M365 Excel Basics Video 04: Date and Time Number Formatting, MRound Function
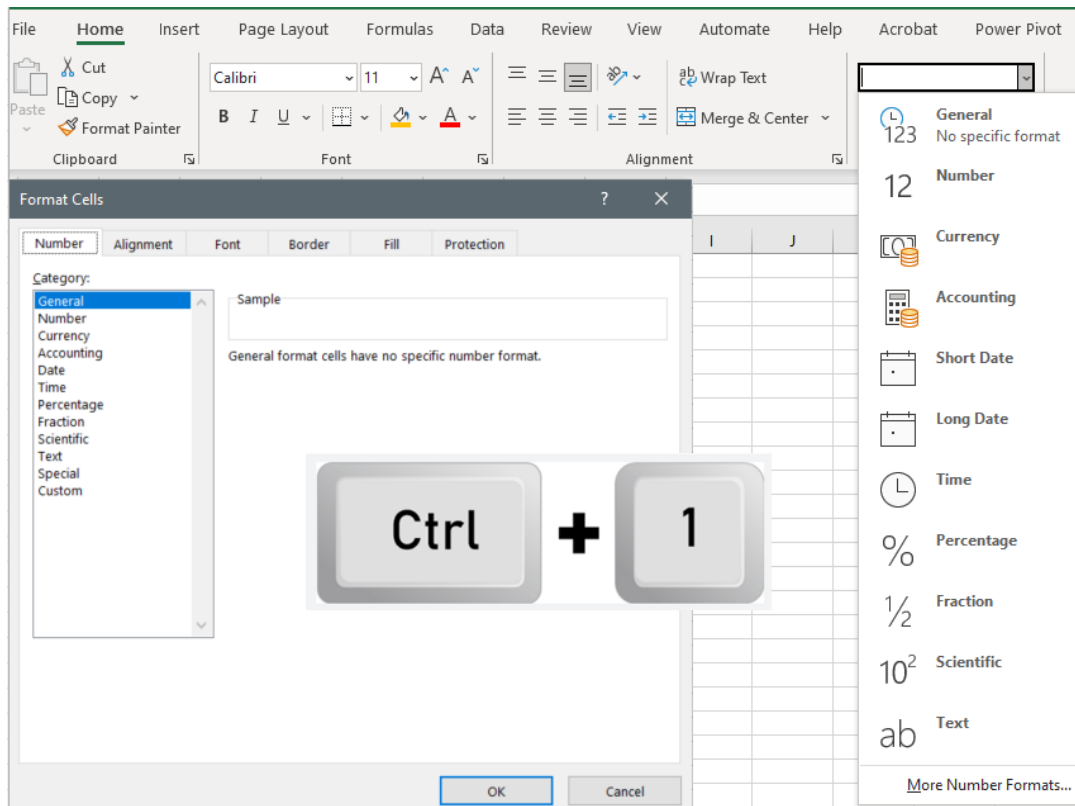
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Topics covered in the M365 Excel Basics Video 4:

❖ Date Number Formatting
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Please note: For this class, we will use F12 to save our files for the first time and CTRL +S to save the changes we make to our files.

Number Formatting and Region setting

Number Formatting only changes the appearance of the number, for more in-depth information on Number Formatting refer to the M365 Excel Basics Video 3

When you enter the date value in the cell, you need to use the form that matches the regional setting in your control panel. The format of date values depends on the regional settings in the Control Panel.

My regional setting is the U.S. where the date is formatted as month/day/year thus I can type my date in the cell as 9/16/2024 and not 16/9/2024. If for example, your regional setting is Tanzania, Excel will see 16/9/2024 as a number and format that as a date. Whereas for me with the U.S. regional settings, 16/9/2024 will be a Text value.

Note: *when you type your numbers with a forward slash in a cell, Excel thinks that what you are typing is a date*.

If you would like to check or change your settings on the control panel:

- On the search bar on the Task pane, type Control Panel and click on it to open the control panel
- On the control panel dialog box click on the Date and Time if you would like to change the Date and Time settings
- You can also click on the Region to change the settings to a different location and customize your format for the Date and Time settings.
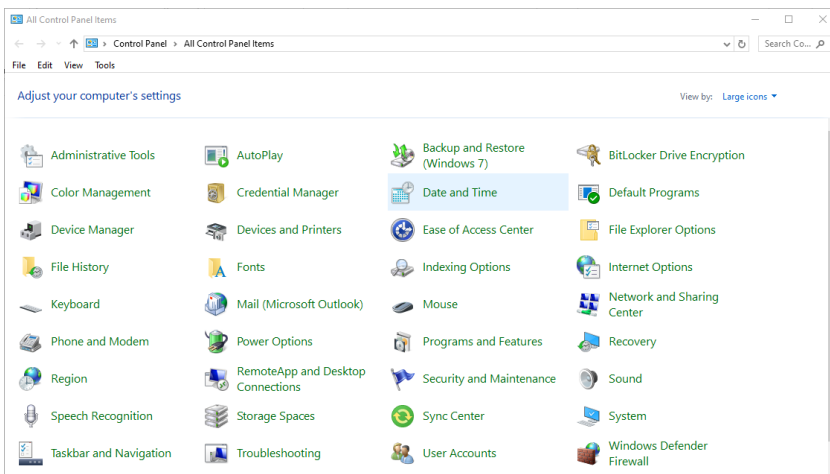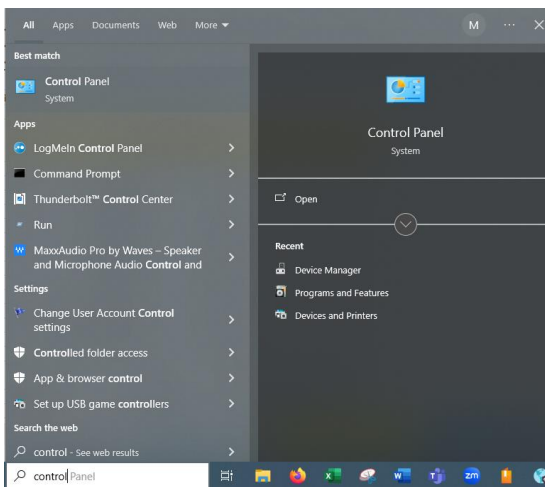
Date Number Formatting

Date is a type of Number Formatting and under the Date Formatting there is a serial number which is a whole number that represents the number of days since December 31, 1899, where January 1, 1900 is 1, January 2, 1900 = 2, January 3, 1900 = 3, August 28, 2024 = 45166.

Here is a list of Dates and their related serial numbers

Date	Serial Number (Actual Number in the Cell)	
1/1/1900	1	
1/2/1900	2	
1/3/1900	3	
12/31/1900	366	
7/7/1949	18086	
4/5/1928	10323	
11/23/2009	40140	
8/7/2014	41858	
8/7/2014	41858	
8/23/2024	45527	
Fri, August 23, 2024	45527	
Friday, August 23, 2024	45527	
Aug-23-2024	45527	
Friday, August 23, 2024	45527	
8.23.2024	8.23.2024	this type of separator is not allowed on Dates in Excel
23/8/2024	23/8/2024	Day first not allowed
12/31/1899	12/31/1899	Date before January 1, 1900
12/31/1800	12/31/1800	Date before January 1, 1900

Type the date in Cell C33 as seen below.

32			
33	Date	8/28/2024	Type this as a Date
34	Date	45532	Type as a Date and change to General Number Format
35	Date	8/28/2024	Type the serial number that you see on cell C34 and format that as a Date
36			

Date Calculation

- The whole number for the Dates helps to easily perform math calculations
- Excel does not see the Number Formatting, with the Date Number Formatting, Excel sees the underlying serial numbers.
- Excel uses the underlying serial numbers under the dates and makes the calculations.

We can do math with Dates because formulas always look at the underlying number below the number formatting to do the calculations. For the Date, the underlying number in the cell is the serial number and that is why we can do the calculations with the Dates.

Below are some examples where we are calculating to add days to the date, subtract days to the date, and calculate how many days we have between the specified dates.

We will use the EDATE and EOMONTH to add months to dates and subtract months from dates

EDATE: This function allows you to add or subtract months to date.

EOMONTH: This function calculates the end-of-the-month date for a given number of months in the future or past.

38	**We can do Math with Dates**			
39				
40	School Start Date	9/23/2024		
41	Today	9/7/2024		Keyboard shortcut for today's Date: Ctrl + ;
42	Days until school starts	16	=C40-C41	Days between dates = Later Date - Earlier Date
43				
44	School End Date	12/13/2024		**TODAY** Function updates each new day you open the Workbook file.
45	Today	9/16/2024		=**TODAY()** is an argumentless Function that will put the current Date in the cell
46	Days until school ends	88	=C44-C45	
47				
48	School Start Date	9/23/2024		
49	School End Date	12/13/2024		
50	How many days of school with Sat and Sun as weekend	60	=NETWORKDAYS.INTL(C48,C49,1)	Number of Days does not include the weekends
51				
52				
53	School Start Date	9/23/2024		
54	School End Date	12/13/2024		
55	How many days of school includes weekend	81	=C54-C53	Number of Days includes the weekends
56				
57				
58	Invoice Issue Date	2/9/2024		
59	Days until invoice is Due	11/25/2024		
60	Invoice Due Date	290	=C59-C58	
61				
62				
63	Project Start Date	10/28/2024		
64	Project Due Date	12/10/2024		
65	Number of Days	44	=C64-C63+1	Days between Dates where the start date is included = Later Date - Earlier Date + 1
66				
67				
68	**Calculate the Invoice Due Date if the contract says the amount is due at the end of the month**			
69				
70	Invoice Issue Date	9/4/2024		=EOMONTH Function allows to take a date and get the end of the month for the current month, future month or past month
71	Invoice Due Date	9/30/2024	=EOMONTH(C70,0)	=EOMONTH(Date,0) end of the current month
72				=EOMONTH(Date,1) end of the next month
73				=EOMONTH(Date,-1) end of the previous month
74				
75	**Calculate the invoice Due Date if the contract states the amount is due on the same day, 3 months ahead.**			
76				
77	Invoice Issue Date	8/10/2024		Due in 3 Months
78	Invoice Due Date	11/10/2024	=EDATE(C77,3)	EDATE Function allows you to take a date and get the same day in a future month or past month
79				EDATE(Date,3) gives you three months ahead
80				EDATE(Date,-3) gives you three months backward
81				

Customers Invoice Tracking

Customers Names	Amount Owed	Invoice Due Date	Today	Number of Days Invoice is Late		Number of Days Invoice is Late - Dynamic Spilled Array Formula	
Tiana Anderson	$4,043.11	8/9/2024	9/16/2024	38	=E85-D85	38	=E85:E100-D85:D100
Cinderelli Carson	$4,703.46	6/29/2024	9/16/2024	79		79	
Carmen Williams	$3,202.68	7/18/2024	9/16/2024	60		60	
Brixten Luis	$4,680.78	7/11/2024	9/16/2024	67		67	
Stella Farewell	$2,135.93	7/24/2024	9/16/2024	54		54	
Miles Smith	$3,173.15	8/28/2024	9/16/2024	19		19	
Miley Davis	$3,553.76	6/25/2024	9/16/2024	83		83	
Tyler Jones	$879.15	8/5/2024	9/16/2024	42		42	
Marcus Brown	$575.69	6/3/2024	9/16/2024	105		105	
Kaitlyn Miller	$1,696.98	6/9/2024	9/16/2024	99		99	
Sophia Garcia	$3,588.07	6/20/2024	9/16/2024	88		88	
Becca Allan	$4,788.51	7/15/2024	9/16/2024	63		63	
Cecilia Thompson	$1,759.14	8/25/2024	9/16/2024	22		22	
Bartholemew Williams	$3,502.52	7/4/2024	9/16/2024	74		74	
Mason Brown	$1,376.51	7/24/2024	9/16/2024	54		54	
Humphrey Jones	$2,021.72	6/25/2024	9/16/2024	83		83	

Time Number Formatting

Under Time Formatting there is a serial number which helps to make the time formula calculations

The same way Excel uses date serial numbers for making date formula calculations, Excel also uses time serial numbers to make the time formula calculations. The time serial number is very different from the date serial number.

Time Serial Number

- Time Serial Number is a Decimal value that represents the portion of a 24-hour a day
- When you type a Time value into a cell, behind the scenes, Excel divides that time by 24 hours.
- An example of this: 6:00 a.m. time value, Excel divides this by 24 which is 6 hours divide by 24 hours, 6/24 = 1/4 = 0.25

When you enter a time value in cell for example 6:00:00 a.m., you use the format type form hh:mm:ss AM/PM, where h = hour, m = minute, s = seconds. The double colon separates hours from minutes and the other double colon separates minutes from seconds. You MUST enter a space between the time value and the AM or PM, for example 6:00AM will default to a text value. If you do not enter the space and the time and you type the AM or PM next to the time, it will default to a text value. If you do not type the AM or PM, the time value is entered as military time. Time values such as 6:00 AM and 6 AM where you are leaving out the minutes and seconds are valid time values.

A list of Time and their related Excel Time Serial Numbers

Time	Portion of 24-hour a day = Hours/24 Hours	Fraction	Time Serial Number in Cell
12:00 AM	0	0	0
6:00 AM	6/24	1/4	0.25
8:00 AM	8/24	1/3	0.333333333
9:00 AM	9/24	3/8	0.375
12:00 PM	12/24	1/2	0.5
3:00 PM	(12+3)/24	15/24	0.625
3:30 PM	(12+3+30/60)/24	16/24	0.645833333
3:15 PM	(12+3+15/60)/24	15/24	0.635416667
8:00pm	8:00pm	Not a valid time value	
8:00PM	8:00PM	Not a valid time value	

24		
25	Enter 6:00 AM Time ==>>	6:00 AM
26	Enter 6:00 AM Again ==>> Then Apply General NF	0.25
27	Type formula =6/24	0.25
28	Type formula Again ==>> Then Time NF ==>>	6:00:00 AM
29		

Time calculation

Since Time is a proportion of 24 hour a day that means we are dividing the number by 24. Thus, to do Time Math and get hours as a result, we MUST multiply the decimal time answer by 24.

Remember that the formulas cannot see the number formatting and acts on the underlying number which is the time serial number to perform the math calculations. 9/24 – 5/24 = 0.375 – 0.208333333 = 0.166667. This may not make sense but if you think how Excel created the time serial number, Excel took the hour value 9 and 5 and divided this by 24 hours to reduce the result to decimal value. When you create formulas to calculate the hours worked, you must convert the decimal value back to hours by multiplying by 24. For the example that we have here where our answer is 0.1666666666667 we multiply this by 24 to make this hours. Thus, 0.1666666666667* 24 = 4. This means that if you want the formula to correctly calculate hours between two-time values or hour worked for a shift, you have to remember to multiply it by 24 and change the format to General Number Format.

Important Formula   Hours Worked = (Time Out – Time In)*24
                      Hours worked = (Later Time – Earlier Time)*24
*** Remember to remove any number formatting by changing to General Number Format.

Below are some examples of Time calculations and MROUND formula

	Employee Name	Hourly Wage	Start Time	End Time	Hours Worked	Gross Pay
33	**Employee Name**	**Hourly Wage**	**Start Time**	**End Time**	**Hours Worked**	**Gross Pay**
34	Tiana Anderson	45.75	5:00 AM	10:00 AM	5	$228.75
35	Cinderelli Carson	32.25	5:00 AM	9:30 AM	4.5	$145.13
36					=(E34-D34)*24	=ROUND(F34*C34,2)
37	**Important Formula:**	Hours Worked = (Time Out - Time In)*24				
38		Hours Worked = (Later Time - Earlier Time)*24				
39						
40						
41	**Hours Worked on a Project**					
42						
43	Start Time	5:00 AM				
44	End Time	9:00 AM				
45	Hours Worked	4	=(C44-C43)*24			
46	Start Time	6:00 PM				
47	End Time	9:30 PM				
48	Hours Worked	3.5	=(C47-C46)*24			
49	Total Hours Worked	7.5	=C45+C48			
50						
51	Total Hours Worked	7.5	=SUM(C44-C43,C47-C46)*24			
52						

Time Sheet Calculation Example							
Employee Name	**Day**	**Start Time**	**Lunch Time Out**	**Lunch Time In**	**End Time**	**Hours Worked**	
Brixten Luis	Monday	8:00 AM	12:00 PM	12:30 PM	5:05 PM	8.583333333	=SUM(E57-D57,G57-F57)*24
	Tuesday	8:15 AM	12:00 PM	12:30 PM	5:30 PM	8.75	
	Wednesday	8:00 AM	12:05 PM	12:35 PM	4:30 PM	8	
	Thursday	8:00 AM	12:10 PM	12:45 PM	5:00 PM	8.416666667	
	Friday	9:00 AM	12:30 PM	1:00 PM	5:45 PM	8.25	
	Total Hours Worked					42	=SUM(H57:H61)
Stella Farewell	Monday	7:00 AM	11:30 AM	12:00 PM	3:45 PM	8.25	
	Tuesday	6:50 AM	11:00 AM	11:30 AM	4:30 PM	9.166666667	
	Wednesday	7:00 AM	12:00 PM	12:30 PM	4:15 PM	8.75	
	Thursday	7:15 AM	10:45 AM	11:15 AM	5:00 PM	9.25	
	Friday	7:00 AM	11:00 AM	11:30 AM	4:45 PM	9.25	
	Total Hours Worked					44.66666667	=SUM(H63:H67)

Payroll Calculation Example							
					Tax Rate	0.102	
Employee	**Wage**	**Time In**	**Time Out**	**Hours Worked**	**Gross Pay**	**Tax Deduction**	**Net Day's Pay**
Marcus	$55.66	8:00 AM	3:30 PM	7.5	$417.45	$42.58	$374.87
Kaitlyn	$99.58	7:00 AM	3:00 PM	8	$796.64	$81.26	$715.38
Risa	$46.49	7:30 AM	3:00 PM	7.5	$348.68	$35.57	$313.11
Tristen	$69.79	8:00 AM	2:30 PM	6.5	$453.64	$46.27	$407.37
Ruby	$85.85	9:00 AM	2:30 PM	5.5	$472.18	$48.16	$424.02
Rosemary	$65.84	8:00 AM	6:00 PM	10	$658.40	$67.16	$591.24
Tiana	$100.71	6:30 AM	1:30 PM	7	$704.97	$71.91	$633.06
Miley Lewis	$95.27	8:00 AM	1:00 PM	5	$476.35	$48.59	$427.76
Vivien Brown	$35.53	7:00 AM	4:30 PM	9.5	$337.54	$34.43	$303.11
Miles Anderson	$73.12	8:30 AM	5:00 PM	8.5	$621.52	$63.40	$558.12
				=(E75-D75)*24		=ROUND(G75#*H72,2)	
					=ROUND(C75:C84*F75:F84,2)		
						=G75#-H75#	

MROUND Function

In our previous video we learned about the Round Function and the standard rounding rules. Sometimes you need to round to a certain amount or a certain multiple, in these situations, you can use the MROUND function where the M is for multiple. For example if you need to round to the amount of money to nearest $0.50 you can use the formula MROUND(Price,$0.50). Same with the time, if you need to round to the nearest 5 minutes the formula will be MROUND(End Time – Start Time,00:05).

MROUND(number,multiple)   *Number is the number to be rounded and the Multiple is the multiple to be rounded to*.

The examples below show MROUND calculation.

This first example uses the Dynamic Spilled Array Formula

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2	Time Sheet with MROUND Calculation													
3								Round to 5 minutes				Tax Rate		
4								0:05:00				9.78%		
5														
6						Formulas used:	=SUM(C9-B9,F9-E9)	=MROUND(G9,H4)	=H9*24		=ROUND(I9:I15*J9:J15,2)	=ROUND(K9#*L4,2)	=K9#-L9#	
7														
8	Employees	Time In	Time Out		Time In	Time Out	Time worked, Not rounded	Time Rounded to 5 minutes	Hours Worked	Wages	Gross Pay	Tax Deduction	Net Pay	
9	Simon E	8:26:00 AM	11:52:00 AM		12:44:00 PM	5:14:00 PM	7:56	7:55	7.916666667	$55.66	$440.64	$43.09	$397.55	
10	Kling L	7:58:00 AM	11:27:00 AM	Lunch	12:14:00 PM	4:34:00 PM	7:49	7:50	7.833333333	$99.58	$780.04	$76.29	$703.75	
11	Tomlin B	9:01:00 AM	1:29:00 PM		2:18:00 PM	5:37:00 PM	7:47	7:45	7.75	$46.49	$360.30	$35.24	$325.06	
12	Elbern P	8:51:00 AM	10:51:00 AM		11:37:00 AM	5:38:00 PM	8:01	8:00	8	$69.79	$558.32	$54.60	$503.72	
13	Warren J	9:18:00 AM	12:47:00 PM		1:18:00 PM	6:22:00 PM	8:33	8:35	8.583333333	$85.85	$736.88	$72.07	$664.81	
14	Bailey O	7:32:00 AM	11:22:00 AM		12:09:00 PM	3:58:00 PM	7:39	7:40	7.666666667	$65.84	$504.77	$49.37	$455.40	
15	Carter C	7:28:00 AM	10:45:00 AM		11:17:00 AM	3:58:00 PM	7:58	8:00	8	$67.77	$542.16	$53.02	$489.14	
16														

								Time worked, Not	Time Rounded to 5					
18														
19	**Relative Cell Reference and Absolute Cell Reference Formula Example**													
20														
21							Round to 5 minutes					Tax Rate		
22							0:05:00					9.78%		
23														
24					Formulas used:	=SUM(C27-B27,F27-E27)	=MROUND(G27,H22)	=H27*24		=ROUND(I27*J27,2)		=ROUND(K27*L22,2)	=K27-L27	

	Employees	Time In	Time Out	Lunch	Time In	Time Out	Time worked, Not rounded	Time Rounded to 5 minutes	Hours Worked	Wages	Gross Pay	Tax Deduction	Net Pay
27	Simon E	8:26:00 AM	11:52:00 AM		12:44:00 PM	5:14:00 PM	7:56	7:55	7.916666667	$55.66	$440.64	$43.09	$397.55
28	Kling L	7:58:00 AM	11:27:00 AM		12:14:00 PM	4:34:00 PM	7:49	7:50	7.833333333	$99.58	$780.04	$76.29	$703.75
29	Tomlin B	9:01:00 AM	1:29:00 PM		2:18:00 PM	5:37:00 PM	7:47	7:45	7.75	$46.49	$360.30	$35.24	$325.06
30	Elbern P	8:51:00 AM	10:51:00 AM		11:37:00 AM	5:38:00 PM	8:01	8:00	8	$69.79	$558.32	$54.60	$503.72
31	Warren J	9:18:00 AM	12:47:00 PM		1:18:00 PM	6:22:00 PM	8:33	8:35	8.583333333	$85.85	$736.88	$72.07	$664.81
32	Bailey O	7:32:00 AM	11:22:00 AM		12:09:00 PM	3:58:00 PM	7:39	7:40	7.666666667	$65.84	$504.77	$49.37	$455.40
33	Carter C	7:28:00 AM	10:45:00 AM		11:17:00 AM	3:58:00 PM	7:58	8:00	8	$67.77	$542.16	$53.02	$489.14

Custom Date and Time Number Formats

Date Time	Custom Number Formatting	Time Serial Number in Cell
9/16/2024 06:00 AM	m/d/yyyy h:mm AM/PM	45551.25
11/13/24 06:00 AM	m/d/yy h:mm AM/PM	45609.25
12/13/2024 22:35	m/d/yy h:mm	45639.94097

Keyboard shortcuts for Date and Time

Keyboard Shortcut	Description
Ctrl+;	Enters the current date
Ctrl+Shift+;	Enters the current time
Ctrl+; <space> Ctrl+Shift+;	Enters a date and time