Exercise 1.1 Page: 14

1. Using appropriate properties find.

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

Solution:

$-2/3 \times 3/5 + 5/2 - 3/5 \times 1/6$

$= -2/3 \times 3/5 - 3/5 \times 1/6 + 5/2$ (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) $2/5 \times (-3/7) - 1/6 \times 3/2 + 1/14 \times 2/5$

Solution:

$2/5 \times (-3/7) - 1/6 \times 3/2 + 1/14 \times 2/5$

$= 2/5 \times (-3/7) + 1/14 \times 2/5 - (1/6 \times 3/2)$ (by commutativity)

$= 2/5 \times (-3/7 + 1/14) - 3/12$

$= 2/5 \times ((-6 + 1)/14) - 3/12$

$= 2/5 \times ((-5)/14)) - 1/4$

$= (-10/70) - 1/4$

$= -1/7 - 1/4$

$= (-4 - 7)/28$

$= -11/28$

2. Write the additive inverse of each of the following

Solution:

(i) 2/8

Additive inverse of 2/8 is −2/8

(ii) -5/9

Additive inverse of -5/9 is 5/9

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

Additive inverse of 6/5 is -6/5

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

Additive inverse of -2/9 is 2/9

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

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 11/15 + (-11/15) = 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
(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
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:

$1\frac{1}{8}$ = -7/8

[Multiplicative inverse ⟹ product should be 1]

According to the question,

8/9 × (-7/8) = -7/9 ≠ 1

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

9. If 0.3 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 ≠ 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: 20

1. Represent these numbers on the number line.

(i) 7/4

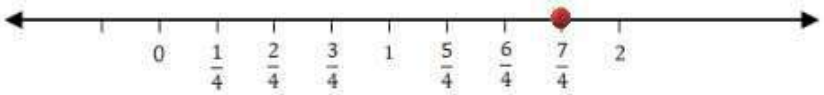
(ii) -5/6

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.

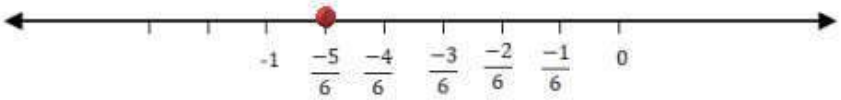
Thus, the rational number 7/4 lies at a distance of 7 points away from 0 towards positive number line.



(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 denominator, dividing 0 to – 1 into 6 part is sufficient.

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

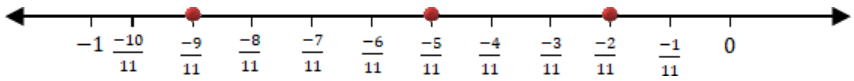


2. Represent -2/11, -5/11, -9/11 on a number line.

Solution:

Divide the line between the integers into 11 parts.

Thus, the rational numbers -2/11, -5/11, -9/11 lies at a distance of 2, 5, 9 points away from 0, towards 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 same, say 50.

$-2/5 = (-2 \times 10)/(5 \times 10) = -20/50$

$½ = (1 \times 25)/(2 \times 25) = 25/50$

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 same, say 60

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

$2/3 = (2 \times 20)/(3 \times 20) = 40/60$

$4/5 = (4 \times 12)/(5 \times 12) = 48/60$

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 same, say 6

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

$-3/2 = (-3 \times 3)/(2 \times 3) = -9/6$

$5/3 = (5 \times 2)/(3 \times 2) = 10/6$

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 same, say 24.
i.e., ¼ and ½ can be written as:
¼ = $(1 \times 6)/(4 \times 6) = 6/24$
½ = $(1 \times 12)/(2 \times 12) = 12/24$
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 same, say 80.
$3/5 = (3 \times 16)/(5 \times 16) = 48/80$
$3/4 = (3 \times 20)/(4 \times 20) = 60/80$
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