

Excel & Business Math
Video/Class Project #09
Five Steps to Solve Math Word Problems in Excel

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1) Five Steps to Solve Math Word Problems in Excel:

1. List all relevant facts and numbers with proper labels
2. State the goal of the problem
3. Solve problem using Efficient Excel Methods
4. Check answer
5. Answer the question with a write statement

2) Translating English words into math symbols

Add	Subtract	Multiply	Divide	Equal	Powers
plus	less	product	divided by	is	squared
more	subtract	double	divided into	the same as	raised to
more than	subtracted from	triple	quotient	equals	to the second power
added to	difference	times	goes into	equal to	cubed
increased by	less than	of	divide	yields	to the 12th power
sum	fewer	twice	divided equally	results in	
total	decreased by	twice as much	per	are	
sum of	loss of				
increase of	minus				
gain of	take away				
add	reduced by				

3) Formula Efficiency Rules from Video 07:

Formula Types:

- 1) **Number formulas** that deliver a single number answers such as a tax deduction or a insurance expense.
- 2) **Logical formulas** (Boolean Formulas) deliver a TRUE or FALSE.

Excel's Golden Rule: If a formula input can change, put it in cell, label it and refer to it with a cell reference.

Formula Elements:

- 1) Equal sign, =
- 2) Cell references, like A1, \$A\$1, A1:A10, \$A\$1:\$A\$10
- 3) Math operators, -, +, /, *, ^, and ()
- 4) Numbers (if they won't change), like 12 months
- 5) Built-in Functions, like SUM and ROUND
- 6) Comparative operators, >, <, >=, <=, =, <>

Math order of operations

- ()
- ^
- * / Left to Right
- + - Left to Right

When to use ROUND Function

- 1) You are required to round, like with Money.
- 2) You have extraneous decimals, like past the penny position.
- 3) You will use formula result in a subsequent formula.

SUM Function Hints:


- 1) Use SUM Function rather than many plus symbols.
- 2) Do not wrap SUM Function around a calculation when the SUM Function is not necessary:

4) Terms used in Retail

i. Some of the terms used in Retail:

1. **Retail Store** = Store that sells items to final customer, like Target or Safeway
2. **Retail Price = List Price = Price** = Amount collected from customer
3. **Wholesale Cost = Net Cost = Cost** = Amount business paid to get the item
4. **Number of Units Sold** = Count of number of products sold to customer
5. **Gross Profit per Unit** = Price - Cost
6. **Revenue** = Price * Number of Units Sold
7. **Cost of Good Sold = COGS** = Cost * Number of Units Sold
8. **Gross Profit** =
 - i. Revenue – COGS
or
 - ii. Gross Profit per Unit * Number of Units Sold

ii. Example From Video:

	A	B	C	D	E
1	Some of the terms used in Retail:				
2	Retail Store = Store that sells items to final customer, like Target or Safeway				
3	Retail Price = List Price = Price = Amount collected from customer				
4	Wholesale Cost = Net Cost = Cost = Amount business paid to get the item				
5	Number of Units Sold = Count of number of products sold to customer				
6	Gross Profit per Unit = Price - Cost				
7	Revenue = Price * Number of Units Sold				
8	Cost of Good Sold = COGS = Cost * Number of Units Sold				
9	Gross Profit = Revenue - COGS or Gross Profit per Unit * Number of Units Sold				
10					
11	Example:				
12	Quad Price =	32			
13	Quad Cost =	17.75			
14	Number Units Sold =	5			
15					
16	Gross Profit per Unit = Price - Cost	14.25	=B12-B13		
17	Gross Profit = Gross Profit per Unit * Number of Units Sold	71.25	=B16*B14		
18	Revenue = Price * Number of Units Sold	160	=B14*B12		
19	COGS = Cost * Number of Units Sold	88.75	=B14*B13		
20	Gross Profit = Revenue - COGS	71.25	=B18-B19	Check ✓	

5) Math Word Problem 01 From Video:

	A	B	C	D	E	F	G	H
1	If a theater owner needs 1,500 total seats and wants the main floor to have 35 rows with 25 seats in each, and the balcony to have 25 rows, how many seats must be in each balcony row?							
2								
3								
4								
5	1) List all relevant facts and numbers with proper labels				2) State the goal of the problem			
6								
7	Total Seats Required	1500			Goal: Calculate How Many Seats must be in each Balcony Row			
8	Rows on Main Floor	35						
9	# Seats in each Row on Main Floor	25						
10	Rows in Balcony	25						
11	# Seats in each Row in Balcony	??						
12								
13								
14	3) Solve problem using Efficient Excel Methods				4) Check answer			
15								
16	Total Seats on Main Floor	875	=B8*B9		Total Seats in Balcony	625	=B18*B10	
17	Total Seats Required in Balcony	625	=B7-B16		Total Seats in Balcony	1500	=F16+B16	
18	# Seats in each Row in Balcony	25	=B17/B10					
19						Check ✓		
20								
21	5) Answer the question with a write statement							
22								
23	Given the requirements of the problem, there need to be 25 seats in each row in the balcony.							
24								

6) FORMULATEXT Function to show formula.

- i. As seen in Word Problem #1 in the video, the Excel Built-in Function FORMULATEXT will show the formula rather than the formula result. This can be helpful to understand more clearly how the calculations in an Excel Solution are being made.

7) Math Word Problem 02 From Video:

	A	B	C	D	E	F	G	H	I	J	
1	Use the Five Steps to Solve Math Word Problems for this problem.										
2	If you sell 5 Quad boomerangs for \$32.00 each and the cost for each was \$17.75 and you sell 2										
3	Carlota boomerangs for \$22 each and the cost for each was \$13, what was the Total Gross Profit that you made?										
4	The companies prices never include decimals past the penny position.										
5											
6	1) List all relevant facts and numbers with proper labels				2) State the goal of the problem						
7											
8	# Quad Boomerangs Sold	5									Goal: Calculate Total Gross Profit
9	Price for one Quad	\$32.00									
10	Cost of Quad	\$17.75									
11	# Carlota Boomerangs Sold	2									
12	Price for one Carlota	\$22.00									
13	Cost of Carlota	\$13.00									
14	Note: The companies prices never include decimals past the penny position. This means I do not have to round if I am multiplying whole units times dollars and cents.										
15											
16	3) Solve problem using Efficient Excel Methods				4) Check answer						
17											
18	Total Revenue for Quad	\$160.00	=B8*B9	Gross Profit for One Quad	\$14.25	=B9-B10					
19	Total Revenue for Carlota	\$44.00	=B11*B12	Gross Profit for One Carlota	\$9.00	=B12-B13					
20	Total Revenue	\$204.00	=SUM(B18:B19)	Total Gross Profit	\$89.25	=SUM(F18*B8,F19*B11)					
21	Total COGS for Quad	\$88.75	=B8*B10								
22	Total COGS for Carlota	\$26.00	=B11*B13							Check ✓	
23	Total COGS	\$114.75	=SUM(B21:B22)								
24	Total Gross Profit	\$89.25	=B20-B23								
25											
26	5) Answer the question with a write statement										
27											
28	The Total Gross Profit was \$89.25.										
29											


8) Cell Reference in Formula Can Pull Number Formatting from the Formula Input Cells

- i. As seen in Word Problem #2 in the video, when you refer to a Formula Input using a Cell Reference, if the Formula Input Cell uses a Number Formatting, the cell with the formula will “pull” the Number Formatting from the Formula Input Cell to the cell that contains the formula.

9) Math Word Problem 03 From Video:

	A	B	C	D	E	F	G	H	I	J	
1	Use the Five Steps to Solve Math Word Problems for this problem.										
2	A federal law requires that all residential toilets sold in the USA use no more than 1.5 gallons of water per flush.										
3	Prior to this legislation, conventional toilets used 3.2 gallons of water per flush.										
4	Find the amount of water saved in one year by a family flushing the toilet 20 times each day (1 year = 365 days).										
5											
6	1) List all relevant facts and numbers with proper labels				2) State the goal of the problem						
7											
8	Required gallons per flush for residential toilets	1.5	gallons				Goal: Calculate the amount of water saved in one year by family flushing 20 times per day				
9	Conventional toilet gallons per flush	3.2	gallons								
10	Number of flushes per day	20									
11	Number days in year	365									
12											
13											
14											
15	3) Solve problem using Efficient Excel Methods				4) Check answer						
16											
17	Number gallons saved with new residential toilets for 1 flush	1.7	gallons	=B9-B8	Amount of water saved in one year	12,410	gallons	=(B9-B8)*B10*B11			
18	Total Flushes in one year	7,300		=B11*B10							
19	Amount of water saved in one year	12,410	gallons	=B18*B17							
20											
21							Check ✓				
22	5) Answer the question with a write statement										
23											
24	Amount of water saved in one year by family flushing 20 times per day										
25											

10) Math Word Problem 04 From Video:

	A	B	C	D	E	F	G	H
1	Use the Five Steps to Solve Math Word Problems for this problem.							
2	Timmy Pham drives a truck for Mad Dog Trucking. On a recent long haul, he drove 423 miles in 6.5 hours without a stop.							
3	What was the average miles per hour that Timmy drove?							
4	Round to the nearest mile per hour							
5								
6								
8	Total Miles driven	423 Miles			Goal: Calculate average miles per hour that Timmy drove			
9	Hours driven	6.5 Hours						
10	per = division							
11	miles per hour = miles/hour = 423 miles/6.5 hours							
12								
13	Note: Anytime we do division with different units in Numerator and Denominator we can leave units in both Numerator and Denominator							
14	and leave a one (1) in the Denominator to help us decipher what the meaning of the ratio is.							
15								
16	3) Solve problem using Efficient Excel Methods			4) Check answer				
18	miles per hour = miles/hour = 423 miles/6.5 hours	65.07692308		=B8/B9	Check answer with unrounded numbers	423	Check ✓	=B18*B9
19	Round to ones position	65		=ROUND(B18,0)	Check answer with rounded number	422.5	Incorrect	=B19*B9
20	423 miles / 6.5 hours = 65 miles per 1 hour = 65 miles/1 hour	65miles/1hour						
21								
22								
23	5) Answer the question with a write statement							
24								
25	The average miles per hour that Timmy drove was 65 miles per hour							

11) Division with Different Units in Numerator and Denominator

- i. **Note:** Anytime we do division with different units in Numerator and Denominator we can leave units in both Numerator and Denominator and leave a one (1) in the Denominator to help us decipher what the meaning of the ratio is.

New Keyboard Shortcuts in this Video

- 1) **Ctrl + N** = Creates a New Excel Workbook File