Math in JavaScript: Complete Beginner's Guide

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1. Introduction to Math in JavaScript

JavaScript supports mathematical operations using **operators** and the built-in **`Math` object**.

Math is used for:

- Calculations
- Geometry formulas
- Random number generation
- Data analysis
- Animation logic in games

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2. Mathematical Operators

Operator	Name	Example	Result
`+`	Addition	`5 + 2`	`7`
`-`	Subtraction	`5 - 2`	`3`
`*`	Multiplication	`5 * 2`	`10`
`/`	Division	`10 / 2`	`5`
`%`	Remainder/Modulus	`10 % 3`	`1`
`**`	Exponentiation	`2 ** 3`	`8`

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3. Special Math Results in JS

```
console.log(8 / 0);    // Infinity
console.log(-8 / 0);   // -Infinity
console.log(0 / 0);    // NaN (Not a Number)
```

💡 **Infinity** and **NaN** are special number types in JavaScript.

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4. Math Object in JavaScript

JavaScript has a built-in `Math` object that offers **constants** and **methods** for advanced mathematical operations.

✅ **You don't need to create it. Just use: `Math.method()` or `Math.property`**

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5. Common Math Properties (Constants)

Property	Description	Value
`Math.PI`	Ratio of circumference to diameter	`3.14159...`
`Math.SQRT2`	Square root of 2	`1.414...`
`Math.E`	Euler's number (e)	`2.718...`

```
console.log(Math.PI);      // 3.141592653589793
console.log(Math.SQRT2);   // 1.4142135623730951
console.log(Math.E);       // 2.718281828459045
```

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6. Common Math Methods

Method	Description	Example	Result
`Math.sqrt(x)`	Square root of x	`Math.sqrt(25)`	`5`

`Math.pow(x, y)`	x to the power y	`Math.pow(2, 3)` → `8`
`Math.floor(x)`	Rounds down to nearest integer	`Math.floor(4.7)` → `4`
`Math.ceil(x)`	Rounds up to nearest integer	`Math.ceil(4.1)` → `5`
`Math.round(x)`	Rounds to nearest integer	`Math.round(4.5)` → `5`
`Math.random()`	Random number between 0 (inclusive) and 1 (exclusive)	`Math.random()` → `0.0 - 0.999`

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7. Practical Example: Rectangle Area

Formula: `Area = length * width`

```
let length = 5;
let width = 3;
let area = length * width;
console.log("Area of Rectangle:", area); // 15
```

⚠️ If either value is `0`, the result is `0`.

```
let areaZero = 0 * 10;
console.log(areaZero); // 0
```

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8. Generating Random Numbers

Get a random number between 0 and 10:

```
let randomNum = Math.floor(Math.random() * 11);
console.log(randomNum);
```

Random dice roll (1 to 6):

```
let dice = Math.floor(Math.random() * 6) + 1;
```

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9. Practice Time: Mini Challenges

🔹 **Task 1:**

Write a program to find the square of any number using `Math.pow()`.

🔹 **Task 2:**

Write a program that:

- Generates a random number between 1 and 100.
- Checks if the number is even or odd using `%` operator.

🔹 **Task 3:**

Find the area of a circle using:
`Area = Math.PI * radius * radius`

💡 Pro Tips for Beginners

- Always round numbers in UI using `Math.round()` or `Math.floor()`.
- Prefer `Math.pow()` over `**` for older browsers.
- Don't forget: `Math.random()` gives decimal — multiply and round it for real use.