TypeScript Mini-Course: Math Functions & Random Numbers

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1. Introduction

This mini-course teaches you how to use **Math functions** in TypeScript including random numbers, rounding, min/max, power, square root, trigonometry, and absolute values.

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2. Rounding Numbers

```
function roundNumbers(num: number): void {
    console.log("Original:", num);
    console.log("Rounded:", Math.round(num));
    console.log("Floor:", Math.floor(num));
    console.log("Ceil:", Math.ceil(num));
}

roundNumbers(4.7);
roundNumbers(4.2);
```

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3. Random Numbers

3.1 Random number between 0 and 1

```
const randomNum = Math.random();
console.log("Random number [0-1):", randomNum);
```

3.2 Random number in a range

```
function randomInRange(min: number, max: number): number {
    return Math.floor(Math.random() * (max - min + 1)) + min;
}
console.log("Random 1-100:", randomInRange(1, 100));
```

3.3 Generate random array of numbers

```
function generateRandomArray(size: number): number[] {
    const arr: number[] = [];
    for (let i = 0; i < size; i++) {
        arr.push(Math.floor(Math.random() * 100) + 1);
    }
    return arr;
}

function displayArray(arr: number[]): void {
    console.log("Random Array:", arr);
}

const randomNums = generateRandomArray(10);
displayArray(randomNums);
```

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4. Min & Max

```
function maxMinExample(numbers: number[]): void {
    console.log("Numbers:", numbers);
    console.log("Max:", Math.max(...numbers));
    console.log("Min:", Math.min(...numbers));
}
maxMinExample([10, 25, 3, 50, 7]);
```

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5. Power & Square Root

```
function powerAndSqrtExample(num: number): void {
    console.log(`${num} squared =`, Math.pow(num, 2));
    console.log(`${num} square root =`, Math.sqrt(num));
}
powerAndSqrtExample(16);
```

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6. Absolute Value

```
function absExample(num: number): void {
    console.log(`Absolute value of ${num} =`, Math.abs(num));
}
absExample(-10);
absExample(5);
```

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7. Trigonometry

```
function trigExample(angle: number): void {
    const rad = angle * (Math.PI / 180);
    console.log(`sin(${angle}) =`, Math.sin(rad));
    console.log(`cos(${angle}) =`, Math.cos(rad));
    console.log(`tan(${angle}) =`, Math.tan(rad));
}
trigExample(30);
trigExample(45);
```

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8. Math.sign()

```
function signExample(num: number): void {
    console.log(`Sign of ${num}:`, Math.sign(num));
}
signExample(10);  // 1
signExample(-5);  // -1
signExample(0);   // 0
```

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9. Combining Math with Arrays & Functions

```
function generateRandomArrayUnique(size: number): number[] {
    const arr: number[] = [];
    while(arr.length < size) {
        const rand = Math.floor(Math.random() * 100) + 1;
        if(!arr.includes(rand)) arr.push(rand);
```

```
    }
    return arr;
}

const uniqueRandoms = generateRandomArrayUnique(10);
displayArray(uniqueRandoms);
```

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10. Exercises

1. Generate 20 random numbers and display them.
2. Find the max and min from a random array.
3. Calculate the square and square root of a number.
4. Count how many positive, negative, and zeros in an array using `Math.sign()`.
5. Create a multiplication table for a random number between 1 and 12.
6. Generate 10 unique random numbers and sort them in ascending order.

Summary

- `Math.round()`, `Math.floor()`, `Math.ceil()` — rounding numbers
- `Math.random()` — generate random numbers
- `Math.max()`, `Math.min()` — find min/max
- `Math.pow()`, `Math.sqrt()` — powers and roots
- `Math.abs()` — absolute value
- `Math.sign()` — detect positive, negative, or zero
- Trigonometry: `Math.sin()`, `Math.cos()`, `Math.tan()`
- Combine with arrays and functions for practical tasks