Excel & Business Math
Video/Class Project #08
Arithmetic Tips for Add, Subtract, Multiply, Divide, Exponents, Rounding

Topics

1) Whole Numbers & Decimals

i. Define **Whole Number (Counting Numbers)** = A number with no decimals, such as 5,678, and not negative.
ii. Define **Integer** = Positive & Negative Counting Numbers and Zero
iii. Define **Decimal** ==> A number written with a decimal such as 4.987 or 0.062 or -1.50

2) Write Number in English

i. Sometimes we need to write our number, like with checks:

Whole Numbers: numbers to the left of the decimal point. Uses the ten one-place digits: 0,1,2,3,4,5,6,7,8,9. Use a comma every third place.															The word "and" goes here when you write the words.	Decimals: numbers to the right of the decimal point - representing parts of a whole - "a whole" is the number 1 and the "part" is a number between 1 and 0.					
Trillions			Billions			Millions			Thousands			Ones			"AND"						
Hundred Trillions	Ten Trillions	Trillions	Hundred Billions	Ten Billions	Billions	Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	Decimal Point (and)	Tenths	Hundredths	Thousandths	Ten-Thousandths	Hundred-Thousandths	Millionths
			4	5	6	7	5	8	4	5	2	1	1	9	.	1	5	5			

ii. Here is a Check Example for writing numbers as words:

Sioux's Accounting
3985 14th Ave. S.
Seattle, WA 98106

No. 4025
66-420
1210

Date 1/9/18

PAY TO THE ORDER OF: Home Depot

Amount $1528.72

Amount One Thousand Five Hundred Twenty Eight & Seventy Two Cents Dollars

Boeing Employees Credit Union
12770 Gateway Dr.
Tukwila, WA 98168

By Sioux Radcoolinator

Memo Purchase Desk

⑆ 1210 ⑆ 0420 ⑆ 6005655960 ⑈ 4025

3) Math Operators & Order of Operations

Math Operators:	
( )	Parentheses.
^	Raising to an exponent. ("caret", like carrot)
*	Multiplying.
/	Dividing.
+	Adding.
-	Subtracting or Negation.

Math Operators on the Standard Keyboard:	
(	Shift + 9
)	Shift + 0
^	Shift + 6
*	Shift + 8, or Number Pad
/	/ Key, or Number Pad
+	Shift + =, or Number Pad
-	- Key, or Number Pad

Math order of operations	
1	First, do everything in the parentheses
2	Second, do all exponents
3	Third, do all multiplication and division, left to right
4	Fourth, do all adding and subtracting, left to right

Math order of operations	
1	( )
2	^
3	* / Left to Right
4	+ - Left to Right

i. Excel Example as seen in Excel:

	A	B	C	D	E
1	**MOOO Example 1:**				
2	Time Sheet using Military Time				
3	Gross Pay = Hours Worked * Wage per Hour				
4	Time In	Time Out	Wage	Gross Pay	
5	8	15	27.75	194.25	=(B5-A5)*C5

4) Adding in Excel

i. Adding in Excel with SUM Function

1. If numbers are next to each other, use SUM Function with a range of cells, rather than using the + symbol.
2. If numbers are not next to each other, you can use SUM Function or the + symbol.
3. Commutative Property of Addition allows us to add in any order. You can add the numbers in any order and you still get the equivalent sum, as in:
    i. 391.62 + 401.58 + 324.21 = 324.21 + 401.58 + 391.62 = 1117.41 and so on…
4. If ranges of cells are not next to each other, use SUM with ranges separated by commas.
5. If individual amounts must be rounded, use ROUND Function BEFORE adding.
6. Efficient to use SUM function for adding because:
    i. Faster than using the plus symbol.
    ii. Can handle structural changes like inserting a row.

ii. Examples for Adding as see in Excel:

Adding in Excel Example 1:
If numbers are next to each other, use SUM Function with a range of cells, rather than using the + symbol
Efficient to use SUM function because:
Fast.
Can handle structural changes like inserting a row.

Invoice 12305

Product	Amount
Quad	$ 45.32
Sunshine	$ 50.00
Carlota	$ 169.30
Majestic Beaut	$ 25.00
MTA	$ 102.00
Total	$ 391.62
	$ 391.62

Efficient to use SUM function because:
1) Fast.
2) Can handle structural changes like inserting a row.

=SUM(B8:B12) is an efficient formula.
=B12+B11+B10+B9+B8 is NOT an efficient formula.

Adding in Excel Example 2:
If numbers are not next to each other, you can use SUM Function or the + symbol

Invoice 12305	Amount
Quad	$ 45.32
Sunshine	$ 50.00
Carlota	$ 169.30
Majestic Beaut	$ 25.00
MTA	$ 102.00
Total	$ 391.62

Invoice 12332	Amount
Sunshine	$ 90.43
Quad	$ 53.13
MTA	$ 78.62
Majestic Beaut	$ 105.70
Carlota	$ 73.70
Total	$ 401.58

Invoice 12288	Amount
Sunset	$ 37.63
Aspen	$ 91.24
Quad	$ 39.02
Yanaki	$ 106.94
Crested Beaut	$ 49.38
Total	$ 324.21

Total	$ 1,117.41
	$ 1,117.41

or

=B25+E25+H25
**Okay to use + + + + or SUM(,,) when cells are not next to each other.
=SUM(B25,E25,H25)

Adding in Excel Example 3:
Commutative Property of Addition allows us to add in any order
You can add the numbers in any order and you still get the equivalent sum, as in:
391.62 + 401.58 + 324.21 = 324.21 + 401.58 + 391.62 = 1117.41 and so on…

$	1,117.41
$	1,117.41

=SUM(H25,E25,B25)
=H25+B25+E25

Adding in Excel Example 4:
If ranges of cells are not next to each other, use SUM with ranges separated by commas

Invoice 12305	Amount	Invoice 12332	Amount	Invoice 12288	Amount
Quad	$ 45.32	Sunshine	$ 90.43	Sunset	$ 37.63
Sunshine	$ 50.00	Quad	$ 53.13	Aspen	$ 91.24
Carlota	$ 169.30	MTA	$ 78.62	Quad	$ 39.02
Majestic Beaut	$ 25.00	Majestic Beaut	$ 105.70	Yanaki	$ 106.94
MTA	$ 102.00	Carlota	$ 73.70	Crested Beaut	$ 49.38
Total	$ 1,117.41	=SUM(B45:B49,E45:E49,H45:H49)			

Adding in Excel Example 5:
If individual amounts must be rounded, use ROUND Function BEFORE adding

	Tax Rate	0.07650

Name	Gross Pay	Tax Deduction		Incorrect:	
Dillon J	$804.02	61.51	=ROUND(B59*$C$56,2)	61.50753	=B59*$C$56
Ian R	$761.98	58.29		58.29147	
Sarah	$1,125.95	86.14		86.135175	
Maria G	$1,070.57	81.9		81.898605	
Kimberlee	$922.23	70.55		70.550595	
Lizaelle M	$1,206.76	92.32		92.31714	
Chad M	$1,090.18	83.4		83.39877	
Lisa L	$1,117.71	85.5		85.504815	
Roy J	$752.14	57.54		57.53871	
Aaron D	$842.64	64.46		64.46196	
		741.61	=SUM(C59:C68)	741.6	=ROUND(SUM(F59:F68),2)
Not Necessary ==>>		741.61	=ROUND(SUM(C59:C68),2)		

5) Subtracting in Excel

i. Use Minus Sign when there are two numbers, like when you calculate Net Income.

ii. When you are subtracting three or more numbers, it usually is easier to add all the numbers that should be subtracted using the SUM Function, and then subtract that single SUM.

iii. Examples for Subtracting as see in Excel:

Subtracting in Excel Example 1:
Use Minus Sign when there are two numbers, like when you calculate Net Income

Total Revenue	$5,625,896.00	
Total Expenses	$4,985,623.00	
Net Income	$640,273.00	=B4-B5

Subtracting in Excel Example 2:
When you are subtracting three or more numbers, it usually is easier to add all the numbers that should be subtracted using the SUM Function, & then subtract that single SUM

							Not Efficient	Efficient
						G14: =SUM(C14:F14)	H14: =B14-C14-D14-E14-F14	I14: =B14-G14
Name	Gross	FICA	Medicare	Fed Tax	Pension	Total	Net Pay	Net Pay
Sioux	$754.00	$46.75	$10.93	$75.40	$0.00	$133.08	$620.92	$620.92
Abdi	822.00	50.96	11.92	82.20	25.00	$170.08	$651.92	$651.92
Gigi	911.00	56.48	13.21	91.10	0.00	$160.79	$750.21	$750.21
Imani	897.00	55.61	13.01	89.70	0.00	$158.32	$738.68	$738.68
Bob	829.00	51.40	12.02	82.90	75.00	$221.32	$607.68	$607.68
Tyrone	867.00	53.75	12.57	86.70	100.00	$253.02	$613.98	$613.98
June	939.00	58.22	13.62	93.90	15.00	$180.74	$758.26	$758.26

6) Check Work When Subtracting or Adding

i. You can always check your work when adding or subtracting:

1. Adding:

i. If **10 + 5 = 15**

ii. Then: **15 – 5 = 10 AND 15 – 10 = 5**

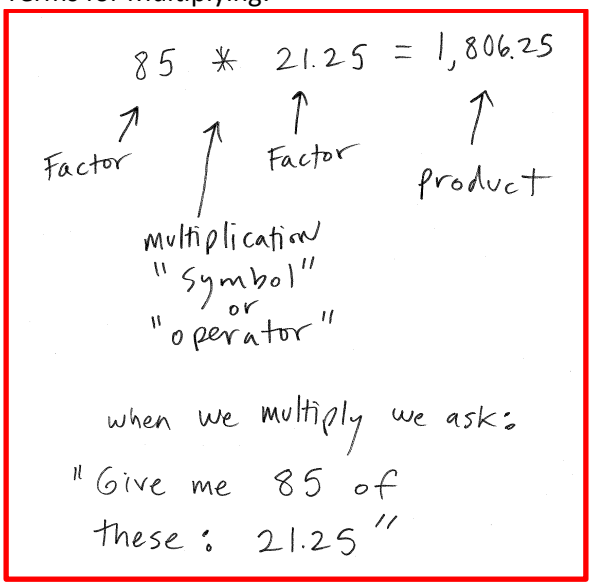
ii. Example in Excel:

	A	B	C	D	E	F
1	**Add and Subtract Example 1:**					
2	You can always check your work when adding and subtracting:					
3						
4	If this is TRUE:					
5	Total Revenue - Total Expenses = Net Income					
6	Total Revenue	$5,625,896.00				
7	Total Expenses	$4,985,623.00				
8	Net Income	$640,273.00	=B6-B7			
9						Check
10	Then this is TRUE:					Your
11	Total Expenses + Net Income = Total Revenue					Work
12	Total Expenses	$4,985,623.00				
13	Net Income	$640,273.00				
14	Total Revenue	$5,625,896.00	=B12+B13			
15						
16	You could also check:					
17	Total Revenue - Net Income = Total Expenses					
18	Total Revenue	$5,625,896.00				
19	Net Income	$640,273.00				
20	Total Expenses	$4,985,623.00	=B18-B19			

7) Multiplying in Excel

i. If you are multiplying two numbers use * Symbol.

ii. Terms for Multiplying:



iii. Commutative Property of multiplication means 2* 5 = 5*2 = 10

iv. If you are multiplying in succession three or more numbers, you can use the PRODUCT Function.

v. When multiplying in business, since we often are dealing with money, we have to consider whether or not we need to use the ROUND Function. If 1) We are required to round, 2) The result of multiplying yields extraneous decimals, & 3) We use result in subsequent formula, we MUST use ROUND.

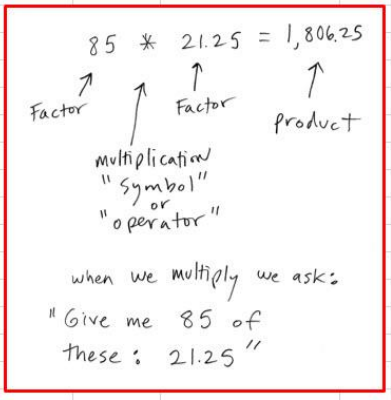
vi. Specific example when you are multiplying but don't need to use the ROUND Function:
   1. When multiplying a Whole Number by Money (Dollars & Pennies), you will never get extraneous decimals.

vii. Specific example when you are multiplying, and you need to use the ROUND Function:
   1. When multiplying Money (Dollars & Pennies) times a Decimal, you CAN get extraneous decimals.

viii. When you need to consider using the ROUND Function, if you want to be safe when performing multiplication, anytime you are multiplying decimals and you are dealing with Money, just use the ROUND Function.

ix. Examples for Multiplying as see in Excel:

	A	B	C	D	E	F	G	H	I	J	K
1	**Multiplying in Excel Example 1:**										
2	If you are multiplying two numbers use * Symbol										
3											
4	Product	Quantity	Price	Total							
5	Quad	85	21.25	1806.25		=C5*B5					
6	Carlota	108	13.95	1506.6							
7	Sunset	25	11.95	298.75							
8	Aspen	15	12.55	188.25							
9											
10	**Multiplying in Excel Example 2:**										
11	If you are multiplying in succession three or more numbers you can use the PRODUCT Function										
12											
13	Item	Trade Discount	Compliment	**Goal:** is to multiply all three compliments							
14	1st Trade Discount	50.0%	50.0%								
15	2nd Trade Discount	10.0%	90.0%								
16	3rd Trade Discount	6.0%	94.0%								
17	Net Cost Equivalent	0.423	0.423	=PRODUCT(C14:C16)							
18											
19	**Multiplying in Excel Example 3:**										
20	Commutative Property of multiplication means 2* 5 = 5*2 = 10										
21											
22	2	5	10		2 * 5 = 10 Here are ask: 'Give me 2 5s						
23	5	2	10		5 * 2 = 10 Here are ask: 'Give me 5 2s						



Multiplying in Excel Example 4:

When multiplying in business, since we often are dealing with money, we have to consider whether or not we need to use the ROUND Function
If 1) We are required to round, 2) You have extraneous decimals, & 3) We use result in subsequent formula, we MUST use ROUND

But before you perform the multiplication, can you predict if you need ROUND?

Yes you can.

Multiplying in Excel Example 5:

This is an example where the result of multiplying will NOT yield extraneous decimals.
When multiplying a Whole Number by Money (Dollars & Pennies),
you will never get extraneous decimals.

Product	Quantity	Price	Total
Quad	85	21.25	1806.25
Carlota	108	13.95	1506.6
Sunset	25	11.95	298.75
Aspen	15	12.55	188.25
		Total	3799.85

=B38*C38

Multiplying in Excel Example 6:

This is an example where the result of multiplying will CAN yield extraneous decimals.
When multiplying Money (Dollars & Pennies) times a Decimal,
you CAN get extraneous decimals.

Product	Price	Discount	Total
Quad	210.25	0.02	4.21
Carlota	130.95	0.045	5.89
Sunset	110.95	0.1	11.1
Aspen	120.55	0.12	14.47
		Total	35.67

=ROUND(B50*C50,2)

Product	Price	Discount	Total
Quad	210.25	0.02	4.205
Carlota	130.95	0.045	5.89275
Sunset	110.95	0.1	11.095
Aspen	120.55	0.12	14.466
		Total	35.65875

=B57*C57

Multiplying in Excel Example 7:

If you want to be safe,
Anytime you are multiplying and you are dealing with Money,
you can use the ROUND Function.

Product	Quantity	Price	Total
Quad	85	21.25	1806.25
Carlota	108	13.95	1506.6
Sunset	25	11.95	298.75
Aspen	15	12.55	188.25
		Total	3799.85

=ROUND(B69*C69,2)

MUST use ROUND:

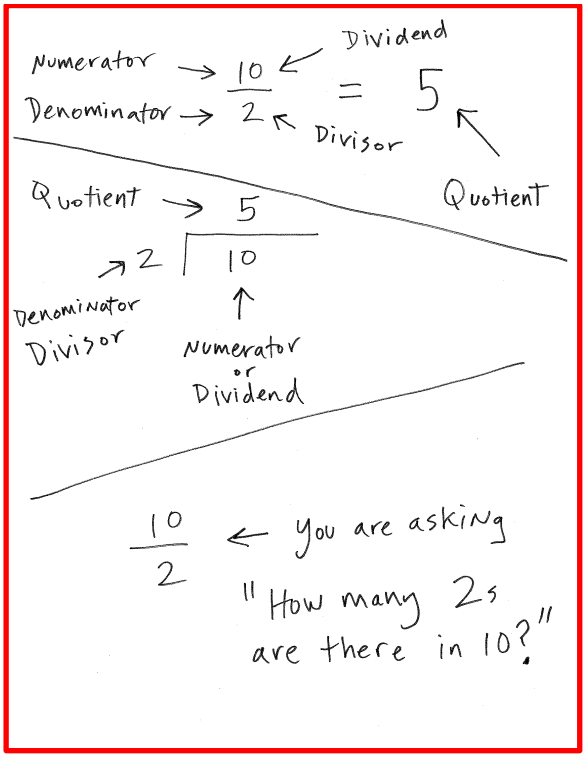
1) We are required to round
2) You have extraneous decimals,
or with money:
you are multiplying or dividing and you might have extraneous decimals
3) We use result in subsequent formula

8) Dividing in Excel

i. In Excel when we are dividing two numbers use / Symbol

ii. Terms for Division:

1. When you are performing division, the formula is:
   Numerator/Denominator = Quotient
2. When you are performing division, you are asking the question: "How Many Denominators are in the Numerator?"



iii. Dividing by zero not allowed because "How many Zeroes are in a number???" We have no way of answer that question.

iv. In Excel we can divide with these two functions:

1. QUOTIENT Function gives you just the integer answer
2. MOD Function gives you just the remainder answer

v. Same Rounding Rules we saw for multiplying apply with division. When we MUST use ROUND:

1. We are required to round
2. The result of dividing yields extraneous decimals
3. We use result in subsequent formula

vi. Examples for dividing as seen in Excel are on next page:

Dividing in Excel Example 1:
If you are dividing two numbers use / Symbol

Expense for Week	2955		** Week for this business is always 7 days.
Daily Expense	422.1428571	=B4/7	* We have no requirement to round and use ROUND function

Dividing in Excel Example 2:
When you are performing division, the formula is: Numerator/Denominator = Quotient ==>> Top/Bottom = Answer
When you are performing division you are asking the question: "How Many Denominators are in the Numerator?"

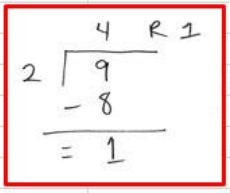
Numerator	Denominator	Quotient (answer)		
10	2	5	=A12/B12	Here we are asking: How many 2s are in 10?

Dividing in Excel Example 3:
** Dividing by zero not allowed because "How many Zeroes are in a number???"

Numerator	Denominator	Quotient (answer)		
10	0	#DIV/0!	=A18/B18	Here we are asking: How many 0s are in 10?

Dividing in Excel Example 4:
We can divide to get the integer answer with a remainder with the QUOTIENT and MOD Functions.

Numerator	Denominator	Quotient (answer)	Integer Answer	Remainder Answer
9	2	4.5	4	1
		=A24/B24	=QUOTIENT(A24,B24)	=MOD(A24,B24)



When we MUST use ROUND:
1) We are required to round
2) The result of dividing yields extraneous decimals
3) We use result in subsequent formula

Dividing in Excel Example 5:
Goal of example: Calculate Grade for Class
We compare Student Point Total to the Maximum Points Possible in Class.
Anytime we compare a "Part of the Whole" to the "Whole", we use Division. This is called "Compare Part to Whole"
* We have no requirement to round here

Student Name	Student Score "Part of Whole"	Grade for Class "Compare Part to Whole"		Max Points for Class "Whole"
Imani	477	0.954	=B40/$E$40	500
Gigi	360	0.72		
Tyrone	500	1		* We have no requirement to round and use ROUND function
Sioux	396	0.792		
Bob	173	0.346		
Abdi	454	0.908		

Dividing in Excel Example 6:
Goal of example: Calculate Monthly Insurance Expense for each policy, then add all monthly expenses to get total.
This situation meets the requirement to round.

Policy Number	Annual Insurance Expenses	Monthly Expense		Monthly Expense	
0121.NGXDS-2948	2434.65	202.89	=ROUND(B52/12,2)	202.89	=B52/12
0171.TOUKP-2257	3940.51	328.38		328.38	
0006.TPZUP-1156	3206.84	267.24		267.24	
0107.PMQGS-1845	1943.33	161.94		161.94	
	Total	960.45		960.44	

9) ROUND Function Rules, including Multiplying & Dividing Money

i. MUST use ROUND:
   1. We are required to round
   2. You have extraneous decimals, or with money: you are multiplying or dividing and you might have extraneous decimals
   3. We use result in subsequent formula

10) Check Work When Multiplying or Dividing

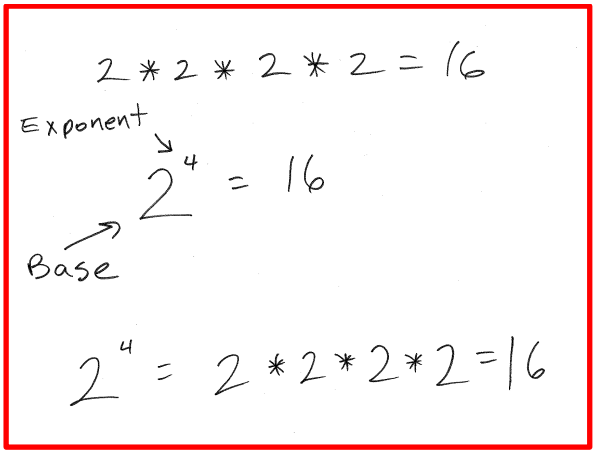
ii. You can always check your work when multiplying or dividing:
   1. If **10 / 2 = 5**
   2. Then **5 * 2 = 10 AND 10 / 5 = 2**

iii. Examples as seen in Excel:

	A	B	C	D	E	F
1	**Multiply and Divide Example 1:**					
2	You can always check your work when Multiplying or Dividing:					
3	**by using the non-rounded original numbers					
4						
5	If this is TRUE:					
6	Quantity * Price = Total					
7	85 * 21.255 = 1806.675					
8	Product	Quad				
9	Quantity	85				
10	Price	21.255				
11	Total	1806.675	=B10*B9			
12						
13	Then this is TRUE:					Check
14	Total / Price = Quantity					Your
15	1806.675 / 21.255 = 85					Work
16	Product	Quad				
17	Total	1806.675				
18	Price	21.255				
19	Quantity	85	=B17/B18			
20						
21	You could also check:					
22	Total / Quantity = Price					
23	1806.675 / 85 = 21.255					
24	Product	Quad				
25	Total	1806.675				
26	Quantity	85				
27	Price	21.255				

11) Exponents

i. Exponents are convenient way to multiply when you have to multiply the same number over and over!
ii. In Excel the operator is caret: ^ (Shift + 6)
iii. Terms:



iv. In Excel the steps to type a label that shows the Base and Exponent are:
    1. Type a lead apostrophe (so number can be considered text)
    2. Type Base and Exponent
    3. Highlight Exponent
    4. Ctrl + 1 to open Format Cells Dialog Box, then on Font Tab, check Superscript checkbox
v. Example as seen in Excel:

	A	B	C	D	E	F	G
1	**Exponent Example 1:**						
2	Exponents are convenient way to multiply when you have to						
3	multiply the same number over and over!						
4	In Excel the operator is caret: ^ (Shift + 6)						
5							
6	2		**What is the number we are multiplying?**				
7	2		2	Base			
8	2		**How many times did we have to multiply it?**				
9	2		6	Exponent			
10	2						
11	2		2^6				
12	64		64	=C7^C9			
13							
14	**Steps to type a label that shows 2^6 :**						
15	1) Type a lead apostrophe (so number can be considered text)						
16	2) Type Base and Exponent: '26						
17	3) Highlight Exponent						
18	4) Ctrl + 1 to open Format Cells Dialog Box, then on Font Tab, check Superscript checkbox						
19							
20	**Exponent Example 2:**						
21	In Finance we often times have to use Exponents.						
22	Famous Finance Formula for Future Value of Lump Sum Investment with Annual Rate:						
23	FV = (1 + AnnualRate)^Years*AmountInvested						
24							
25	Amount Deposited in Bank	$2,500.00					
26	Years Left in Bank	10					
27	Annual Interest Rate	0.045		FV = (1 + AnnualRate)^Years*AmountInvested			
28	Future Value	3882.424		FV = (1+0.045)^10*2500			
29				FV =(1+B27)^B26*B25			

12) Rounding & ROUND Function Video Examples:

	A	B	C	D	E	F	G	H
1	**Rounding Example 1:**							
2	Round to the Penny when you are dealing with dollars and cents							
3	ROUND(Formula,2)							
4								
5	Invoice	Amount	Discount Rate	Discount Amount			Incorrect:	
6	12254	1099.11	0.01	10.99	=ROUND(C6*B6,2)		10.9911	=B6*C6
7	12255	367.46	0.015	5.51			5.5119	
8	12256	712.35	0.03	21.37			21.3705	
9	12257	655.16	0.02	13.1			13.1032	
10			**Total**	50.97			50.9767	
11								
12	**Rounding Example 2:**							
13	Round to the Dollar is required for a few tax calculations, for example Federal Income Tax Forms.							
14	ROUND(Formula,0)							
15								
16	Name	Taxable Amount	Tax Rate	Paid Tax			Incorrect:	
17	Sioux	48661.43	0.125	6083	=ROUND(C17*B17,0)		6082.67875	=B17*C17
18	Imani	52861.1	0.13	6872			6871.943	
19	Bob	51487.39	0.125	6436			6435.92375	
20	Gigi	48436.34	0.13	6297			6296.7242	
21			**Total**	25688			25687.2697	
22								
23	**Rounding Example 3:**							
24	Round to the thousandths position because the syllabus states that that is required							
25	ROUND(Formula,3)							
26								
27	Max Possible Points		500					
28								
29	Student	Class Score	Grade				Grade	
30	Pham	401.7	0.803	=ROUND(B30/$C$27,3)			0.8034	=B30/$C$27
31	Miki	359.1	0.718				0.7182	
32	Abdi	386.7	0.773				0.7734	
33	Phil	389.5	0.779				0.779	
34		Average	0.768	=ROUND(AVERAGE(C30:C33),3)			0.7685	
35								
36	**Rounding Example 4:**							
37	Round to the thousands position, sometimes you need to do this when creating a Financial Report.							
38	ROUND(Formula,-3)							
39								
40	Company	Cash Balance	Round to Thousands, Divide by 1000					
41	GOOG	48,088,124,879	48,088,125	=ROUND(B41,-3)/1000				
42	MSFT	11,324,045,674	11,324,046					
43	YHOO	1,526,427,125	1,526,427					
44	FB	18,434,320,789	18,434,321					

New Keyboard In This Video

1. **Esc Key** = Will Turn Off "Dancing Ants" From Copied Cells