

Exercise 1.1

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1. Using appropriate properties find.

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

Solution:

$$\begin{aligned}
 & -2/3 \times 3/5 + 5/2 - 3/5 \times 1/6 \\
 & = -2/3 \times 3/5 - 3/5 \times 1/6 + 5/2 && \text{(by commutativity)} \\
 & = 3/5 (-2/3 - 1/6) + 5/2 \\
 & = 3/5 ((-4 - 1)/6) + 5/2 \\
 & = 3/5 ((-5)/6) + 5/2 && \text{(by distributivity)} \\
 & = -15/30 + 5/2 \\
 & = -1/2 + 5/2 \\
 & = 4/2 \\
 & = 2
 \end{aligned}$$

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

Solution:

$$\begin{aligned}
 & 2/5 \times (-3/7) - 1/6 \times 3/2 + 1/14 \times 2/5 \\
 & = 2/5 \times (-3/7) + 1/14 \times 2/5 - (1/6 \times 3/2) && \text{(by commutativity)} \\
 & = 2/5 \times (-3/7 + 1/14) - 3/12 \\
 & = 2/5 \times ((-6 + 1)/14) - 3/12 \\
 & = 2/5 \times ((-5)/14) - 1/4 \\
 & = (-10/70) - 1/4 \\
 & = -1/7 - 1/4 \\
 & = (-4 - 7)/28 \\
 & = -11/28
 \end{aligned}$$

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 $-13/17 + 13/17 = 0$)

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

(i) -13

(ii) $-13/19$

(iii) $1/5$

(iv) $-5/8 \times (-3/7)$

(v) $-1 \times (-2/5)$

(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) $-5/8 \times (-3/7) = 15/56$

Multiplicative inverse of $15/56$ is $56/15$

(v) $-1 \times (-2/5) = 2/5$

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

(ii) $-13/17 \times (-2/7) = -2/7 \times (-13/17)$

(iii) $-19/29 \times 29/-19 = 1$

Solution:

(i) $-4/5 \times 1 = 1 \times (-4/5) = -4/5$

Here 1 is the multiplicative identity.

(ii) $-13/17 \times (-2/7) = -2/7 \times (-13/17)$

The property of commutativity is used in the equation

(iii) $-19/29 \times 29/-19 = 1$

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,

$$6/13 \times (\text{Reciprocal of } -7/16)$$

$$6/13 \times (-16/7) = -96/91$$

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

Solution:

$$1/3 \times (6 \times 4/3) = (1/3 \times 6) \times 4/3$$

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 \Rightarrow product should be 1]

According to the question,

$$8/9 \times (-9/8) = -1 \neq 1$$

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 \Rightarrow product should be 1]

According to the question,

$$3/10 \times 10/3 = 1$$

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 $-1 = -1$

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(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 $x \neq 0$ 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.

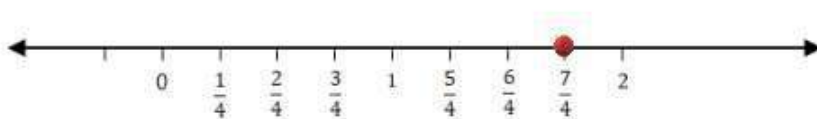
Exercise 1.2

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1. Represent these numbers on the number line.(i) $\frac{7}{4}$ (ii) $-\frac{5}{6}$ **Solution:**(i) $\frac{7}{4}$

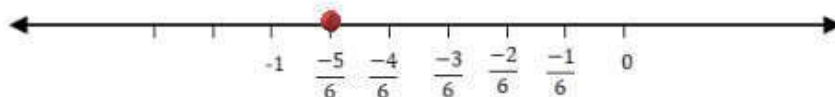
Divide the line between the whole numbers into 4 parts. i.e., divide the line between 0 and 1 to 4 parts, 1 and 2 to 4 parts and so on.

Thus, the rational number $\frac{7}{4}$ lies at a distance of 7 points away from 0 towards positive number line.

(ii) $-\frac{5}{6}$

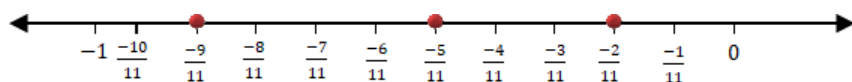
Divide the line between the integers into 6 parts. i.e., divide the line between 0 and -1 to 6 parts, -1 and -2 to 6 parts and so on. Here since the numerator is less than denominator, dividing 0 to -1 into 6 part is sufficient.

Thus, the rational number $-\frac{5}{6}$ lies at a distance of 5 points, away from 0, towards negative number line

**2. Represent $-\frac{2}{11}$, $-\frac{5}{11}$, $-\frac{9}{11}$ on a number line.****Solution:**

Divide the line between the integers into 11 parts.

Thus, the rational numbers $-\frac{2}{11}$, $-\frac{5}{11}$, $-\frac{9}{11}$ 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 $1/2$.

Solution:

Let us make the denominators same, say 50.

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

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

Ten rational numbers between $-2/5$ and $1/2$ = 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) $1/4$ and $1/2$

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 $10/6$

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

(iii) $1/4$ and $1/2$

Let us make the denominators same, say 24.

i.e., $1/4$ and $1/2$ can be written as:

$$1/4 = (1 \times 6)/(4 \times 6) = 6/24$$

$$1/2 = (1 \times 12)/(2 \times 12) = 12/24$$

Five rational numbers between $1/4$ and $1/2 =$ 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 $3/4$,

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 $3/4 =$ ten rational numbers between $48/80$ and $60/80$

Therefore, ten rational numbers between $48/80$ and $60/80 = 49/80, 50/80, 51/80, 52/80,$

$54/80, 55/80, 56/80, 57/80, 58/80, 59/80$