

Learn to Use Excel

MS Excel has an interface similar to MS Word, but it is specialized in spreadsheets instead of documents. Spreadsheets are used to analyze data. If you are new to Excel, it will be helpful to go through following exercises before coming to the lab.

Open Excel program.

1. Basic skills:

Select cell(s): click on the cell with the mouse to select one cell. Click and drag to select adjacent cells. Selected cells are highlighted.

Enter text or numbers to a cell: select a cell and type something. Press “Enter” to finish entering the content. What you type will show up in the cell and in a blank space above the spreadsheet (called “formula bar”).

Find the address of a cell: select the cell and look at the display above the spreadsheet, at the far left. The cell address consists of a letter and a number like “C10”. That is the cell address.

Copy the content of cell(s): the conventional “Copy and Paste” works fine, but there is a quicker way: select the cells, then click and hold on the little black square at the lower-right corner of the selected area (cursor becomes a cross) and drag to the cells you want to copy to. Try it!

Formula: some cells contain formulas that calculate results from other cells. They always start with an “=” sign. The formula cells will display the result of the calculations and the formula bar shows the formula itself. For example, if you enter “3” in cell A1, “2” in cell B1, and “=A1+B1” in cell C1, C1 will display “5”. (The display of the formula cell can be toggled by pressing “Ctrl `”.)

Graph: select the data you want to graph (if you need to select another chunk of data, hold the “Ctrl” key after you have selected the first chunk of data), then click menu item “Insert – Chart”, choose “XY (Scatter)” option, and click “Finish”.

2. Now, start from a new spreadsheet and type following. The cells that have text in gray are calculated results, so you should type in formulas rather than numbers. The formulas are given below.

	A	B	C	D	E
1	Excel workshop: projectile motion starting from (0,0)				
2					
3	initial velocity	70	m/s		
4	angle of incident	30	degrees	0.523599	rad
5	gravitational acc	-9.81	m/s/s		
6	initial vx	60.62177826			
7	initial vy	35			
8					
9	time	x displacement	y displacement		
10	0	0	0		
11	1	60.62177826	30.095		
12	2	121.2435565	50.38		
13	3	181.8653348	60.855		

D4 =B4/180*PI()
 B6 =B3*COS(D4)
 B7 =B3*SIN(D4)
 B10 =B\$6*A10
 C10 =B\$7*A10+0.5*B\$5*A10^2
 B11 =B\$6*A11
 C11 =B\$7*A11+0.5*B\$5*A11^2

To calculate the displacements for more times, we can simply copy cell B10 and B11: first, select cells B11 and C11. Then, click and hold on the black square and drag to row 20.

Click on cell B12, B13 etc. to examine the formula. You should see B12 shows “=B\$6*A12” and B13 shows “=B\$6*A13” and so on. The physical meaning is that the horizontal displacement equals the horizontal velocity multiplying the time. The time changes for each row, but not the horizontal velocity. That is why we use B\$6 for the horizontal velocity. When copying, Excel will change the cell address based on the cell positions automatically, for example, in the above copy, A11 is changed to A12, A13 etc. If you do not want a cell to change, simply put in the \$ signs. The “\$” sign can be turned on/off by the “F4” key on your keyboard.

3. Select column A and B from row 10 to 20 and graph the horizontal displacement vs. time.

4. Select column A and C (remember to hold Ctrl key when you select column C) from row 10 to 20 and graph the vertical displacement vs. time.

5. Now, we want to copy the spread sheet to a new spreadsheet to look at the projectile motion on the moon (where gravitational acceleration is about 1.6 m/s²). Right click the tab “Sheet1” at the bottom of the sheet and rename “Sheet1” to be “Earth”. Right click the tabs “Sheet2” and “Sheet3” to delete them. Then right click the tab “Earth” and select “Move or Copy...”. In the pop-up dialogue box, select “(move to end)”, check the “Create a copy” and press “OK”. Rename “Earth (2)” to “Moon” and change to gravitational acceleration in this spreadsheet to look at the motion on the moon.