



REVIEW

variables store data in a computer's memory for later use.

Variables can store different types of values. 4 major types of variables are:

- 1) Number: `var a = 42;`
`var m = 4.2;`
- 2) Strings: Anything that have quotes around them.
`var s = "Hello World!"`
`var a = "4";`
- 3) Functions: very specific syntax. `var g = function (arg1, arg2) {`
`return (arg1*arg2);`
`}`

What is the answer for `g(4,5)`;

Answer: 20

- 4) Arrays

`var a = [1,2,3,4,5];` (this is the only time we are using square brackets)

`var b = ["Hello", "World"];`

`var c = [10, "after", 11];` (can have even different types of values inside arrays)

FOR LOOPS

`for (var i=0; i<10; i++)`

this kind of statement is used.

PUZZLE # 1

`d= 0;` old value of `d = 0;`

`i=0;` new value = `i + old value = 0+0 = 0;` // now old value = 0;

`i=1;` new value = `i + old value of d = 1 + 0 = 1;` // now old value = 1;

`i=2;` new value = `i + old value of d = 1+ 2 = 3;` // now old value = 3;

`i=3;` new value = `i + old value of d = 3 + 3 = 6;` // now old value = 6;

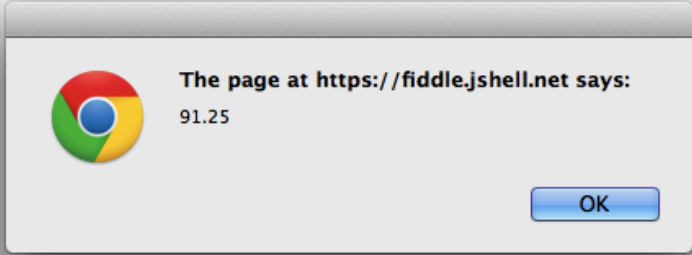
`i=4;` new value = `i + old value of d = 6 + 4 = 10;` // now old value = 10;

`i=5;` So, `i` is not less than 5, stop the loop.

`d= 10;` // Answer

```
1 var grades = [80,100,90,95];
2 var sum = 0;
3 for (var i=0; i<grades.length; i++) {
4     var grade = grades[i]; // 1st run: 80
5                             // 2nd run: 100
6     sum = sum + grade;
7 }
8 alert (sum/ grades.length);
```

JavaScript



The page at <https://fiddle.jshell.net> says:
91.25

OK

PUZZLE # 2

$i = 0; a[i] = a[0] = 3;$

$k = 17;$

$k = 17 - 3 = 14;$

$i=1; a[1] = 4;$

$k = 14;$

$k = 14 - 4 = 10;$

$i=2; a[2] = 5;$

$k=10;$

$k = 10 - 5 = 5;$

So, $k=5; //Answer$

```
1 var d = 0;
2 for (var i =0; i<5; i++) {
3     d = d+i;
4 }
5 alert (d);
```

JavaScript



The page at <https://fiddle.jshell.net> says:
10

OK

PUZZLE # 3

var cart = [8.5,52.49,31.99];
Get 10% off orders \$50 or more!
Get 50% off orders \$250 or more!

```
var calculate = function (cart) {  
    var sum = 0;  
    for (var i=0; i<cart.length; i++) {  
        sum = sum + cart[i];  
    }  
    if (sum>=250) {  
        sum = sum*(0.5);  
    }  
    else if (sum>=50) {  
        sum=sum*(0.9);  
    }  
    return (sum);  
}
```

In the codecademy tutorials, we saw the dot operator:

```
console.log ("hello World!");
```

```
console.log
```

Ask console for its log

“.” is a special symbol that we can ask for something, some property. We can ask for methods (function calls): for e.g., cart.length

NUMBER SYSTEMS AND PLACE VALUE

Place value of 123 (base 10)

1 times 1 = 3

2 times 10 = 20

1 times 100 = 100

(100+20+3) = 123

Place value of 213

3 times 1 = 3

1 times 10 = 10

2 times 100 = 200

(200+10+3) = 213

Our number system is 10.

Our number system uses the digits 0,1,2,3,4,5,6,7,8 and 9. It is called decimal system.

Computer has base 2: Binary number system. Instead of 10, it uses 2.

Computer uses the digits 0 and 1.

Place value of 101 (base 2)

$$2^0 = 1; \quad 1 \text{ times } 1 = 1;$$

$$2^1 = 2; \quad 0 \text{ times } 2 = 0;$$

$$2^2 = 4; \quad 1 \text{ times } 4 = 4;$$

$$(1+0+4) = 5;$$

$$(101)_2 = 5$$

Place value of 011 (base 2)

$$2^0 = 1; \quad 1 \text{ times } 1 = 1;$$

$$2^1 = 2; \quad 1 \text{ times } 2 = 2;$$

$$2^2 = 4; \quad 0 \text{ times } 4 = 0;$$

$$(1+2+0) = 3;$$

$$(011)_2 = 3$$

So far, we have seen **variables** store four different types of data:

Data Type	JavaScript Code
Number	<code>var n = 42;</code>
String	<code>var s = "Illinois";</code>
Function	<code>var f = function (n) { return n + 1; };</code>
Arrays	<code>var a = [1, 2, 3, 4, 5];</code>

We have also seen three **JavaScript keywords** that indicate JavaScript statements that encapsulates code:

Keyword	JavaScript Code
if	<code>if (x<10) { }</code>
for	<code>for (var i = 0; i < 10; i++) { ... }</code>
functions	<code>var f = function (a, b, c, d) { };</code>

Suppose you have four grades in a course: 80, 100, 90, and 95. Create a JavaScript variable that contains an array of those four course grades:

```
var grades = [80, 100, 90, 95];
```

Suppose you want to find your average grade. Using the array above, write the JavaScript code that finds the average and `alert` the value to the user:

```
var sum = 0;
for (var i=0; i<grades.length; i++) {
  var grade = grades[i]; //1st run 80
  sum = sum + grade;
}
alert (sum/grades.length);
```

Puzzle #1: What is the value of the variable `d` after the code executes? (10)

```
var d = 0;
for (var i = 0; i < 5; i++) {
  d = d + i;
}
```

Puzzle #2: What is the value of the variable `k` after the code executes? (5)

```
var k = 17;
var a = [3, 4, 5];
for (var i = 0; i < a.length; i++) {
  k = k - a[i];
}
```

Suppose we are creating an online store. The variable `cart` is an array that stores the price of the items in a user's cart. For example:

```
var cart = [ 8.50, 52.49, 31.99 ];
```

We are running a sale on our online store:

- Get 10 % off orders of \$ 50 or more
- Get 50 % off orders of \$ 250 or more

Puzzle #3: Create a function called `calculate` that takes in one argument, an array, and returns the final price. The final price is the total of all of the items in the card and has the correct discount applied.

```
var calculate = function (cart) {
  var sum = 0;
  for (var i=0; i<cart.length; i++) {
    sum = sum + cart[i];
  }
}
```

```

if (sum >= 250) {
    sum = sum * (0.5);
}
else if (sum >= 50) {
    sum = sum * (0.9);
}
return (sum);
}

```

In the codecademy tutorials, we saw the **dot operator**:

```

console.log("Hello, world!");

```

[1] [2]

Method:

Property:

The data type of the variable determines what properties and methods that the variable has:

If the variable is a String :	If the variable is an Array :
<code>.length</code> (Property) returns the number of characters in the string (Number)	<code>.length</code> (Property) returns the number of elements in the array (Number)
<code>.charAt(index)</code> (Method) returns the character at index <code>index</code> (String)	<code>.charAt(index)</code> (Method) returns the element in the array at index <code>index</code> (type of the element at that index)

Puzzles #4-6: What are the values of the variables `x`, `y`, `z`?

```

var s = "Hello, world!";
var x = s.length;           (x = 13)

```

```

var a = [2, 4, 6, 8, 10];
var y = a.length;         (y = 5)

```

```

var s2 = "Hello, world!";
var z = s2.charAt(4);    // Same as s2[4]   (z = "o")

```

In JavaScript, we can create our own data types! In this week's lab and MP, you will learn about the `simpleImage` data type – a data type that has properties and methods that allow you to manipulate an image.

In our number system, the value of a digit is based on its **place value**:

	10^2	10^1	10^0			10^2	10^1	10^0		
	100	10	1			100	10	1		
x	1	2	3			2	1	3		
	100	+ 20	+ 3	=	<u>123</u>	200	+ 10	+ 3	=	<u>213</u>

Our standard number system goes by two names:

1. **Base 10**
2. **Decimal Number System**

Inside of a computer, there are only 0s and 1s. Therefore, computers represent everything in **base 2**, aka the **Binary** number system.

Puzzle #7:

What is 101_2 in base 10?

	2^2	2^1	2^0		
	4	2	1		
x	1	0	1		
	4	+ 0	+ 1	=	<u>5</u>

Puzzle #8:

What is 011_2 in decimal?

	2^2	2^1	2^0		
	4	2	1		
x	0	1	1		
	0	+ 2	+ 1	=	<u>3</u>

Puzzle #9:

Inside of computer, we call the storage of a single binary digit a _____.

...and _____ is equal to one _____.

This means that:

Smallest Possible Value: _____₂ == _____₁₀

Largest Possible Value: _____₂ == _____₁₀