1.2: Exponents, Square roots, and the order of operations

Note Title 9/11/2017

1.2.1

Last Note on 1.1: Absolute Value:

Ex: $|-13| = 13$

$|13| = 13$

$|-6| = 6$

$|6| = 6$

$|0| = 0$

$|5| = 5$

$-|7| = -7$

$-|-8| = -8$ (the $|-8|$ part equals 8)

1.2

Exponents: An exponent indicates repeated multiplication

$$2^3 = 2(2)(2) = 4(2) = \boxed{8}$$

Example: "What is negative four squared?"

Unclear! Which situation do you mean?

$-4^2 = -(4)(4) = \boxed{-16}$ ($= -(4)^2$)

$(-4)^2 = (-4)(-4) = \boxed{16}$

Note: $0 - 4^2 = 0 - 16 = \boxed{-16}$

Ex: $(-5)^3 = (-5)(-5)(-5) = 25(-5) = \boxed{-125}$

$(-5)^4 = (-5)(-5)(-5)(-5) = 25(25) = \boxed{625}$

$-5^4 = -(5)(5)(5)(5) = \boxed{-625}$

$-5^3 = -(5)(5)(5) = \boxed{-125}$

Square Roots:

Example: "What are the square roots of 64?"

This means: "What can I square to get 64?"

Answer: $\boxed{8 \text{ or } -8}$

$8^2 = 64$ and also $(-8)^2 = (-8)(-8) = 64$

$\sqrt{}$ means the principal, or positive, square root.

Ex: $\sqrt{64} = \boxed{8}$

$-\sqrt{64} = \boxed{-8}$

Order of Operations

1.2.3

Key Ideas

* Operations within grouping symbols are carried out first.

  Grouping symbols: Parentheses ( )

  Brackets [ ] { }

  Fraction Bars

  Absolute Value | |

  Square root $\sqrt{\ }$

* Multiplication and division precede (come before) addition and subtraction

* Multiplication and division operations are done from left to right

* exponents apply only to their base

Ex: $4 \cdot 6 - \left[(3 + 2(5))(7-5) - 9 \right]$

$= 4 \cdot 6 - \left[(3+10)(2) - 9 \right]$

$= 4 \cdot 6 - \left[(13)(2) - 9 \right]$

$= 4 \cdot 6 - \left[26 - 9 \right]$

$= 4 \cdot 6 - [17]$

$= 24 - 17$

$= \boxed{7}$

Ex: $3 - 7(5)$

$= 3 - 35$

$= \boxed{-32}$

Ex: $50 \div 10 \cdot 3 \div 2$

$= 5 \cdot 3 \div 2$

$= 15 \div 2$

$= \boxed{\frac{15}{2}}$ or $\boxed{7\frac{1}{2}}$ or $\boxed{7.5}$

1.3: Addition of Real Numbers

Ex: $4 + (-2) + 6 + (-3)$

$= 4 - 2 + 6 - 3$

$= 2 + 6 - 3$

$= 8 - 3$

$= \boxed{5}$

Translate to an algebraic expression

Ex: 5 more than a number

x

x is a variable representing the unknown number

$\boxed{x + 5}$ $5 + x$ is also correct.

Ex: 3 less than twice a number

$2x$

$\boxed{2x - 3}$

Note: $3 - 2x$ is not correct.

1.4. Subtraction of Real Numbers

$5+(-7)$ is the same as $5-7$. Both give us $\boxed{-2}$

We've already covered this.