UFHealth
INFORMATION TECHNOLOGY TRAINING

Office

Excel 2016
Math with Dates and Times

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Microsoft Excel 2016: Math with Dates and Times

1.5 hour

In this advanced math workshop, we will unlock the secrets of date/time math in Excel; learn lots of shortcuts and custom formatting options; explore many of the built in date/time functions; build our own date/time equations. By the end of this workshop you will be able to create a simple timesheet, and calculate how many days between two dates, excluding holidays and weekends. This advanced workshop assumes prior experience with Microsoft Excel; experience with building equations in Excel required.

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Dates in Excel

If you've ever lost the date formatting on a cell, you have seen it turn into a strange number. For example, according to Excel these cells are the same number:

	A	B
1	10/17/2013	41564

The serial number 41, 564 tells us how many days it has been since January 1st, 1900*. The date serial numbers are sequential, one day at a time:

	A	B
1	10/17/2013	41564
2	10/18/2013	41565
3	10/19/2013	41566

**Note: The default date system for the Macintosh begins with January 1, 1904. This may cause some confusion if you try to use the same file in both a Mac and a PC. The setting can be changed in the Excel Options on the File menu.*

Times in Excel

One day has 24 hours, so in Microsoft Excel, 1 is equivalent to 24 hours, 0.5 is equivalent to 12 hours. If we take our October 17th date, and add in a time of 12:00pm, it translates into 41564.5, the 0.5 representing the half-way point of the day.

1=24 hours, 0.5=12 hours, 0.25=6 hours…

	A	B
1	10/17/13 12:00 PM	41564.5

If you leave the date off a time, Excel will default to 1/0/1900 as the 'understood' date. You can ignore it, but realize that is what happens if you change a time format into a date/time format. All three of these cells contain 12:00 PM, they are just displayed with different formats:

	A	B	C
1	12:00 PM	1/0/1900	1/0/00 12:00 PM

Useful Date/Time Shortcuts

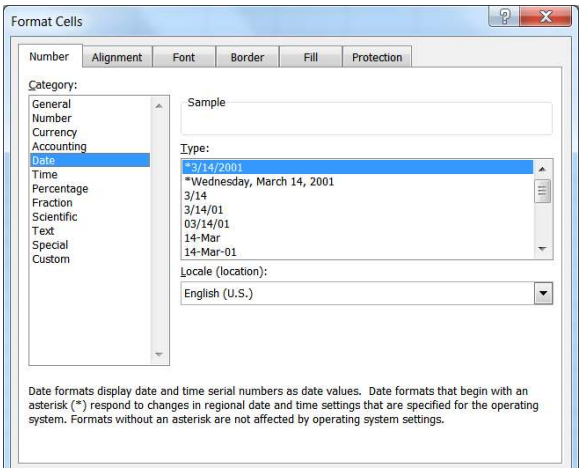
Shortcut	Result	Note
Ctrl-;	Current Date	Control Semicolon
Ctrl-:	Current Time	Control Colon
Shift-Ctrl-3	Formats the cell to show DD-MMM-YYYY	3/# from the full keyboard
Shift-Ctrl-2	Formats the cell to show h:mm AM/PM	2/@ from the full keyboard

Custom Formatting

Days, Months, and Years

You can format a cell with a preset list of options in the Format Cells Window.

- Click the More button in the Number group
- Right-click on a cell and choose Format cells
- Select the cell and press Ctrl-1 to open this window



Excel has a pretty extensive list of date and time formats, but it is possible to custom build a date format, using simple abbreviations.

Dates for Tuesday, February 3, 2004					
Day		**Month**		**Year**	
D	3	m	2	yy	04
dd	03	mm	02		
ddd	Tue	mmm	Feb	yyyy	2004
dddd	Tuesday	mmmm	February		

Hours, minutes, and seconds

If you use "m" immediately after the "h" or "hh" code or immediately before the "ss" code, Excel displays minutes instead of the month.

Times for 1:02:05					
Hours		**Minutes**		**Seconds**	
H	1	m	2	s	5
hh	01	mm	02	ss	05

If you would like to use the 12 hour clock you need to add the appropriate designator at the end. Access will accept any of the following: AM/PM; am/pm; A/P; a/p; AMPM.

Times for 17:02:05					
Hours		**24 hour clock**		**12 hour clock**	
H	17	h:m	17:2	h:m am/pm	5:2 PM
hh	17	h:mm	17:02	h:mm am/pm	5:02 PM
h AM/PM	5 PM	hh:mm	17:02	hh:mm am/pm	05:02 PM

If you need to go smaller, adding .00 after the second format (ss.00) will give the fraction of a second.

Totaling Time

The time formats in Excel stay within the defaults of 24 hours, 60 minutes, 60 seconds. If we do math we may want it to display the times beyond these boundaries. For this, we use the brackets [ ] around the abbreviation.

Beyond the Boundaries					
36 Hours		**75 minutes**		**75 seconds**	
h	12	m	*(assumes month)*	s	15
hh	12	mm	*(assumes month)*	ss	15
[h]	36	[m]	75	[s]	75

Simple Date/Time Math

Because dates and times are stored as numbers you can do simple math with them.

Begin	End	Formula	Result
01/02/2013	05/15/2013	=Last Date – First Date	Days Elapsed = 133
8:15 AM	5:00 PM	=Last Time – First Time	Time Elapsed = 8:45 (8 hours 45 minutes)

Times are a fraction of a day. As mentioned earlier, 0.5=12 hours. If we multiply a time by 24 we should get the numeric value.

Time	Time * 24
8:45 AM	6:00 PM

Why doesn't it look right? You have to format the result as a true number field.

Time	Time * 24 (formatted as a number)
8:45 AM	8.75

Remember if you are going beyond the 24 hour clock, you will need to set up a custom format.

Date Worksheet Functions

Adapted from Excel Help

DATE - Returns the sequential serial number that represents a particular date

Syntax: DATE(year, month, day)

Year The value of the year argument can include one to four digits.

Month A positive or negative integer representing the month of the year from 1 to 12. If *month* is greater than 12, *month* adds that number of months to the first month in the year specified

Day A positive or negative integer representing the day of the month from 1 to 31.

Equation	Result	Notes
=DATE(2009, 3, 15)	03/15/2009	
=DATE(5, 10, 15)	10/15/1905	Notice this counts year from 1900, thus will not assume "2005"
=DATE(2010, 15, 20)	03/20/2011	Notice this is going into the following year because 15 months
=DATE(1976, 11, 35)	120/5/1976	Notice this is going into the following month because 35 days
=DATE(2007, -1, 5)	11/05/2006	Negative values will go backwards in time, minus day/year