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 = (3×2) / (4×2) = 6/8 and
-5/8 = (-5×1) / (8×1) = -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 × -1)/ (-9 × -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 = (-5×1) / (9×1) = -5/9 and
7/3 = (7×3) / (3×3) = 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 = (-3×5) / (1×5) = -15/5 and
3/5 = (3×1) / (5×1) = 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 = (-7×2) / (27×2) = -14/54 and
11/18 = (11×3) / (18×3) = 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 × -1)/ (-4 × -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 = (-31×2) / (4×2) = -62/8 and
-5/8 = (-5×1) / (8×1) = -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 = (5×1) / (36×1) = 5/36 and
-7/12 = (-7×3) / (12×3) = -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 = (-5×3) / (16×3) = -15/48 and
7/24 = (7×2) / (24×2) = 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 × -1)/ (-18 × -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 = (-7×3) / (18×3) = -21/54 and
8/27 = (8×2) / (27×2) = 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
(8×2)/(9×2) + (-11×3)/(6×3)
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×-1)/(-7×-1) = -5/7
3/1 + -5/7
Now let us take the LCM for 1 and 7 which is 7
(3×7)/(1×7) + (-5×1)/(7×1)
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×-1)/(-12×-1) = -1/12
2/-15 = (2×-1)/(-15×-1) = -2/15

-1/12 + -2/15
Now let us take the LCM for 12 and 15 which is 60
(-1×5)/(12×5) + (-2×4)/(15×4)
-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
(-8×3)/(19×3) + (-4×1)/(57×1)
-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×-1)/(-4×-1) = -3/4
7/9 + -3/4
Now let us take the LCM for 9 and 4 which is 36
(7×4)/(9×4) + (-3×9)/(4×9)
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×-1)/(-39×-1) = -11/39
5/26 + -11/39
Now let us take the LCM for 26 and 39 which is 78
(5×3)/(26×3) + (-11×2)/(39×2)
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
(-16×12)/(9×12) + (-5×9)/(12×9)
-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
(-13×9)/(8×9) + (5×2)/(36×2)
-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
(1×5)/(1×5) + (-4×1)/(5×1)
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
(-12×2)/(5×2) + (43×1)/(10×1)
-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 $1\ 9/10$ 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
(24×4)/(7×4) + (-11×7)/(4×7)
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
(-31×4)/(6×4) + (-27×3)/(8×3)
-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 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
(101×4)/(6×4) + (7×3)/(8×3)
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 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 ∴ 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 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

Now, -11/5 = (-11 × 7) / (5 ×7) = -77/35

4/7 = (4 ×5) / (7 ×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

Now, 4/7 = (4 × 5) / (7 ×5) = 20/35

-11/5 = (-11 ×7) / (5 ×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

∴ -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 × -1)/ (-12 × -1) = -7/12

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

∴ 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 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
Now, 4/9 = (4 × 4) / (9 ×4) = 16/36
-7/12 = (-7 ×3) / (12 ×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
Now, -7/12 = (-7 ×3) / (12 ×3) = -21/36
4/9 = (4 × 4) / (9 ×4) = 16/36
Since the denominators are same we can add them directly
-21/36 + 16/36 = (-21 + 16)/36 = -5/36

∴ 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.
∴ 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 and -2/-15 + -3/5
-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
Now, -3/5 = (-3 × 3) / (5×3) = -9/15
2/15 = (2 ×1) / (15 ×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
-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

Now, 2/15 = (2 ×1) / (15 ×1) = 2/15
-3/5 = (-3 × 3) / (5×3) = -9/15
Since the denominators are same we can add them directly
2/15 + -9/15 = (2 + (-9))/15 = (2-9)/15 = -7/15

∴ -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 × -1)/ (-7 × -1) = -2/7
12/-35 = (12 × -1)/ (-35 × -1) = -12/35
By using the commutativity law, the addition of rational numbers is commutative.
∴ 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 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
Now, -2/7 = (-2 × 5) / (7 ×5) = -10/35
-12/35 = (-12 ×1) / (35 ×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
Now, -12/35 = (-12 ×1) / (35 ×1) = -12/35
-2/7 = (-2 × 5) / (7 ×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

∴ -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.
∴ a/b + c/d = c/d + a/b

In order to verify the above property let us consider the given fraction
4/1 and -3/5 as
4/1 + -3/5 and -3/5 + 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, 4/1 = (4 × 5) / (1×5) = 20/5
-3/5 = (-3 ×1) / (5 ×1) = -3/5
Since the denominators are same we can add them directly
20/5 + -3/5 = (20 + (-3))/5 = (20-3)/5 = 17/5

-3/5 + 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, -3/5 = (-3 ×1) / (5 ×1) = -3/5
4/1 = (4 × 5) / (1×5) = 20/5
Since the denominators are same we can add them directly
-3/5 + 20/5 = (-3 + 20)/5 = 17/5

∴ 4/1 + -3/5 = -3/5 + 4/1 is satisfied.

(vi) -4 and 4/-7
Solution: Firstly we need to convert the denominators to positive numbers.
4/-7 = (4 × -1)/ (-7 × -1) = -4/7
By using the commutativity law, the addition of rational numbers is commutative.
∴ a/b + c/d = c/d + a/b
In order to verify the above property let us consider the given fraction
-4/1 and -4/7 as
-4/1 + -4/7 and -4/7 + -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, -4/1 = (-4 × 7) / (1×7) = -28/7
-4/7 = (-4 ×1) / (7 ×1) = -4/7
Since the denominators are same we can add them directly
-28/7 + -4/7 = (-28 + (-4))/7 = (-28-4)/7 = -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
Now, -4/7 = (-4 ×1) / (7 ×1) = -4/7
-4/1 = (-4 × 7) / (1×7) = -28/7
Since the denominators are same we can add them directly
-4/7 + -28/7 = (-4 + (-28))/7 = (-4-28)/7 = -32/7

∴ -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 = ½, 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× 3)/(2×3) + (2×2)/(3×2)
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
(7×5)/(6×5) + (-1×6)/(5×6)
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)) = (2×5)/(3×5) + (-1×3)/(5×3)
= 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 = (1×15)/(2×15) + (7×2)/(15×2)

= 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× 3)/(5×3) + (4×5)/(3×5)
-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
(14×2)/(15×2) + (-7×3)/(10×3)
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)) = (4×10)/(3×10) + (-7×3)/(10×3)
= 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 = (-2×6)/(5×6) + (19×1)/(30×1)
= -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×-1)/ (-5×-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
(-7×5)/(11×5) + (-2×11)/(5×11)
-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
(-57×2)/(55×2) + (-3×5)/(22×5)
-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))= (-2×22)/(5×22) + (-3×5)/(22×5)
= -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 = (-7×10)/(11×10) + (-59×1)/(110×1)
= -70/110 + -59/110
Since the denominators are same we can add them directly,
= (-70 -59)/110 = -129/110
∴ 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)
Taking LCM for 1 and 5 is 5
(-2×5)/(1×5) + (3×1)/(5×1)

-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
(-7×3)/(5×3) + (-4×5)/(3×5)
-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)) = (3×3)/(5×3) + (-4×5)/(3×5)
= 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 = (-2×15)/(1×15) + (-11×1)/(15×1)
= -30/15 + -11/15
Since the denominators are same we can add them directly,
= (-30 -11)/15 = -41/15
∴ 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
(vii) -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
(-2×3)/(5×3) + (6×5)/(3×5)
-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
(-8×3)/ (7×3) + (1×7)/ (3×7)

-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
(6×3)/ (5×3) + (2×15)/ (1×15) + (-11×1)/ (15×1)
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
(-9×9)/ (7×9) + (-8×7)/ (9×7) + (17×3)/ (21×3)
-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
11/12 + -17/3 + -14/2
By taking LCM for 12, 3 and 2 we get, 12
(11×1)/(12×1) + (-17×4)/(3×4) + (-14×6)/(2×6)
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
(-3×18)/(1×18) + (-5×3)/(6×3) + (-4×2)/(9×2)
-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
(12×3)/(5×3) + (-13×1)/(15×1)
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
(5×8)/(13×8) + (-5×13)/(8×13)
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

2/3 + 1/3 + -4/5 + 2/5
(2+1)/3 + (-4+2)/5
3/3 + -2/5
1/1 + -2/5
By taking LCM for 1 and 5 we get, 5
(1×5)/(1×5) + (-2×1)/(5×1)
5/5 + -2/5
Since the denominators are same can be added directly
(5-2)/5 = 3/5

(vi) 1/8 + 5/12 + 2/7 + 7/12 + 9/7 + -5/16
Solution: Firstly group the rational numbers with same denominators
1/8 + 5/12 + 7/12 + 2/7 + 9/7 + -5/16
1/8 + (5+7)/12 + (2+9)/7 + -5/16
1/8 + 12/12 + 11/7 + -5/16
1/8 + 1/1 + 11/7 + -5/16
By taking LCM for 8, 1, 7 and 16 we get, 112
(1×14)/(8×14) + (1×112)/(1×112) + (11×16)/(7×16) + (-5×7)/(16×7)
14/112 + 112/112 + 176/112 + -35/112
Since the denominators are same can be added directly
(14+112+176-35)/112 = 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) ¼, -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 = (-3×1)/(8×1) - (1×2)/(4×2) = -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 = (5×1)/(6×1) - (-2×2)/(3×2) = 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 = (-13×1)/(14×1) - (-6×2)/(7×2) = -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 = (-7×3)/(22×3) - (-8×2)/(33×2) = -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 = (2×5 - 3×3)/15
= 1/15

(ii) -4/7 – 2/-3
Solution: convert the denominator to positive number by multiplying by -1
2/-3 = -2/3
-4/7 – -2/3
By taking LCM for 7 and 3 which is 21
-4/7 – -2/3 = (-4×3 - -2×7)/21
= (-12+14)/21
= 2/21

(iii) 4/7 - -5/-7

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

-5/-7 = 5/7

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 = (-2×9 - 5×1)/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

3/8 – -2/7

By taking LCM for 8 and 7 which is 56

3/8 – -2/7 = (3×7 - -2×8)/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 = (-4×2 - -5×1)/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 = (-5×1 - -2×2)/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 = (13×5 - 12×3)/75

= (65 - 36)/75

= 29/75

(ix) -6/13 - -7/13

Solution: Since the denominators are same we can subtract directly

-6/13 - -7/13 = (-6+7)/13

= 1/13

(x) 7/24 – 19/36

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

7/24 – 19/36 = (7×3 - 19×2)/72

= (21 - 38)/72

= -17/72

(xi) 5/63 - -8/21

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

5/63 - -8/21 = (5×1 - -8×3)/63

= (5 + 24)/63

= 29/63

3. The sum of the two numbers is 5/9. If one of the numbers is 1/3, find the other.

Solution: Let us note down the given details

Sum of two numbers = 5/9

One of the number = 1/3

By using the formula,

Other number = sum of number – given number

= 5/9 – 1/3

By taking LCM for 9 and 3 which is 9

5/9 – 1/3 = (5×1 - 1×3)/9

= (5 - 3)/9

= 2/9

∴ the other number is 2/9

4. The sum of the two numbers is -1/3. If one of the numbers is -12/3, find the other.

Solution: Let us note down the given details

Sum of two numbers = -1/3

One of the number = -12/3

By using the formula,

Other number = sum of number – given number

= -1/3 – -12/3

Since the denominators are same we can subtract directly

= (-1+12)/3 = 11/3

∴ 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 = -5/1
By using the formula,
Other number = sum of number – given number
= -4/3 – -5/1
By taking LCM for 3 and 1 which is 3
-4/3 – -5/1 = (-4×1 - -5×3)/3
= (-4 + 15)/3
= 11/3
∴ the other number is 11/3

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 = -8/1
One of the number = -15/7
Let us consider the other number as x
x + -15/7 = -8
(7x -15)/7 = -8
7x -15 = -8×7
7x – 15 = -56
7x = -56+15
x = -41/7
∴ 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
So, -7/8 + x = 5/9
(-7 + 8x)/8 = 5/9
(-7 + 8x) × 9 = 5 × 8
-63 + 72x = 40
72x = 40 + 63
x = 103/72
∴ the required number is 103/72

8. What number should be added to -5/11 so as to get 26/33?

Solution: Let us consider a number as x to be added to -5/11 to get 26/33

So, -5/11 + x = 26/33

x = 26/33 + 5/11

let us take LCM for 33 and 11 which is 33

x = (26×1 + 5×3)/33

= (26 + 15)/33

= 41/33

∴ the required number is 41/33

9. What number should be added to -5/7 to get -2/3?

Solution: Let us consider a number as x to be added to -5/7 to get -2/3

So, -5/7 + x = -2/3

x = -2/3 + 5/7

let us take LCM for 3 and 7 which is 21

x = (-2×7 + 5×3)/21

= (-14 + 15)/21

= 1/21

∴ the required number is 1/21

10. What number should be subtracted from -5/3 to get 5/6?

Solution: Let us consider a number as x to be subtracted from -5/3 to get 5/6

So, -5/3 - x = 5/6

x = -5/3 – 5/6

let us take LCM for 3 and 6 which is 6

x = (-5×2 - 5×1)/6

= (-10 - 5)/6

= -15/6

Further we can divide by 3 we get,

-15/6 = -5/2

∴ the required number is -5/2

11. What number should be subtracted from 3/7 to get 5/4?

Solution: Let us consider a number as x to be subtracted from 3/7 to get 5/4

So, 3/7 - x = 5/4

x = 3/7 – 5/4

let us take LCM for 7 and 4 which is 28

x = (3×4 - 5×7)/28

= (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 + 2×5 + 3×3)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 + 1×15 + 1×10 + 1×6)30 = 3
30x + 15 + 10 + 6 = 3 × 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
So, (3/4 – 2/3) - x = -1/6
x = 3/4 – 2/3 + 1/6
Let us take LCM for 4 and 3 which is 12
x = (3×3 - 2×4)/12 + 1/6
= (9 - 8)/12 + 1/6
= 1/12 + 1/6
Let us take LCM for 12 and 6 which is 12
= (1×1 + 1×2)/12
= 3/12
Further we can divide by 3 we get,
3/12 = 1/4 ∴ the required number is ¼

15. Fill in the blanks:
(i) -4/13 - -3/26 = ….
Solution:
-4/13 - -3/26
Let us take LCM for 13 and 26 which is 26
(-4×2 + 3×1)/26
(-8+3)/26 = -5/26

(ii) -9/14 + …. = -1
Solution:
Let us consider the number to be added as x
-9/14 + x = -1
x = -1 + 9/14
By taking LCM as 14 we get,
x = (-1×14 + 9)/14
= (-14+9)/14
= -5/14

(iii) -7/9 + …. =3
Solution:
Let us consider the number to be added as x
-7/9 + x = 3
x = 3 + 7/9
By taking LCM as 9 we get,
x = (3×9 + 7)/9
= (27 + 7)/9
= 34/9

(iv) … + 15/23 = 4
Solution:
Let us consider the number to be added as x
x + 15/23 = 4
x = 4 - 15/23
By taking LCM as 23 we get,
x = (4×23 - 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) 3/4 + 5/6 + -7/8
Solution:
3/4 + 5/6 -7/8
By taking LCM for 4, 6 and 8 which is 24
((3×6) + (5×4) – (7×3))/24
(18 + 20 - 21)/24
(38-21)/24
17/24

(ii) 2/3 + -5/6 + -7/9
Solution:
2/3 + -5/6 + -7/9
By taking LCM for 3, 6 and 9 which is 18
((2×6) + (-5×3) + (-7×2))/18
(12 - 15 - 14)/18
-17/18

(iii) -11/2 + 7/6 + -5/8
Solution:
-11/2 + 7/6 + -5/8
By taking LCM for 2, 6 and 8 which is 24
((-11×12) + (7×4) + (-5×3))/24
(-132 + 28 - 15)/24
-119/24

(iv) -4/5 + -7/10 + -8/15
Solution:
-4/5 + -7/10 + -8/15
By taking LCM for 5, 10 and 15 which is 30
((-4×6) + (-7×3) + (-8×2))/30
(-24 - 21 - 16)/30
-61/30

(v) -9/10 + 22/15 + 13/-20
Solution:
-9/10 + 22/15 + 13/-20

By taking LCM for 10, 15 and 20 which is 60
((-9×6) + (22×4) + (-13×3))/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
((5×2) + (-3×3) + (-7×2) + (3×6))/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
((-8×8) + (-1×6) + (-11×4) + (3×3) – (3×24))/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
((6×9) + (1×63) + (-7×7) + (19×3) + (-12×9))/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
((15×12) + (9×3) + (-11×8) + (6×24) + (-7×4))/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
((-7×35) + (-9×28) + (19×14) + (11×10))/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
((-7×3) + (5×4) + (-1×6) + (-5×2) + (2×12))/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
((-3×2) + (5×1) - (7×1))/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
((5×2) - (7×1) + (-2×2))/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

((5×3) - (7×2) - (-2×4))/12
(15 - 14 + 8)/12
9/12
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
((-2×14) - (-3×7) - (-4×10))/70
(-28 + 21 + 40)/70
33/70

(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
((5×5) + (-2×6) - (-2×2))/30
(25 - 12 + 4)/30
17/30

(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
((3×9) - (-2×8) + (-5×2))/72
(27 + 16 - 10)/72
33/72
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) × (5/4) = (7×5)/(11×4)

= 35/44

(ii) 5/7 by -3/4

Solution:

5/7 by -3/4

(5/7) × (-3/4) = (5×-3)/(7×4)

= -15/28

(iii) -2/9 by 5/11

Solution:

-2/9 by 5/11

(-2/9) × (5/11) = (-2×5)/(9×11)

= -10/99

(iv) -3/17 by -5/-4

Solution:

-3/17 by -5/-4

(-3/17) × (-5/-4) = (-3×-5)/(17×-4)

= 15/-68

= -15/68

(v) 9/-7 by 36/-11

Solution:

9/-7 by 36/-11

(9/-7) × (36/-11) = (9×36)/(-7×-11)

= 324/77

(vi) -11/13 by -21/7

Solution:

-11/13 by -21/7

(-11/13) × (-21/7) = (-11×-21)/(13×7)

= 231/91 = 33/13

(vii) -3/5 by -4/7
Solution:
-3/5 by -4/7
(-3/5) × (-4/7) = (-3×-4)/(5×7)
= 12/35

(viii) -15/11 by 7
Solution:
-15/11 by 7
(-15/11) × 7 = (-15×7)/11
= -105/11

2. Multiply:
(i) -5/17 by 51/-60
Solution:
-5/17 by 51/-60
(-5/17) × (51/-60) = (-5×51)/(17×-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) × (-55/36) = (-6×-55)/(11×36)
= 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) × (-5/16) = (-8×-5)/(25×16)
= 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) × (-49/36) = (6×-49)/(7×36)
= 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) × (-7/-16) = (8×-7)/(-9×-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
(-8/9) × (3/64) = (-8×3)/(9×64)
= -24/576
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) × (14/5)
Solution:
(-16/21) × (14/5) = (-16/3) × (2/5) (divisible by 7)
= (-16×2)/(3×5)
= -32/15

(ii) (7/6) × (-3/28)
Solution:
(7/6) × (-3/28) = (1/2) × (-1/4) (divisible by 7 and 3)
= -1/8

(iii) (-19/36) × 16
Solution:
-19/36 × 16 = (-19/9) × 4 (divisible by 4)
= (-19×4)/9 = -76/9

(iv) (-13/9) × (27/-26)
Solution:
(-13/9) × (27/-26) = (-1/1) × (3/-2) (divisible by 13 and 9)
= -3/-2 = 3/2

(v) (-9/16) × (-64/-27)
Solution:
(-9/16) × (-64/-27) = (-1/1) × (-4/-3) (divisible by 9 and 16)
= 4/-3 = -4/3

(vi) (-50/7) × (14/3)
Solution:
(-50/7) × (14/3) = (-50/1) × (2/3) (divisible by 7)
= (-50×2)/(1×3)
= -100/3

(vii) (-11/9) × (-81/-88)
Solution:
(-11/9) × (-81/-88) = (-1/1) × (-9/-8) (divisible by 11 and 9)
= (-1×-9)/(1×-8)
= 9/-8 = -9/8

(viii) (-5/9) × (72/-25)
Solution:
(-5/9) × (72/-25) = (-1/1) × (8/-5) (divisible by 5 and 9)
= (-1×8)/(1×-5)
= -8/-5 = 8/5

4. Simplify:
(i) ((25/8) × (2/5)) – ((3/5) × (-10/9))
Solution:
((25/8) × (2/5)) – ((3/5) × (-10/9)) = (25×2)/(8×5) – (3×-10)/(5×9)
= 50/40 - -30/45
= 5/4 + 2/3 (divisible by 5 and 3)
By taking LCM for 4 and 3 which is 12
= ((5×3) + (2×4))/12
= (15+8)/12
= 23/12

(ii) ((1/2) × (1/4)) + ((1/2) × 6)

Solution:

((1/2) × (1/4)) + ((1/2) × 6) = (1×1)/(2×4) + (1×3) (divisible by 2)

= 1/8 +3

By taking LCM for 8 and 1 which is 8

= ((1×1) + (3×8))/8

= (1+24)/8

= 25/8

(iii) (-5 × (2/15)) - (-6 × (2/9))

Solution:

(-5 × (2/15)) - (-6 × (2/9)) = (-1 × (2/3)) - (-2 × (2/3)) (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) × (5/3)) + ((13/2) × (5/6))

Solution:

((-9/4) × (5/3)) + ((13/2) × (5/6)) = (-9×5)/(4×3) + (13×5)/(2×6)

= -45/12 + 65/12

Since the denominators are same we can add directly

= (-45+65)/12

= 20/12 (divisible by 2)

= 10/6 (divisible by 2)

= 5/3

(v) ((-4/3) × (12/-5)) + ((3/7) × (21/15))

Solution:

((-4/3) × (12/-5)) + ((3/7) × (21/15)) = ((-4/1) × (4/-5)) + ((1/1) × (3/5)) (divisible by 3, 7)

= (-4×4)/(1×-5) + (1×3)/(1×5)

= -16/-5 + 3/5

Since the denominators are same we can add directly

= (16+3)/5

= 19/5

(vi) ((13/5) × (8/3)) - ((-5/2) × (11/3))

Solution:

((13/5) × (8/3)) - ((-5/2) × (11/3)) = (13×8)/(5×3) - (-5×11)/(2×3)

= 104/15 + 55/6

By taking LCM for 15 and 6 which is 30

= ((104×2) + (55×5))/30

= (208+275)/30

= 483/30

(vii) ((13/7) × (11/26)) - ((-4/3) × (5/6))

Solution:

((13/7) × (11/26)) - ((-4/3) × (5/6)) = ((1/7) × (11/2)) - ((-2/3) × (5/3)) (divisible by 13, 2)

= (1×11)/(7×2) - (-2×5)/(3×3)

= 11/14 + 10/9

By taking LCM for 14 and 9 which is 126

= ((11×9) + (10×14))/126

= (99+140)/126

= 239/126

(viii) ((8/5) × (-3/2)) + ((-3/10) × (11/16))

Solution:

((8/5) × (-3/2)) + ((-3/10) × (11/16)) = ((4/5) × (-3/1)) + ((-3/10) × (11/16)) (divisible by 2)

= (4×-3)/(5×1) + (-3×11)/(10×16)

= -12/5 - 33/160

By taking LCM for 5 and 160 which is 160

= ((-12×32) - (33×1))/160

= (-384 - 33)/160

= -417/160

5. Simplify:

(i) ((3/2) × (1/6)) + ((5/3) × (7/2) - (13/8) × (4/3))

Solution:

((3/2) × (1/6)) + ((5/3) × (7/2) - (13/8) × (4/3)) =

((1/2) × (1/2)) + ((5/3) × (7/2) - (13/2) × (1/3))

(1×1)/(2×2) + (5×7)/(3×2) - (13×1)/(2×3)

1/4 + 35/6 – 13/6

By taking LCM for 4 and 6 which is 24

((1×6) + (35×4) - (13×4))/24

(6 + 140 - 52)/24

94/24

Further divide by 2 we get, 94/24 = 47/12

(ii) ((1/4) × (2/7)) - ((5/14) × (-2/3) + (3/7) × (9/2))

Solution:

((1/4) × (2/7)) - ((5/14) × (-2/3) + (3/7) × (9/2)) =
((1/2) × (1/7)) - ((5/7) × (-1/3) + (3/7) × (9/2))
(1×1)/(2×7) - (5×-1)/(7×3) + (3×9)/(7×2)
1/14 + 5/21 + 27/14
By taking LCM for 14 and 21 which is 42
((1×3) + (5×2) + (27×3))/42
(3 + 10 + 81)/42
94/42
Further divide by 2 we get, 94/42 = 47/21

(iii) ((13/9) × (-15/2)) + ((7/3) × (8/5) + (3/5) × (1/2))

Solution:

((13/3) × (-5/2)) + ((7/3) × (8/5) + (3/5) × (1/2)) =
(13×-5)/(3×2) + (7×8)/(3×5) + (3×1)/(5×2)
-65/6 + 56/15 + 3/10
By taking LCM for 6, 15 and 10 which is 30
((-65×5) + (56×2) + (3×3))/30
(-325 + 112 + 9)/30
-204/30
Further divide by 2 we get, -204/30 = -102/15

(iv) ((3/11) × (5/6)) - ((9/12) × (4/3) + (5/13) × (6/15))

Solution:

((3/11) × (5/6)) - ((9/12) × (4/3) + (5/13) × (6/15)) =
((1/11) × (5/2)) - ((1/1) × (1/1) + (1/13) × (2/1))
(1×5)/(11×2) – 1/1 + (1×2)/(13×1)
5/22 – 1/1 + 2/13
By taking LCM for 22, 1 and 13 which is 286
((5×13) - (1×286) + (2×22))/286
(65 - 286 + 44)/286
-177/286

EXERCISE 1.6 PAGE NO: 1.31

1. Verify the property: x × y = y × x by taking:
(i) x = -1/3, y = 2/7
Solution:
By using the property
x × y = y × x
-1/3 × 2/7 = 2/7 × -1/3
(-1×2)/(3×7) = (2×-1)/(7×3)
-2/21 = -2/21
Hence, the property is satisfied.

(ii) x = -3/5, y = -11/13
Solution:
By using the property
x × y = y × x
-3/5 × -11/13 = -11/13 × -3/5
(-3×-11)/(5×13) = (-11×-3)/(13×5)
33/65 = 33/65
Hence, the property is satisfied.

(iii) x = 2, y = 7/-8
Solution:
By using the property
x × y = y × x
2 × 7/-8 = 7/-8 × 2
(2×7)/-8 = (7×2)/-8
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 × y = y × x
0 × -15/8 = -15/8 × 0
0 = 0
Hence, the property is satisfied.

2. Verify the property: x × (y × z) = (x × y) × z by taking:
(i) x = -7/3, y = 12/5, z = 4/9
Solution:
By using the property
x × (y × z) = (x × y) × z
-7/3 × (12/5 × 4/9) = (-7/3 × 12/5) × 4/9
(-7×12×4)/(3×5×9) = (-7×12×4)/(3×5×9)
-336/135 = -336/135
Hence, the property is satisfied.

(ii) x = 0, y = -3/5, z = -9/4
Solution:
By using the property
x × (y × z) = (x × y) × z
0 × (-3/5 × -9/4) = (0 × -3/5) × -9/4
0 = 0
Hence, the property is satisfied.

(iii) x = 1/2, y = 5/-4, z = -7/5
Solution:
By using the property
x × (y × z) = (x × y) × z
1/2 × (5/-4 × -7/5) = (1/2 × 5/-4) × -7/5
(1×5×-7)/(2×-4×5) = (1×5×-7)/(2×-4×5)
-35/-40 = -35/-40
35/40 = 35/40
Hence, the property is satisfied.

(iv) x = 5/7, y = -12/13, z = -7/18
Solution:
By using the property
x × (y × z) = (x × y) × z
5/7 × (-12/13 × -7/18) = (5/7 × -12/13) × -7/18
(5×-12×-7)/(7×13×18) = (5×-12×-7)/(7×13×18)
420/1638 = 420/1638
Hence, the property is satisfied.

3. Verify the property: x × (y + z) = x × y + x × z by taking:
(i) x = -3/7, y = 12/13, z = -5/6
Solution:
By using the property
x × (y + z) = x × y + x × z
-3/7 × (12/13 + -5/6) = -3/7 × 12/13 + -3/7 × -5/6
-3/7 × ((12×6) + (-5×13))/78 = (-3×12)/(7×13) + (-3×-5)/(7×6)
-3/7 × (72-65)/78 = -36/91 + 15/42
-3/7 × 7/78 = (-36×6 + 15×13)/546
-1/26 = (196-216)/546
= -21/546
= -1/26
Hence, the property is verified.

(ii) x = -12/5, y = -15/4, z = 8/3
Solution:
By using the property
x × (y + z) = x × y + x × z
-12/5 × (-15/4 + 8/3) = -12/5 × -15/4 + -12/5 × 8/3
-12/5 × ((-15×3) + (8×4))/12 = (-12×-15)/(5×4) + (-12×8)/(5×3)
-12/5 × (-45+32)/12 = 180/20 - 96/15
-12/5 × -13/12 = 9 – 32/5
13/5 = (9×5 - 32×1)/5
= (45-32)/5
= 13/5
Hence, the property is verified.

(iii) x = -8/3, y = 5/6, z = -13/12
Solution:
By using the property
x × (y + z) = x × y + x × z
-8/3 × (5/6 + -13/12) = -8/3 × 5/6 + -8/3 × -13/12
-8/3 × ((5×2) - (13×1))/12 = (-8×5)/(3×6) + (-8×-13)/(3×12)
-8/3 × (10-13)/12 = -40/18 + 104/36
-8/3 × -3/12 = (-40×2 + 104×1)/36
2/3 = (-80+104)/36
= 24/36
= 2/3
Hence, the property is verified.

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

Solution:

By using the property

x × (y + z) = x × y + x × z

-3/4 × (-5/2 + 7/6) = -3/4 × -5/2 + -3/4 × 7/6

-3/4 × ((-5×3) + (7×1))/6 = (-3×-5)/(4×2) + (-3×7)/(4×6)

-3/4 × (-15+7)/6 = 15/8 - 21/24

-3/4 × -8/6 = (15×3 - 21×1)/24

-3/4 × -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 × ((35/24) + (10/1))

Solution:

3/5 × 35/24 + 3/5 × 10

1/1 × 7/8 + 6/1

By taking LCM for 8 and 1 which is 8

7/8 + 6 = (7×1 + 6×8)/8

= (7+48)/8

= 55/8

(ii) -5/4 × ((8/5) + (16/5))

Solution:

-5/4 × 8/5 + -5/4 × 16/5

-1/1 × 2/1 + -1/1 × 4/1

-2 + -4

-2 – 4

-6

(iii) 2/7 × ((7/16) - (21/4))

Solution:

2/7 × 7/16 - 2/7 × 21/4

1/1 × 1/8 - 1/1 × 3/2

1/8 – 3/2

By taking LCM for 8 and 2 which is 8

1/8 – 3/2 = (1×1 - 3×4)/8

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

(iv) 3/4 × ((8/9) - 40)
Solution:
3/4 × 8/9 - 3/4 × 40
1/1 × 2/3 - 3/1 × 10
2/3 – 30/1
By taking LCM for 3 and 1 which is 3
2/3 – 30/1 = (2×1 - 30×3)/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 × 9/4
(vii) -5/8 × 16/15
(viii) -2 × -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 × 9/4 is
Firstly solve for 2/3 × 9/4 = 1/1 × 3/2 = 3/2

∴ The reciprocal of 3/2 is 2/3

(vii) The reciprocal of -5/8 × 16/15
Firstly solve for -5/8 × 16/15 = -1/1 × 2/3 = -2/3
∴ The reciprocal of -2/3 is 3/-2

(viii) The reciprocal of -2 × -3/5
Firstly solve for -2 × -3/5 = 6/5
∴ The reciprocal of 6/5 is 5/6

(ix) The reciprocal of -1 is -1

(x) The reciprocal of 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) -5/16 × 8/15 = 8/15 × -5/16
(ii) -17/5 ×9 = 9 × -17/5
(iii) 7/4 × (-8/3 + -13/12) = 7/4 × -8/3 + 7/4 × -13/12
(iv) -5/9 × (4/15 × -9/8) = (-5/9 × 4/15) × -9/8
(v) 13/-17 × 1 = 13/-17 = 1 × 13/-17
(vi) -11/16 × 16/-11 = 1
(vii) 2/13 × 0 = 0 = 0 × 2/13
(viii) -3/2 × 5/4 + -3/2 × -7/6 = -3/2 × (5/4 + -7/6)
Solution:

(i) -5/16 × 8/15 = 8/15 × -5/16
According to commutative law, a/b × c/d = c/d × a/b
The above rational number satisfies commutative property.

(ii) -17/5 ×9 = 9 × -17/5
According to commutative law, a/b × c/d = c/d × a/b
The above rational number satisfies commutative property.

(iii) 7/4 × (-8/3 + -13/12) = 7/4 × -8/3 + 7/4 × -13/12
According to given rational number, a/b × (c/d + e/f) = (a/b × c/d) + (a/b × e/f)
Distributivity of multiplication over addition satisfies.

(iv) -5/9 × (4/15 × -9/8) = (-5/9 × 4/15) × -9/8
According to associative law, a/b × (c/d × e/f) = (a/b × c/d) × e/f
The above rational number satisfies associativity of multiplication.

(v) 13/-17 × 1 = 13/-17 = 1 × 13/-17
Existence of identity for multiplication satisfies for the given rational number.

(vi) -11/16 × 16/-11 = 1
Existence of multiplication inverse satisfies for the given rational number.

(vii) 2/13 × 0 = 0 = 0 × 2/13
By using a/b × 0 = 0 × a/b
Multiplication of zero satisfies for the given rational number.

(viii) -3/2 × 5/4 + -3/2 × -7/6 = -3/2 × (5/4 + -7/6)
According to distributive law, (a/b × c/d) + (a/b × e/f) = a/b × (c/d + e/f)
The above rational number satisfies satisfies distributive law.

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 ≠ 0 is …
(xii) $(17\times12)^{-1} = 17^{-1} \times$ …
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) $(17\times12)^{-1} = 17^{-1} \times 12^{-1}$

8. Fill in the blanks:
(i) -4 × 7/9 = 79 × …
Solution:
-4 × 7/9 = 79 × -4
By using commutative property.

(ii) 5/11 × -3/8 = -3/8 × …
Solution:
5/11 × -3/8 = -3/8 × 5/11
By using commutative property.

(iii) 1/2 × (3/4 + -5/12) = 1/2 × … + … × -5/12
Solution:
1/2 × (3/4 + -5/12) = 1/2 × 3/4 + 1/2 × -5/12
By using distributive property.

(iv) -4/5 × (5/7 + -8/9) = (-4/5 × …) + -4/5 × -8/9
Solution:
-4/5 × (5/7 + -8/9) = (-4/5 × 5/7) + -4/5 × -8/9
By using distributive property.

EXERCISE 1.7 PAGE NO: 1.35

1. Divide:
(i) 1 by 1/2
Solution:
1/1/2 = 1 × 2/1 = 2

(ii) 5 by -5/7
Solution:
5/-5/7 = 5 × 7/-5 = -7

(iii) -3/4 by 9/-16
Solution:
(-3/4) / (9/-16)
(-3/4) × -16/9 = 4/3

(iv) -7/8 by -21/16
Solution:
(-7/8) / (-21/16)
(-7/8) × 16/-21 = 2/3

(v) 7/-4 by 63/64
Solution:
(7/-4) / (63/64)
(7/-4) × 64/63 = -16/9

(vi) 0 by -7/5
Solution:
0 / (7/5) = 0

(vii) -3/4 by -6
Solution:
(-3/4) / -6
(-3/4) × 1/-6 = 1/8

(viii) 2/3 by -7/12
Solution:
(2/3) / (-7/12)
(2/3) × 12/-7 = -8/7

(ix) -4 by -3/5
Solution:
-4 / (-3/5)
-4 × 5/-3 = 20/3

(x) -3/13 by -4/65
Solution:
(-3/13) / (-4/65)
(-3/13) × (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) / (26/15)
(2/5) × (15/26)
(2/1) × (3/26) = (2×3)/ (1×26) = 6/26 = 3/13

(ii) 10/3 ÷ -35/12
Solution:
(10/3) / (-35/12)
(10/3) × (12/-35)
(10/1) × (4/-35) = (10×4)/ (1×-35) = -40/35 = -8/7

(iii) -6 ÷ -8/17
Solution:
-6 / (-8/17)
-6 × (17/-8)
-3 × (17/-4) = (-3×17)/ (1×-4) = 51/4

(iv) -40/99 ÷ -20
Solution:
(-40/99) / -20
(-40/99) × (1/-20)
(-2/99) × (1/-1) = (-2×1)/ (99×-1) = 2/99

(v) -22/27 ÷ -110/18
Solution:
(-22/27) / (-110/18)
(-22/27) × (18/-110)

(-1/9) × (6/-5)
(-1/3) × (2/-5) = (-1×2) / (3×-5) = 2/15

(vi) -36/125 ÷ -3/75
Solution:
(-36/125) / (-3/75)
(-36/125) × (75/-3)
(-12/25) × (15/-1)
(-12/5) × (3/-1) = (-12×3) / (5×-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
∴ other number can be obtained by dividing the product by the given number.
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
∴ other number is obtained by dividing the product by the given number.
Other number = (-8/9)/(-4/15)
= (-8/9) × (15/-4)
= (-2/3) × (5/-1)
= (-2×5) /(3×-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
So, x × -1/6 = -23/9
x = (-23/9)/(-1/6)
x = (-23/9) × (6/-1)
= (-23/3) × (2×-1)

= (-23×-2)/(3×1)
= 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 × -15/28 = -5/7
x = (-5/7)/(-15/28)
x = (-5/7) × (28/-15)
= (-1/1) × (4×-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
So, x × -8/13 = 24
x = (24)/(-8/13)
x = (24) × (13/-8)
= (3) × (13×-1)
= -39

8. By what number should -3/4 be multiplied in order to produce 2/3?
Solution:
Let us consider a number = x
So, x × -3/4 = 2/3
x = (2/3)/(-3/4)
x = (2/3) × (4/-3)
= -8/9

9. Find (x+y) ÷ (x-y), if
(i) x= 2/3, y= 3/2
Solution:
(x+y) ÷ (x-y)
(2/3 + 3/2) / (2/3 – 3/2)
((2×2 + 3×3)/6) / ((2×2 - 3×3)/6)
((4+9)/6) / ((4-9)/6)
(13/6) / (-5/6)
(13/6) × (6/-5)
-13/5

(ii) x= 2/5, y= 1/2
Solution:
(x+y) ÷ (x-y)
(2/5 + 1/2) / (2/5 – 1/2)
((2×2 + 1×5)/10) / ((2×2 - 1×5)/10)
((4+5)/10) / ((4-5)/10)
(9/10) / (-1/10)
(9/10) × (10/-1)
-9

(iii) x= 5/4, y= -1/3
Solution:
(x+y) ÷ (x-y)
(5/4 - 1/3) / (5/4 + 1/3)
((5×3 - 1×4)/12) / ((5×3 + 1×4)/12)
((15-4)/12) / ((15+4)/12)
(11/12) / (19/12)
(11/12) × (12/19)
11/19

(iv) x= 2/7, y= 4/3
Solution:
(x+y) ÷ (x-y)
(2/7 + 4/3) / (2/7 - 4/3)
((2×3 + 4×7)/21) / ((2×3 - 4×7)/21)
((6+28)/21) / ((6-28)/21)
(34/21) / (-22/21)
(34/21) × (21/-22)
-34/22
-17/11

(v) x= 1/4, y= 3/2
Solution:
(x+y) ÷ (x-y)
(1/4 + 3/2) / (1/4 - 3/2)
((1×1 + 3×2)/4) / ((1×1 - 3×2)/4)
((1+6)/4) / ((1-6)/4)
(7/4) / (-5/4)
(7/4) × (4/-5) = -7/5

10. The cost of 7 2/3 meters of rope is Rs 12 ¾. 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 × 23/3 = 51/4
x = (51/4)/(23/3)
x = (51/4) × (3/23)

= (51×3) / (4×23)
= 153/92
= 1 61/92

∴ cost per meter is Rs 1 61/92

11. The cost of 2 1/3 meters of cloth is Rs 75 ¼. 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
So, x × 7/3 = 301/4
x = (301/4)/(7/3)
x = (301/4) × (3/7)

= (301×3) / (4×7)
= (43×3) / (4×1)
= 129/4
= 32.25

∴ 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
So, (-33/16)/x = -11/4
-33/16 = x × -11/4
x = (-33/16) / (-11/4)
= (-33/16) × (4/-11)
= (-33×4)/(16×-11)
= (-3×1)/(4×-1)
= ¾

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
((-13×7) + (12×5))/35
(-91+60)/35
-31/35

Product of -31/7 and -1/2
-31/7 × -1/2
(-31×-1)/(7×2)
31/14
∴ by dividing the sum and the product we get,
(-31/35) / (31/14)
(-31/35) × (14/31)
(-31×14)/(35×31)
-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)
((65×7 + 12×12)/84) / ((65×7 - 12×12)/84)
((455+144)/84) / ((455 - 144)/84)
(599/84) / (311/84)
599/84 × 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
= 9/4
∴ 9/4 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
(-3+1)/2 = -2/2 = -1
So, the rational number between -3 and 1 is -1
∴ -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
(1/3)/2
1/6
The rational numbers between -2/9 and 1/6 is
(-2/9 + 1/6)/2
((-2×2 + 1×3)/18)/2
(-4+3)/36
-1/36
∴ 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
((1×2 + 1×5)/10)/2
(2+5)/20 = 7/20
The rational numbers between 1/5 and 7/20 is
(1/5 + 7/20)/2
((1×4 + 7×1)/20)/2
(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 = (1×2)/4 = 2/4
1/4 = (1×20 / 4×20) = 20/80
1/2 = (2×20 / 4×20) = 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 = (-2×2)/10 = -4/10
1/2 = (1×5)/10 = 5/10
-2/5 = (-4×2 / 10×2) = -8/20
1/2 = (5×2 / 10×2) = 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× 20 / 5×20 = 60/100
3/4 = 3×25 / 4×25 = 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