



Find the Value of Numerical Expressions



Purpose In this activity, students find the value of numerical expressions using order of operations.

Note: Numerical expressions in this activity include integers and exponents.

Activity may be useful for:

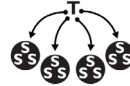


new learning



intervention

Activity may be delivered in:



teacher-facilitated instruction



Setting Up For Instruction

- Make 1 copy of **Order of Operations 2 Examples** (PG. 5) so that it can be projected using your classroom technology.
- Make 1 copy of **Order of Operations 2 Examples** (PG. 5) for each student.
- Make 1 copy of **Order of Operations 2** (PG. 6) for each student.
- Other materials:
 - Colored pencils:** 1 pack per pair



How-To Guide (1 of 2)

1. Place students in pairs and hand out materials.
2. Project **Order of Operations 2 Examples**, “Finding the Value of Expressions Using Order of Operations”. Cover the three examples. Have students fill in the blanks and discuss.

Note: This is from the activity Order of Operations 1 with slight revisions. If students did this activity, they should be able to fill in the blanks with their partners.

3. Uncover the examples. As you work through the examples, use the colored pencils to underline the parts of the expressions you are working on.

🗨 How are the numerical expressions alike? *The 2 or -2 have an exponent of 3. 2^3 is added or subtracted from 1.*

🗨 How are the numerical expressions different? *Sometimes the 2 or -1 is in parentheses and sometimes it isn't.*

4. Work through Example 1 with students.

🗨 Find the number with the exponent. What number is taken to the 3rd power? How do you know? *-2; The -2 is in the parentheses and there is no operation in the parentheses.*

🗨 [Underline $(-2)^3$.] The negative sign is inside the parentheses with the 2. This means that the number -2 is taken to the 3rd power. What does $(-2)^3$ mean? *-2 is multiplied together 3 times. $-2 \cdot -2 \cdot -2$.*

🗨 What is its value? *-8*

🗨 Now that you know the value of $(-2)^3$, how do you finish simplifying the expression? *Write $1 + -8$ and then add.*

🗨 What is the value of the expression? *-7*



How-To Guide (2 of 2)

5. Work through Example 2 with students.

🗨 Find the number with the exponent. What number is taken to the 3rd power? 2

🗨 What do you do with the subtraction sign in front of the 2? Why? *Nothing right now. Once we find the value of 2^3 , then we subtract.*

🗨 [Underline 2^3 .] What is the value of 2^3 ? 8

🗨 Now that you know the value of 2^3 , how do you finish simplifying the expression? $1 - 8 = -7$

🗨 What is the value of the expression? -7

6. Work through Example 3 with students.

🗨 Find the number with the exponent. What number is taken to the 3rd power? -2

🗨 What do you do with the subtraction sign in front of the -2 ? Why? *Nothing right now. Once we find the value of $(-2)^3$, then we subtract.*

🗨 [Underline $(-2)^3$.] How do you find the value of $(-2)^3$? $(-2) \cdot (-2) = 4$; $4 \cdot (-2) = -8$

🗨 Now that you know the value of $(-2)^3$, how do you finish simplifying the expression? $1 - (-8) = 9$

🗨 What is the value of the expression? 9

7. Hand out **Order of Operations 2**. Have students work together to solve the problems.



Thought Extenders

- What is the purpose of parentheses?
- How do you know what operation to perform first?
- Which operation should be performed next? How do you know?
- How are exponents and multiplication related?
- When there are several multiplications and divisions, which do you do first?
- When there are several additions and subtractions, which do you do first?
- How do you handle subtraction with order of operations?
- What is the next operation? What numbers do you use with that operation?
- How do you write each step?



ORDER OF OPERATIONS 2 EXAMPLES

ANSWER KEY

Finding the Value of Expressions Using Order of Operations

- 1 Do the operations in the grouping symbols first.



- 2 Slide your finger to the exponents. Do that operation.

- 3 Slide your finger to the first multiplication or division. Do that operation. Repeat until there is no more multiplication or division.

- 4 Slide your finger to the first addition or subtraction. Do that operation. Repeat until there is no more addition or subtraction.

5

$$\begin{aligned} & 1 + (-2)^3 \\ & 1 + (-2 \cdot -2 \cdot -2) \\ & 1 + (-8) \\ & -7 \end{aligned}$$

6

$$\begin{aligned} & 1 - 2^3 \\ & 1 - (2 \cdot 2 \cdot 2) \\ & 1 - 8 \\ & 1 + -8 \\ & -7 \end{aligned}$$

7

$$\begin{aligned} & 1 - (-2)^3 \\ & 1 - (-2 \cdot -2 \cdot -2) \\ & 1 - (-8) \\ & 1 + 8 \\ & 7 \end{aligned}$$



ORDER OF OPERATIONS 2

ANSWER KEY

Directions: Use order of operations to find the value of each expression.

1 $5^2 + 4$ $25 + 4$ 29	2 $(-5)^2 + 4$ $25 + 4$ 29
3 $(-5)^2 - 4$ $25 - 4$ 21	4 $-4 - (-5)^2$ $-4 - 25$ $-4 + (-25)$ -29
5 $12 - 2^5$ $12 - 32$ $12 + (-32)$ -20	6 $(-3)^3 + 4^2$ $-27 + 42$ $-27 + 16$ -11
7 $(-3)^2 + (-6)^2$ $9 + (-6)^2$ $9 + 36$ 45	8 $3 \cdot (-8)^2 - 192$ $3 \cdot 64 - 192$ $192 - 192$ 0

**Finding the Value of Expressions Using Order of Operations**

1 Do the operations in the _____ first.



2 Slide your finger to the _____. Do that operation.

3 Slide your finger to the first _____ or _____. Do that operation. Repeat until there is no more _____ or _____.

4 Slide your finger to the first _____ or _____. Do that operation. Repeat until there is no more _____ or _____.

5

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

6

$$1 - 2^3$$

7

$$1 - (-2)^3$$



ORDER OF OPERATIONS 2

Name: _____

Directions: Use order of operations to find the value of each expression.

1

$$5^2 + 4$$

2

$$(-5)^2 + 4$$

3

$$(-5)^2 - 4$$

4

$$-4 - (-5)^2$$

5

$$12 - 2^5$$

6

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

7

$$(-3)^2 + (-6)^2$$

8

$$3 \cdot (-8)^2 - 192$$