Math 10 Lecture Videos

Section 1.8
Exponents and Order of Operations

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OBJECTIVES:

1. Evaluate exponential expressions.
2. Simplify algebraic expressions.
3. Use order of operations agreement.

Objective 1:
Evaluate exponential expressions

Natural Number Exponents

If *b* is a real number and *n* is a natural number,

$$b^n = b * b * b * b * ... * b$$

b is the **base** and *n* is the **exponent.**
b^n is read "the *nth* power of *b*" or "*b* to the *nth* power".

Objective 1:
Evaluate exponential expressions

Examples:

Exponential Expression	Base	Exponent	Evaluate!
3^4	3	4	3 * 3 * 3 * 3 = 81
$(-4)^3$	-4	3	-4 * -4 * -4 = -64
-8^2	8	2	-(8 * 8) = -64
$(-8)^2$	-8	2	-8 * -8 = 64

Objective 2:
Simplify algebraic expressions

Simplify: $3x^2 + 7x^2$

• There are two like terms with same variable factor, namely x^2.

$$3x^2 + 7x^2 = 10x^2$$

Simplify: $5x^3 + 4x^2$

• This cannot be simplified because they are not like terms.

Objective 3:
Use order of operations agreement

Order of Operations
1. Perform all operations within grouping symbols. (Starting with innermost.)
2. Evaluate all exponential expressions.
3. Do all multiplications and divisions in the order they occur, working left to right.
4. Finally, do all additions and subtractions in the order in which they occur, working left to right.

Objective 3:
Use order of operations agreement

Simplify: $7^2 - 48 \div 4^2 * 5 - 2$	
$= 49 - 48 \div 16 * 5 - 2$	Evaluate the exponential expressions.
$= 49 - 3 * 5 - 2$	Perform division.
$= 49 - 15 - 2$	Perform multiplication.
$= 32$	Subtract.

Simplify: $5[2(3 - 7) + 6]$	
$= 5[2(-4) + 6]$	Remove the innermost grouping.
$= 5[-8 + 6]$	Work inside brackets. Multiply!
$= 5[-2]$	Add inside brackets.
$= -10$	Multiply.

Objective 4:
Use order of operations agreement

Simplify: $25 \div 5 + 3[4 + 2(7 - 9)^3]$
$= 25 \div 5 + 3[4 + 2(7 - 9)^3]$
$= 25 \div 5 + 3[4 + 2(-2)^3]$
$= 25 \div 5 + 3[4 - 16]$
$= 25 \div 5 + 3(-12)$
$= 5 + (-36)$
$= -31$

OBJECTIVES:

1. Evaluate exponential expressions. ✓
2. Simplify algebraic expressions. ✓
3. Use order of operations agreement. ✓