DIVISION

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1. Q) What is Division ?

A) Division is the Process of Finding How Many times one Number is Contained in another Number. The Act or Process of Dividing. To Divide is to Separate, to put into Groups, to Deal Out, to Share, to Cause a Disagreement between.

2. Division is the Inverse Operation to Multiplication.

3. Division is the Operation of Finding, for Two Numbers or Polynomials, a Third Number or Polynomial, called the Quotient; such that the First Number or Polynomial is Equal to the Quotient Multiplied by the Second Number.

4. The Operation is WRITTEN AS : $q = a / b$, Where q is the Quotient, a is the Dividend and b is the Divisor.

5. The Dividend is to be Divided by another Number called the Divisor.

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6. When Dividing a Positive Term by a Negative Term the Result or Quotient is Negative.

7, When a Negative Term is Divided by a Negative Term the Result or Quotient is Positive.

8. Q) List Some Known Types of Division ? Along with a Brief Description.

Type of Division	Purpose	Typical Example
Synthetic Division	Fast division of a polynomial by a linear factor of the form $x - c$	$(x^3 + 2x^2 - 5x + 6) \div (x - 2)$
Long Division	Standard method for numbers and polynomials	$789 \div 23$ or $(x^4 - 1) \div (x^2 + 1)$
Short Division	Abbreviated numerical long division for simple divisors	$864 \div 4$
Polynomial Division	General term for dividing one polynomial by another	$(x^3 - 1) \div (x - 1)$
Partial Quotients Division	Flexible arithmetic division using repeated subtraction	$856 \div 7$
Euclidean Division	Fundamental theorem: dividend = divisor × quotient + remainder	$a = bq + r$
Integer Division	Division producing quotient and remainder only	$17 \div 5 = 3$ remainder 2
Modular Division	Division in modular arithmetic using multiplicative inverses	$3^{-1} \pmod 7$
Fraction Division	Dividing rational numbers by multiplying by the reciprocal	$\frac{3}{4} \div \frac{2}{5}$

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Matrix Division	Multiplication by an inverse matrix	AB^{-1}
Complex Division	Division of complex numbers using conjugates	$\frac{3+4i}{1-2i}$

Synthetic Division

$(x^3 + 2x^2 - 5x + 6) \div (x - 2)$

Synthetic division is a streamlined method for dividing a polynomial by a linear divisor such as $x - c$. It avoids writing the variable repeatedly, making calculations much faster.

Long Division

Long division is the classic algorithm taught in arithmetic and later extended to polynomials. It works for virtually any division problem.

Euclidean Division

The foundational principle states:

$$a = bq + r, \qquad 0 \leq r < |b|.$$

$a = bq + r$

This underlies all integer division.

Polynomial Division

Synthetic division is really a special case of polynomial long division when the divisor is linear.

Summary

> Synthetic Division is the fastest specialized form, while Long Division is the universal workhorse.

Division, much like cooking, has several recipes—but they all aim for the same meal.

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9. Q) Divide the Number One(1) by the Numbers 2 - 10
SHOW YOUR WORK

DIVISION	LONG DIVISION WORK	DECIMAL FORM
1 ÷ 2	2) 1.000000 → 0.5	0.500000...
1 ÷ 3	3) 1.000000 → 0.333333...	0.\overline{3}
1 ÷ 4	4) 1.000000 → 0.25	0.250000...
1 ÷ 5	5) 1.000000 → 0.2	0.200000...
1 ÷ 6	6) 1.000000 → 0.166666...	0.1\overline{6}
1 ÷ 7	7) 1.000000 → 0.142857142857...	0.\overline{142857}
1 ÷ 8	8) 1.00000 0.125	0.125000...
1 ÷ 9	9) 1.000000 → 0.111111...	0.\overline{1}
1 ÷ 10	10) 1.000000 → 0.1	0.100000...

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10. Q) What are the Names of the Division Bar and Symbols for Division ?

A) A Vinculum (plural: Vincula) or Division Bar is a Horizontal Line used in Mathematics to Group Terms, Signify Division, or Act as a Fraction Dar. It Binds Symbols Together, functioning as a "tie" or "bond" that often acts like Brackets or Parentheses to show which Operations are performed together, particularly in Fractions, Radical Signs and Repeating Decimals.

The long division symbol (sometimes called the division bracket or house of math) is a mathematical symbol used to visually structure a long division problem, separating the divisor, dividend, and quotient.

Definition
The symbol consists of two main parts:

The Right Parenthesis): Separates the divisor (number you are dividing by) on the left from the dividend (number being divided) on the right.

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The Vinculum — (Horizontal Bar): Extends to the right above the dividend, serving as a roof under which the quotient (answer) is written.

- ‾‾‾‾‾
- **2) 10**

In Unicode, this specialized mathematical symbol is represented as \unicode{x27CC}.

Image of Long Division Symbol

The image below shows the standard placement of the components, often referred to as the "bus stop method"

Components Summary

- **Divisor: The number outside the bracket (left).**
- **Dividend: The number inside/under the bracket.**
- **Quotient: The answer on top.**
- **Remainder: The final leftover amount at the bottom.**

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11. Q) What is The Obelus ?

The OBELUS (plural: OBELI) is a mathematical and typographical symbol most commonly recognized today as the division sign

÷

Wikipedia

Definition

The Obelus consists of a short horizontal line with a dot above and a dot below (÷). The term comes from the Ancient Greek word *obelós* (ὀβελός), meaning a "sharpened stick," "spit," or "pointed pillar".

Descriptions and Uses

1. Mathematical Division

- **Primary Use: In Anglophone countries, it represents the operation of division.**

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- **Visual Representation: It is often interpreted as a blank fraction, with the dots replacing the numerator and denominator.**
- **Origin: It was first used for division in 1659 by Swiss mathematician Johann Rahn in his book *Teutsche Algebra*.**
- **Status: Despite its common use on calculators and in elementary education, it is technically deprecated by the ISO 80000-2 standard, which recommends using the SOLIDUS or COLON instead.**

12. Q) What is The Solidus ?

A) The solidus (/) is a diagonal slash used in mathematics as an in-line notation for fractions, ratios, and division, allowing them to be written on a single line. It serves as a modern alternative to horizontal fraction bars or the obelus, acting as a "per" operator in units.

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Usage Examples in Mathematics

- **In-line Fractions:** $1/2$, $3/4$.
- **Division/Ratios:** a/b instead of $\frac{a}{b}$.
- **Units of Measurement:** km/h (kilometers per hour), m/s^2.
- **Superscript/Subscript:** $x^{1/2}$ for $\sqrt{x}$.
- **Sets:** A/B can sometimes denote quotient sets (though other symbols exist). Wolfram MathWorld +4

Synonyms and Related Terms

- **Slash / Slant / Virgule:** Commonly used names.
- **Fraction Slash / Division Slash:** Specific Unicode characters (U+2044 / U+2215) designed for this purpose.
- **Shilling Mark:** Historically, as the solidus was used to separate shillings from pence. Wikipedia +2

Key Considerations

- **Ambiguity:** In expressions like a/bc, it can be ambiguous whether it means $(a/b) \times c$ or $a/(bc)$. Parentheses are recommended for clarity (e.g., $a/(bc)$).
- **Reverse Solidus:** The backslash (`\`) is not the same and is used for specific operations, such as the set difference ($A \setminus B$).
- **Difference from Obelus:** The solidus (`/`) is preferred over the obelus (÷) in modern notation, according to. Wolfram MathWorld +4