Office 2016– **Excel Basics 09**
Video/Class Project #21
Excel Basics 9: Number Formatting and the ROUND Function

Goal in video # 9: Learn more about Number Formatting. Learn when and how to use the ROUND function in Business.

Number Formatting

1) What does Number Formatting do?

    i. Number Formatting allows you to change how the Number is displayed without actually changing the underlying number that sits in the cell.

        1. For example, in this picture, the Decrease Decimal button is used to display no decimals, but we can still see the decimals in the Formula Bar:

        2. Number Formatting allows you to display numbers on the ***surface of the cell*** without changing the number that ***sits in the cell***.

        3. You can think of Number Formatting as a "Façade". In the above picture, the Façade shows the number 35061, but underneath that façade is the actual number 35060.7056.

2) Formulas do not "see" Number Formatting.

   i.   Formulas make calculations on the underlying number that sits in the cell.

   ii. Formulas do NOT make calculations on the Number Formatting that you see on the surface of the cell.

   iii. For example, in this picture, the formula shows an answer of 199, but 100*2 is really 200!! What is going on? If you look in the Formula Bar it shows that the value in cell A2 is really 99.5. Because formulas make calculations on the underlying number that sits in the cell, the formula makes the calculation on 99.5*2 = 199.

Formula Bar shows the number that the formula uses to make calculation.

A2			×	✓	*fx*	99.5	

	A	B	C	D	E
1	Price	Quantity	Total		Formula in cell:
2	100	2	199		Formula in cell C2 is: =A2*B2 (Price*Quantity)

Number is displayed to show zero decimals, but formula does not "see" Number

   iv. Formulas make their calculation on the actual numbers in the cells, not the numbers that are displayed on the surface of the cells.

   v.   To fix this visual mistake, we need to increase the decimals for cell A2. This picture shows the decimals increased for cell A2:

A2			×	✓	*fx*	99.5	

	A	B	C	D	E
1	Price	Quantity	Total		Formula in cell:
2	99.5	2	199		Formula in cell C2 is: =A2*B2 (Price*Quantity)

3) Number Formatting can save us a lot of time with data entry.
    i. In the picture below the numbers on the right are the digits that you type in. The numbers on the left have Currency Number Format applied so the dollar signs and decimal point and decimals are displayed.

	A	B	C	D
1		Sales		Sales
2		45		$45.00
3		65.2		$65.20
4		78.99		$78.99
5		100		$100.00

D2   45

We only had to type the two digits: 45

Currency Number Format shows $ sign, decimal and two zeros.

    ii.

4) Compare General Number Formatting, Currency Number Format and Accounting Number Format:
    1. General Number Formatting:
        i. General Number Formatting = What you see is what is in the cell.
        ii. If you apply General Number Formatting, it will wipe away all of the previously applied Number Formatting to reveal what number actually sits in the cell.
        iii. Applying General Number Formatting ERASES all previously applied Number Formatting.
        iv. General Number Formatting is the default Number Formatting on all cells.
    2. Accounting Number Format:
        i. Fixed dollar sign (left edge of cell).
        ii. Negatives are in parenthesis.
        iii. Zeros are dashes.
        iv. Decimals always line up.
        v. When you use Accounting Number Format it may hide decimals by displaying fewer decimals than are actually in the cell. This may lead to formula errors due to fact the formula calculates on the underlying number and not the displayed number.
    3. Currency:
        i. Floating dollar sign.
        ii. You choose how to show negatives.
        iii. Zeros are zeros.
        iv. Decimals usually line up.
        v. When you use Currency Number Format it may hide decimals by displaying fewer decimals than are actually in the cell. This may lead to formula errors due to fact the formula calculates on the underlying number and not the displayed number.
    4. Example:

General	Currency	Accounting
Sales	Sales	Sales
45	$45.00	$ 45.00
0	$0.00	$ -
78.99	$78.99	$ 78.99
100	$100.00	$ 100.00
-101	-$101.00	$ (101.00)
98.2	$98.20	$ 98.20
20	$20.00	$ 20.00

        i.

5) Percentage Number Formatting:
   i. What is a percentage?
      1. How many parts out of 100?
         i. If the tax rate is 9.95%, this means that you must pay 9.95 pennies out of every 100 pennies (or one dollar).
   ii. What Percentage Number Format does:
      1. For the number 0.03, Percentage Number Formatting displays the number with:
         i. The decimal slid two positions to the right
            and
         ii. A percentage sign.
         iii. 0.03 displays as 3.00%
      2. For a tax rate of 1.45%, you have to remember that the underlying number is 0.0145.

ROUND Function

Reminder of how we round numbers by hand:

How to round by hand?

1) Pick position you want to round to

2) look at digit to right:

     5 or bigger ==>> add one to position you are rounding to and remove unwanted digits

     4 or less   ==>> remove unwanted digits

| 52.727625 | 52.7**2**7625 | 52.727**7**625 | 52.7**(2+1)**7625 | 52.73 |
| 52.724584 | 52.7**2**4584 | 52.724**4**584 | 52.7**(2+0)**4584 | 52.72 |

We can use the ROUND function to remove unwanted decimals

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1) We can use the ROUND function to remove unwanted decimals.
2) ROUND Function arguments:
   - i. **Number** argument contains the number you want to round. In this picture we want to round the Tax Deduction Amount, B13*B18:

12	Employee	Gross Pay	Tax Deduction	Tax Deduction
13	Lillian Holt	689.25	$52.73	=ROUND(B13*B18,2)
14	Jasmine Phelps	765.71	$58.58	ROUND(**number**, num_digits)
15	Sadie Hudson	687.43	$52.59	$52.59
16		Total	$163.89	$163.90
17				
18	Tax Rate	0.0765		

   - ii.
   - iii. **Num_digits** argument is the position you would like to round to. For example, because the penny position is two digits to the right of the decimal, you would use a 2 for rounding to the penny. Like in this picture:

12	Employee	Gross Pay	Tax Deduction	Tax Deduction
13	Lillian Holt	689.25	$52.73	=ROUND(B13*B18,2)
14	Jasmine Phelps	765.71	$58.58	ROUND(number, **num_digits**)
15	Sadie Hudson	687.43	$52.59	$52.59
16		Total	$163.89	$163.90
17				
18	Tax Rate	0.0765		

   - iv.

3) Rules for second argument in ROUND:
   - i. Round to penny (hundredths position) use 2
   - ii. Round to dollar (ones position) use 0
   - iii. Round to thousands (thousands position) use -3

4) Here is an example of how we use ROUND to remove unwanted decimals, rather than Number Formatting:

5)
6) When you MUST use ROUND:
    i.   You are required to round, like with Money.
    ii. You have extraneous decimals, like past the penny position.
    iii. You will use formula result in a subsequent formula.

7) If you don't use ROUND when you are required to, you may calculate the incorrect amounts, like in the following Payroll example:

8)

9) In business we mostly need to use round when we are multiplying decimals and the unit is Money.
    i.   Examples:
         1. Payroll
         2. Invoices
         3. Taxes
10) You are not required to use round if you will never use the formula result in another formula. Then you can just use Number Formatting to display the numbers with the correct number of decimals.