Alg 1 1.2

Evaluate numerical expressions using the order of operations.

Evaluate algebraic expressions using order of operations

PEMDAS
GEMA

GemA

$2 \cdot 3 + 8$

$2 \cdot 11$

22

$2 \cdot 3 + 8$

$6 + 8$

14

11

Key Concept — Order of Operations

Step 1 Evaluate expressions inside grouping symbols. G

Step 2 Evaluate all powers. E

Step 3 Do all multiplications and/or divisions from left to right. M

Step 4 Do all additions and/or subtractions from left to right. A

PemDAS

Example 1 Evaluate Expressions

Evaluate each expression.

GemA

a. $3 + 2 \cdot 3 + 5$

$3 + 6 + 5 = 14$

b. $15 \div 3 \cdot 5 - 4^2$

$= 15 \div 15 - 16$

$25 - 16 = 9$

$1 - 16 = -15$

Example 2 Grouping Symbols

Evaluate each expression.

a. $2(5) + 3(4 + 3)$

$2 \cdot 5 + 3 \cdot 7$

$10 + 21$

31

b. $2[5 + (30 \div 6)^2]$

$2[5 + 5^2]$

$2[5 + 25]$

$2 \cdot 30 = 60$

Example 3 Fraction Bar

Evaluate $\dfrac{(6 + 4^2)}{(3^2 \cdot 4)}$ → $\dfrac{(6+16)}{(9 \cdot 4)} = \dfrac{22 \div 2}{36 \div 2} = \dfrac{11}{18}$

Example 4 Evaluate an Algebraic Expression

Evaluate $a^2 - (b^3 - 4c)$ if $a = 7$, $b = 3$, and $c = 5$.

$7^2 - (3^3 - 4 \cdot 5)$

$7^2 - (27 - 20)$

$7^2 - (7)$

$49 - 7 = 49 + -7 = 42$

Evaluate each expression.

4. $(4 + 6)7$ $= 70$
$10 \cdot 7 = 70$

5. $50 - (15 + 9) = 26$
24

6. $29 - 3(9 - 4)$
$29 - 15 = 14$

7. $[7(2) - 4] + [9 + 8(4)]$
$(14 - 4) + (9 + 32)$
$10 + 41$
51

8. $\frac{(4 \cdot 3)^2 \cdot 5}{9 + 3} = \frac{720}{12}$
$= 60$

9. $\frac{(3 + 2^3)}{(5^2(4))} = \frac{3 + 8}{25 \cdot 4}$
$= \frac{11}{100}$
$= 0.11$

Justify (explain) ...

Evaluate each expression if $g = 4$, $h = 6$, $j = 8$, and $k = 12$.

10. $hk - gj$

11. $2k + gh^2 - j$

12. $\dfrac{2g(h-g)}{gh-j}$

$6 \cdot 12 - 4 \cdot 8$

$72 - 32$

$= 40$