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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.