 and 15 we get, 15

$$(6 \times 3)/(5 \times 3) + (2 \times 15)/(1 \times 15) + (-11 \times 1)/(15 \times 1)$$

$$18/15 + 30/15 + -11/15$$

Since the denominators are same can be added directly

$$(18+30+ (-11))/15 = (18+30-11)/15 = 37/15$$

(iv) $4/7 + 0 + -8/9 + -13/7 + 17/21$

Solution: Firstly group the rational numbers with same denominators

$$4/7 + -13/7 + -8/9 + 17/21$$

Now the denominators which are same can be added directly. (4
 $+ (-13))/7 + -8/9 + 17/21$

$$(4-13)/7 + -8/9 + 17/21$$

$$-9/7 + -8/9 + 17/21$$

By taking LCM for 7, 9 and 21 we get, 63

$$(-9 \times 9)/(7 \times 9) + (-8 \times 7)/(9 \times 7) + (17 \times 3)/(21 \times 3)$$

$$-81/63 + -56/63 + 51/63$$

Since the denominators are same can be added directly (-

$$81+(-56)+ 51)/63 = (-81-56+51)/63 = -86/63$$

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

(i) $11/12 + -17/3 + 11/2 + -25/2$

Solution: Firstly group the rational numbers with same denominators

$$11/12 + -17/3 + (11-25)/2 \quad 11/12 + -17/3 + -14/2$$

By taking LCM for 12, 3 and 2 we get, 12 ($11 \times 1)/$

$$(12 \times 1) + (-17 \times 4)/(3 \times 4) + (-14 \times 6)/(2 \times 6) \quad 11/12 + -68/12 + -84/12$$

Since the denominators are same can be added directly

$$(11-68-84)/12 = -141/12$$

(ii) $-6/7 + -5/6 + -4/9 + -15/7$

Solution: Firstly group the rational numbers with same denominators

$$-6/7 + -15/7 + -5/6 + -4/9 (-$$

$$6-15)/7 + -5/6 + -4/9 -21/7$$

$$+ -5/6 + -4/9$$

$$-3/1 + -5/6 + -4/9$$

By taking LCM for 1, 6 and 9 we get, 18 (-

$$3 \times 18)/(1 \times 18) + (-5 \times 3)/(6 \times 3) + (-4 \times 2)/(9 \times 2) -54/18 + -15/18 + -8/18$$

Since the denominators are same can be added directly (-

$$54-15-8)/18 = -77/18$$

(iii) $3/5 + 7/3 + 9/5 + -13/15 + -7/3$

Solution: Firstly group the rational numbers with same denominators

$$3/5 + 9/5 + 7/3 + -7/3 + -13/15$$

$$(3+9)/5 + -13/15 12/5 + -13/15$$

By taking LCM for 5 and 15 we get, 15

$$(12 \times 3)/(5 \times 3) + (-13 \times 1)/(15 \times 1)$$

$$36/15 + -13/15$$

Since the denominators are same can be added directly

$$(36-13)/15 = 23/15$$

(iv) $4/13 + -5/8 + -8/13 + 9/13$

Solution: Firstly group the rational numbers with same denominators

$$4/13 + -8/13 + 9/13 + -5/8 (4-8+9)/13 + -5/8$$

$$5/13 + -5/8$$

By taking LCM for 13 and 8 we get, 104

$$(5 \times 8)/(13 \times 8) + (-5 \times 13)/(8 \times 13)$$

$$40/104 + -65/104$$

Since the denominators are same can be added directly

$$(40-65)/104 = -25/104$$

(v) $2/3 + -4/5 + 1/3 + 2/5$

Solution: Firstly group the rational numbers with same denominators

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

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

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

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

By taking LCM for 1 and 5 we get, 5

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

Since the denominators are same can be added directly $\frac{(5-2)}{5} = \frac{3}{5}$

(vi) $\frac{1}{8} + \frac{5}{12} + \frac{2}{7} + \frac{7}{12} + \frac{9}{7} + \frac{-5}{16}$

Solution: Firstly group the rational numbers with same denominators

$$\frac{1}{8} + \frac{5}{12} + \frac{7}{12} + \frac{2}{7} + \frac{9}{7} + \frac{-5}{16}$$

$$\frac{1}{8} + \frac{(5+7)}{12} + \frac{(2+9)}{7} + \frac{-5}{16}$$

$$\frac{1}{8} + \frac{12}{12} + \frac{11}{7} + \frac{-5}{16}$$

$$\frac{1}{8} + \frac{1}{1} + \frac{11}{7} + \frac{-5}{16}$$

By taking LCM for 8, 1, 7 and 16 we get, 112

$$\frac{(1 \times 14)}{(8 \times 14)} + \frac{(1 \times 112)}{(1 \times 112)} + \frac{(11 \times 16)}{(7 \times 16)} + \frac{(-5 \times 7)}{(16 \times 7)}$$

$$\frac{14}{112} + \frac{112}{112} + \frac{176}{112} + \frac{-35}{112}$$

Since the denominators are same can be added directly

$$\frac{(14+112+176-35)}{112} = \frac{267}{112}$$

EXERCISE 1.3**PAGE NO: 1.18****1. Subtract the first rational number from the second in each of the following:****(i) $3/8$, $5/8$** **(ii) $-7/9$, $4/9$** **(iii) $-2/11$, $-9/11$** **(iv) $11/13$, $-4/13$** **(v) $1/4$, $-3/8$** **(vi) $-2/3$, $5/6$** **(vii) $-6/7$, $-13/14$** **(viii) $-8/33$, $-7/22$ Solution:****(i)** let us subtract

$$5/8 - 3/8$$

Since the denominators are same we can subtract directly $(5-3)/8 = 2/8$

Further we can divide by 2 we get,

$$2/8 = 1/4$$

(ii) let us subtract $4/9 - -7/9$ Since the denominators are same we can subtract directly $(4+7)/9 = 11/9$ **(iii)** let us subtract $-9/11 - -2/11$ Since the denominators are same we can subtract directly $(-9+2)/11 = -7/11$ **(iv)** let us subtract $-4/13 - 11/13$

Since the denominators are same we can subtract directly

$$(-4-11)/13 = -15/13$$

(v) let us subtract $-3/8 - 1/4$

By taking LCM for 8 and 4 which is 8

$$-3/8 - 1/4 = (-3 \times 1)/(8 \times 1) - (1 \times 2)/(4 \times 2) = -3/8 - 2/8$$

Since the denominators are same we can subtract directly

$$(-3-2)/8 = -5/8$$

(vi) let us subtract $5/6 - -2/3$

By taking LCM for 6 and 3 which is 6

$$5/6 - -2/3 = (5 \times 1)/(6 \times 1) - (-2 \times 2)/(3 \times 2) = 5/6 - -4/6$$

Since the denominators are same we can subtract directly $(5+4)/6 = 9/6$

Further we can divide by 3 we get,

$$9/6 = 3/2$$

(vii) let us subtract $-13/14 - -6/7$

By taking LCM for 14 and 7 which is 14

$$-13/14 - -6/7 = (-13 \times 1)/(14 \times 1) - (-6 \times 2)/(7 \times 2) = -13/14 - -12/14$$

Since the denominators are same we can subtract directly $(-13+12)/14 = -1/14$

(viii) let us subtract $-7/22 - -8/33$

By taking LCM for 22 and 33 which is 66

$$-7/22 - -8/33 = (-7 \times 3)/(22 \times 3) - (-8 \times 2)/(33 \times 2) = -21/66 - -16/66$$

Since the denominators are same we can subtract directly $(-21+16)/66 = -5/66$

2. Evaluate each of the following:

(i) $2/3 - 3/5$

Solution: By taking LCM for 3 and 5 which is 15

$$2/3 - 3/5 = (2 \times 5 - 3 \times 3)/15 = 1/15$$

(ii) $-4/7 - 2/-3$

Solution: convert the denominator to positive number by multiplying by -1

$$2/-3 = -2/3 \quad -4/7 - -2/3$$

$$\begin{aligned} \text{By taking LCM for 7 and 3 which is 21} \quad -4/7 - -2/3 &= (-4 \times 3 - -2 \times 7)/21 \\ &= (-12+14)/21 \\ &= 2/21 \end{aligned}$$

(iii) $4/7 - -5/-7$ **Solution:** convert the denominator to positive number by multiplying by -1

$$-5/-7 = 5/7 \quad 4/7 - 5/7$$

Since the denominators are same we can subtract directly

$$(4-5)/7 = -1/7$$

(iv) $-2 - 5/9$ **Solution:** By taking LCM for 1 and 9 which is 9

$$-2/1 - 5/9 = (-2 \times 9 - 5 \times 1)/9 =$$

$$(-18 - 5)/9$$

$$= -23/9$$

(v) $-3/-8 - -2/7$ **Solution:** convert the denominator to positive number by multiplying by -1

$$-3/-8 = 3/8 \quad 3/8 - -2/7$$

By taking LCM for 8 and 7 which is 56

$$3/8 - -2/7 = (3 \times 7 - -2 \times 8)/56 =$$

$$(21 + 16)/56$$

$$= 37/56$$

(vi) $-4/13 - -5/26$ **Solution:** By taking LCM for 13 and 26 which is 26

$$-4/13 - -5/26 = (-4 \times 2 - -5 \times 1)/26 =$$

$$(-8 + 5)/26$$

$$= -3/26$$

(vii) $-5/14 - -2/7$ **Solution:** By taking LCM for 14 and 7 which is 14

$$-5/14 - -2/7 = (-5 \times 1 - -2 \times 2)/14$$

$$= (-5 + 4)/14 = -1/14$$

(viii) $13/15 - 12/25$ **Solution:** By taking LCM for 15 and 25 which is 75

$$13/15 - 12/25 = (13 \times 5 - 12 \times 3)/75 =$$

$$(65 - 36)/75$$

$$= 29/75$$

(ix) $-\frac{6}{13} - -\frac{7}{13}$

Solution: Since the denominators are same we can subtract directly

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

(x) $\frac{7}{24} - \frac{19}{36}$

Solution: By taking LCM for 24 and 36 which is 72

$$\begin{aligned}\frac{7}{24} - \frac{19}{36} &= \frac{7 \times 3 - 19 \times 2}{72} \\ &= \frac{21 - 38}{72} \\ &= -\frac{17}{72}\end{aligned}$$

(xi) $\frac{5}{63} - -\frac{8}{21}$

Solution: By taking LCM for 63 and 21 which is 63

$$\begin{aligned}\frac{5}{63} - -\frac{8}{21} &= \frac{5 \times 1 - -8 \times 3}{63} \\ &= \frac{5 + 24}{63} \\ &= \frac{29}{63}\end{aligned}$$

3. The sum of the two numbers is $\frac{5}{9}$. If one of the numbers is $\frac{1}{3}$, find the other.

Solution: Let us note down the given details

$$\text{Sum of two numbers} = \frac{5}{9}$$

$$\text{One of the number} = \frac{1}{3}$$

By using the formula,

$$\begin{aligned}\text{Other number} &= \text{sum of number} - \text{given number} \\ &= \frac{5}{9} - \frac{1}{3}\end{aligned}$$

$$\begin{aligned}\text{By taking LCM for 9 and 3 which is 9} \quad \frac{5}{9} - \frac{1}{3} &= \frac{5 \times 1 - 1 \times 3}{9} \\ &= \frac{5 - 3}{9} = \frac{2}{9}\end{aligned}$$

\therefore the other number is $\frac{2}{9}$

4. The sum of the two numbers is $-\frac{1}{3}$. If one of the numbers is $-\frac{12}{3}$, find the other.

Solution: Let us note down the given details

$$\text{Sum of two numbers} = -\frac{1}{3}$$

$$\text{One of the number} = -\frac{12}{3}$$

By using the formula,

$$\begin{aligned}\text{Other number} &= \text{sum of number} - \text{given number} \\ &= -\frac{1}{3} - -\frac{12}{3}\end{aligned}$$

$$\text{Since the denominators are same we can subtract directly} = \frac{-1+12}{3} = \frac{11}{3}$$

\therefore the other number is $11/3$

5. The sum of the two numbers is $-4/3$. If one of the numbers is -5 , find the other.

Solution: Let us note down the given details

Sum of two numbers = $-4/3$

One of the number = -5

By using the formula,

Other number = sum of number – given number
 $= -4/3 - 5$

By taking LCM for 3 and 1 which is 3 $-4/3 - 5 = (-4 \times 1 - 5 \times 3)/3$
 $= (-4 - 15)/3 = -19/3$

\therefore the other number is $-19/3$

6. The sum of the two rational numbers is -8 . If one of the numbers is $-15/7$, find the other.

Solution: Let us note down the given details

Sum of two rational numbers = -8

One of the number = $-15/7$

Let us consider the other number as x

$$x + -15/7 = -8$$

$$(7x - 15)/7 = -8$$

$$7x - 15 = -8 \times 7$$

$$7x - 15 = -56$$

$$7x = -56 + 15$$

$$x = -41/7$$

\therefore the other number is $-41/7$

7. What should be added to $-7/8$ so as to get $5/9$?

Solution: Let us consider a number as x to be added to $-7/8$ to get $5/9$

$$\text{So, } -7/8 + x = 5/9$$

$$(-7 + 8x)/8 = 5/9$$

$$(-7 + 8x) \times 9 = 5 \times 8$$

$$-63 + 72x = 40$$

$$72x = 40 + 63$$

$$x = 103/72$$

\therefore the required number is $103/72$

8. What number should be added to $-\frac{5}{11}$ so as to get $\frac{26}{33}$? Solution:

Let us consider a number as x to be added to $-\frac{5}{11}$ to get $\frac{26}{33}$ So, $-\frac{5}{11} +$

$$x = \frac{26}{33}$$

$$x = \frac{26}{33} + \frac{5}{11}$$

let us take LCM for 33 and 11 which is 33

$$x = \frac{(26 \times 1 + 5 \times 3)}{33}$$

$$= \frac{(26 + 15)}{33} = \frac{41}{33}$$

\therefore the required number is $\frac{41}{33}$

9. What number should be added to $-\frac{5}{7}$ to get $-\frac{2}{3}$?

Solution: Let us consider a number as x to be added to $-\frac{5}{7}$ to get $-\frac{2}{3}$

$$\text{So, } -\frac{5}{7} + x = -\frac{2}{3} \quad x = -\frac{2}{3} + \frac{5}{7}$$

let us take LCM for 3 and 7 which is 21 $x = \frac{(-2 \times 7 + 5 \times 3)}{21}$

$$= \frac{(-14 + 15)}{21} = \frac{1}{21}$$

\therefore the required number is $\frac{1}{21}$

10. What number should be subtracted from $-\frac{5}{3}$ to get $\frac{5}{6}$?

Solution: Let us consider a number as x to be subtracted from $-\frac{5}{3}$ to get $\frac{5}{6}$

$$\text{So, } -\frac{5}{3} - x = \frac{5}{6}$$

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

let us take LCM for 3 and 6 which is 6 $x = \frac{(-5 \times 2 - 5 \times 1)}{6}$

$$= \frac{(-10 - 5)}{6} = -\frac{15}{6}$$

Further we can divide by 3 we get, $-\frac{15}{6} = -\frac{5}{2}$

\therefore the required number is $-\frac{5}{2}$

11. What number should be subtracted from $\frac{3}{7}$ to get $\frac{5}{4}$?

Solution: Let us consider a number as x to be subtracted from $\frac{3}{7}$ to get $\frac{5}{4}$

$$\text{So, } \frac{3}{7} - x = \frac{5}{4} \quad x = \frac{3}{7} - \frac{5}{4}$$

let us take LCM for 7 and 4 which is 28 $x = \frac{(3 \times 4 - 5 \times 7)}{28}$

$$= \frac{(12 - 35)}{28}$$

$$= -23/28$$

∴ the required number is $-23/28$

12. What should be added to $(2/3 + 3/5)$ to get $-2/15$?

Solution: Let us consider a number as x to be added to $(2/3 + 3/5)$ to get $-2/15$

$$x + (2/3 + 3/5) = -2/15$$

By taking LCM of 3 and 5 which is 15 we get, $(15x + 2 \times 5 + 3 \times 3)15 = -2/15$

$$15x + 10 + 9 = -2$$

$$15x = -2 - 19$$

$$x = -21/15$$

Further we can divide by 3 we get,

$$-21/15 = -7/5$$

∴ the required number is $-7/5$

13. What should be added to $(1/2 + 1/3 + 1/5)$ to get 3?

Solution: Let us consider a number as x to be added to $(1/2 + 1/3 + 1/5)$ to get 3

$$x + (1/2 + 1/3 + 1/5) = 3$$

By taking LCM of 2, 3 and 5 which is 30 we get,

$$(30x + 1 \times 15 + 1 \times 10 + 1 \times 6)30 = 3$$

$$30x + 15 + 10 + 6 = 3 \times 30$$

$$30x + 31 = 90$$

$$30x = 90 - 31$$

$$x = 59/30$$

∴ the required number is $59/30$

14. What number should be subtracted from $(3/4 - 2/3)$ to get $-1/6$?

Solution: Let us consider a number as x to be subtracted from $(3/4 - 2/3)$ to get $-1/6$

$$\text{So, } (3/4 - 2/3) - x = -1/6 \quad x = 3/4 - 2/3 + 1/6$$

Let us take LCM for 4 and 3 which is 12 $x = (3 \times 3 - 2 \times 4)/12 + 1/6$

$$= (9 - 8)/12 + 1/6 = 1/12 + 1/6$$

Let us take LCM for 12 and 6 which is 12 =

$$(1 \times 1 + 1 \times 2)/12$$

$$= 3/12$$

Further we can divide by 3 we get,

$$3/12 = 1/4 \quad \therefore \text{the required number is } 1/4$$

15. Fill in the blanks:**(i) $-\frac{4}{13} - \frac{3}{26} = \dots$ Solution:**

$$-\frac{4}{13} - \frac{3}{26}$$

Let us take LCM for 13 and 26 which is 26

$$(-4 \times 2 + 3 \times 1)/26 = (-8+3)/26 = -5/26$$

(ii) $-\frac{9}{14} + \dots = -1$ Solution:

Let us consider the number to be added as x

$$-\frac{9}{14} + x = -1 \quad x = -1 + \frac{9}{14}$$

By taking LCM as 14 we get, x

$$= (-1 \times 14 + 9)/14$$

$$= (-14+9)/14$$

$$= -5/14$$

(iii) $-\frac{7}{9} + \dots = 3$ Solution:

Let us consider the number to be added as x

$$-\frac{7}{9} + x = 3 \quad x = 3 + \frac{7}{9}$$

By taking LCM as 9 we get, x

$$= (3 \times 9 + 7)/9$$

$$= (27 + 7)/9 = 34/9$$

(iv) $\dots + \frac{15}{23} = 4$ Solution:

Let us consider the number to be added as x

$$x + \frac{15}{23} = 4 \quad x = 4 - \frac{15}{23}$$

By taking LCM as 23 we get, x

$$= (4 \times 23 - 15)/23$$

$$= (92 - 15)/23 = 77/23$$

EXERCISE 1.4**PAGE NO: 1.22****1. Simplify each of the following and write as a rational number of the form p/q:****(i) $\frac{3}{4} + \frac{5}{6} + -\frac{7}{8}$ Solution:**

$$\frac{3}{4} + \frac{5}{6} - \frac{7}{8}$$

By taking LCM for 4, 6 and 8 which is 24

$$((3 \times 6) + (5 \times 4) - (7 \times 3))/24$$

$$(18 + 20 - 21)/24 = (38 - 21)/24$$

$$17/24$$

(ii) $\frac{2}{3} + -\frac{5}{6} + -\frac{7}{9}$ Solution:

$$\frac{2}{3} + -\frac{5}{6} + -\frac{7}{9}$$

By taking LCM for 3, 6 and 9 which is 18 $((2 \times 6) + (-5 \times 3) + (-7 \times 2))/18$

$$(12 - 15 - 14)/18$$

$$-17/18$$

(iii) $-\frac{11}{2} + \frac{7}{6} + -\frac{5}{8}$ Solution:

$$-\frac{11}{2} + \frac{7}{6} + -\frac{5}{8}$$

By taking LCM for 2, 6 and 8 which is 24

$$((-11 \times 12) + (7 \times 4) + (-5 \times 3))/24$$

$$(-132 + 28 - 15)/24$$

$$-119/24$$

(iv) $-\frac{4}{5} + -\frac{7}{10} + -\frac{8}{15}$ Solution:

$$-\frac{4}{5} + -\frac{7}{10} + -\frac{8}{15}$$

By taking LCM for 5, 10 and 15 which is 30

$$((-4 \times 6) + (-7 \times 3) + (-8 \times 2))/30 =$$

$$(-24 - 21 - 16)/30$$

$$-61/30$$

(v) $-\frac{9}{10} + \frac{22}{15} + \frac{13}{-20}$ Solution:

$$-\frac{9}{10} + \frac{22}{15} + \frac{13}{-20}$$

By taking LCM for 10, 15 and 20 which is 60

$$((-9 \times 6) + (22 \times 4) + (-13 \times 3))/60$$

$$(-54 + 88 - 39)/60$$

$$-5/60 = -1/12$$

(vi) $5/3 + 3/-2 + -7/3 + 3$ Solution:

$$5/3 + 3/-2 + -7/3 + 3$$

By taking LCM for 3, 2, 3 and 1 which is 6

$$((5 \times 2) + (-3 \times 3) + (-7 \times 2) + (3 \times 6))/6$$

$$(10 - 9 - 14 + 18)/6$$

$$5/6$$

2. Express each of the following as a rational number of the form p/q :

(i) $-8/3 + -1/4 + -11/6 + 3/8 - 3$ Solution:

$$-8/3 + -1/4 + -11/6 + 3/8 - 3$$

By taking LCM for 3, 4, 6, 8 and 1 which is 24

$$((-8 \times 8) + (-1 \times 6) + (-11 \times 4) + (3 \times 3) - (3 \times 24))/24$$

$$(-64 - 6 - 44 + 9 - 72)/24$$

$$-177/24$$

Further divide by 3 we get,

$$-177/24 = -59/8$$

(ii) $6/7 + 1 + -7/9 + 19/21 + -12/7$ Solution:

$$6/7 + 1 + -7/9 + 19/21 + -12/7$$

By taking LCM for 7, 1, 9, 21 and 7 which is 63

$$((6 \times 9) + (1 \times 63) + (-7 \times 7) + (19 \times 3) + (-12 \times 9))/63$$

$$(54 + 63 - 49 + 57 - 108)/63$$

$$17/63$$

(iii) $15/2 + 9/8 + -11/3 + 6 + -7/6$ Solution:

$$15/2 + 9/8 + -11/3 + 6 + -7/6$$

By taking LCM for 2, 8, 3, 1 and 6 which is 24

$$((15 \times 12) + (9 \times 3) + (-11 \times 8) + (6 \times 24) + (-7 \times 4))/24$$

$$(180 + 27 - 88 + 144 - 28)/24$$

$$235/24$$

(iv) $-7/4 + 0 + -9/5 + 19/10 + 11/14$ Solution:

$$-7/4 + 0 + -9/5 + 19/10 + 11/14$$

By taking LCM for 4, 5, 10 and 14 which is 140

$$((-7 \times 35) + (-9 \times 28) + (19 \times 14) + (11 \times 10))/140$$

$$(-245 - 252 + 266 + 110)/140 = -121/140$$

(v) $-7/4 + 5/3 + -1/2 + -5/6 + 2$ Solution:

$$-7/4 + 5/3 + -1/2 + -5/6 + 2$$

By taking LCM for 4, 3, 2, 6 and 1 which is 12

$$((-7 \times 3) + (5 \times 4) + (-1 \times 6) + (-5 \times 2) + (2 \times 12))/12$$

$$(-21 + 20 - 6 - 10 + 24)/12$$

$$7/12$$

3. Simplify:

(i) $-3/2 + 5/4 - 7/4$

Solution:

$$-3/2 + 5/4 - 7/4$$

By taking LCM for 2 and 4 which is 4

$$((-3 \times 2) + (5 \times 1) - (7 \times 1))/4$$

$$(-6 + 5 - 7)/4$$

$$-8/4$$

Further divide by 2 we get,

$$-8/2 = -2$$

(ii) $5/3 - 7/6 + -2/3$ Solution:

$$5/3 - 7/6 + -2/3$$

By taking LCM for 3 and 6 which is 6

$$((5 \times 2) - (7 \times 1) + (-2 \times 2))/6$$

$$(10 - 7 - 4)/6$$

$$-1/6$$

(iii) $5/4 - 7/6 - -2/3$ Solution:

$$5/4 - 7/6 - -2/3$$

By taking LCM for 4, 6 and 3 which is 12

$$\begin{aligned} & ((5 \times 3) - (7 \times 2) - (-2 \times 4)) / 12 \\ & (15 - 14 + 8) / 12 \\ & 9 / 12 \end{aligned}$$

Further can divide by 3 we get, $9/12 = 3/4$

(iv) $-2/5 - 3/10 - 4/7$ Solution:

$$-2/5 - 3/10 - 4/7$$

By taking LCM for 5, 10 and 7 which is 70

$$\begin{aligned} & ((-2 \times 14) - (-3 \times 7) - (-4 \times 10)) / 70 \\ & (-28 + 21 + 40) / 70 \\ & 33 / 70 \end{aligned}$$

(v) $5/6 + -2/5 - 2/15$ Solution:

$$5/6 + -2/5 - 2/15$$

By taking LCM for 6, 5 and 15 which is 30

$$\begin{aligned} & ((5 \times 5) + (-2 \times 6) - (-2 \times 2)) / 30 \\ & (25 - 12 + 4) / 30 \\ & 17 / 30 \end{aligned}$$

(vi) $3/8 - 2/9 + -5/36$ Solution:

$$3/8 - 2/9 + -5/36$$

By taking LCM for 8, 9 and 36 which is 72

$$\begin{aligned} & ((3 \times 9) - (-2 \times 8) + (-5 \times 2)) / 72 \\ & (27 + 16 - 10) / 72 \\ & 33 / 72 \end{aligned}$$

Further can divide by 3 we get,
 $33/72 = 11/24$

EXERCISE 1.5**PAGE NO: 1.25****1. Multiply:****(i) $7/11$ by $5/4$ Solution:** $7/11$ by $5/4$

$$(7/11) \times (5/4) = (7 \times 5)/(11 \times 4) \\ = 35/44$$

(ii) $5/7$ by $-3/4$ Solution: $5/7$ by $-3/4$

$$(5/7) \times (-3/4) = (5 \times -3)/(7 \times 4) = -15/28$$

(iii) $-2/9$ by $5/11$ Solution: $-2/9$ by $5/11$

$$(-2/9) \times (5/11) = (-2 \times 5)/(9 \times 11) \\ = -10/99$$

(iv) $-3/17$ by $-5/4$ Solution: $-3/17$ by $-5/4$

$$(-3/17) \times (-5/4) = (-3 \times -5)/(17 \times 4) = \\ 15/-68 \\ = -15/68$$

(v) $9/-7$ by $36/-11$ Solution: $9/-7$ by $36/-11$

$$(9/-7) \times (36/-11) = (9 \times 36)/(-7 \times -11) \\ = 324/77$$

(vi) $-11/13$ by $-21/7$ Solution: $-11/13$ by $-21/7$

$$(-11/13) \times (-21/7) = (-11 \times -21)/(13 \times 7) \\ = 231/91 = 33/13$$

(vii) $-3/5$ by $-4/7$ Solution:

$-3/5$ by $-4/7$

$$(-3/5) \times (-4/7) = (-3 \times -4)/(5 \times 7) = 12/35$$

(viii) $-15/11$ by 7 Solution:

$-15/11$ by 7

$$(-15/11) \times 7 = (-15 \times 7)/11 = -105/11$$

2. Multiply:

(i) $-5/17$ by $51/-60$ Solution:

$-5/17$ by $51/-60$

$$(-5/17) \times (51/-60) = (-5 \times 51)/(17 \times -60) = -255/-1020$$

Further can divide by 255 we get, -

$$255/-1020 = 1/4$$

(ii) $-6/11$ by $-55/36$ Solution:

$-6/11$ by $-55/36$

$$(-6/11) \times (-55/36) = (-6 \times -55)/(11 \times 36) = 330/396$$

Further can divide by 66 we get,

$$330/396 = 5/6$$

(iii) $-8/25$ by $-5/16$ Solution:

$-8/25$ by $-5/16$

$$(-8/25) \times (-5/16) = (-8 \times -5)/(25 \times 16) = 40/400$$

Further can divide by 40 we get,

$$40/400 = 1/10$$

(iv) $6/7$ by $-49/36$ Solution:

$6/7$ by $-49/36$

$$(6/7) \times (-49/36) = (6 \times -49)/(7 \times 36) = 294/252$$

Further can divide by 42 we get, $294/252 = -7/6$

(v) $8/-9$ by $-7/-16$ Solution:

$8/-9$ by $-7/-16$

$$(8/-9) \times (-7/-16) = (8 \times -7)/(-9 \times -16) = -56/144$$

Further can divide by 8 we get, $-56/144 = -7/18$

(vi) $-8/9$ by $3/64$ Solution:

$-8/9$ by $3/64$

$$\begin{aligned} (-8/9) \times (3/64) &= (-8 \times 3)/(9 \times 64) \\ &= -24/576 \end{aligned}$$

Further can divide by 24 we get, $-24/576 = -1/24$

3. Simplify each of the following and express the result as a rational number in standard form:

(i) $(-16/21) \times (14/5)$ Solution:

$$\begin{aligned} (-16/21) \times (14/5) &= (-16/3) \times (2/5) \text{ (divisible by 7)} \\ &= (-16 \times 2)/(3 \times 5) \\ &= -32/15 \end{aligned}$$

(ii) $(7/6) \times (-3/28)$ Solution:

$$\begin{aligned} (7/6) \times (-3/28) &= (1/2) \times (-1/4) \text{ (divisible by 7 and 3)} \\ &= -1/8 \end{aligned}$$

(iii) $(-19/36) \times 16$ Solution:

$$\begin{aligned} -19/36 \times 16 &= (-19/9) \times 4 \text{ (divisible by 4)} \\ &= (-19 \times 4)/9 = -76/9 \end{aligned}$$

(iv) $(-13/9) \times (27/-26)$ Solution:

$$\begin{aligned} (-13/9) \times (27/-26) &= (-1/1) \times (3/-2) \text{ (divisible by 13 and 9)} \\ &= -3/-2 = 3/2 \end{aligned}$$

(v) $(-9/16) \times (-64/-27)$ Solution:

$$\begin{aligned} (-9/16) \times (-64/-27) &= (-1/1) \times (-4/-3) \text{ (divisible by 9 and 16)} \\ &= 4/-3 = -4/3 \end{aligned}$$

(vi) $(-50/7) \times (14/3)$ Solution:

$$\begin{aligned} (-50/7) \times (14/3) &= (-50/1) \times (2/3) \text{ (divisible by 7)} \\ &= (-50 \times 2)/(1 \times 3) \\ &= -100/3 \end{aligned}$$

(vii) $(-11/9) \times (-81/-88)$ Solution:

$$\begin{aligned} (-11/9) \times (-81/-88) &= (-1/1) \times (-9/-8) \text{ (divisible by 11 and 9)} \\ &= (-1 \times -9)/(1 \times -8) \\ &= 9/-8 = -9/8 \end{aligned}$$

(viii) $(-5/9) \times (72/-25)$ Solution:

$$\begin{aligned} (-5/9) \times (72/-25) &= (-1/1) \times (8/-5) \text{ (divisible by 5 and 9)} \\ &= (-1 \times 8)/(1 \times -5) \\ &= -8/-5 = 8/5 \end{aligned}$$

4. Simplify:

(i) $((25/8) \times (2/5)) - ((3/5) \times (-10/9))$ Solution:

$$((25/8) \times (2/5)) - ((3/5) \times (-10/9)) = (25 \times 2)/(8 \times 5) - (3 \times -10)/(5 \times 9)$$

$$\begin{aligned} &= 50/40 - -30/45 \\ &= 5/4 + 2/3 \text{ (divisible by 5 and 3) By} \\ &\text{taking LCM for 4 and 3 which is 12} \\ &= ((5 \times 3) + (2 \times 4))/12 \\ &= (15+8)/12 \\ &= 23/12 \end{aligned}$$

(ii) $((1/2) \times (1/4)) + ((1/2) \times 6)$ Solution:

$$((1/2) \times (1/4)) + ((1/2) \times 6) = (1 \times 1)/(2 \times 4) + (1 \times 3) \text{ (divisible by 2)}$$

$$= 1/8 + 3$$

By taking LCM for 8 and 1 which is 8

$$= ((1 \times 1) + (3 \times 8))/8 =$$

$$(1+24)/8$$

$$= 25/8$$

(iii) $(-5 \times (2/15)) - (-6 \times (2/9))$ Solution:

$$(-5 \times (2/15)) - (-6 \times (2/9)) = (-1 \times (2/3)) - (-2 \times (2/3)) \text{ (divisible by 5 and 3)}$$

$$= (-2/3) + (4/3)$$

Since the denominators are same we can add directly =

$$(-2+4)/3$$

$$= 2/3$$

(iv) $((-9/4) \times (5/3)) + ((13/2) \times (5/6))$

Solution:

$$((-9/4) \times (5/3)) + ((13/2) \times (5/6)) = (-9 \times 5)/(4 \times 3) + (13 \times 5)/(2 \times 6)$$

$$= -45/12 + 65/12$$

Since the denominators are same we can add directly =

$$(-45+65)/12$$

$$= 20/12 \text{ (divisible by 2)}$$

$$= 10/6 \text{ (divisible by 2)}$$

$$= 5/3$$

(v) $((-4/3) \times (12/-5)) + ((3/7) \times (21/15))$ Solution:

$$((-4/3) \times (12/-5)) + ((3/7) \times (21/15)) = ((-4/1) \times (4/-5)) + ((1/1) \times (3/5)) \text{ (divisible by 3, 7)}$$

$$= (-4 \times 4)/(1 \times -5) + (1 \times 3)/(1 \times 5)$$

$$= -16/-5 + 3/5$$

Since the denominators are same we can add directly = $(16+3)/5$

$$= 19/5$$

(vi) $((13/5) \times (8/3)) - ((-5/2) \times (11/3))$ Solution:

$$((13/5) \times (8/3)) - ((-5/2) \times (11/3)) = (13 \times 8)/(5 \times 3) - (-5 \times 11)/(2 \times 3)$$

$$\begin{aligned}
 &= 104/15 + 55/6 \text{ By} \\
 &\text{taking LCM for 15 and 6 which is 30} \\
 &= ((104 \times 2) + (55 \times 5))/30 = (208 + 275)/30 \\
 &= 483/30
 \end{aligned}$$

(vii) $((13/7) \times (11/26)) - ((-4/3) \times (5/6))$ Solution:

$$\begin{aligned}
 ((13/7) \times (11/26)) - ((-4/3) \times (5/6)) &= ((1/7) \times (11/2)) - ((-2/3) \times (5/3)) \text{ (divisible by 13, 2)} \\
 &= (1 \times 11)/(7 \times 2) - (-2 \times 5)/(3 \times 3) = 11/14 + 10/9
 \end{aligned}$$

$$\begin{aligned}
 &\text{By taking LCM for 14 and 9 which is 126} \\
 &= ((11 \times 9) + (10 \times 14))/126 = \\
 &(99 + 140)/126 \\
 &= 239/126
 \end{aligned}$$

(viii) $((8/5) \times (-3/2)) + ((-3/10) \times (11/16))$ Solution:

$$\begin{aligned}
 ((8/5) \times (-3/2)) + ((-3/10) \times (11/16)) &= ((4/5) \times (-3/1)) + ((-3/10) \times (11/16)) \text{ (divisible by 2)} \\
 &= (4 \times -3)/(5 \times 1) + (-3 \times 11)/(10 \times 16) = -12/5 - 33/160
 \end{aligned}$$

$$\begin{aligned}
 &\text{By taking LCM for 5 and 160 which is 160} \\
 &= ((-12 \times 32) - (33 \times 1))/160 = \\
 &(-384 - 33)/160 \\
 &= -417/160
 \end{aligned}$$

5. Simplify:

(i) $((3/2) \times (1/6)) + ((5/3) \times (7/2)) - (13/8) \times (4/3)$ Solution:

$$\begin{aligned}
 ((3/2) \times (1/6)) + ((5/3) \times (7/2)) - (13/8) \times (4/3) &= \\
 ((1/2) \times (1/2)) + ((5/3) \times (7/2)) - (13/2) \times (1/3) &= \\
 (1 \times 1)/(2 \times 2) + (5 \times 7)/(3 \times 2) - (13 \times 1)/(2 \times 3) &= \\
 1/4 + 35/6 - 13/6 &=
 \end{aligned}$$

$$\begin{aligned}
 &\text{By taking LCM for 4 and 6 which is 12} \\
 &= ((1 \times 3) + (35 \times 2) - (13 \times 2))/12 \\
 &= (3 + 70 - 26)/12 \\
 &= 47/12
 \end{aligned}$$

Further divide by 2 we get, $47/12 = 47/12$

(ii) $((\frac{1}{4}) \times (\frac{2}{7})) - ((\frac{5}{14}) \times (-\frac{2}{3}) + (\frac{3}{7}) \times (\frac{9}{2}))$

Solution:

$$((\frac{1}{4}) \times (\frac{2}{7})) - ((\frac{5}{14}) \times (-\frac{2}{3}) + (\frac{3}{7}) \times (\frac{9}{2})) =$$

$$((\frac{1}{2}) \times (\frac{1}{7})) - ((\frac{5}{7}) \times (-\frac{1}{3}) + (\frac{3}{7}) \times (\frac{9}{2}))$$

$$(1 \times 1)/(2 \times 7) - (5 \times -1)/(7 \times 3) + (3 \times 9)/(7 \times 2)$$

$$1/14 + 5/21 + 27/14$$

By taking LCM for 14 and 21 which is 42

$$((1 \times 3) + (5 \times 2) + (27 \times 3))/42$$

$$(3 + 10 + 81)/42$$

$$94/42$$

Further divide by 2 we get, $94/42 = 47/21$

(iii) $((\frac{13}{9}) \times (-\frac{15}{2})) + ((\frac{7}{3}) \times (\frac{8}{5}) + (\frac{3}{5}) \times (\frac{1}{2}))$

Solution:

$$((\frac{13}{9}) \times (-\frac{15}{2})) + ((\frac{7}{3}) \times (\frac{8}{5}) + (\frac{3}{5}) \times (\frac{1}{2})) =$$

$$(13 \times -5)/(3 \times 2) + (7 \times 8)/(3 \times 5) + (3 \times 1)/(5 \times 2) -$$

$$65/6 + 56/15 + 3/10$$

By taking LCM for 6, 15 and 10 which is 30

$$((-65 \times 5) + (56 \times 2) + (3 \times 3))/30 (-$$

$$325 + 112 + 9)/30$$

$$-204/30$$

Further divide by 2 we get, $-204/30 = -102/15$

(iv) $((\frac{3}{11}) \times (\frac{5}{6})) - ((\frac{9}{12}) \times (\frac{4}{3}) + (\frac{5}{13}) \times (\frac{6}{15}))$

Solution:

$$((\frac{3}{11}) \times (\frac{5}{6})) - ((\frac{9}{12}) \times (\frac{4}{3}) + (\frac{5}{13}) \times (\frac{6}{15})) =$$

$$((\frac{1}{11}) \times (\frac{5}{2})) - ((\frac{1}{1}) \times (\frac{1}{1}) + (\frac{1}{13}) \times (\frac{2}{1}))$$

$$(1 \times 5)/(11 \times 2) - 1/1 + (1 \times 2)/(13 \times 1)$$

$$5/22 - 1/1 + 2/13$$

By taking LCM for 22, 1 and 13 which is 286

$$((5 \times 13) - (1 \times 286) + (2 \times 22))/286$$

$$(65 - 286 + 44)/286 -177/286$$

EXERCISE 1.6**PAGE NO: 1.31****1. Verify the property: $x \times y = y \times x$ by taking:****(i) $x = -1/3$, $y = 2/7$ Solution:**

By using the property

$$x \times y = y \times x$$

$$-1/3 \times 2/7 = 2/7 \times -1/3 \quad (-1 \times 2)/$$

$$(3 \times 7) = (2 \times -1)/(7 \times 3) \quad -2/21 = -2/21$$

Hence, the property is satisfied.

(ii) $x = -3/5$, $y = -11/13$ Solution:

By using the property

$$x \times y = y \times x$$

$$-3/5 \times -11/13 = -11/13 \times -3/5 \quad (-3 \times -$$

$$11)/(5 \times 13) = (-11 \times -3)/(13 \times 5) \quad 33/65 = 33/65$$

Hence, the property is satisfied.

(iii) $x = 2$, $y = 7/-8$ Solution:

By using the property

$$x \times y = y \times x$$

$$2 \times 7/-8 = 7/-8 \times 2$$

$$(2 \times 7)/-8 = (7 \times 2)/-8 \quad 14/-8 = 14/-8$$

$$-14/8 = -14/8$$

Hence, the property is satisfied.

(iv) $x = 0$, $y = -15/8$ Solution:

By using the property

$$x \times y = y \times x$$

$$0 \times -15/8 = -15/8 \times 0 \quad 0 = 0$$

Hence, the property is satisfied.

2. Verify the property: $x \times (y \times z) = (x \times y) \times z$ by taking:**(i) $x = -7/3$, $y = 12/5$, $z = 4/9$ Solution:**

By using the property

$$x \times (y \times z) = (x \times y) \times z$$

$$\begin{aligned} -7/3 \times (12/5 \times 4/9) &= (-7/3 \times 12/5) \times 4/9 \quad (- \\ 7 \times 12 \times 4) / (3 \times 5 \times 9) &= (-7 \times 12 \times 4) / (3 \times 5 \times 9) \quad - \\ 336/135 &= -336/135 \end{aligned}$$

Hence, the property is satisfied.

(ii) $x = 0$, $y = -3/5$, $z = -9/4$ Solution:

By using the property

$$x \times (y \times z) = (x \times y) \times z$$

$$\begin{aligned} 0 \times (-3/5 \times -9/4) &= (0 \times -3/5) \times -9/4 \\ 0 &= 0 \end{aligned}$$

Hence, the property is satisfied.

(iii) $x = 1/2$, $y = 5/-4$, $z = -7/5$ Solution:

By using the property

$$x \times (y \times z) = (x \times y) \times z$$

$$\begin{aligned} 1/2 \times (5/-4 \times -7/5) &= (1/2 \times 5/-4) \times -7/5 \\ (1 \times 5 \times -7) / (2 \times -4 \times 5) &= (1 \times 5 \times -7) / (2 \times -4 \times 5) \quad -35/-40 = -35/-40 \\ 35/40 &= 35/40 \end{aligned}$$

Hence, the property is satisfied.

(iv) $x = 5/7$, $y = -12/13$, $z = -7/18$ Solution:

By using the property

$$x \times (y \times z) = (x \times y) \times z$$

$$\begin{aligned} 5/7 \times (-12/13 \times -7/18) &= (5/7 \times -12/13) \times -7/18 \\ (5 \times -12 \times -7) / (7 \times 13 \times 18) &= (5 \times -12 \times -7) / (7 \times 13 \times 18) \\ 420/1638 &= 420/1638 \end{aligned}$$

Hence, the property is satisfied.

3. Verify the property: $x \times (y + z) = x \times y + x \times z$ by taking:

(i) $x = -3/7$, $y = 12/13$, $z = -5/6$ Solution:

By using the property

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

$$\begin{aligned} -3/7 \times (12/13 + -5/6) &= -3/7 \times 12/13 + -3/7 \times -5/6 \\ -3/7 \times ((12 \times 6) + (-5 \times 13))/78 &= (-3 \times 12)/(7 \times 13) + (-3 \times -5)/(7 \times 6) \\ -3/7 \times (72 - 65)/78 &= -36/91 + 15/42 \\ -3/7 \times 7/78 &= (-36 \times 6 + 15 \times 13)/546 \\ -1/26 &= (196 - 216)/546 \\ &= -21/546 = -1/26 \end{aligned}$$

Hence, the property is verified.

(ii) $x = -12/5$, $y = -15/4$, $z = 8/3$ Solution:

By using the property

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

$$\begin{aligned} -12/5 \times (-15/4 + 8/3) &= -12/5 \times -15/4 + -12/5 \times 8/3 \\ -12/5 \times ((-15 \times 3) + (8 \times 4))/12 &= (-12 \times -15)/(5 \times 4) + (-12 \times 8)/(5 \times 3) \\ -12/5 \times (-45 + 32)/12 &= 180/20 - 96/15 \\ -12/5 \times -13/12 &= 9 - 32/5 \\ 13/5 &= (9 \times 5 - 32 \times 1)/5 = \\ &= (45 - 32)/5 \\ &= 13/5 \end{aligned}$$

Hence, the property is verified.

(iii) $x = -8/3$, $y = 5/6$, $z = -13/12$ Solution:

By using the property

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

$$\begin{aligned} -8/3 \times (5/6 + -13/12) &= -8/3 \times 5/6 + -8/3 \times -13/12 \\ -8/3 \times ((5 \times 2) - (13 \times 1))/12 &= (-8 \times 5)/(3 \times 6) + (-8 \times -13)/(3 \times 12) \\ -8/3 \times (10 - 13)/12 &= -40/18 + 104/36 \\ -8/3 \times -3/12 &= (-40 \times 2 + 104 \times 1)/36 \\ 2/3 &= (-80 + 104)/36 \\ &= 24/36 = 2/3 \end{aligned}$$

Hence, the property is verified.

(iv) $x = -3/4$, $y = -5/2$, $z = 7/6$ Solution:

By using the property

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

$$-3/4 \times (-5/2 + 7/6) = -3/4 \times -5/2 + -3/4 \times 7/6$$

$$-3/4 \times ((-5 \times 3) + (7 \times 1))/6 = (-3 \times -5)/(4 \times 2) + (-3 \times 7)/(4 \times 6)$$

$$-3/4 \times (-15 + 7)/6 = 15/8 - 21/24$$

$$-3/4 \times -8/6 = (15 \times 3 - 21 \times 1)/24$$

$$-3/4 \times -4/3 = (45 - 21)/24$$

$$1 = 24/24$$

$$= 1$$

Hence, the property is verified.

4. Use the distributivity of multiplication of rational numbers over their addition to simplify:

(i) $3/5 \times ((35/24) + (10/1))$ Solution:

$$3/5 \times 35/24 + 3/5 \times 10$$

$$1/1 \times 7/8 + 6/1$$

$$\text{By taking LCM for 8 and 1 which is 8 } 7/8 + 6 = (7 \times 1 + 6 \times 8)/8$$

$$= (7 + 48)/8$$

$$= 55/8$$

(ii) $-5/4 \times ((8/5) + (16/5))$ Solution:

$$-5/4 \times 8/5 + -5/4 \times 16/5$$

$$-1/1 \times 2/1 + -1/1 \times 4/1 -2 + -4$$

$$-2 - 4$$

$$-6$$

(iii) $2/7 \times ((7/16) - (21/4))$ Solution:

$$2/7 \times 7/16 - 2/7 \times 21/4$$

$$1/1 \times 1/8 - 1/1 \times 3/2 \quad 1/8 - 3/2$$

$$\text{By taking LCM for 8 and 2 which is 8 } 1/8 - 3/2 = (1 \times 1 - 3 \times 4)/8$$

$$= (1 - 12)/8 = -11/8$$

(iv) $3/4 \times ((8/9) - 40)$ Solution:

$$3/4 \times 8/9 - 3/4 \times 40 = 1/1 \times 2/3 - 3/1 \times 10 = 2/3 - 30/1$$

By taking LCM for 3 and 1 which is 3 $2/3 - 30/1 = (2 \times 1 - 30 \times 3)/3$
 $= (2 - 90)/3 = -88/3$

5. Find the multiplicative inverse (reciprocal) of each of the following rational numbers:

(i) 9

(ii) -7

(iii) $12/5$

(iv) $-7/9$

(v) $-3/-5$

(vi) $2/3 \times 9/4$

(vii) $-5/8 \times 16/15$

(viii) $-2 \times -3/5$

(ix) -1

(x) $0/3$

(xi) 1 Solution:

(i) The reciprocal of 9 is $1/9$

(ii) The reciprocal of -7 is $-1/7$

(iii) The reciprocal of $12/5$ is $5/12$

(iv) The reciprocal of $-7/9$ is $9/-7$

(v) The reciprocal of $-3/-5$ is $5/3$

(vi) The reciprocal of $2/3 \times 9/4$ is

Firstly solve for $2/3 \times 9/4 = 1/1 \times 3/2 = 3/2$

∴ The reciprocal of $\frac{3}{2}$ is $\frac{2}{3}$

(vii) The reciprocal of $-\frac{5}{8} \times \frac{16}{15}$

Firstly solve for $-\frac{5}{8} \times \frac{16}{15} = -\frac{1}{1} \times \frac{2}{3} = -\frac{2}{3}$

∴ The reciprocal of $-\frac{2}{3}$ is $\frac{3}{-2}$

(viii) The reciprocal of $-2 \times -\frac{3}{5}$

Firstly solve for $-2 \times -\frac{3}{5} = \frac{6}{5}$ ∴ The reciprocal of $\frac{6}{5}$ is $\frac{5}{6}$

(ix) The reciprocal of -1 is -1

(x) The reciprocal of $\frac{0}{3}$ does not exist

(xi) The reciprocal of 1 is 1

6. Name the property of multiplication of rational numbers illustrated by the following statements:

(i) $-\frac{5}{16} \times \frac{8}{15} = \frac{8}{15} \times -\frac{5}{16}$

(ii) $-\frac{17}{5} \times 9 = 9 \times -\frac{17}{5}$

(iii) $\frac{7}{4} \times (-\frac{8}{3} + -\frac{13}{12}) = \frac{7}{4} \times -\frac{8}{3} + \frac{7}{4} \times -\frac{13}{12}$

(iv) $-\frac{5}{9} \times (\frac{4}{15} \times -\frac{9}{8}) = (-\frac{5}{9} \times \frac{4}{15}) \times -\frac{9}{8}$

(v) $\frac{13}{-17} \times 1 = \frac{13}{-17} = 1 \times \frac{13}{-17}$

(vi) $-\frac{11}{16} \times \frac{16}{-11} = 1$

(vii) $\frac{2}{13} \times 0 = 0 = 0 \times \frac{2}{13}$

(viii) $-\frac{3}{2} \times \frac{5}{4} + -\frac{3}{2} \times -\frac{7}{6} = -\frac{3}{2} \times (\frac{5}{4} + -\frac{7}{6})$ **Solution:**

(i) $-\frac{5}{16} \times \frac{8}{15} = \frac{8}{15} \times -\frac{5}{16}$

According to commutative law, $\frac{a}{b} \times \frac{c}{d} = \frac{c}{d} \times \frac{a}{b}$ The above rational number satisfies commutative property.

(ii) $-\frac{17}{5} \times 9 = 9 \times -\frac{17}{5}$

According to commutative law, $\frac{a}{b} \times \frac{c}{d} = \frac{c}{d} \times \frac{a}{b}$ The above rational number satisfies commutative property.

(iii) $\frac{7}{4} \times (-\frac{8}{3} + -\frac{13}{12}) = \frac{7}{4} \times -\frac{8}{3} + \frac{7}{4} \times -\frac{13}{12}$

According to given rational number, $\frac{a}{b} \times (\frac{c}{d} + \frac{e}{f}) = (\frac{a}{b} \times \frac{c}{d}) + (\frac{a}{b} \times \frac{e}{f})$
Distributivity of multiplication over addition satisfies.

(iv) $-5/9 \times (4/15 \times -9/8) = (-5/9 \times 4/15) \times -9/8$

According to associative law, $a/b \times (c/d \times e/f) = (a/b \times c/d) \times e/f$

The above rational number satisfies associativity of multiplication.

(v) $13/-17 \times 1 = 13/-17 = 1 \times 13/-17$

Existence of identity for multiplication satisfies for the given rational number.

(vi) $-11/16 \times 16/-11 = 1$

Existence of multiplication inverse satisfies for the given rational number.

(vii) $2/13 \times 0 = 0 = 0 \times 2/13$ By using $a/b \times 0 = 0 \times a/b$

Multiplication of zero satisfies for the given rational number.

(viii) $-3/2 \times 5/4 + -3/2 \times -7/6 = -3/2 \times (5/4 + -7/6)$

According to distributive law, $(a/b \times c/d) + (a/b \times e/f) = a/b \times (c/d + e/f)$

The above rational number satisfies commutative property.

7. Fill in the blanks:

(i) The product of two positive rational numbers is always...

(ii) The product of a positive rational number and a negative rational number is always....

(iii) The product of two negative rational numbers is always...

(iv) The reciprocal of a positive rational numbers is...

(v) The reciprocal of a negative rational numbers is...

(vi) Zero has Reciprocal.

(vii) The product of a rational number and its reciprocal is...

(viii) The numbers ... and ... are their own reciprocals.

(ix) If a is reciprocal of b, then the reciprocal of b is.

(x) The number 0 is ... the reciprocal of any number.

(xi) reciprocal of $1/a$, $a \neq 0$ is ...

(xii) $(17 \times 12)^{-1} = 17^{-1} \times \dots$ Solution:

(i) The product of two positive rational numbers is always positive.

(ii) The product of a positive rational number and a negative rational number is always negative.

(iii) The product of two negative rational numbers is always positive.

(iv) The reciprocal of a positive rational numbers is positive.

- (v) The reciprocal of a negative rational numbers is negative.
- (vi) Zero has no Reciprocal.
- (vii) The product of a rational number and its reciprocal is 1.
- (viii) The numbers 1 and -1 are their own reciprocals.
- (ix) If a is reciprocal of b, then the reciprocal of b is a.
- (x) The number 0 is not the reciprocal of any number.
- (xi) reciprocal of $1/a$, $a \neq 0$ is a.
- (xii) $(17 \times 12)^{-1} = 17^{-1} \times 12^{-1}$

8. Fill in the blanks:

(i) $-4 \times 7/9 = 79 \times \dots$ Solution:

$$-4 \times 7/9 = 79 \times -4$$

By using commutative property.

(ii) $5/11 \times -3/8 = -3/8 \times \dots$ Solution:

$$5/11 \times -3/8 = -3/8 \times 5/11$$

By using commutative property.

(iii) $1/2 \times (3/4 + -5/12) = 1/2 \times \dots + \dots \times -5/12$ Solution:

$$1/2 \times (3/4 + -5/12) = 1/2 \times 3/4 + 1/2 \times -5/12$$

By using distributive property.

(iv) $-4/5 \times (5/7 + -8/9) = (-4/5 \times \dots) + -4/5 \times -8/9$ Solution:

$$-4/5 \times (5/7 + -8/9) = (-4/5 \times 5/7) + -4/5 \times -8/9$$

By using distributive property.

EXERCISE 1.7**PAGE NO: 1.35****1. Divide:****(i) 1 by $\frac{1}{2}$ Solution:**

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

(ii) 5 by $-\frac{5}{7}$ **Solution:**

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

(iii) $-\frac{3}{4}$ by $\frac{9}{-16}$ **Solution:**

$$(-\frac{3}{4}) \div (\frac{9}{-16})$$

$$(-\frac{3}{4}) \times -\frac{16}{9} = \frac{4}{3}$$

(iv) $-\frac{7}{8}$ by $-\frac{21}{16}$ **Solution:**

$$(-\frac{7}{8}) \div (-\frac{21}{16})$$

$$(-\frac{7}{8}) \times \frac{16}{-21} = \frac{2}{3}$$

(v) $\frac{7}{-4}$ by $\frac{63}{64}$ **Solution:**

$$(\frac{7}{-4}) \div (\frac{63}{64})$$

$$(\frac{7}{-4}) \times \frac{64}{63} = -\frac{16}{9}$$

(vi) 0 by $-\frac{7}{5}$ **Solution:**

$$0 \div (\frac{7}{5}) = 0$$

(vii) $-\frac{3}{4}$ by -6**Solution:**

$$(-\frac{3}{4}) \div -6$$

$$(-\frac{3}{4}) \times \frac{1}{-6} = \frac{1}{8}$$

(viii) $\frac{2}{3}$ by $-\frac{7}{12}$ **Solution:**

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

$$(\frac{2}{3}) \times \frac{12}{-7} = -\frac{8}{7}$$

(ix) -4 by -3/5 Solution:

$$-4 \div (-3/5)$$

$$-4 \times 5/-3 = 20/3$$

(x) -3/13 by -4/65 Solution:

$$(-3/13) \div (-4/65)$$

$$(-3/13) \times (65/-4) = 15/4$$

2. Find the value and express as a rational number in standard form:

(i) 2/5 ÷ 26/15 Solution:

$$(2/5) \div (26/15)$$

$$(2/5) \times (15/26)$$

$$(2/1) \times (3/26) = (2 \times 3) / (1 \times 26) = 6/26 = 3/13$$

(ii) 10/3 ÷ -35/12

Solution:

$$(10/3) \div (-35/12)$$

$$(10/3) \times (12/-35)$$

$$(10/1) \times (4/-35) = (10 \times 4) / (1 \times -35) = -40/35 = -8/7$$

(iii) -6 ÷ -8/17 Solution:

$$-6 \div (-8/17)$$

$$-6 \times (17/-8)$$

$$-3 \times (17/-4) = (-3 \times 17) / (1 \times -4) = 51/4$$

(iv) -40/99 ÷ -20 Solution:

$$(-40/99) \div -20 \quad (-40/99) \times (1/-20)$$

$$(-2/99) \times (1/-1) = (-2 \times 1) / (99 \times -1) = 2/99$$

(v) -22/27 ÷ -110/18 Solution:

$$(-22/27) \div (-110/18)$$

$$(-22/27) \times (18/-110)$$

$$(-1/9) \times (6/-5)$$

$$(-1/3) \times (2/-5) = (-1 \times 2) / (3 \times -5) = 2/15$$

(vi) $-36/125 \div -3/75$ Solution:

$$(-36/125) / (-3/75) = (-36/125) \times (75/-3) = (-12/25) \times (15/-1)$$

$$(-12/5) \times (3/-1) = (-12 \times 3) / (5 \times -1) = 36/5$$

3. The product of two rational numbers is 15. If one of the numbers is -10, find the other.

Solution:

We know that the product of two rational numbers = 15

One of the number = -10

\therefore other number can be obtained by dividing the product by the given number.

$$\text{Other number} = 15/-10$$

$$= -3/2$$

4. The product of two rational numbers is $-8/9$. If one of the numbers is $-4/15$, find the other.

Solution:

We know that the product of two rational numbers = $-8/9$

One of the number = $-4/15$

\therefore other number is obtained by dividing the product by the given number.

$$\text{Other number} = (-8/9) / (-4/15)$$

$$= (-8/9) \times (15/-4) = (-2/3) \times (5/-1)$$

$$= (-2 \times 5) / (3 \times -1)$$

$$= -10/-3$$

$$= 10/3$$

5. By what number should we multiply $-1/6$ so that the product may be $-23/9$?

Solution:

Let us consider a number = x

$$\text{So, } x \times -1/6 = -23/9$$

$$x = (-23/9) / (-1/6)$$

$$x = (-23/9) \times (6/-1)$$

$$= (-23/3) \times (2 \times -1)$$

$$= (-23 \times -2) / (3 \times 1)$$

$$= 46/3$$

6. By what number should we multiply $-15/28$ so that the product may be $-5/7$? Solution:

Let us consider a number = x So, $x \times -15/28 = -5/7$

$$x = (-5/7) / (-15/28)$$

$$x = (-5/7) \times (28/-15)$$

$$= (-1/1) \times (4 \times -3) = 4/3$$

7. By what number should we multiply $-8/13$ so that the product may be 24? Solution:

Let us consider a number = x

$$\text{So, } x \times -8/13 = 24 \quad x = (24) / (-8/13)$$

$$x = (24) \times (13/-8)$$

$$= (3) \times (13 \times -1) = -39$$

8. By what number should $-3/4$ be multiplied in order to produce $2/3$? Solution:

Let us consider a number = x

$$\text{So, } x \times -3/4 = 2/3 \quad x = (2/3) / (-3/4)$$

$$x = (2/3) \times (4/-3)$$

$$= -8/9$$

9. Find $(x+y) \div (x-y)$, if

(i) $x = 2/3$, $y = 3/2$

Solution:

$$(x+y) \div (x-y)$$

$$(2/3 + 3/2) / (2/3 - 3/2)$$

$$((2 \times 2 + 3 \times 3)/6) / ((2 \times 2 - 3 \times 3)/6) \quad ((4+9)/6) / ((4-9)/6)$$

$$(13/6) / (-5/6)$$

$$(13/6) \times (6/-5)$$

$$-13/5$$

(ii) $x = 2/5$, $y = 1/2$ Solution:

$$\begin{aligned}& (x+y) \div (x-y) \\& (2/5 + 1/2) / (2/5 - 1/2) \\& ((2 \times 2 + 1 \times 5)/10) / ((2 \times 2 - 1 \times 5)/10) \\& ((4+5)/10) / ((4-5)/10) \\& (9/10) / (-1/10) \\& (9/10) \times (10/-1) \\& -9\end{aligned}$$

(iii) $x = 5/4$, $y = -1/3$ Solution:

$$\begin{aligned}& (x+y) \div (x-y) \\& (5/4 - 1/3) / (5/4 + 1/3) \\& ((5 \times 3 - 1 \times 4)/12) / ((5 \times 3 + 1 \times 4)/12) \\& ((15-4)/12) / ((15+4)/12) \\& (11/12) / (19/12) \\& (11/12) \times (12/19) \\& 11/19\end{aligned}$$

(iv) $x = 2/7$, $y = 4/3$ Solution:

$$\begin{aligned}& (x+y) \div (x-y) \\& (2/7 + 4/3) / (2/7 - 4/3) \\& ((2 \times 3 + 4 \times 7)/21) / ((2 \times 3 - 4 \times 7)/21) \\& ((6+28)/21) / ((6-28)/21) \\& (34/21) / (-22/21) \\& (34/21) \times (21/-22) \\& -34/22 \\& -17/11\end{aligned}$$

(v) $x = 1/4$, $y = 3/2$ Solution:

$$\begin{aligned}& (x+y) \div (x-y) \\& (1/4 + 3/2) / (1/4 - 3/2) \\& ((1 \times 1 + 3 \times 2)/4) / ((1 \times 1 - 3 \times 2)/4) \\& ((1+6)/4) / ((1-6)/4) \\& (7/4) / (-5/4) \\& (7/4) \times (4/-5) = -7/5\end{aligned}$$

10. The cost of $7\frac{2}{3}$ meters of rope is Rs $12\frac{3}{4}$. Find the cost per meter. Solution:

We know that $23/3$ meters of rope = Rs $51/4$

Let us consider a number = x So, $x \times 23/3 = 51/4$

$$x = (51/4)/(23/3)$$

$$x = (51/4) \times (3/23)$$

$$= (51 \times 3) / (4 \times 23) = 153/92$$

$$= 1\frac{61}{92}$$

\therefore cost per meter is Rs $1\frac{61}{92}$

11. The cost of $2\frac{1}{3}$ meters of cloth is Rs $75\frac{1}{4}$. Find the cost of cloth per meter. Solution:

We know that $7/3$ meters of cloth = Rs $301/4$ Let us consider a number = x

$$\text{So, } x \times 7/3 = 301/4$$

$$x = (301/4)/(7/3)$$

$$x = (301/4) \times (3/7)$$

$$= (301 \times 3) / (4 \times 7) = (43 \times 3) / (4 \times 1)$$

$$= 129/4$$

$$= 32.25$$

\therefore cost of cloth per meter is Rs 32.25

12. By what number should $-33/16$ be divided to get $-11/4$? Solution:

Let us consider a number = x

$$\text{So, } (-33/16)/x = -11/4$$

$$-33/16 = x \times -11/4$$

$$x = (-33/16) / (-11/4)$$

$$= (-33/16) \times (4/-11) = (-33 \times 4) / (16 \times -11)$$

$$= (-3 \times 1) / (4 \times -1)$$

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

13. Divide the sum of $-13/5$ and $12/7$ by the product of $-31/7$ and $-1/2$. Solution:

sum of $-13/5$ and $12/7$ -
 $13/5 + 12/7$
 $((-13 \times 7) + (12 \times 5))/35$ (-
 $91+60)/35$
 $-31/35$

Product of $-31/7$ and $-1/2$ -
 $31/7 \times -1/2$
 $(-31 \times -1)/(7 \times 2)$
 $31/14$
 \therefore by dividing the sum and the product we get, (-
 $31/35) / (31/14)$
 $(-31/35) \times (14/31)$
 $(-31 \times 14)/(35 \times 31)$
 $-14/35$
 $-2/5$

14. Divide the sum of $65/12$ and $12/7$ by their difference. Solution:

The sum is $65/12 + 12/7$

The difference is $65/12 - 12/7$

When we divide, $(65/12 + 12/7) / (65/12 - 12/7)$

$((65 \times 7 + 12 \times 12)/84) / ((65 \times 7 - 12 \times 12)/84) ((455+144)/84) / ((455 - 144)/84)$

$(599/84) / (311/84)$

$599/84 \times 84/311$

$599/311$

15. If 24 trousers of equal size can be prepared in 54 meters of cloth, what length of cloth is required for each trouser?

Solution:

We know that total number trousers = 24

Total length of the cloth = 54

Length of the cloth required for each trouser = total length of the cloth/number of trousers

$$= 54/24$$

$$= 9/2$$

\therefore $9/2$ meters is required for each trouser.

EXERCISE 1.8**PAGE NO: 1.43****1. Find a rational number between -3 and 1. Solution:**

Let us consider two rational numbers x and y

We know that between two rational numbers x and y where $x < y$ there is a rational number $(x+y)/2$

$$x < (x+y)/2 < y \quad (-3+1)/2 = -2/2 = -1$$

So, the rational number between -3 and 1 is -1

$$\therefore -3 < -1 < 1$$

2. Find any five rational numbers less than 2. Solution:

Five rational numbers less than 2 are 0, $1/5$, $2/5$, $3/5$, $4/5$

3. Find two rational numbers between -2/9 and 5/9 Solution:

The rational numbers between $-2/9$ and $5/9$ is

$$(-2/9 + 5/9)/2 \quad (1/3)/2$$

$$1/6$$

The rational numbers between $-2/9$ and $1/6$ is $(-2/9 + 1/6)/2$

$$((-2 \times 2 + 1 \times 3)/18)/2$$

$$(-4+3)/36$$

$$-1/36$$

\therefore the rational numbers between $-2/9$ and $5/9$ are $-1/36$, $1/6$

4. Find two rational numbers between 1/5 and 1/2 Solution:

The rational numbers between $1/5$ and $1/2$ is

$$(1/5 + 1/2)/2$$

$$((1 \times 2 + 1 \times 5)/10)/2 \quad (2+5)/20 = 7/20$$

The rational numbers between $1/5$ and $7/20$ is $(1/5 + 7/20)/2$

$$((1 \times 4 + 7 \times 1)/20)/2 \quad (4+7)/40$$

11/40

∴ the rational numbers between $1/5$ and $1/2$ are $7/20$, $11/40$

5. Find ten rational numbers between $1/4$ and $1/2$. Solution:

Firstly convert the given rational numbers into equivalent rational numbers with same denominators.

The LCM for 4 and 2 is 4. $1/4 = 1/4$

$$1/2 = (1 \times 2)/4 = 2/4$$

$$1/4 = (1 \times 20 / 4 \times 20) = 20/80 \quad 1/2 = (2 \times 20 / 4 \times 20) = 40/80$$

So, we now know that 21, 22, 23,...39 are integers between numerators 20 and 40.

∴ the rational numbers between $1/4$ and $1/2$ are $21/80$, $22/80$, $23/80$,, $39/80$

6. Find ten rational numbers between $-2/5$ and $1/2$. Solution:

Firstly convert the given rational numbers into equivalent rational numbers with same denominators.

The LCM for 5 and 2 is 10. $-2/5 = (-2 \times 2)/10 = -4/10$

$$1/2 = (1 \times 5)/10 = 5/10$$

$$-2/5 = (-4 \times 2 / 10 \times 2) = -8/20$$

$$1/2 = (5 \times 2 / 10 \times 2) = 10/20$$

So, we now know that -7, -6, -5,...10 are integers between numerators -8 and 10.

∴ the rational numbers between $-2/5$ and $1/2$ are $-7/20$, $-6/20$, $-5/20$,, $9/20$

7. Find ten rational numbers between $3/5$ and $3/4$. Solution:

Firstly convert the given rational numbers into equivalent rational numbers with same denominators.

The LCM for 5 and 4 is 20.

$$3/5 = 3 \times 20 / 5 \times 20 = 60/100 \quad 3/4 = 3 \times 25 / 4 \times 25 = 75/100$$

So, we now know that 61, 62, 63,..74 are integers between numerators 60 and 75.

∴ the rational numbers between $3/5$ and $3/4$ are $61/100$, $62/100$, $63/100$,, $74/100$