

Math 6: Week of May 4th

Unit: Introduction to Algebra

Lesson #3: Order of Operations with Powers

Target: Find values of expressions with exponents using the order of operations.

Lesson #4: Order of Operations with Grouping

Target: Find values of expressions with grouping symbols using the order of operations.

Directions:

- Go through the slides (notes) and work through the examples on a separate piece of paper. If you have your math notebook, use it!
- Complete the practice problems on a separate piece of paper.
- Check your answers with the key given at the end of the lesson. If you got one wrong, double check your steps with your notes and recalculate it.
- Are you stuck?
 - Use Google Classroom or Gmail to ask Mrs. Thomas a question.
 - Check your email and Google Classroom for when live video help sessions are available.

Last week, Order of Operations was introduced using just adding, subtracting, multiplying and dividing (the four operations). This week, we are adding the rest of the rules, which include exponents and parentheses.

These are rules we all have to follow when solving an expression. If we don't, there are many different answers we could come up with.

When solving these expressions, solve one step at a time. Use your notebook lines and show all your work.

Lesson 3~

Order of Operations (Adding one more step!)

- Find the value of all powers.
- Multiply and divide from left to right.
- Add and subtract from left to right.

Example 1

Find the value of each expression. (Solve)

$$5 + 2^3 \times 3 - 10$$

$$5 + 2^3 \times 3 - 10$$

$$5 + 8 \times 3 - 10$$

$$5 + 24 - 10$$

$$19$$

$2^3 =$
 $2 \times 2 \times 2 =$
 8

- Find the value of all powers.
- Multiply and divide from left to right.
- Add and subtract from left to right.

Example 2

$$4^2 + 5 \div 1^4 \times 7$$

$$4^2 + 5 \div 1^4 \times 7$$

$$16 + 5 \div 1 \times 7$$

$$16 + 5 \times 7$$

$$16 + 35$$

$$51$$

$4^2 =$
 $4 \times 4 =$
 16

Example 3

Find the value of each expression. (Solve)

$$3^2 \times 2 + 6 - 1$$

$$3^2 \times 2 + 6 - 1$$

$$9 \times 2 + 6 - 1$$

$$18 + 6 - 1$$

$$24 - 1$$

$$23$$

$3^2 =$
 $3 \times 3 =$
 9

- Find the value of all powers.
- Multiply and divide from left to right.
- Add and subtract from left to right.

Example 4

Find the value of each expression. (Solve)

$$1^4 + 2^3 \times 3$$

$$1^4 + 2^3 \times 3$$

$$1 + 8 \times 3$$

$$1 + 24$$

$$25$$

$2^3 =$
 $2 \times 2 \times 2 =$
 8

$1^4 =$
 $1 \times 1 \times 1 \times 1 =$
 1

- Find the value of all powers.
- Multiply and divide from left to right.
- Add and subtract from left to right.

Lesson 4~

Vocabulary

Grouping Symbols: Symbols that group parts of an expression that must be completed **before** any other steps are completed.

Order of Operations (Adding the last step!)

- Find the value of expressions within grouping symbols, such as parentheses and fraction bars.
- Find the value of all powers.
- Multiply and divide from left to right.
- Add and subtract from left to right.

REMEMBER: ORDER OF OPERATIONS

PLEASE EXCUSE MY DEAR AUNT SALLY

Please = Parentheses

Excuse = Exponents

My Dear = Multiplication and/or Division

Aunt Sally = Addition and/or Subtraction



Example 1

Find the value of each expression. (Solve)

$$5 \times (3 + 4) - 8$$

$$5 \times (3 + 4) - 8$$

$$5 \times 7 - 8$$

$$35 - 8$$

$$27$$

Example 2

$$30 + (1 + 3)^2 \div 2$$

$$30 + (1 + 3)^2 \div 2$$

$$30 + 4^2 \div 2$$

$$30 + 16 \div 2$$

$$30 + 8$$

$$38$$

Solve what is inside the parentheses first, then the exponent.

1. Solve within grouping symbols, such as parentheses and fraction bars.
2. Find the value of all powers.
3. *Multiply and divide* from left to right.
4. *Add and subtract* from left to right.

Example 3

Find the value of each expression. (Solve)

$$\frac{8-2}{1+1}$$

Solve for the numerator and denominator first.

$$\frac{8-2}{1+1} = \frac{6}{2} = 3$$

$$\frac{6^2}{3+6} - 2$$

Solve for the numerator and denominator first.

$$\frac{6^2}{3+6} - 2 = \frac{36}{9} - 2 = 4 - 2 = 2$$

Solve the fraction, then subtract

1. Solve within grouping symbols, such as parentheses and fraction bars.
2. Find the value of all powers.
3. *Multiply and divide* from left to right.
4. *Add and subtract* from left to right.

Example 5

Find the value of each expression. (Solve)

$$\frac{6+10}{2+2}$$

Solve for the numerator and denominator first.

$$\frac{6+10}{2+2} = \frac{16}{4} = 4$$

$$7 \times 3 + \frac{16-2}{2}$$

Solve for the numerator and denominator first.

$$7 \times 3 + \frac{16-2}{2} = 7 \times 3 + \frac{14}{2} =$$

Then solve the fraction!

$$7 \times 3 + 7 = 21 + 7 = 28$$

1. Solve within grouping symbols, such as parentheses and fraction bars.
2. Find the value of all powers.
3. *Multiply and divide* from left to right.
4. *Add and subtract* from left to right.

Example 6

Practice Problems: Worksheets

Lesson 3~ Order of Operations with Powers

Lesson 4~ Order of Operations with Grouping

Check your work!
Worksheet Answers Provided Here!
If you're stuck, ASK! Live Meet help sessions are provided every Thursday at 9:30am. Check Google Classroom for more information.

$$12. 100 - 3 \times (6 + 9) = 63$$

$$11. 7 + (3 + 6) + 3 = 10$$

$$10. 5 \times (3 + 7) = 50$$

$$9. \$11$$

$$8. 2\frac{1}{2}$$

$$7. 45$$

$$6. 17$$

$$5. 11$$

$$4. 24$$

$$3. 35$$

$$2. 32$$

$$1. 2$$

$$12. -8 - 3 + 5^2 = 30$$

$$11. 4 \times 6 + 3^2 = 33$$

$$10. 13$$

$$9. 3$$

$$8. 51$$

$$7. 41$$

$$6. 59$$

$$5. 12$$

$$4. 10$$

$$3. 5$$

$$2. 19$$

$$1. 22$$

Worksheet 4

Worksheet 3

Lesson 3 ~ Order of Operations with Powers

Name _____ Period _____ Date _____

Find the value of each expression. When solving these expressions, solve one step at a time. Use notebook paper and use the lines provided. Show all your work.

1. $4 + 3^2 \times 2$

2. $27 \div 3 + 4^2 - 6$

3. $7 - 2^5 \div 16$

4. $6^2 \div 4 + 1$

5. $8 \div 2^3 \times 12$

6. $4^3 - 14 + 3^2$

7. $3^4 \div 9 + 2 \times 4^2$

8. $8^2 - 2^4 + 3$

9. $1^3 \times 2 + 4 \div 4$

10. $5 \times 3 - 16 \div 2^3$

In each numerical equation, one of the numbers needs to be squared to get the given answer. Rewrite the equation with the appropriate number squared.

11. $4 \times 6 + 3 = 33$

12. $8 - 3 + 5 = 30$

Lesson 4 ~ Order of Operations with Grouping Symbols

Name _____ Period _____ Date _____

Find the value of each expression. When solving these expressions, solve one step at a time. Use notebook paper and use the lines provided. Show all your work.

1. $\frac{4+6}{7-2}$

2. $4 \times (2 + 6)$

3. $(3 + 4)^2 - 14$

4. $16 \div 2 + 4 \times (7 - 3)$

5. $15 \times 3 \div 9 + 6$

6. $4 \times 3 + \frac{6+9}{3}$

7. $10 \times (5 - 2)^2 - 9 \times 5$

8. $12 \div 3 + \frac{2+7}{5-3} - 6$

9. Three friends go to the movies. Each ticket costs \$7. They also buy popcorn for \$6, candy for \$4 and a drink for \$2. The friends want to split the total cost evenly. Write a numerical expression to represent this situation and determine how much each friend owes.

Insert one set of parentheses in each numerical expression to make it equal the stated amount.

10. $5 \times 3 + 7 = 50$

11. $7 + 3 + 6 \div 3 = 10$

12. $100 - 3 \times 6 + 5 - 4 = 63$