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RATIONAL NUMBERS

PERIOD 5

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 1
CHAPTER NAME : RATIONAL NUMBERS

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Learning outcome

- Students will be able to **multiply** rational numbers
- Students will be able to understand and apply properties of multiplication.

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Previous Knowledge:

1)1/6 of the class students are above average, 1/4 are average and rests are below average. If there are 48 students in all, how many students are below average in
the class?

2) One fruit salad recipe requires 1/2 cup of sugar. Another recipe for the same fruit salad requires 2 tablespoons of sugar. If 1 tablespoon is 1 equivalent to 1/16 cup, how much more sugar does the first recipe require?

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Properties of multiplication of Rational Numbers

Closure property of multiplication :

Closure property of multiplication of rational numbers:

The product of two rational numbers is always a rational number.

If a/b and c/d are any two rational numbers then (a/b × c/d) is also a rational number.

Consider the rational numbers -3/7 and 5/14. Then

(-3/7 × 5/14) = {(-3) × 5}/(7 × 14) = -15/98, is a rational number .

Commutative property of multiplication

Two rational numbers can be multiplied in any order.

Thus, for any rational numbers a/b and c/d, we have:

(a/b × c/d) = (c/d × a/b)

Let us consider the rational numbers -2/5 **and** 6/7.Then,

{(-2)/5 × 6/7} = {(-2) × 6}/(5 × 7) = -12/35 **and** (6/7 × -2/5)

= {6 × (-2)}/(7 × 5) = -12/35

Therefore, (-2/5 × 6/7) = (6/7 × (-2)/5)

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Associative property of multiplication:

While multiplying three or more rational numbers, they can be grouped in any order.

Thus, for any rationals a/b, c/d, and e/f we have:

(a/b × c/d) × e/f = a/b × (c/d × e/f)

Consider the rationals -5/2, -7/4 and 1/3 we have

(-5/2 × (-7)/4) × 1/3 = {(-5) × (-7)}/(2 × 4) ×1/3} = (35/8 × 1/3)

= (35 × 1)/(8 × 3) = 35/24

$(-5)/2 \times (-7/4 \times 1/3) = -5/2 \times \{(-7) \times 1\}/(4 \times 3) = (-5/2 \times -7/12)$

$= \{(-5) \times (-7)\}/(2 \times 12) = 35/24$

Therefore, $(-5/2 \times -7/4) \times 1/3 = (-5/2) \times (-7/4 \times 1/3)$

Existence of multiplicative identity

For any rational number a/b, we have $(a/b \times 1) = (1 \times a/b) = a/b$

1 is called the multiplicative identity for rationals.

Consider the rational -9/13. Then, we have

$(-9/13 \times 1) = (-9/13 \times 1/1) = \{(-9) \times 1\}/(13 \times 1) = -9/13$

and $(1 \times (-9)/13) = (1/1 \times (-9)/13) = \{1 \times (-9)\}/(1 \times 13) = -9/13$

Therefore, $\{(-9)/13 \times 1\} = \{1 \times (-9)/13\} = (-9)/13$

Existence of multiplicative inverse property:

Every nonzero rational number a/b has its multiplicative inverse b/a.

Thus, $(a/b \times b/a) = (b/a \times a/b) = 1$

b/a is called the **reciprocal** of a/b.

Clearly, zero has no reciprocal.

Reciprocal of 1 is 1 and the reciprocal of (-1) is (-1)

Reciprocal of -8/9 is -9/8, since $(-8/9 \times -9/8) = (-9/8 \times -8/9) = 1$.

Distributive property of multiplication over addition:

For any three rational numbers a/b, c/d and e/f, we have :

$a/b \times (c/d + e/f) = (a/b \times c/d) + (a/b \times e/f)$

For example:

Consider the rational numbers -3/4, 2/3 and -5/6 we have

$(-3)/4 \times \{2/3 + (-5)/6\} = (-3/4) \times \{4 + -5/6\} = (-3/4) \times (-1)/6$

$= \{(-3) \times (-1)\}/(4 \times 6) = 3/24 = 1/8$

again, $(-3/4) \times 2/3 = \{(-3) \times 2\}/(4 \times 3) = -6/12 = -1/2$

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Multiplication of Rational Numbers, Properties of multiplication

https://www.youtube.com/watch?v=JMYr1iAnH0w (7:28)

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Exercise- 1(C)

1.(v) -16/5 x 20/8

= -8

2.(v) -7/10 x -8/15

= 28/75

3. (i) **(2/-3 x 5/4) + (5/9 x 3/-10)**

= 5/-6 + 1/-6

= -5/6 -1/6

= -5 -1/6

=-6/6

=-1

4. (v) -6/-7 x 1

= 6/7 x1

=6/7

5.(i) rational numbers -1/5 **and** 2/9.Then,

{(-1)/5 × 2/9} = {(-1) × 2}/(5 × 9) = -2/45 **and** (2/9 × -1/5)

= {2 × (-1)}/(9 × 5) = -2/45

Therefore, (-1/5 × 2/9) = (2/9 × (-1)/5)

6.(v) Multiplicative inverse of -8/-7= 7/8

Home assignment

Exercise 1(C) - 7 to 10

1. **Can you find a rational number whose multiplicative inverse is -1?**
2. **Find the two rational numbers whose absolute value is** 15
3. **From a rope 40 m long, pieces of equal size are cut. If the length of one piece is** 10/3 **m, find the number of such pieces.**
4. . **Find the product of additive inverse and multiplicative inverse of** −1/3**.**

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THANKING YOU

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