Math Overview

Order of Operations

1. Solve problems within grouping symbols.
2. Multiply or divide from left to right.
3. Add or subtract from left to right.

Order of Operations

Example 1

Find the value of $3 + 8 \div 2 * 4 - 1$

$3 + 8 \div 2 * 4 - 1$

$= 3 + 4 * 4 - 1$ Divide.

Order of Operations

Example 1

Find the value of $3 + 8 \div 2 * 4 - 1$

$3 + 8 \div 2 * 4 - 1 = 3 + 4 * 4 - 1$ Divide.

$= 3 + 16 - 1$ Multiply.

Order of Operations

Example 1

Find the value of $3 + 8 \div 2 * 4 - 1$

$3 + 8 \div 2 * 4 - 1 = 3 + 4 * 4 - 1$ Divide.

$= 3 + 16 - 1$ Multiply.

$= 19 - 1$ Add.

Order of Operations

Example 1

Find the value of $3 + 8 \div 2 * 4 - 1$

$3 + 8 \div 2 * 4 - 1 = 3 + 4 * 4 - 1$ Divide.

$= 3 + 16 - 1$ Multiply.

$= 19 - 1$ Add.

$= 18$ Subtract

Order of Operations

Example 2
Find the value of $44 * 4 \div (6 - [2* 2])$.

Do operations in innermost grouping symbols first.

$44 * 4 \div (6 - [2* 2]) =$
$44 * 4 \div (6 - 4)$

Order of Operations

Example 2
Find the value of $44 * 4 \div (6 - [2* 2])$.
Do operations in innermost grouping symbols first.
$44 * 4 \div (6 - [2* 2])$
Do operations in parentheses.
$= 44 * 4 \div (6 - 4)$
$= 44 * 4 \div 2$

Order of Operations

Example 2

Find the value of $44 * 4 \div (6 - [2* 2])$.

$44 * 4 \div (6 - [2* 2]) = 44 \text{ X } 4 \div (6 - 4)$

Do operations in innermost grouping symbols first.

$= 44 * 4 \div 2$ Do operations in parentheses.

$= 176 \div 2$ Multiply.

Order of Operations

Example 2

Find the value of $44 * 4 \div (6 - [2* 2])$.

$44 * 4 \div (6 - [2* 2]) = 44 * 4 \div (6 - 4)$

Do operations in innermost grouping symbols first.

$= 44 * 4 \div 2$

Do operations in parentheses.

$= 176 \div 2$ Multiply.

$= 88$ Divide.

Order of Operations

Example 2

Find the value of $44 * 4 \div (6 - [2* 2])$.

$44 * 4 \div (6 - [2* 2]) = 44 * 4 \div (6 - 4)$

Do operations in innermost grouping symbols first.

$= 44 * 4 \div 2$ Do operations in parentheses.

$= 176 \div 2$ Multiply.

$= 88$ Divide.

4-2 Powers and Exponents

Order of Operations
1. Do all operations within grouping symbols; start with the innermost grouping symbols.
2. Evaluate all powers from left to right.
3. Do all multiplication and division from left to right.
4. Do all addition and subtraction from left to right.

4-2 Powers and Exponents

Example 3

Evaluate each expression if x = 3 and z = 2.

$4x + z^4$

4-2 Powers and Exponents

Example 1

Evaluate each expression if x = 3, z = 2

$4x + z^4$

$= 4 * x + z^4$

$= 4* 3 + (2)^4$ Replace x with 3 and z with 2.

4-2 Powers and Exponents

Example 1

Evaluate each expression if x = 3, and z = 2.

$4x + z^4$

$4 * x + z^4 = 4(3) + (2)^4$ Replace x with 3 and z with 2.

$= 4*3 + 16$ Evaluate the power.

4-2 Powers and Exponents

Example 1

Evaluate each expression if x = 3, z = 2.

$4x + z^4$

$= 4*x + z^4 = 4(3) + (2)^4$

Replace x with 3 and z with 2.

$= 4*3 + 16$

Evaluate the power.

$= 12 + 16$ Find the product of 4 and 3.

4-2 Powers and Exponents

Example 1

Evaluate equation if x = 3, z = 2.

$4x + z^4$

$4*x + z^4 = 4*3 + (2)^4$ Replace x with 3 and z with 2.

$= 4*3 + 16$ Evaluate the power.

$= 12 + 16$ Find the product of 4 and 3.

$= 28$ Find the sum.

4-2 Powers and Exponents

Example 2

Solve the following equation if x = 3, y = 2, and z = 2.

$2[(xy)^2 - z^3]$

4-2 Powers and Exponents

Example 2

Evaluate each expression if x = 3, y = 2, and z = 2.

$2[(xy)^2 - z^3]$

$2[(x*y)^2 - z^3] = 2[(3*2)^2 - (2)^3]$ Replace x with 3, y with 2, and z with 2.

4-2 Powers and Exponents

Example

Evaluate each expression if x = 3, y = 2, and z = 2.

$2[(xy)^2 - z^3]$

$2[(x*y)^2 - z^3] = 2[(3*2)^2 - (2)^3]$ Replace x with 3, y with 2, and z with 2.

$= 2[(6)^2 - (2)^3]$ Evaluate the innermost grouping symbols.

4-2 Powers and Exponents

Example 2

Evaluate each expression if x = 3, y = 2, and z = 2.

$2[(xy)^2 - z^3]$

$2[(x*y)^2 - z^3] = 2[(3*2)^2 - (2)^3]$ Replace x with 3, y with 2, and z with 2.

$= 2[(6)^2 - (2)^3]$ Evaluate the innermost grouping symbols.

$= 2[36 - 8]$ Evaluate the powers.

4-2 Powers and Exponents

Example

Evaluate each expression if x = 3, y = 2, and z = 2.

$2[(xy)^2 - z^3]$

$2[(x*y)^2 - z^3] = 2[(3*2)^2 - (2)^3]$ Replace x with 3, y with 2, and z with 2.

$= 2[(6)^2 - (2)^3]$ Evaluate the innermost grouping symbols.

$= 2[36 - 8]$ Evaluate the powers.

$= 2[28]$ Do operations inside grouping symbols.

4-2 Powers and Exponents

Example 2
Evaluate each expression if x = 3, y = 2, and z = 2.
$2[(xy)^2 - z^3]$

$2[(x*y)^2 - z^3] = 2[(3*2)^2 - (2)^3]$	Replace x with 3, y with 2, and z with 2.
$= 2[(6)^2 - (2)^3]$	Evaluate the innermost grouping symbols.
$= 2[36 - 8]$	Evaluate the powers.
$= 2[28]$	Do operations inside grouping symbols.
$= 56$	Find the product.

Example 3 – Hazen-Williams

$$h_f = \frac{10.5}{D^{4.87}} * (Q \div C)^{1.85} * L$$

Solve equation of h, given
- D = 2 inches
- Q = 50 gpm
- C = 130
- L = 500 feet

Example 3 – Hazen–Williams

$$h_f = \frac{10.5}{2^{4.87}} * (50 \div 130)^{1.85} * 500$$

Step 1: Plug variables in

Example 3 – Hazen–Williams

$$h_f = \frac{10.5}{2^{4.87}} * (0.385)^{1.85} * 500$$

Step 1: Plug variables in
Step 2: Evaluate the innermost grouping symbols.

Example 3 – Hazen–Williams

$$h_f = \frac{10.5}{29.2} * 0.18 * 500$$

Step 1: Plug variables in
Step 2: Evaluate the innermost grouping symbols.
Step 3: Evaluate the powers.

Example 3 – Hazen–Williams

$$h_f = 30.7$$

Step 1: Plug variables in
Step 2: Evaluate the innermost grouping symbols.
Step 3: Evaluate the powers.
Step 4: Multiple and divide moving from left to right