Order of Operations

Fill in the guided notes as you watch the video in the Digital Toolbox.

- Use the acronym **PEMDAS** to help you remember the order to simplify expressions.
- PEMDAS stands for **P**arentheses, **E**xponents, **M**ultiplication/**D**ivision, and **A**ddition/**S**ubtraction.
- Parentheses means any **grouping** symbol including absolute value bars.
- **Exponents** include any square roots since exponents and square roots are related.
- Multiplication/division are simplified from **left to right** across the expression.
- Addition/subtraction are simplified from left to right across the **expression**.
- The addition/subtraction symbols are natural breaks in the expression. You can simplify a large expression into a few smaller ones by adding **grouping symbols** where you find addition and subtraction symbols.

Example 1

Complete the example as you watch the video in the Digital Toolbox.

Evaluate.

$$3^3+4\div\left(\frac{1}{2}\right)^2-4(1-3)^2+|-5+3|+\sqrt{25}$$

Implement

$$3^3+4\div\left(\frac{1}{2}\right)^2-4(-2)^2+|-2|+\sqrt{25}$$

$$27+4\div\frac{1}{4}-4(4)+2+5$$

$$27+4\cdot 4-16+2+5$$

$$27+16-16+2+5$$

$$\boxed{34}$$

Explain

Group the expression using the addition and subtraction symbols

P: parentheses
E: exponents

M/D: multiply or divide from left to right

A/S: add or subtract from left to right

Example 2

Complete the example as you watch the video in the Digital Toolbox.

Evaluate.

$-4|-3-2|+2^3-(5+1)^2\div 12$

Implement

$-4|-5|+2^3-(6)^2\div 12$

$-4(5)+8-36\div 12$

$-20+8-3$

-15

Explain

Group the expression using the addition and subtraction symbols

Practice

Complete the problems. Show your work.

1) $4^2 \div 8 + 3(1-2)^4 - |-5|$

$16 \div 8 + 3(-1)^4 - 5$

$16 \div 8 + 3(1) - 5$

$2 + 3 - 5$

$\boxed{0}$

2) $|2^3 - 3^3| + 15 \div 5 - 2 + \sqrt{16}$

$|8 - 27| + 15 \div 5 - 2 + \sqrt{16}$

$|-19| + 3 - 2 + 4$

$19 + 3 - 2 + 4$

$\boxed{24}$

3) $|5-(-2)| - 6(-3) + 3|-4| \div 6$

$|5+2| - 6(-3) + 3(4) \div 6$

$7 + 18 + 12 \div 6$

$7 + 18 + 2$

$\boxed{27}$

4) $-6^2 \div 3 - 2^2(83-81)^2$

$-(36) \div 3 - 4(2)^2$

$-36 \div 3 - 4(4)$

$-12 - 16$

$\boxed{-28}$

5) $\sqrt{4^2+3^2} + (2-4)^2$

$\sqrt{16+9} + (-2)^2$

$\sqrt{25} + 4$

$5 + 4$

$\boxed{9}$

6) $(3 + |7-8| \cdot 9)^2 \div (5 - |-6-11|)$

$(3 + |-1| \cdot 9)^2 \div (5 - |-17|)$

$(3 + 1 \cdot 9)^2 \div (5 - 17)$

$(3+9)^2 \div -12$

$(12)^2 \div -12$

$144 \div -12$

$\boxed{-12}$

Complete the problems. Show your work.

7) $|78-75|\cdot(-15)+5^2\cdot 3\div 5$

$|3|\cdot(-15)+25\cdot 3\div 5$

$3(-15)+75\div 5$

$-45+15$

$\boxed{-30}$

8) $-\sqrt{81}\div 3+16\cdot\frac{1}{2}\div\sqrt{64}$

$-9\div 3+8\div 8$

$-3+8\div 8$

$-3+1$

$\boxed{-2}$

9) $(128-(5(2+1))+6(10-8))\div 5$

$(128-5(3)+6(2))\div 5$

$(128-15+12)\div 5$

$(113+112)\div 5$

$125\div 5$

$\boxed{25}$

10) $2^3-\frac{1}{3}\sqrt{81}\cdot 4+\frac{4}{5}\sqrt{100}$

$8-\frac{1}{3}(9)\cdot 4+\frac{4}{5}(10)$

$8-3\cdot 4+8$

$8-12+8$

$\boxed{4}$

11) $\left|13-(8-2)^2+\sqrt{121}\right|$

$|13-(6)^2+11|$

$|13-36+11|$

$|-23+11|$

$|-12|$

$\boxed{12}$

12) $17-30\div 2\cdot 3+85$

$17-15\cdot 3+85$

$17-45+85$

$\boxed{57}$