

Basic Arithmetic
Skill-Builder # W – 11B
Performing Combined Operations on Whole Numbers Part 2

When performing combined operations on whole numbers, follow **PEMDAS** (**P**arentheses, **E**xponentiation, **M**ultiplication, **D**ivision, **A**ddition, **S**ubtraction). This means everything within parentheses (or any other symbol of grouping) has to be performed first, then all exponentiations; multiplication and division need to be performed in the order in which they appear from left to right; likewise, addition and subtraction need to be performed in the order in which they appear from left to right.

Examples

1. $3(5-3)^3 + 80 \div (7-3)^2$

Solution:

$$\begin{aligned} & 3(5-3)^3 + 80 \div (7-3)^2 \\ & = 3(2)^3 + 80 \div (4)^2 && \text{Perform the operation S inside the parentheses.} \\ & = 3 \cdot 8 + 80 \div 16 && 2^3 = 2 \cdot 2 \cdot 2 = 8 \text{ and } 4^2 = 4 \cdot 4 = 16 \\ & = 24 + 5 && 3 \cdot 8 = 24 \text{ and } 80 \div 16 = 5 \\ & = 29 \end{aligned}$$

2. $\frac{1^2 + 2^2 + 3^2 + 4^2}{(1+2)^2 + (4-3)^2}$

Solution:

$$\begin{aligned} & \frac{1^2 + 2^2 + 3^2 + 4^2}{(1+2)^2 + (4-3)^2} \\ & = \frac{1+4+9+16}{3^2 + 1^2} && \text{Perform the exponentiations on top and the operations inside the () below.} \\ & = \frac{30}{9+1} && \text{Perform the addition on top and the exponentiations below.} \\ & = \frac{30}{10} && 9+1=10 \\ & = 3 \end{aligned}$$

3. $\frac{(8-6)^3}{3 \cdot 2^3 - 4^2} + \frac{2 \cdot 3 + 4 \cdot 5}{2^2 + 3^2}$

Solution:

$$\begin{aligned} & \frac{(8-6)^3}{3 \cdot 2^3 - 4^2} + \frac{2 \cdot 3 + 4 \cdot 5}{2^2 + 3^2} \\ & = \frac{2^3}{3 \cdot 8 - 16} + \frac{6 + 20}{4 + 9} \\ & = \frac{8}{24 - 16} + \frac{26}{13} \\ & = \frac{8}{8} + 2 \\ & = 1 + 2 \\ & = 3 \end{aligned}$$

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Find the value of the given numeric expression.

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

2. $(8 - 2)(3 + 6) \div (6^2 - 3^2)$

3. $\frac{6(2 \cdot 3 + 5) - 3 \cdot 4^2}{3(6 \div 2 - 4 \div 2)^4}$

4. $2(2^2 \cdot 2 + 2(2^2 + 2)) - \frac{2^2 - (2^2 - 2)}{2^2 - 2}$

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Answers

1. 13
2. 2
3. 6
4. 39

Prepared by: Dr. Teresa V. Sutcliffe, Winter 2010