

# Order of Operations & Excel

**Overview:** This activity is designed to familiarize you with the Order of Operations. Specifically, it gives you the opportunity to have the spreadsheet solve several mathematical expressions involving parentheses, powers, and the four standard mathematical operations of addition, subtraction, multiplication, and division.

1. Open a new spreadsheet file.
2. Adding the Data
  - A. Type the following entries into the spreadsheet file.

	A	B	C	D	E
1	8	6	4	2	
2					

- B. Select cells A1 through D1.

	A	B	C	D
1	8	6	4	2
2				

- C. Position the cursor so it is located in the lower-right corner of D1. It will become a thin cross. Drag to cell D8 and release the mouse. This should fill the contents of the first row into rows 1 through 8.

	A	B	C	D
1	8	6	4	2
2	8	6	4	2
3	8	6	4	2
4	8	6	4	2
5	8	6	4	2
6	8	6	4	2
7	8	6	4	2
8	8	6	4	2
9				

- D. Add a left border to column E.

	A	B	C	D	E
1	8	6	4	2	
2	8	6	4	2	

3. About the Order of Operations
 

The spreadsheet applies the Order of Operations to solve math problems. Calculations are performed in this order:

  - A. ( ) Parentheses (hold <Shift> while typing 9 or 0 to get the parentheses)
  - B. ^ Powers (hold <Shift> while typing 6);  $3^2$  is the same as  $3^2$
  - C. \*, / Multiplication and Division, from left to right
  - D. +, - Addition and Subtraction, from left to right
  - Within parentheses, powers are calculated first, followed by multiplication and division from left to right and then finally addition and subtraction from left to right.
  - If there are computations in the numerator and/or denominator of a fraction, the fraction bar is used to group things. The Order of Operations will be used to compute the numerator, then to compute the denominator. After the numerator and denominator are calculated, the final division is performed.

## Order of Operations & Excel *(cont.)*

### 4. Exploring the Order of Operations

#### A. Problem 1

Take out a pencil and a piece of paper.

Apply the Order of Operations as you calculate  $8 + 6 * 4 / 2$

What answer did you get? \_\_\_\_\_

In what order did you perform the calculations? \_\_\_\_\_

Click cell E1 and type  $=A1+B1*C1/D1$ .

What answer did the computer display? \_\_\_\_\_

Did your answer match the computer's answer? \_\_\_\_\_ (It should!)

#### B. Problem 2

On your paper, apply the Order of Operations to calculate the answer to  $(8 + 6) * (4 / 2)$ .

What answer did you get? \_\_\_\_\_

In what order did you perform the calculations? \_\_\_\_\_

Click cell E2 and type  $=(A2+B2)*(C2/D2)$ .

What answer did the computer display? \_\_\_\_\_

Did your answer match the computer's answer? \_\_\_\_\_

#### C. Problem 3

On your paper, apply the Order of Operations to calculate the answer to  $8 - 6 + 4 ^ 2$ .

What answer did you get? \_\_\_\_\_

In what order did you perform the calculations? \_\_\_\_\_

Click cell E3 and type  $=A3-B3+C3^D3$ .

What answer did the computer display? \_\_\_\_\_

Did your answer match the computer's answer? \_\_\_\_\_

#### D. Problem 4

On your paper, apply the Order of Operations to calculate the answer to  $(8 - 6)^(4 / 2)$ .

What answer did you get? \_\_\_\_\_

In what order did you perform the calculations? \_\_\_\_\_

Click cell E4 and type  $=(A4-B4)^(C4/D4)$ .

What answer did the computer display? \_\_\_\_\_

Did your answer match the computer's answer? \_\_\_\_\_

#### E. Problem 5

On your paper, apply the Order of Operations to calculate the answer to  $8 * 6 / 4 + 2$ .

What answer did you get? \_\_\_\_\_

In what order did you perform the calculations? \_\_\_\_\_

Click cell E5 and type  $=A5*B5/C5+D5$ .

What answer did the computer display? \_\_\_\_\_

Did your answer match the computer's answer? \_\_\_\_\_

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## Order of Operations & Excel *(cont.)*

### 5. Do You Understand?

Add  $()$ ,  $^$ ,  $+$ ,  $-$ ,  $*$ , and  $/$  to the contents of cells E6 and E7 respectively to find expressions that equal 2. The order of the cells has to stay the same as with each of the problems in rows 1 through 5; however, the operations can change. Check the answers in the back of the book or on the CD-ROM after you have completed the exercise.

### 6. A Challenge

Write down an even number other than 2 here. \_\_\_\_\_

In E8, your challenge is to develop an expression that equals the number you wrote above.

Good luck!

### 7. Finishing

A. In the footer, type *the name of your spreadsheet*, press <Enter>, and type *your name*.

B. Save the spreadsheet.

C. Print the spreadsheet with the answers displayed and with the formulas displayed.

D. Go to **FILE** and select *Exit*.

## Time to Review

Answer the following questions.

1. Without looking, see if you can remember the order in which the four levels of computations are performed. Write what you think here.

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2. Why is Order of Operations important? \_\_\_\_\_

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## Order of Operations & Excel Answer Key

4A) 20; multiply first, then divide, then add.

4B) 28; Add  $8+6$  first, Divide  $4/2$  second, and then multiply 14 by 2.

4C) 18; Take 4 and square it first, then subtract  $8-6$ , and last add the result (2) to 16.

4D) 4; Subtract  $8-6$  first, divide  $4/2$  second, and then take 2 (from the  $8-6$ ) to the second power.

4E) 14; Multiply  $8*6$  first, then divide 48 by 4 and lastly, add 2 to this answer.

5)  $=A6/(B6-C6)/D6$  is one possible answer,  $=A7/(B7-C7)-D7$  is another, other possibilities may exist.

6) *Answers will vary.*

Review 1) Parentheses are first, then powers, then multiplication and division from left to right, and last addition and subtraction from left to right.

Review 2) Order of Operations is important because answers of mathematical expressions are dependent upon the consistent application of these rules. Different answers would result if not followed.