Order of Operations

for Dixon Elementary School's 5th-Grade Math Classes

Before We Begin…

- This is an **expression**:

  5 + 4

- This is an **equation**:

  5 + 4 = 9

- How are they different?

PEMDAS…What is It?

- **PEMDAS** is an acronym for:

  "**P**lease **E**xcuse
  My **D**ear **A**unt **S**ally."
- **PEMDAS** is a mnemonic device to help you remember the order that operations are completed in an equation

PEMDAS…

- The letters in **PEMDAS** stand for:

  Parentheses,

  Exponents,

  Multiplication ***OR***

  Division,

  Addition ***OR***

  Subtraction

P = Parentheses

- In an equation, always solve expressions grouped in **parentheses** first!
- Do **NOT** solve parentheses that represent multiplication first, only those with grouped expression!

P = Parentheses

- Grouped expression (solve what's inside these parentheses FIRST):

  5 x **(6 + 3)**

- Multiplication (do NOT solve these parentheses first!):

  5**(6)** + 3

P = Parentheses

- To solve the equation below, you would FIRST solve what's inside the parentheses:

$$5 \times 3^2 + \underline{\mathbf{(3 + 3)}} \div 2 - 4$$

$$= 5 \times 3^2 + \mathbf{6} \div 2 - 4$$

E = Exponents

- In an equation, always solve **exponents** next!
  - An exponent has a base number with a smaller number beside and above it:

$$4^{2}$$

(**base**) (**exponent**)

- The exponent tells how many times the base number is multiplied by itself (4^2 = 4 x 4, **NOT** 4 x 2)

E = Exponents

- To solve the equation below, you would solve exponents NEXT:

$$5 \times \underline{\mathbf{3^2}} + 6 \div 2 - 4$$

$$= 5 \times \mathbf{9} + 6 \div 2 - 4$$

$(3^2 = 3 \times 3 = \mathbf{9})$

M & D = Multiplication & Division

- In an equation, always solve **multiplication *or* division, in any order, from left to right** next
- Start on the left, and solve 5 x 9 first, then solve 6 ÷ 2:

$$\underline{\mathbf{5 \times 9}} + \underline{\mathbf{6 \div 2}} - 4$$

$$= \quad \mathbf{45} + \mathbf{3} - 4$$

A & S = Addition & Subtraction

- In an equation, always solve **addition *or* subtraction, in any order, from left to right** last:

$$\underline{\mathbf{45 + 3}} - 4$$

$$= \quad \underline{\mathbf{48 \quad - 4}}$$

$$= \quad 44$$

Practice!

Use order of operations to solve these expressions:

(Why are they expressions and not equations?)

1. $5 + 4 \times 2$
2. $6 + (3 + 2) \times 8$
3. $3.2 \times (2^2 + 2) \div 6 - 1$
4. $15 - 3 + (2.2 \times 2) \div 2$
5. $6.3^2 - 6.5 \times 3 \div 6$

Practice Answers!

How did you do?

1. $5 + 4 \times 2$ **= 13**
2. $6 + (3 + 2) \times 8$ **= 46**
3. $3.2 \times (2^2 + 2) \div 6 - 1$ **= 2.2**
4. $15 - 3 + (2.2 \times 2) \div 2$ **= 14.2**
5. $6.3^2 - 6.5 \times 3 \div 6$ **= 36.44**