

# Operators



Mark Zamoyta

markzamoyta@gmail.com

# Module Overview

+ - \* / %

Unary

Bitwise

Boolean

Equality

Relational

---

# Addition

---

```
var total = 5 + 3;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

8

```
var total = 5.1 + 3.3;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

8.399999999999999

```
var total = 5.1 + 3.3;  
console.log(total.toFixed(2));
```

## Question

What shows in the console?

---

## Answer

8.40

```
var id = "PRD" + "X99";  
console.log(id);
```

## Question

What shows in the console?

---

## Answer

PRDX99

```
var id = "PRD" + 2000;  
console.log(id);
```

## Question

What shows in the console?

---

## Answer

PRD2000



```
var id = 2000 + "PRD";  
console.log(id);
```

## Question

What shows in the console?

---

## Answer

2000PRD

```
var id = "2000" + "500";  
console.log(id);
```

## Question

What shows in the console?

---

## Answer

2000500

```
var id = 2000 + "500";  
console.log(id);
```

## Question

What shows in the console?

---

## Answer

2000500

```
var id = 2000 + undefined;  
console.log(id);
```

## Question

What shows in the console?

---

## Answer

NaN

```
var id = "PRD" + undefined;  
console.log(id);
```

## Question

What shows in the console?

---

## Answer

PRDundefined

```
var id = 2000 + null;  
console.log(id);
```

## Question

What shows in the console?

---

## Answer

2000

```
var id = "PRD" + null;  
console.log(id);
```

## Question

What shows in the console?

---

## Answer

PRDnull

```
var id = 2000 + NaN;  
console.log(id);
```

## Question

What shows in the console?

---

## Answer

NaN



```
var id = "PRD" + NaN;  
console.log(id);
```

## Question

What shows in the console?

---

## Answer

PRDNaN

---

# Subtraction

---

```
var total = 30 - 20;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

10

```
var total = 3.8 - 2.1;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

1.69999999999999997

```
var total = 3.8 - 2.1;  
console.log(total.toFixed(3));
```

## Question

What shows in the console?

---

## Answer

1.700

```
var total = "300" - "200";  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

100

```
var total = "PRD300" - "ITEM200";  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

NaN

```
var total = 300 - undefined;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

NaN



```
var total = 300 - null;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

300

```
var obj = {  
  valueOf: function () { return 100; }  
};  
var total = 300 - obj;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

200

```
var total = 300 - NaN;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

NaN

```
var total = 300 - "";  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

300

---

# Multiplication, Division and Modulus

---

```
var total = 9 * 3;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

27

```
var total = 1.1 * 1.1;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

1.210000000000000002

```
var total = 1.1 * 1.1;  
console.log(total);  
if (total !== 1.21)  
    console.log('Big Problem!');
```

## Question

What shows in the console?

---

## Answer

1.210000000000000002

Big Problem!



```
var total = 1.1 * 1.1;  
console.log(total);  
if (total.toFixed(2) == 1.21)  
    console.log('Fixed!');
```

## Question

What shows in the console?

---

## Answer

1.210000000000000002

Fixed!

```
var total = 20 * NaN;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

NaN

```
var total = 20 * undefined;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

NaN

```
var total = 20 * null;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

0

```
var obj = {  
  valueOf: function () { return 100; }  
};  
var total = 4 * obj;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

400

```
var total = 4 * Infinity;  
console.log(total);
```

Question

What shows in the console?

---

Answer

Infinity

```
var total = -4 * Infinity;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

-Infinity

```
var total = 4 * "XYZ";  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

NaN



```
var total = 9 / 0;  
console.log(total);
```

Question

What shows in the console?

---

Answer

Infinity

```
var total = -9 / 0;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

-Infinity

```
var total = 9 / "3";  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

3

```
var total = 9 % 4;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

1

```
var total = 9 % " 4 ";  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

1

---

# Unary Operators

++ -- +value -value

```
var level = 5;  
++level;  
console.log(level);
```

## Question

What shows in the console?

---

## Answer

6

```
var level = 5;  
level++;  
console.log(level);
```

## Question

What shows in the console?

---

## Answer

6



```
var level = 5;  
var nextLevel = ++level;  
console.log(nextLevel);
```

## Question

What shows in the console?

---

## Answer

6

```
var level = 5;  
var nextLevel = level++;  
console.log(nextLevel);
```

## Question

What shows in the console?

---

## Answer

5

```
var level = 5;  
var nextLevel = --level;  
console.log(nextLevel);
```

## Question

What shows in the console?

---

## Answer

4

```
var level = 5;  
var base = 10;  
var nextLevel = level-- * base;  
console.log(nextLevel);
```

## Question

What shows in the console?

---

## Answer

50

```
var level = 5;  
var base = 10;  
var nextLevel = --level * base;  
console.log(nextLevel);
```

## Question

What shows in the console?

---

## Answer

40

```
var level;  
console.log(++level);
```

## Question

What shows in the console?

---

## Answer

NaN

```
var level = null;  
console.log(++level);
```

## Question

What shows in the console?

---

## Answer

1

```
var value = 9;  
value = +value;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

9



```
var value = -9;  
value = +value;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

-9

```
var value = 'calc';  
value = +value;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

NaN

```
var value = 42;  
value = -value;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

-42

```
var value = -42;  
value = -value;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

42

```
var value = 'calc';  
value = -value;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

NaN

---

# Bitwise Operators

---

```
var num1 = parseInt('1010', 2);  
var num2 = parseInt('0110', 2);  
var total = num1 & num2;  
console.log(total.toString(2));
```

## Question

What shows in the console?

---

## Answer

10

```
var num1 = parseInt('1010', 2);  
var num2 = parseInt('0110', 2);  
var total = num1 | num2;  
console.log(total.toString(2));
```

## Question

What shows in the console?

---

## Answer

1110



```
var num1 = parseInt('1010', 2);  
var num2 = parseInt('0110', 2);  
var total = num1 ^ num2;  
console.log(total.toString(2));
```

## Question

What shows in the console?

---

## Answer

1100

```
var num1 = parseInt('0001', 2);  
num1 = num1 << 2;  
console.log(num1.toString(2));
```

## Question

What shows in the console?

---

## Answer

100

```
var num1 = parseInt('1000', 2);  
num1 = num1 >> 3;  
console.log(num1.toString(2));
```

## Question

What shows in the console?

---

## Answer

1

```
var num1 = -parseInt('1000', 2);  
num1 = num1 >> 3;  
console.log(num1.toString(2));
```

## Question

What shows in the console?

---

## Answer

-1

```
var num1 = parseInt('1000', 2);  
num1 = num1 >>> 1;  
console.log(num1.toString(2));
```

## Question

What shows in the console?

---

## Answer

100

```
var num1 = -parseInt('1000', 2);  
num1 = num1 >>> 1;  
console.log(num1.toString(2));
```

## Question

What shows in the console?

---

## Answer

```
11111111111111111111111111111111  
11111100
```

---

# Boolean Operators

---

```
var value = !true;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

false



```
var value = !false;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

true

```
var value = !99;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

false

```
var value = !0;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

true

```
var value = !"";  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

true

```
var value = !"A";  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

false

```
var value = !" ";  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

false

```
var value = !new Object();  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

false

```
var value = !null;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

true



```
var value = !undefined;  
console.log(value);
```

Question

What shows in the console?

---

Answer

true

```
var value = !NaN;  
console.log(value);
```

Question

What shows in the console?

---

Answer

true

```
var value = !!false;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

false

```
var value = true && true;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

true

```
var value = true && false;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

false

```
var value = false && true;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

false

```
var value = false && false;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

false

```
var obj = {  
  calc: 'Logical AND'  
};  
var value = obj && 99;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

99



```
var obj = {  
  calc: 'Logical AND'  
};  
var value = obj && 0;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

0

```
var obj = {  
  calc: 'Logical AND'  
};  
var value = obj && obj;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

```
Object {calc: "Logical  
AND"}
```

```
var obj = {  
  calc: 'Logical AND'  
};  
var value = true && obj;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

```
Object {calc: "Logical  
AND"}
```

```
var value = null && 99;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

null

```
var value = "Z" && null;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

null

```
var value = "Z" && undefined;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

undefined

```
var value = "Z" && NaN;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

NaN

```
var value = false && productId;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

false



```
var productId = 5;  
var value = false && ++productId;  
console.log(productId);
```

## Question

What shows in the console?

---

## Answer

5

```
var value = true || true;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

true

```
var value = true || false;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

true

```
var value = false || true;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

true

```
var value = false || false;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

false

```
var obj = {  
  calc: 'Logical OR'  
};  
var value = obj || 99;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

```
Object {calc: "Logical  
OR"}
```

```
var obj = {  
  calc: 'Logical OR'  
};  
var value = false || 99;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

99

```
var defaultSettings = {  
  who: 'default'  
};  
var userSettings = {  
  who: 'user'  
};  
var value = userSettings || defaultSettings;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

Object {who: "user"}



```
var defaultSettings = {  
  who: 'default'  
};  
var userSettings;  
var value = userSettings || defaultSettings;  
console.log(value);
```

## Question

What shows in the console?

---

## Answer

Object {who: "default"}

---

# Equality Operators

`==` `!=` `===` `!==`

```
if (true == 1)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

true

```
if (true == 2)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

```
if (false == 0)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

true

```
if (42 == '42')  
    console.log('true');  
else  
    console.log('false');
```

## Question

What shows in the console?

---

## Answer

true

```
var obj = {  
  valueOf: function () { return 42; }  
}  
if (42 == obj)  
  console.log('true');  
else  
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

true

```
var obj = {  
  toString: function () { return 42; }  
}  
if (42 == obj)  
  console.log('true');  
else  
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

true



```
var obj = {  
  name: 'Trigger'  
};  
var obj2 = {  
  name: 'Trigger'  
};  
if (obj == obj2)  
  console.log('true');  
else  
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

```
var obj = {  
  name: 'Trigger'  
};  
if (obj == obj)  
  console.log('true');  
else  
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

true

```
var obj = {  
  name: 'Trigger'  
};  
var obj2 = obj;  
if (obj == obj2)  
  console.log('true');  
else  
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

true

```
if (null == undefined)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

true

```
if (undefined == 0)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

```
if (null == 0)
    console.log('true');
else
    console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

```
if (NaN == NaN)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

```
if (42 !== 'forty-two')  
    console.log('true');  
else  
    console.log('false');
```

## Question

What shows in the console?

---

## Answer

true



```
if (55 === '55')  
    console.log('true');  
else  
    console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

```
if (55 === 55)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

true

```
if (false === 0)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

```
if (null === undefined)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

```
if (55 !== 55)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

---

# Relational Operators

< <= > >=

```
if (55 < 66)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

true

```
if (55 <= 55)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

true



```
if (55 > 55)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

```
if (55 >= 55)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

true

```
if ("alpha" < "beta")  
    console.log('true');  
else  
    console.log('false');
```

## Question

What shows in the console?

---

## Answer

true

```
if ("alpha" < "alph")  
    console.log('true');  
else  
    console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

```
if ("beta" < "Alpha")  
    console.log('true');  
else  
    console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

```
if ("Beta" < "alpha")  
    console.log('true');  
else  
    console.log('false');
```

## Question

What shows in the console?

---

## Answer

true

```
if ("Beta".toLowerCase() < "alpha".toLowerCase())  
    console.log('true');  
else  
    console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

```
if ('42' < 55)
  console.log('true');
else
  console.log('false');
```

## Question

What shows in the console?

---

## Answer

true



```
if ('42' < '142')  
    console.log('true');  
else  
    console.log('false');
```

## Question

What shows in the console?

---

## Answer

false

```
var total = NaN;  
if (total < 5)  
    console.log('less than 5');  
if (total >= 5)  
    console.log('greater than or equal to 5');
```

## Question

What shows in the console?

---

## Answer

(nothing)

---

# Miscellaneous Operators

---

```
var total = 6;  
total += 4;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

10

```
var total = 6;  
total -= 4;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

2

```
var total = 6;  
total *= 4;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

24

```
var total = 6;  
total /= 3;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

2

```
var total = 6;  
total %= 4;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

2



```
var total = 1;  
total <<= 2;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

4

```
var total = 4;  
total >>= 1;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

2

```
var total = 6;  
total *= 4 + 1;  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

30

```
var total = 99, tax = 9;  
console.log(total);  
console.log(tax);
```

## Question

What shows in the console?

---

## Answer

99

9

```
var total = (99, 88, 44);  
console.log(total);
```

## Question

What shows in the console?

---

## Answer

44

# Summary



- Basic Arithmetic Operators: + - \* / %
- Unary
- Bitwise
- Boolean
- Equality
- Relational
- Miscellaneous