

Data Types & Operations

Lesson Objectives

- Understand datatypes
- Understand arithmetic, relational and logical operators.
- Understand implicit and explicit type conversions.
- Learn to use Math object.

Data Types

- All programming languages have idea of data types, some languages are strict on data types, and others are loose.
- In JavaScript, variables get their type based on the content it is currently referring to.
- When a variable is not assigned to a value, by default its value is undefined, which is a special primitive type. Other primitive types are:

Type	Definition	Example
boolean	stores true or false	let new = true;
number	an integer or fractional number	let count = 10; let average = 5.25;
string	single or sequence of characters	let alpha = 'a' let city = "Fairfield"

- function, array, object are other complex types.
- typeof operator can be used to find the datatype during runtime.

Example

```
let x = 5;  
let y = 7;  
let z = x;  
x = "Hi" ;  
y = z;  
z = false;  
console.log(x); // Hi  
console.log(typeof x) // string  
console.log(y); // 5  
console.log(typeof y); // number  
console.log(z); // false  
console.log(typeof z); //boolean
```

Operations & Operators

- Different set of operations can be performed on a variable based on its data type
 - Arithmetic operations using operators (+, -, *, /, %, ++, --)
 - When at least one of the operand type is string, + operator will perform string concatenation.
 - Comparisons using relational operators (==, !=, >, <, >=, <=)
 - Logical operations using operators (&&, ||, !)

Arithmetic Operations

- These are similar operation as we learn in mathematics (algebra)
 - With same precedence
- The modulus operator (%) gives the remainder whereas the division (/) operator gives back the quotient.
- Multiplication (*) operator is no more implicit.
- What will the result of following arithmetic operation?
 - $2-9+8-6+5$

Converting a string to a number

- User input always comes as string, even when user may have entered a number.
- Before arithmetic operation can be performed, string should be converted to numeric type.
 - `parseInt(string)`
 - `parseFloat(string)`
- [Example](#)

Implicit type conversion

- In most cases JavaScript automatically performs type conversion/casting / coercion
- [Example](#)

Exercise

- Make book examples for temperature conversion on page 41 and 42 running in your machine.
 - Copy comments too.

More assignment operators

- These are merely shortcuts

Operator	Example	Equivalent
<code>+=</code>	<code>x += 2</code>	<code>x = x+2</code>

- Same rule for `-`, `*`, `/` and `%` operators

Increment and Decrement Operators

- Shortcuts to increment and decrement current value by 1
 - `++ count; => count += 1; => count = count + 1;`
 - `-- count; => count -= 1; => count = count - 1;`
- Pre vs Post, increment and decrement
 - `++ count` vs `count ++`
 - `-- count` vs `count --`
- [Example](#)

Operator Precedence Revisited

Operator(s)	Name(s)
()	parentheses
- (unary)	negation
++ --	increment, decrement
* / %	multiplication, division, modulus
+ -	additions, subtraction
= += -= *= /= %=	assignments

Math Object

- Inbuilt object as a part of JavaScript language, that provides functionality necessary for mathematical computations.
- [Example](#)

Exercise

- Make following book examples running in your machine
 - Volume of a Cylinder (Chapter 5, page 48)
 - Distance between two points (chapter 5, page 50)

Relational operators

- As the name implies, these operator compares two values and results to either true or false (Boolean values).
- <, >, <=, >=, ==, ===, !=, !==
- [Example](#)

Logical Operators

- Logical operators (&&, ||, !) also results into Boolean values, but logical operators are typically used with Boolean (logical) values.
 - Recall, relational operators results into Boolean values.
 - So, logical operators can be to used to combine two or more relational expressions.
 - [Example](#)

Main point

- Data type determines the operations that can be carried out on data. Same operator can do different operation depending on the data type. *Science of consciousness, Experiencing the pure field of consciousness is one operation that every human nervous system is capable of. TM operates in same way for every human nervous system, when practiced correctly.*

Truthy & Falsy

- In JavaScript, any value can be used as a Boolean
 - **"falsy"** values: 0, 0.0, NaN, "", null, and undefined
 - **"truthy"** values: anything else

Short-circuit evaluation

- The && and || operators actually return the value of one of the specified operand, so if these operators are used with non-Boolean values, they will return non-Boolean value.
 - [Example](#)

Assignments

- Reading chapter 5
- Programming Assignments from Chapter 5 (except question 4)
 - 8 and 9 are optional