# Summary of MATLAB Onramp

## **Basic syntax**

| **Example** | **Description** |
| --- | --- |
| [x = pi](https://www.mathworks.com/help/matlab/matlab_env/create-and-edit-variables.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) | Create variables with the equal sign (=). The left-side (x) is the variable name containing the value on the right-side (pi). |
| [y = sin(-5)](https://www.mathworks.com/help/matlab/learn_matlab/calling-functions.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) | You can provide inputs to a function using parentheses. |

## **Desktop management**

| **Function** | **Example** | **Description** |
| --- | --- | --- |
| [save](https://www.mathworks.com/help/matlab/ref/save.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) | save data.mat | Save your current workspace to a MAT-file. |
| [load](https://www.mathworks.com/help/matlab/ref/load.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) | load data.mat | Load the variables in a MAT-file to the Workspace. |
| [clear](https://www.mathworks.com/help/matlab/ref/clear.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) | clear | Clear all variables from the Workspace. |
| [clc](https://www.mathworks.com/help/matlab/ref/clc.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) | clc | Clear all text from the Command Window. |
| [format](https://www.mathworks.com/help/matlab/ref/format.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) | format long | Change how numeric output is displayed. |

## **Array types**

| **Example** | **Description** |
| --- | --- |
| 4 | scalar |
| [3 5] | row vector |
| [1;3] | column vector |
| [3 4 5;6 7 8] | matrix |

## **Evenly-spaced vectors**

| **Example** | **Description** |
| --- | --- |
| 1:4 | Create a vector from 1 to 4, spaced by 1, using the [colon (:)](https://www.mathworks.com/help/matlab/ref/colon.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) operator. |
| 1:0.5:4 | Create a vector from 1 to 4, spaced by 0.5. |
| [linspace](https://www.mathworks.com/help/matlab/ref/linspace.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank)(1,10,5) | Create a vector with 5 elements. The values are evenly spaced from 1 to 10. |

## **Creating matrices**

| **Example** | **Description** |
| --- | --- |
| [rand](https://www.mathworks.com/help/matlab/ref/rand.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank)(2) | Create a square matrix with 2 rows and 2 columns. |
| [zeros](https://www.mathworks.com/help/matlab/ref/zeros.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank)(2,3) | Create a rectangular matrix with 2 rows and 3 columns. |

## **Indexing**

| **Example** | **Description** |
| --- | --- |
| A([end](https://www.mathworks.com/help/matlab/ref/end.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank),2) | Access the element in the second column of the last row. |
| A(2,:) | Access the entire second row |
| A(1:3,:) | Access all columns of the first three rows. |
| A(2) = 11 | Change the value of the second element an array to 11. |

## **Array operations**

| **Example** | **Description** |
| --- | --- |
| [1 1; 1 1]\*[2 2;2 2]ans =  4 4  4 4 | Perform [matrix multiplication](https://www.mathworks.com/help/matlab/matlab_prog/array-vs-matrix-operations.html" \l "btyv9yp-4" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank). |
| [1 1; 1 1].\*[2 2;2 2]ans =  2 2  2 2 | Perform [element-wise multiplication](https://www.mathworks.com/help/matlab/matlab_prog/array-vs-matrix-operations.html" \l "bu90xxy-1" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank). |

## **Multiple outputs**

| **Example** | **Description** |
| --- | --- |
| [xrow,xcol] = [size](https://www.mathworks.com/help/matlab/ref/size.html" \l "bvfgzsm-6" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank)(x) | Save the number of rows and columns in x to two different variables. |
| [xMax,idx] = [max](https://www.mathworks.com/help/matlab/ref/max.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank)(x) | Calculate the maximum value of x and its corresponding index value. |

## **Documentation**

| **Example** | **Description** |
| --- | --- |
| [doc](https://www.mathworks.com/help/matlab/ref/doc.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) randi | Open the documentation page for the randi function. |

## **Plotting**

| **Example** | **Description** |
| --- | --- |
| [plot](https://www.mathworks.com/help/matlab/ref/plot.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank)(x,y,"ro-","LineWidth",5) | Plot a red (r) dashed (--) line with a circle (o) marker, with a heavy line width. |
| [hold](https://www.mathworks.com/help/matlab/ref/hold.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) on | Add the next line to existing plot. |
| hold off | Create a new axes for the next plotted line. |
| [title](https://www.mathworks.com/help/matlab/creating_plots/add-title-axis-labels-and-legend-to-graph.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank)("My Title") | Add a label to a plot. |

## **Using tables**

| **Example** | **Description** |
| --- | --- |
| [data.HeightYards](https://www.mathworks.com/help/matlab/matlab_prog/access-data-in-a-table.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) | Extract the variable HeightYards from the table data. |
| data.HeightMeters = data.HeightYards\*0.9144 | Derive a table variable from existing data. |

## **Logicals**

| **Example** | **Description** |
| --- | --- |
| [[5 10 15] > 12](https://www.mathworks.com/help/matlab/matlab_prog/array-comparison-with-relational-operators.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) | Compare a vector to the value 12. |
| [v1(v1 > 6)](https://www.mathworks.com/help/matlab/matlab_prog/find-array-elements-that-meet-a-condition.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) | Extract all elements in v1 that are greater than 6. |
| x(x==999) = 1 | Replace all values in x that are equal to 999 with the value 1. |

## **Programming**

| **Example** | **Description** |
| --- | --- |
| [if](https://www.mathworks.com/help/matlab/ref/if.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) x > 0.5  y = 3else  y = 4end | If x is greater than 0.5, set the value of y to 3.  Otherwise, set the value of y to 4. |
| [for](https://www.mathworks.com/help/matlab/ref/for.html" \t "https://matlabacademy-content.mathworks.com/4.28/R2021a/content/Additional%20Resources/_blank) c = 1:3  disp(c)end | The loop counter (c) progresses through the values 1:3 (1, 2, and 3).  The loop body displays each value of c. |