

Worksheet-3

Subject: - Mathematics

Class: - VIII

Teacher: - Ms. Neeru

Name: _____ Class & Sec: _____ Roll No. _____ Date: 07.03.2020

Topic: Rational Numbers

Things to remember:

- i) All counting numbers start from 1 are called natural numbers.
- ii) All counting numbers as well as 0 are called whole numbers.
- iii) All positive and negative numbers are called integers.
- iv) Rational numbers are numbers which can be written in the form of $\frac{p}{q}$. p and q are integers and $q \neq 0$.

Properties of Rational numbers:

i) whole numbers:

Operation	Numbers	Remarks
addition	$0 + 5 = 5$, a whole no. $4 + 7 = 11$, a whole no. $\therefore a + b$ are whole nos and their sum is also a whole number.	whole numbers are closed under addition

ii) Integers

Operation	Numbers	Remarks
Addition	$(-1+2)+3 \neq -1+(2+3)$ for any three integers a, b and c .	addition is associative
Subtraction	$(0-(-2))-4 \neq 0-((-2)-4)$ for any three integers a, b and c .	Subtraction is associative. not
Multiplication	$(8 \times 3) \times -1 = 8 \times (3 \times -1)$ for any three integers a, b and c .	Multiplication is associative
Division	$(-8 \div -1) \div 0 \neq -8 \div (-1 \div 0)$ for any three integers a, b and c .	Division is not associative

iii) Rational Numbers

Operation	Numbers	Remarks
Addition	$(\frac{2}{3} + \frac{4}{3}) + \frac{5}{3} = \frac{2}{3} + (\frac{4}{3} + \frac{5}{3})$ for any three rational numbers a, b and c .	Addition is associative

associativity

i) whole numbers

Operation	Numbers	Remarks
Addition	$1+(3+2)=(1+3)+2$, for any two ^{three} whole numbers a, b and c	addition is associative
Subtraction	$(1-3)-2 \neq 1-(3-2)$, for any three whole numbers a, b and c.	Subtraction is not associative
Multiplication	$(1 \times 2) \times 3 = 1 \times (2 \times 3)$, for any three whole numbers a, b and c	Multiplication is associative.
Division	$(1 \div 2) \div 3 \neq 1 \div (2 \div 3)$, for any three whole numbers a, b and c.	Division is not associative

iii) Rational Numbers

Operation	Numbers	Remarks
addition	$\frac{2}{3} + \frac{5}{3} = \frac{5}{3} + \frac{2}{3}$, for any 2 rational nos, commutative a and b	Addition is commutative
Subtraction	$\frac{2}{3} - \frac{5}{3} \neq \frac{5}{3} - \frac{2}{3}$, for any two rational commutative numbers a and b.	Subtraction is not commutative
Multiplication	$\frac{2}{3} \times \frac{5}{3} = \frac{5}{3} \times \frac{2}{3}$, for any two rational numbers a and b.	Multiplication is commutative
Division	$\frac{2}{3} \div \frac{5}{3} \neq \frac{5}{3} \div \frac{2}{3}$, for any two rational numbers a and b.	Division is not commutative

Division

 $a \div b \neq b \div a$,
 for any two whole
 nos. a and b .

 Division
 is not
 commutative

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ii) Integers:

Operation

Examples

Remarks

Addition

 $-5 + 3 = 3 + (-5)$,
 for any two whole
 numbers a and b .
 integers

 Addition is
 commutative

Subtraction

 $5 - (-3) \neq -3 - 5$,
 for any two wh
 integers a and b .

 Subtraction
 is not
 commutative

Multiplication

 $-8 \times 21 = 21 \times (-8)$,
 for any two
 integers a and b .

 Multiplication
 is
 commutative

Division

 $-5 \div 3 \neq 3 \div (-5)$,
 for any two integers
 a and b

 Division
 is not
 commutative

Division $\frac{8}{12} \div \frac{1}{2} = \frac{4}{3}$, and

$\frac{8}{2} \div \frac{0}{1}$ is not a rational no.

Rational nos. are not closed under division

Commutativity

i) whole numbers

Operation	Examples	Remarks
addition	$0 + 7 = 7 + 0 = 7$, for any two whole numbers a and b .	addition is commutative
subtraction	$0 - 7 \neq 7 - 0$, for any two whole numbers a and b .	subtraction is not commutative
multiplication	$7 \times 3 = 3 \times 7$, for any two whole nos. a and b	multiplication is commutative

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Multiplication	$5 \times -8 = -40,$ an integer	Integers are closed under multiplication
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Division	$5 \div 9 = 0.55,$ not an integer	Integers are not closed under division
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ii) Rational numbers

Operation	Numbers	Remarks
addition	$\frac{5}{8} + \frac{9}{8} = \frac{14}{8},$ a rational number	Rational nos are closed under addition
Subtraction	$\frac{9}{17} - \frac{12}{17} = \frac{-3}{17},$ a rational number	Rational nos are closed under subtraction
Multiplication	$\frac{8}{12} \times \frac{34}{15} = \frac{12}{2},$ a rational number	Rational nos are closed under multiplication

Subtraction $5 - 7 = -2$, not a whole number

Whole nos. are not closed under subtraction

Multiplication $0 \times 3 = 0$, a whole number.

whole nos. are closed under multiplication

Division $5 \div 8 = 0.62$, not a whole number

whole nos are not closed under division

ii) Integers :

Operation

Numbers

Remarks

Addition

$-6 + 5 = -1$, an integer

Integers are closed under addition

Subtraction

$7 - 5 = 2$, an integer

Integers are closed under subtraction

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Rational Numbers

Examples

Ex-1

Subtraction $(\frac{1}{3} - \frac{2}{3}) - \frac{8}{3} \neq \frac{1}{3} - (\frac{2}{3} - \frac{8}{3})$ Subtraction is not associative for any three rational numbers a, b and c.

Multiplication $(\frac{0}{3} \times \frac{8}{3}) \times \frac{1}{3} = \frac{0}{3} \times (\frac{8}{3} \times \frac{1}{3})$ Multiplication is associative for any three rational numbers a, b, and c.

Division $(\frac{1}{3} \times \frac{2}{3}) \times \frac{6}{3} \neq \frac{1}{3} \times (\frac{2}{3} \times \frac{6}{3})$ Division is not associative for any three rational numbers a, b and c.