EXERCISE 1.1 PAGE NO: 14

1. Using appropriate properties, find:

(i) -2/3 × 3/5 + 5/2 – 3/5 × 1/6

Solution:

-2/3 × 3/5 + 5/2 – 3/5 × 1/6

= -2/3 × 3/5– 3/5 × 1/6+ 5/2 (by commutativity)

= 3/5 (-2/3 – 1/6)+ 5/2

= 3/5 ((- 4 – 1)/6)+ 5/2

= 3/5 ((–5)/6)+ 5/2 (by distributivity)

= – 15 /30 + 5/2

= – 1 /2 + 5/2

= 4/2

= 2

(ii) 2/5 × (- 3/7) – 1/6 × 3/2 + 1/14 × 2/5

Solution:

2/5 × (- 3/7) – 1/6 × 3/2 + 1/14 × 2/5

= 2/5 × (- 3/7) + 1/14 × 2/5 – (1/6 × 3/2) (by commutativity)

= 2/5 × (- 3/7 + 1/14) – 3/12

= 2/5 × ((- 6 + 1)/14) – 3/12

= 2/5 × ((- 5)/14)) – 1/4

= (-10/70) – 1/4

= – 1/7 – 1/4

= (– 4– 7)/28

= – 11/28

2. Write the additive inverse of each of the following:

Solution:

(i) 2/8

The Additive inverse of 2/8 is – 2/8

(ii) -5/9

The additive inverse of -5/9 is 5/9

(iii) -6/-5 = 6/5

The additive inverse of 6/5 is -6/5

(iv) 2/-9 = -2/9

The additive inverse of -2/9 is 2/9

(v) 19/-16 = -19/16

The additive inverse of -19/16 is 19/16

3. Verify that: -(-x) = x for:

(i) x = 11/15

(ii) x = -13/17

Solution:

(i) x = 11/15

We have, x = 11/15

The additive inverse of x is – x (as x + (-x) = 0).

Then, the additive inverse of 11/15 is – 11/15 (as 11/15 + (-11/15) = 0).

The same equality, 11/15 + (-11/15) = 0, shows that the additive inverse of -11/15 is 11/15.

Or, – (-11/15) = 11/15

i.e., -(-x) = x

(ii) -13/17

We have, x = -13/17

The additive inverse of x is – x (as x + (-x) = 0).

Then, the additive inverse of -13/17 is 13/17 (as 13/17 + (-13/17) = 0).

The same equality (-13/17 + 13/17) = 0, shows that the additive inverse of 13/17 is -13/17.

Or, – (13/17) = -13/17,

i.e., -(-x) = x

4. Find the multiplicative inverse of the following:

(i) -13 (ii) -13/19 (iii) 1/5 (iv) -5/8 × (-3/7) (v) -1 × (-2/5) (vi) -1

Solution:

(i) -13

Multiplicative inverse of -13 is -1/13.

(ii) -13/19

Multiplicative inverse of -13/19 is -19/13.

(iii) 1/5

Multiplicative inverse of 1/5 is 5.

(iv) -5/8 × (-3/7) = 15/56

Multiplicative inverse of 15/56 is 56/15.

(v) -1 × (-2/5) = 2/5

Multiplicative inverse of 2/5 is 5/2.

(vi) -1

Multiplicative inverse of -1 is -1.

5. Name the property under multiplication used in each of the following:

(i) -4/5 × 1 = 1 × (-4/5) = -4/5

(ii) -13/17 × (-2/7) = -2/7 × (-13/17)

(iii) -19/29 × 29/-19 = 1

Solution:

(i) -4/5 × 1 = 1 × (-4/5) = -4/5

Here 1 is the multiplicative identity.

(ii) -13/17 × (-2/7) = -2/7 × (-13/17)

The property of commutativity is used in the equation.

(iii) -19/29 × 29/-19 = 1

The multiplicative inverse is the property used in this equation.

6. Multiply 6/13 by the reciprocal of -7/16.

Solution:

Reciprocal of -7/16 = 16/-7 = -16/7

According to the question,

6/13 × (Reciprocal of -7/16)

6/13 × (-16/7) = -96/91

7. Tell what property allows you to compute 1/3 × (6 × 4/3) as (1/3 × 6) × 4/3.

Solution:

1/3 × (6 × 4/3) = (1/3 × 6) × 4/3

Here, the way in which factors are grouped in a multiplication problem supposedly does not change the product. Hence, the Associativity Property is used here.

8. Is 8/9 the multiplication inverse of $-1\frac{1}{8}$? Why or why not?

Solution:

$-1\frac{1}{8}$ = -9/8

[Multiplicative inverse ⟹ product should be 1]
According to the question,

8/9 × (-9/8) = -1 ≠ 1

Therefore, 8/9 is not the multiplicative inverse of $-1\frac{1}{8}$.

9. If 0.3 is the multiplicative inverse of $3\frac{1}{3}$? Why or why not?

Solution:

$3\frac{1}{3}$ = 10/3

0.3 = 3/10

[Multiplicative inverse ⟹ product should be 1]
According to the question,

3/10 × 10/3 = 1

Therefore, 0.3 is the multiplicative inverse of $3\frac{1}{3}$.

10. Write:

(i) The rational number that does not have a reciprocal.

(ii) The rational numbers that are equal to their reciprocals.

(iii) The rational number that is equal to its negative.

Solution:

(I) The rational number that does not have a reciprocal is 0.

Reason:

0 = 0/1

Reciprocal of 0 = 1/0, which is not defined.

(ii) The rational numbers that are equal to their reciprocals are 1 and -1.

Reason:

1 = 1/1

Reciprocal of 1 = 1/1 = 1, similarly, reciprocal of -1 = – 1

(iii) The rational number that is equal to its negative is 0.

Reason:

Negative of 0=-0=0

11. Fill in the blanks.

(i) Zero has _____reciprocal.

(ii) The numbers _____and _____are their own reciprocals

(iii) The reciprocal of – 5 is _____.

(iv) Reciprocal of 1/x, where x ≠ 0 is _____.

(v) The product of two rational numbers is always a _____.

(vi) The reciprocal of a positive rational number is _____.

Solution:

(i) Zero has no reciprocal.

(ii) The numbers -1 and 1 are their own reciprocals

(iii) The reciprocal of – 5 is -1/5.

(iv) Reciprocal of 1/x, where $x \neq 0$ is x.

(v) The product of two rational numbers is always a rational number.

(vi) The reciprocal of a positive rational number is positive.

EXERCISE 1.2

PAGE NO: 20

1. Represent these numbers on the number line.

(i) 7/4

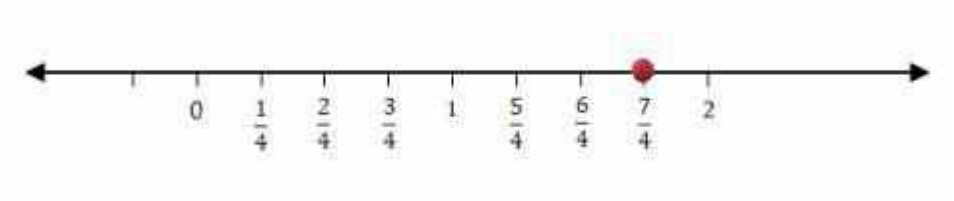
(ii) -5/6

Solution:

(i) 7/4

Divide the line between the whole numbers into 4 parts, i.e. divide the line between 0 and 1 to 4 parts, 1 and 2 to 4 parts, and so on.

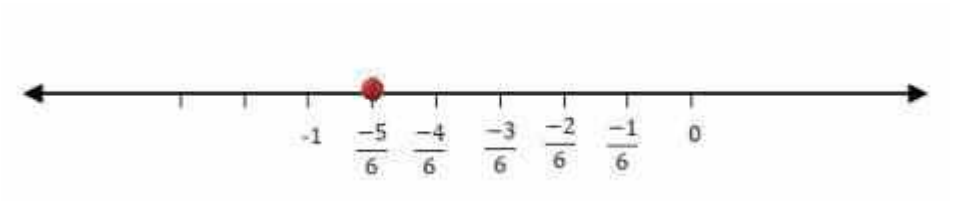
Thus, the rational number 7/4 lies at a distance of 7 points away from 0 towards the positive number line.



(ii) -5/6

Divide the line between the integers into 4 parts, i.e. divide the line between 0 and -1 to 6 parts, -1 and -2 to 6 parts, and so on. Here, since the numerator is less than the denominator, dividing 0 to – 1 into 6 parts is sufficient.

Thus, the rational number -5/6 lies at a distance of 5 points, away from 0, towards the negative number line.

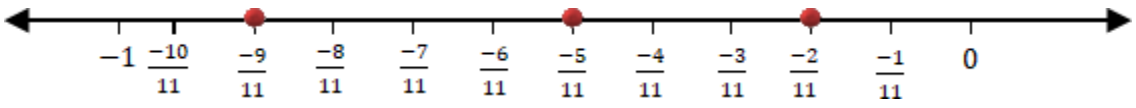


2. Represent -2/11, -5/11, -9/11 on a number line.

Solution:

Divide the line between the integers into 11 parts.

Thus, the rational numbers -2/11, -5/11, and -9/11 lie at a distance of 2, 5, and 9 points away from 0, towards the negative number line, respectively.



3. Write five rational numbers which are smaller than 2.

Solution:

The number 2 can be written as 20/10

Hence, we can say that the five rational numbers which are smaller than 2 are:

2/10, 5/10, 10/10, 15/10, 19/10

4. Find the rational numbers between -2/5 and ½.

Solution:

Let us make the denominators the same, say 50.

-2/5 = (-2 × 10)/(5 × 10) = -20/50

½ = (1 × 25)/(2 × 25) = 25/50

Ten rational numbers between -2/5 and ½ = ten rational numbers between -20/50 and 25/50.

Therefore, ten rational numbers between -20/50 and 25/50 = -18/50, -15/50, -5/50, -2/50, 4/50, 5/50, 8/50, 12/50, 15/50, 20/50.

5. Find five rational numbers between:

(i) 2/3 and 4/5

(ii) -3/2 and 5/3

(iii) ¼ and ½

Solution:

(i) 2/3 and 4/5

Let us make the denominators the same, say 60

i.e., 2/3 and 4/5 can be written as:

2/3 = (2 × 20)/(3 × 20) = 40/60

4/5 = (4 × 12)/(5 × 12) = 48/60

Five rational numbers between 2/3 and 4/5 = five rational numbers between 40/60 and 48/60.

Therefore, five rational numbers between 40/60 and 48/60 = 41/60, 42/60, 43/60, 44/60, 45/60.

(ii) -3/2 and 5/3

Let us make the denominators the same, say 6

i.e., -3/2 and 5/3 can be written as:

-3/2 = (-3 × 3)/(2× 3) = -9/6

5/3 = (5 × 2)/(3 × 2) = 10/6

Five rational numbers between -3/2 and 5/3 = five rational numbers between -9/6 and 10/6.

Therefore, five rational numbers between -9/6 and 10/6 = -1/6, 2/6, 3/6, 4/6, 5/6.

(iii) ¼ and ½

Let us make the denominators the same, say 24

i.e., ¼ and ½ can be written as:

¼ = (1 × 6)/(4 × 6) = 6/24

½ = (1 × 12)/(2 × 12) = 12/24

Five rational numbers between ¼ and ½ = five rational numbers between 6/24 and 12/24.

Therefore, five rational numbers between 6/24 and 12/24 = 7/24, 8/24, 9/24, 10/24, 11/24.

6. Write five rational numbers greater than -2.

Solution:

-2 can be written as – 20/10

Hence, we can say that the five rational numbers greater than -2 are

-10/10, -5/10, -1/10, 5/10, 7/10

7. Find ten rational numbers between 3/5 and ¾.

Solution:

Let us make the denominators the same, say 80.

3/5 = (3 × 16)/(5× 16) = 48/80

3/4 = (3 × 20)/(4 × 20) = 60/80

Ten rational numbers between 3/5 and ¾ = ten rational numbers between 48/80 and 60/80.

Therefore, ten rational numbers between 48/80 and 60/80 = 49/80, 50/80, 51/80, 52/80, 54/80, 55/80, 56/80, 57/80, 58/80, 59/80.