



Order of Operations

Suggested time: 75 minutes

What's important in this lesson:

You will review the order of operations and then apply them to various computational problems.

Complete these steps:

1. Read the lesson portion of the package on your own.
2. Complete the exercises as they appear in the lesson.
3. Check your answers with the answer key that your teacher has.
4. Ask for help at any point during the lesson.
5. Complete the "Unit 1, Lesson 1 Order of Operations Assignment" and submit to your teacher for evaluation.

Hand-in the following to your teacher:

1. Unit 1, Lesson 1 Order of Operations Assignment

Questions for the teacher:



What's Wrong?

To claim a cash prize, John answers a skill-testing question:

$$\begin{aligned} &64 \div 16 \div 4 + 3 - 2 \times 2 \\ &= 64 \div 4 + 3 - 2 \times 2 \\ &= 16 + 3 - 2 \times 2 \\ &= 16 + 1 \times 2 \\ &= 16 + 2 \\ &= 18 \end{aligned}$$

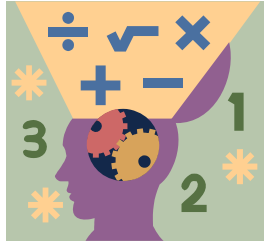
1. Find two errors in John's solution.
2. Give a correct solution.





1.0 Order of Operations

The correct sequence of steps for a calculation can be remembered with the BEDMAS code.



Complete the following chart to help you remember the order of operations. For assistance, consult a text or ask your teacher.

B	
E	
D	
M	
A	
S	

Exercise 1.0:

1. Evaluate.

$3(5-1)^2$ $= 3(4)^2$ $= 3(16)$ $= 48$	Brackets first ($5-1 = 4$) Exponents $4^2 = 4 \times 4 = 16$ Multiplication
$6^2 + 4^2$ $= 36 + 16$ $= 52$	Exponents $6^2 = 6 \times 6 = 36$ $4^2 = 4 \times 4 = 16$ Addition
$(4-2)(6-3)^3 + \sqrt{8-4}$ $= (2)(3)^3 + \sqrt{4}$ $= (2)(27) + 2$ $= 54 + 2$ $= 56$	Brackets first (you can do the operation under the root sign as well) Exponents: evaluate 3^3 and $\sqrt{4}$ Division/Multiplication Addition/Subtraction



$\frac{4 + 8(3 - 1)}{\sqrt{16}}$ $= \frac{4 + 8(\underline{\quad})}{\sqrt{16}}$ $= \frac{4 + 8(\underline{\quad})}{(\underline{\quad})}$ $= \frac{4 + (\underline{\quad})}{4}$ $= \frac{(\underline{\quad})}{4}$ $=$	<p>Simplify the numerator (top) and the denominator (bottom) separately, and then perform the division.</p> <p>Brackets:</p> <p>Exponents (or square roots):</p> <p>Division/Multiplication (top only)</p> <p>Addition/Subtraction (top only)</p> <p>Simplify</p> <p>State the fraction.</p> <p>Perform the division.</p>
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2. Try a few more...

a. $8 \div (1 + 3)$

b. $2(5 - 3) - 3$

c. $(9 + 2)^2$

d. $(16 - 7) \div 3^2$

e. $\sqrt{3^2 + 4^2}$

f. $68 - 2(2 + 1)^3$

g. $5 + (4 - 2)$

h. $(7 + 3)(6 - 1)$



i. $(6-2^2)+(3^3-7)$

j. $12\div 2^2(8-5)$

k. $11-1(3^2-3)$

l. $(10\div 5)^2-(6+6)\div 3$

m. $\sqrt{2^2(10^2)}\div 10$

n. $\frac{(8-3\times 2)}{2}$

o. $7-\sqrt{10-1}(6-2^2)$

p. $\frac{3\div(8-5)+9}{1+\sqrt{1+3\times 5}}$

3. "It's a Balancing Act" is a dice game that you can play on your own or competitively with a partner. Try a few rounds to improve your order of operations skills.

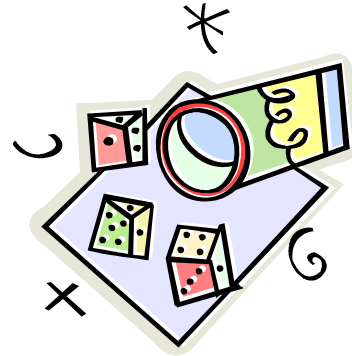


It's a Balancing Act...

You will need 3 dice, paper and pencil.

Goal:

To create a balanced equation using the numbers rolled in two successive rolls of 3 dice. If there are 2 players, then each would roll 3 dice and use those numbers to balance. All operations (brackets, exponents, addition/subtraction and multiplication/division) can be used. (If with a partner, the first player to call out a balanced equation scores the point for that round)



Example 1

6	6	1	Needs to Equal	5	4	3
First roll of 3 dice				Second roll of 3 dice		

The player can balance the equation

$$6 \div 6 + 1 = 2 \text{ balances } 3 - (5 - 4) = 2$$

Example 2:

4	1	1	Needs to Equal	3	1	1
First roll of 3 dice				Second roll of 3 dice		

The player can balance the equation

$$(4 - 1) \times 1 = 3 \text{ balances } 3 \times 1 \times 1 = 3$$

Example 3:

5	4	1	Needs to Equal	6	3	6
First roll of 3 dice				Second roll of 3 dice		

The player can balance the equation

$$5 + 4 \times 1 = 9 \text{ balances } 6 - 3 + 6 = 9$$

Example 4:

6	6	6	Needs to Equal	6	4	1
First roll of 3 dice				Second roll of 3 dice		

The player can balance the equation

$$6 \times 6 - 6 = 30 \text{ balances } 6 \times (4 + 1) = 30$$



It's a Balancing Act...

(game template)



Round 1:

			Needs to Equal			
First roll of 3 dice				Second roll of 3 dice		

Your balanced equation

	balances	
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Round 2:

			Needs to Equal			
First roll of 3 dice				Second roll of 3 dice		

Your balanced equation

	balances	
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Round 3:

			Needs to Equal			
First roll of 3 dice				Second roll of 3 dice		

Your balanced equation

	balances	
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Round 4:

			Needs to Equal			
First roll of 3 dice				Second roll of 3 dice		

Your balanced equation

	balances	
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Assessment and Evaluation

Order of Operations Assignment

1. Use BEDMAS to evaluate each expression.

(a) $6 \times 2 + 1 \times 5 - 3$

(b) $4^2 + 2(8 - 6)$

{6}

(c) $\sqrt{6^2 + 8^2}$

(d) $68 - 2(2 + 1)^3$

{6}

2. Describe, in order, the operations required to evaluate the following:

(a) 5×3^7

{2}

3. Insert brackets to make the statement true.

$$3 + 2 \times 15 - 7 = 19$$

{2}

4. Your parent is planning a birthday party. She has decided to spend a fixed amount of money based on your age. She presents you with the following options:

A. double your age, squared

B. 2 to the exponent of your age

C. the square root of your age, cubed

Which option would you advise her to use? Explain your choice.

{4}