

1.2

Apply Order of Operations

Goal • Use the order of operations to evaluate expressions.

Your Notes

VOCABULARY

Order of Operations The rules established to evaluate an expression involving more than one operation

ORDER OF OPERATIONS

To evaluate an expression involving more than one operation, use the following steps.

Step 1 Evaluate expressions inside grouping symbols.

Step 2 Evaluate powers.

Step 3 Multiply and divide from left to right.

Step 4 Add and subtract from left to right.

Example 1 Evaluate Expressions

Evaluate the expression $30 \times 2 \div 2^2 - 5$.

Solution

Step 1

There are no grouping symbols, so go to Step 2.

Step 2

$$30 \times 2 \div 2^2 - 5 = 30 \times 2 \div \underline{4} - 5 \quad \text{Evaluate power.}$$

Step 3

$$30 \times 2 \div \underline{4} - 5 = \underline{60} \div \underline{4} - 5 \quad \text{Multiply.}$$
$$= \underline{15} - 5 \quad \text{Divide.}$$

Step 4

$$\underline{15} - 5 = \underline{10} \quad \text{Subtract.}$$

Your Notes

✓ **Checkpoint** Evaluate the expression.

1. $10 + 3^2$ 19	2. $16 - 2^3 + 4$ 12
3. $28 \div 2^2 + 1$ 8	4. $4 \cdot 5^2 + 4$ 104

Example 2 Evaluate expressions with grouping symbols

Evaluate the expression.

a. $6(9 + 3) = 6(\underline{12})$

Add within parentheses.

$= \underline{72}$

Multiply.

b. $50 - (3^2 + 1) = 50 - (\underline{9} + 1)$

Evaluate power.

$= 50 - (\underline{10})$

Add within parentheses.

$= \underline{40}$

Subtract.

c. $3[5 + (5^2 + 5)] = 3[5 + (\underline{25} + 5)]$

Evaluate power.

$= 3[5 + (\underline{30})]$

Add within parentheses.

$= 3[\underline{35}]$

Add within brackets.

$= \underline{105}$

Multiply.

Grouping symbols such as parentheses () and brackets [] indicate that operations inside the grouping symbols should be performed first.

Your Notes

✓ **Checkpoint** Evaluate the expression.

5. $6(3 + 3^2)$

72

6. $2[(10 - 4) \div 3]$

4

Example 3 Evaluate an algebraic expression

Evaluate the expression $\frac{12k}{3(k^2 + 4)}$ when $k = 2$.

Solution

$$\frac{12k}{3(k^2 + 4)} = \frac{12(\boxed{2})}{3(\boxed{2}^2 + 4)}$$

Substitute 2 for k .

$$= \frac{12(\boxed{2})}{3(\boxed{4} + 4)}$$

Evaluate power.

$$= \frac{12(\boxed{2})}{3(\boxed{8})}$$

Add within parentheses.

$$= \frac{\boxed{24}}{\boxed{24}}$$

Multiply.

$$= \underline{1}$$

Divide.

A fraction bar can act as a grouping symbol. Evaluate the numerator and denominator before dividing.

✓ **Checkpoint** Evaluate the expression when $x = 3$.

Homework

7. $x^3 - 5$

22

8. $\frac{6x + 2}{x + 7}$

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