

Math Objects Notes & Practice

Tutorial 9, Session 9.3 (Carey 6e)

Some Math object methods: Math.round(x) and Math.random(). Here are some examples of the use of built-in objects called Math objects. Notice that the M in Math is capitalized. Recall objects are acted on by methods and have properties

1. **Math.round(x)** - Math is the special built-in object (one might say, *symbolizing numbers*) and round(x) is the method. The method round(x) takes a parameter value x, a real number, and rounds it to the nearest whole number. Example: Math.round(14.85) evaluates to 15. In the language of object-oriented programming, we can say that we are performing the method of rounding to the value 14.85, of the Math object, and the result is 15.
2. **Math.random()** - Note there is no parameter in Math.random(). So the () parentheses are empty here. This method randomly generates a number between 0 and 1.

Example:

statement: `document.write(Math.random());` might display 0.24656465911852116

If I multiply `math.random()` by a factor of **n** then I get a random number x, where $0 \leq x < n$. So if **n** were 10, I would write `Math.random()*10` to generate a decimal between 0 and 10, including 0 but not 10.

Example:

statement: `document.write(Math.random()*10);` might display 8.15427303406635

3. **Composing Math.round(x) and Math.random().** Let's suppose I want a random number between 0 and 100, ($0 \leq x < 100$), and want it rounded to a whole number.
Example:
statement: `document.write(Math.round(Math.random()*100));` might display 49.
Here are the steps: If `Math.random()` generated, say, 48.725643824153258, then `Math.round(48.725643824153258) = 49`.

4. **Round a number to a set number of decimal places (by several methods).**
 - a. Method 1: To round a number using **Math.round** together with mult and division

Example: Round 7.139 to 2 places (answer 7.14):

Solution:

`x = 7.139`

`document.write(Math.round(x*100)/100);`

The result will be 7.14. Here are some steps:

`Math.round(7.139*100)/100;`

`Math.round(713.9) / 100;`

`714/100;`

7.14

substitute x with 7.139 and mult it by 100

round 713.9 to whole number

divide by 100

answer

- b. Method 2: To round a number using **.toFixed(n)** and a variable. see p721-722

Example: Round x = 7.139 to 2 decimal places.

Solution:

document.write(x.toFixed(2));

This rounds directly to 2 decimal places to get 7.14.

Try this: [SEE ANSWER at bottom of document. This is item #4a]
round 5.374 to 1 decimal place with method 1.

5. **For other methods of Math object** see chart in Tutorial 9 (Carey, 6e) p708 (constants are also in another chart p712).

- a. Math.ceil(x) and Math.floor(x) are related to rounding.

Example: for x = 12.43,

// ceiling and floor Math object methods

x = 12.43;

*document.write(Math.ceil(x) + "
"); // always rounds **up** to very next integer after 12.43*

*document.write(Math.floor(x)); // always rounds **down** to integer preceding 12.43*

and this results in:

13

12

- b. Others:

Math.pow(x,y) evaluates to x^y

Math.sqrt(x) evaluates to \sqrt{x}

Math.PI is π or approp.3.14

Try these: [SEE ANSWERS at bottom of document. This is item #5b]

i) Find value of

ii) Math.sqrt(81)

iii) Math.sqrt(156)

iv) Math.pow(2, 3)

v) Math.pow(7,8)

(Use document.write's to see the results.)

ANSWERS:

#4a round 5.374 to 1 place: Math.round(5.374*10)/10 (evaluates to 5.4)

#5b 9, 12.48999, 8, 5764801