CLASS VII SPPS KAMLAPUR

RATIONAL NUMBERS

Ch-4

Page number 58 EXERCISE (4a)

1. write the standard form of the following rational numbers

a. 48/75

Here we see that HCF of 48 and 75 is 3.

now, dividing both numerator and denominator by HCF.

48/75 = 48÷3/75÷3 = 16/25

Which is the standard form.

b. -60/96

Here, we see that HCF of 60 and 96 is 12.
Thus, dividing both numerator and denominator by their HCF.
So, - 60/96 = - 66÷12/96÷12 = -5/8
So, this is the standard form.

c. 56/-72

Yeah, we see that HCF of 56 and 72 is 8.
Thus, dividing both numerator and denominator by HCF
so, 56/-72 = 56÷8/-72÷8 = 7/-9
but, in standard form denominator can't be negative.
So, multiplying numerator and denominator by -1.
7×-1/-9×-1 = -7/9
so, this is the standard form

d. 66 /111
HCF of 66 and 111 is 3.
Now, 66÷3/111÷3 = 22/37
so, this is the standard form.

e. 45/105
HCF of 45 and 105 is 15.
now, 45÷15/105÷15 = 3/7
so, this is the standard form.

2. represent the following rational numbers on the number line (sorry this is not possible through mobile)

3. write two equivalent rational numbers of the following rational numbers

a. – 18 /7

Ans : in order to find equivalent rational numbers we need to multiply numerator and denominator by same integers.

Thus, we have

-18×2/7×2 = -36/14 , -18×3/7×3 = -54/21

Thus -36/14 and -54/21 are equivalent rational numbers of – 18/7

b. 3/8

Ans : 3×2/8×2 = 6/16 , -3×3/8×3 = -9/24

e. 10/-16

Ans : first make denominator positive by multiplying numerator and denominator by -1.

10×(-1)/-16×(-1) = -10/16

$-10\times2/16\times2 = -20/32$, $-10\times3/16\times3 = -30/48$

4. use the property of cross products to put correct option out of >, < or = in the boxes for given rational numbers

a. -9/7 _ -63/49

now, cross product -9×49 __ -63×7

$-441 = -441$

$-9/7 = -63/49$

b. 7/13 ___ 15/18

now, cross product 7×18 __ 13×15

i.e. $126 \leq 195$

so, $7/13 \leq 15/18$

c. 3/-7 ___ -6/-5

first we should write in standard form

3/-7 has standard form -3/7 and -6/-5 has standard form 6/ 5.

now, cross product, -3×5 ___ 6×7

i.e. $-15 \leq 42$

So, $-3/7 \leq 6/5$

5. find the absolute value of the following rational numbers.

a. -145/388

absolute value of -145/388 = |-145/388| = 145/388

Reason: absolute value of a rational number can be obtained by removing negative sign.

b. 754/-121

absolute value of 754/-121 =|754/-121|= 754/121

e. -146/-785

absolute value of -146/-785 = |-146/-785| = 146/785

6. arrange the following rational numbers in ascending order
-2/3, -7/3 , -5/9 , -1/6 , 4/-9
Sol: here, all rational numbers are in standard form.
LCM of denominators 3, 3, 9, 6, 6, 9. = 3×3×2 = 18
now, convert all rational numbers into equivalent rational number having denominators equal to LCM. Thus,

-2/3 = -2×6/3×6 = -12/18
-7/3 = -7×6/3×6 = -42/18
-5/9 = -5×2/9×2 = -10/18
-5/6 = -5×3/6×3 = -15/18
-1/6 = -1×3/6×3 = -3/18
4/-9 = -4/9 = -4×2/9×2 = -8/18

Now, on arranging these equivalent rational numbers as per their numerator, we get

-42/18 , -15/18 , -12/18 , -10/18 , -8/18 , -3/18

Also, on replacing them with their corresponding rational number, we have given rational numbers in ascending order

-7/3 < -5/6 < -2/3 < -5/9 < 4/-9 < -1/6

7. arrange the following rational numbers in descending order.
b. 7/16 , 5/8 , -9/16 , -5/4 , ¾ , 9/8
Sol : first step to convert above in standard form.
Here, all are in the standard form.
Next find LCM of denominators. LCM = 2 × 2 × 2 × 2 = 16

convert all into equivalent rational numbers having denominators equal to LCM.
Thus,
7/16 = 7×1/16×1 = 7/16
5/8 = 5×2/8×2 = 10/16
-9/16 = -9×1/16×1 = -9/16
-5/4 = -5×4/4×4 = -20/16
¾ = 3×4/4×4 = 12/16
9/8 = 9×2/8×2 = 18/16

now, on arranging equivalent rational as per their numerator, we get

-20/16, -9/16 , 7/16 , 10/16 , 12/16 , 18/16

Also on replacing game with their corresponding rational we have given rational numbers in descending order.
9/8 > 3/4 > 5/8 > 7/16 > -9/16 > -5/4

8. write the smallest and largest rational number out of the given rational numbers.

a. 8/3 , 7/6 , 5/9 , -5/6 , 7/-9 , 5/-9

Ans : take LCM of denominators

LCM = 3 × 2 × 3 × 1 = 18

8/3 = 8×6/3×6 = 48/18

7/6 = 7×3/6×3 = 21/18

5/9 = 5×2/9×2 = 10/18

-5/6 = -5×3/6×3 = -15/18

7/-9 = -7/9 = -7×2/9×2 = -14/18

5/-9 = -5/9 = -5×2/9×2 = -10/18

among these, -15/18 is smallest i.e. -5/6 is smallest and 48/18 is largest i.e. 8/3 is largest

b. 6/5 , 3/4 , 9/20 , 7/10 , 13/10 , 8/5

Ans : LCM of 5, 4, 20, 10, 10, 5 is 20.

6/5 = 6×4/5×4 = 24/20

3/4 = 3×5/4×5 = 15/20

9/20 = 9×1/20×1 = 9/20

7/10 = 7×2/10×2 = 14/20

13/10 = 13×2/10×2 = 26/20

8/5 = 8×4/5×4 = 32/20

So,, among these equivalent rational numbers, 9/20 is smallest and 32/20 is largest.

so, rational number corresponding to 9/20 is 9/20 (smallest)

and rational number corresponding to 32/20 is 8/5 (largest)

PAGE NUMBER 59

TRY THESE

Find the sum of – 5/9, 4/9 and -7/9.

Sol : - 5/9 + 4/9 + -7/9 = -5+4+(-7)/9 = -8/9

Reason : if rational numbers have same denominators, we add the numerator simply.

find the sum of 2/3 and -7/9

Sol : here we see that 9 is a multiple of 3 and if we divide 9 by 3, we get 3 as quotient. Thus, we need to multiply and divide 2/3 by 3 i.e., 2×3/3×3 = 6/9

Here, 2/3 = 6/9 So, 6/9 and -7/9 are equivalent rational numbers.

now, on adding 6/9 and-7/9 , we get

6/9 + (-7/9) = -1/9

So, 2/3 + (-7/9) = -1/9

find the sum of 5/12 and -4/5.

Sol : hair denominators 12 and 5 are coprime since both have only common factor 1. First we make equivalent rational numbers having same denominator.

5/12 + (-4/5) = 5×5/12×5 + (-4)×12/5×12 = 25/60 + (-48)/60 = -23/60

PAGE NUMBER 61

TRY THESE

subtract -4/9 from 7/9

Sol : additive inverse of -4/9 is 4/9

We will add 4/9 to 7/9

The resultant sum is difference of 7/9 and -4/9

Hence, 7/9 –(-4/9) = 7+4/9 = 11/9

PAGE NUMBER 62 # EXERCISE 4B

1. find the sum of the following rational numbers
   a. 3/9 and 7/9

   Sol : 3/9 + 7/9 = 10/9

   b. 2/15 and -21/15

   Sol : 2/15 + (-21/15) = 2-21/15 = -19/15

2. Subtract the following.
   a. 3/10 from 5/10 Ans : 5/10 – 3/10 = 2/10 = 1/5
   b. 1/9 from -6/9 Ans : -6/9 – 1/9 = -6-1/9 = -7/9
   c. -5/4 from 7/12 Ans :7/12 – (-5/4) = 7/12 – (-5×3/4×3) = 7-(-15)/12 = 22/12=11/6
   d. 2/3 from 1/15 Ans : 1/15 – 2/3 = 1/15 – 2×5/3×5 = 1+(-10)/15 = -9/15 = -3/5
   e. -8/16 from-11/60 Ans : -11/60 –(-8/16) =-11/60 + 8/16

      LCM of 60 and 16 = 2 × 2 × 15 × 4 = 240

      make equivalent rational numbers.

      -11/60 = -11×4/60×4 = -44/240

      8/16 = 8×15/16×15 = 120/240

      So, -11/60 –(-8/16) = -11/60 + 8/16 = -44/240 + 120/240 = 76/240

      =76÷HCF/240÷HCF = 76÷4/240÷4 = 19/60

   g.-7/9 from 2/5 Ans : 2/5 –(-7/9) = 2/5 + 7/9 = 2×9+9×5/9×5 =53/45

   h.3/4 from -1/7 Ans : -1/7 – 3/4 = -1/7 + (-3/4) = -1×4+(-3) ×7/7×4 = -4+(-21)/28

   = -25/28

3. what is to be added to 17/3 to get a sum of 45?
   Sol : let the number added is x.

A/q

X + 17/3 = 45

X = 45/1 – 17/3

X = 45×3/1×3 – 17/3 = 135-17/3 = 118/3

this is the required number

4. what is to be added to -21/5 to get a sum of 15/4 ?

Sol : let the number to be added be x

a/q

(-21/5) + x = 15/4

X = 15/4 – (-21/5)

X = 15/4 + 21/5

X = 15×5+21×4/5×4 = 75+84/20 = 159/20

this is the required number

5. what is to be subtracted from 41/-8 to get 35/8?

Sol : standard form of 41/-8 is -41/8

Let number to be subtracted be x.

A/q

41/-8 – x = 35/8

-41/8 – x = 35/8

X = -41/8 – 35/8

X = -41-35/8 = -76/8 = -19/2

this is the required number

6. from what rational number 52/7 is subtracted so that the answer is 41/14?

Sol : let the rational number be x from which 52/7 is subtracted to get answer is 41/14.

A/q

x – 52/7 = 41/14

X = 41/14 + 52/7

X = 41/14 + 52×2/7×2

X = 41/14 + 104/14 = 145/14

7. what will be the output if 25/12 is subtracted from the sum of 3/4 and 2/5?

Sol : sum of 3/4 and 2/5 = 3/4 + 2/5 = 3×5+2×4/5×4= 23/20

now, 25/12 it's subtracted from sum.

23/20 – 25/12 = 23/2×2×5 – 25/2×2×3

= 23×3/2×2×5×3 – 25×5/2×2×3×5 = 69/60 – 125/60 = 69-125/60 = -56/60 = -56÷4/60÷4

= -14/15

8. what will be the output if 11/7 is added to the difference of 11/8 and 2/3?

Sol : difference of 11/8 and 2/3 = 11/8 – 2/3 = 11×3-2×8/8×3 = 33-16/24 = 17/24

Since, 11/7 is added to difference

Therefore, 11/7 + 17/24 = 11×24+17×7/24×7 = 264+119/168 = 383/168

hence, this is required out put.

RATIONAL NUMBERS

Page number 63

TRY THESE

Multiply:

1) 7/18 by -9/5

Sol : 7/18 × -9/5 = 7×-9/18×5 = 7×-1/2×5 = -7/10

Reason : in multiplication of two rational numbers, multiplication of numerators form numerator of resultant rational number and multiplication of denominator form denominator of resultant rational number. then, simplify it.

2) -17/6 by -2/31

Sol : -17/6 × -2/31 = -17×(-2)/6×31 = -17×-1/3×31 = 17/93

TRY THESE

1) divide 3/7 by 9/5

Sol : 3/7 ÷ 9/5

= 3/7 × 5/9 = 3×5/7×9 = 5/21

Reason : division of rational numbers is executed by multiplying multiplicative inverse of divisor with dividend.

multiplicative inverse of divisor 9/5 is is obtained by reversing its numerator and denominator i.e. 5/9. Then multiply 5/9 with dividend 3/7. then, simplify it

TRY THESE

Divide :

1. 3/7 by 9/5 Sol : 3/7 ÷ 9/5 = 3/7 × 5/9 = 3×5/7×9 = 5/21
2. -1/7 by -2/15 Sol : -1/7 ÷ -2/15 = -1/7 × -15/2 = 15/14
3. -4/15 by -6/25 Sol : -4/15 ÷ -6/25 = -4/15 × -25/6 = -4×-25/6×15 = -2×-5/3×3 = 10/9

Reason: in any rational number, number of negative signs is even, then result is positive.

Also, is number of negatives is odd, result is negative.

PAGE NUMBER 64

EXERCISE 4C

1. Multiply :
   a. -3/5 × (-9/2)
   Ans : -3×-9/5×2 = 27/10
   d.-13/5 × 25/16
   Ans : -13×25/16×5 = -13×5/16 = -65/16
   e. -7/5 × 24/7

   Ans : -7×24/5×7 = -1×24/5 = -24/5

   j. -3/4 × -7/6

   Ans : -3×-7/6×4 = 21/24 = 7/8

2. Divide :
   a. -12/9 ÷ 4/36

   Ans : -12/9 × 36/4 = -12×36/36 = -12

   Reason : we take multiplicative inverse of divisor and multiply it with dividend.

   b. -2/5 ÷ 12/25

   Ans : -2/5 × 25/12 = -2×25/5×12 = -1×5/1×6 = -5/6

   c. 18/5 ÷ (-9/25)

Ans : 18/5 × (-25/9) = 18×(-25)/9×5 = 2×(-5) = -10

j.-45/6 ÷ (-5/48)

Ans : -45/6 × (-48/5) = -45×(-48)/6×5 = -9×(-8) = 72

Reason : hair number of negative signs is two (even). so, result is in positive. (+)

3. What is to be multiplied to -4/9 to get 7/18?
   Sol : let the number to be multiplied be x
   A/q
   X × (-4/9) = 7/18
   X = 7/18 ÷ (-4/9) = 7/18 × (-9)/4
   X = 7×(-9)/18×4 = 7×(-1)/2×4 = -7/8
   hence -7/8 is the required number.
   Reason: when multiplied (-4/9) change side, it comes in divide.

4. what is to be multiplied to 2/3 to get -1/9?
   Ans : let the number to be multiplied be x.
   A/q
   X x 2/3 = -1/9
   X = -1/9 ÷ 2/3
   X = -1/9 × 3/2 = -1/6

5. by what rational number -5/3 is to be divided to get the quotient 8/30?
   Sol : let the rational number be X by which -5/3 is to be divided.
   A/q
   -5/3 ÷ x = 8/30
   -5/3 × 1/x = 8/30
   -5×1/3x = 8/30
   -5/3x = 8/30
   1/x = 8/30 ÷ -5/3
   1/x = 8/30 × -3/5
   1/x = 8×(-1)/50 = -4/25
   X = -25/4

6. by what rational number -18/11 is to be divided to get quotient-9/10?
   Sol : let the rational number to be divided be x.
   A/q

$-18/11 \div x = -9/10$
$-18/11 \times 1/x = -9/10$
$1/x = -9/10 \div -18/11$
$1/x = -9/10 \times -11/18$
$1/x = -9\times-11/10\times18 = -1\times-11/10\times2$
$1/x = 11/20$
$X = 20/11$

NOTE : rational numbers between two rational numbers are infinite in number.
we can find infinite rational numbers between 2 and 3 but no (zero) integer between 2 and 3.
suppose we need to find three rational numbers between 2 and 3.
Here, a=2, b=3, n=3 (number of rational numbers to be found)
Then, we multiply a with (n + 1) i.e. $2 \times (3+1)$, for maintaining the value we divide by (3+1) too.
i.e.
$2= 2\times4/4 = 8/4$
Again, $3 = 3\times4/4 = 12/4$
So, three rational numbers between 2 and 3 i.e., 8/4 and 12/4 are 9/4, 10/4,11/4.
As $2 = 8/4$, 9/4, 10/4, 11/4, $3=12/4$

NOTE 2 : if two rational numbers (a and b) have different denominators i.e. unlike fractions, dams for finding n rational numbers between a and b, first step is to convert a and b in two rational numbers with same denominators.
suppose we need to find two rational numbers between -2/5 and -1/4.
Here, first take LCM and make equivalent fractions.
LCM of 4,5 = 4×5 = 20
so, $-2/5 = -2\times4/5\times4 = -8/20$; $-1/4 = -1\times5/4\times5 = -5/20$
clearly, $-8/20 < -5/20$
So, here, a = -8/20, b = -5/20
here, between a and b, two rational numbers directly can be found.
i.e. $-2/5 = a = -8/20$, -7/20, -6/20, $-1/4 = b = -5/20$
if we need to find three rational numbers between -2/5 and -1/4
then, n=3, we multiply and divide both a and b by (n+1) = (3+1) = 4

$a\times4/4 = -2/5 = -8\times4/20\times4 = -32/80$
$b\times4/4 = -1/4 = -5\times4/20\times4 = -20/80$

now, we can find many rational numbers between -32/80 and -20/80 among them three rational numbers are -31/80, -30/80, -29/80

EXERCISE (4D)

PAGE NUMBER 67

1. write the following rational numbers as decimal numbers
   a. 3/8 = 0.375

   Reason: given decimal number is terminating (ending)

   yeah, in decimal part, number of digits are fixed (3).

   b. $2/7 = \overline{0.285714}$

   Reason : here, given rational number as different number which is not ending but recur (repeat) after 6 places. After sixth digit 4, again repeated up to 6 places and go on. it's repeated block of digits is as $\overline{285714}$, a bar (line) above these six digits.

   So, 2/7 has non terminating but recurring (repeating) decimal representation.

   c. $1/9 = 0.1111\ldots\ldots\ldots\ldots = 0.\bar{1}$

   Reason: Here, if we divide 1 by 9, we get non ending remainders 1. So, non ending quotirnn. So, given rational number has non terminating but a recurring (repeating) decimal representation. So, g

   there will be a bar above 1 as repeating block.

   d. $1/3 = 0.3333\ldots\ldots\ldots = 0.\bar{3}$

   Same reason.

   e. $4/11 = 0.36363636\ldots\ldots = 0.\overline{36}$

   Reason : repeating block of digits is 36. so, bar will be above 36.

   this decimal number is non terminating but recurring.

   f. 3/5 = 0.6

Reason : 3/5 as decimal number 0.6 which is ended after one digit 6. so, 3/5 has terminating decimal representation.

PAGE NUMBER 68

2. write the following rational numbers as decimal numbers.

a. 3 ½ = 3 + 1/2 = 3 + 0.5 = 3.5

Reason : since, 3 ½ is terminated after one place of decimal.

So, 3 ½ has terminating decimal representation.

Aliter : 3 ½ = (3×2)+1 /2 = 6+1 /2 = 7/2 = 3.5

b. 9 7/10 = 9 + 7/10 = 9 + 0.7 = 9.7

terminating decimal.

Aliter : 9 7/10 = (9×10)+7 /10 = 97/10 = 9.7

c. 11/4 = 2.75

terminating decimal

d. 2 1/9 = 2 + 1/9 = 2 + 0.11111….. = 2.1111……= $2.\overline{1}$

Reason: Here, 2 1/9 = $2.\overline{1}$ as 1/9 has non terminating but recurring (repeating) decimal representation.

Aliter : 2 1/9 = (2×9)+1 /9 = 19/9 = 2.11111….. = $2.\overline{1}$

e. 1 1/6 = 1 + 1/6 = 1 + 0.166666……. = $1.1\bar{6}$

Reason : here 1/6 has unending remainder 4. So, in quotient 6 is repeating block. so, there is bar above 6. so, 1 1/6 is non inverting but repeating decimal.