

Division

What is Division?

The division is a method of dividing or distributing a number into equal parts, For example, if 16 is divided by 4, then 16 is divided into 4 equal parts. Therefore, the resultant value is 4.

$$16 \div 4 = 4$$

Parts of division

Dividend \div Divisor = Quotient

$$15 \div 3 = 5$$

In the above example, there are three parts for division.

- 15 is dividend
- 3 is divisor
- 5 is quotient (R.H.S)

Multiplication and Division Relationship

Multiplication and division, are inverse operations of each other. If we say, a multiplied by b is equal to c, then c divided by b results in a. Mathematically, it can be represented as:

- $a \times b = c$
- $c \div b = a$

For example,

- $4 \times 5 = 20$ [4 multiplied by 5 results in 20]
- $20 \div 5 = 4$ [20 divided by 5 returns back 4]

Multiplication and Division Rules

For every mathematical computation, we need to follow the rules. Thus even to multiply and divide the numbers, there are some rules which we need to follow.

Rule 1: Order of operations

The order of operations for multiplication does not matter. It means if we arrange the number in a different order while multiplying them, then the result will be the same.

Examples are:

$$3 \times 4 = 12$$

$$4 \times 3 = 12$$

In the above example, we can see, even if we have swapped the position of 3 and 4, the product of the two integers is equal to 12.

But this rule is not applicable for division. Let us take another example.

$$12 \div 3 = 4$$

$$3 \div 12 \neq 4 \text{ (it is equal to 0.25)}$$

Thus, we cannot change the order of numbers in division method.

Rule 2: Multiplying and Dividing by Positive Numbers

If any real number is multiplied or divided by the positive real number, then the sign of the resulting number does not change.

Examples are:

$$2 \times 3 = 6$$

$$-2 \times 3 = -6$$

Since, 2 and 3 both are positive integers, therefore the product of 2 and 3 is also positive. But the product of -2 and 3 is a negative number.

$$4 \div 2 = 2$$

$$-4 \div 2 = -2$$

Since, 4 and 2 both are positive, therefore, 4 divided by 2 is also a positive number. But -4 divided by 2 is a negative number.

Thus, we can conclude that:

$$(+) \times (+) = (+)$$

$$(+) \div (+) = (+)$$

$$(-) \times (+) = (-)$$

$$(-) \div (+) = (-)$$

Rule 3: Multiplying and Dividing by Negative Numbers

Multiplication and division of any real number by a negative number will change the sign of the resulting number. Examples are given below.

1. Multiply 5 by -2.

$$5 \times -2 = -10$$

2. Multiply -5 by -2.

$$-5 \times -2 = 10$$

3. Divide 10 by 2.

$$10 \div -2 = -5$$

$$-10 \div -2 = 5$$

Thus we can conclude that:

$$(+) \times (-) = (-)$$

$$(+) \div (-) = (-)$$

$$(-) \times (-) = (+)$$

$$(-) \div (-) = (+)$$

Summary of Multiplication and Division Rules

Multiplication rules	Division rules
• $(+) \times (+) = (+)$	• $(+) \div (+) = (+)$
• $(-) \times (-) = (+)$	• $(-) \div (-) = (+)$
• $(+) \times (-) = (-)$	• $(+) \div (-) = (-)$
• $(-) \times (+) = (-)$	• $(-) \div (+) = (-)$

Multiplication and Division of Integers

Integers are those values that are not fractions and can be negative, positive or zero. The integers can be easily represented on a number line. Thus, the arithmetic calculations on integers can be done in a simple manner.

Multiplying and dividing any integer with a whole number, or a fraction or an integer itself is given below with examples.

- $3 \times 9 = 27$ (Integer \times Whole number)
- $2 \times \frac{1}{4} = \frac{1}{2}$ (Integer \times Fraction)
- $2 \times -5 = -10$ (Integer \times Integer)

Multiplication and Division of Fractions

Here, we will learn how to multiply and divide fractions with examples.

A fraction is a part of a whole. For example, $\frac{1}{2}$ is a fraction that represents half of a whole number or any value. Here, the upper part is called the numerator and the lower part is called the denominator. Let us multiply and divide fractions with examples.

$$\frac{1}{4} \times \frac{1}{2} = (1 \times 1)/(4 \times 2) = \frac{1}{8}$$

$$\frac{1}{4} \div \frac{1}{2} = (1 \times 2)/(1 \times 4) = \frac{2}{4} = \frac{1}{2}$$

Division of Decimals

We can use the same trick we used in the multiplication of decimals i.e. remove the decimal points and divide the numbers like whole numbers.

Let's divide 40.5 by .20. Methods to divide these decimal numbers are as follows:

Method 1: Convert the decimal numbers into whole numbers by multiplying both numerator and denominator by the same number. *The denominator must be always a whole number.*

$$40.5 \div 0.20 = \frac{40.5}{0.20}$$

$$\frac{40.5}{0.20} = \frac{40.5 \times 5}{0.20 \times 5} = \frac{202.5}{1} = 202.5$$

(Multiply both the numerator and denominator by 5)

Method 2: Alternatively, one can convert decimal numbers into whole numbers by multiplying with numbers having powers of 10 (10, 100, 1000, etc.).

- Consider the denominator, count the number of places (digits) right to the decimal point.

Here, the denominator is 0.20 and the number of digits right to the decimal point is 2.

$$40.5 \div 0.20 = 40.5 / 0.20$$

- Take the power of 10 the same as the number of digits right to the decimal point e. $10^2 = 100$
- Multiply both numerator and denominator by 100.

$$\frac{40.5}{0.20} = \frac{40.5 \times 100}{0.20 \times 100} = \frac{4050}{20} = 202.5$$

Division of Decimal Numbers by 10, 100 and 1000

Multiplication and division of decimals by numbers that have powers of 10 is easier than that by a whole number. Rules for multiplication and division of decimal numbers by 10, 100 and 1000:

Division	Rules	Examples
Divide by 10(10^1)	The number will move one place value to the right	$56.3 \div 10 = 5.63$
Divide by 100(10^2)	The number will move two places value to the right	$56.3 \div 100 = 0.563$
Divide by 1000(10^3)	The number will move three places value to the right	$56.3 \div 1000 = 0.0563$

Multiplication and Division Equations

The equations are the expression that includes integers, variables, equality signs and arithmetic operations. For example,

$$2a + 9 = 7$$

If we solve the above equation for a, then,

$$2a = 7 - 9$$

$$a = -2 \div 2 = -1$$

Solved Examples – Multiplication and Division

Q.1: Find the division of:

$$34 \div 2 = ?$$

$$555 \div 5 = ?$$

$$81 \div 3 = ?$$

$$812 \div 4 = ?$$

Solution: The divisions are:

$$34 \div 2 = 17$$

$$555 \div 5 = 111$$

$$81 \div 3 = 27$$

$$812 \div 4 = 203$$

Word Problems on Multiplication and Division

Q.1: Raju has 1615 candies stored in a box. If there are 85 such boxes, then how many candies are there in each box?

Solution: Total number of candies = 1615

Number of boxes = 85

Therefore, each box contains = $1615 \div 85$ candies
= 19 candies.

Practice Questions – Multiplication and Division

1. Fill in the blanks:

$$7 \times 9 = \underline{\quad}$$

$$83 \div 2 = \underline{\quad}$$

2. Find the value of:

$$\frac{2}{3} \times \frac{5}{9} = ?$$

$$\frac{5}{6} \times 12 = ?$$

$$16 \div \frac{4}{3} = ?$$

$$200 \div 40 = ?$$

3. Each toffee cost Rs. 2. If there are 120 toffees, then what is the total cost?

4. A school is planning a trip. There are 1729 students and each bus has 19 seats. How many buses are required to go for the trip?

To solve more problems on multiplication and division of decimals, download BYJU'S – The Learning App from Google Play Store and watch interactive videos.

Frequently Asked Questions on Multiplication and Division

What is the order of operations of multiplication and division?

As per the BODMAS rule, we divide first and then multiply, unless an expression is included in the bracket.

$$15 \div 3 \times 2 = 5 \times 2 = 10$$

$$15 \div (3 \times 2) = 15 \div 6 = 2.5$$

What do we get when we multiply an integer with an integer?

Multiplication of an integer with an integer result in an integer itself.

$$\text{Integer} \times \text{Integer} = \text{Integer}$$

How do you divide a number by a fraction?

If we divide a number by a fraction, we need to find the reciprocal of the given fraction first and then multiply it with the dividend. Say, 3 is divided by $\frac{1}{3}$. Then,

$$3 \div \left(\frac{1}{3}\right)$$

Reciprocal of $\frac{1}{3}$ is 3

Therefore,

$$3 \times 3 = 9.$$

Is multiplication and division applicable to all the real numbers?

We can multiply and divide all the real numbers such as whole numbers, natural numbers, integers, rational numbers, irrational numbers.