LESSON 1.2

GOAL

Use the order of operations to evaluate expressions.

Vocabulary

The **order of operations** was established to evaluate an expression involving more than
one operation.

Order of Operations (PEMDAS)

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 $4^2 \bullet 5 - 6^2$.
Solution

$4^2 \cdot 5 - 6^2 = 16 \cdot 5 - 36$ Evaluate powers.
$= 80 - 36$ Multiply.
$= 44$ Subtract.

Exercises for Example 1

Evaluate the expression.

1. $20 - 3^2 + 7$
2. $5 \bullet 2^3 \div 6$
3. $4 \bullet 6 - 21 \div 3$

EXAMPLE 2
Evaluate expressions with grouping symbols

Evaluate the expression.

a. $47 - 2(9 + 12)$
b. $6[2^3 + (13 - 8)]$
Solution

a	$47 - (9 + 12) = 47 - 2(21)$	Add within parentheses.
	$= 47 - 42$	Multiply.
	$= 5$	Subtract.
b	$6[2^3 + (13 - 8)] = 6[8 + (13 - 8)]$	Evaluate power.
	$= 6[8 + 5]$	Subtract within the parentheses.
	$= 6[13]$	Add within the parentheses.
	$= 78$	Multiply.

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Exercises for Example 2

Evaluate the expression.

4. $3(14 - 5)$
5. $6(9 - 1^4)$
6. $(7 + 5) - (8 + 4)$
7. $(3^3 - 6) \div 3$
8. $4^2(2 + 8)$
9. $9[15 \div (2 + 3)]$

EXAMPLE 3
Evaluate an algebraic expression

Evaluate the expression $\frac{4y+8}{2+y}$ when $y = 3$.

Solution

$\frac{4y+8}{2+y} = \frac{4(3)+8}{2+3}$ Substitute 3 for y.

$= \frac{12+8}{2+3}$ Multiply.

$= \frac{20}{5}$ Add.

$= 4$ Divide.

Exercises for Example 3

Evaluate the expression when $w = 9$.

10. $17 - 3w$
11. $w^2 - 13$
12. $\frac{5w}{w+6}$
13. $7(13 - w)$

14. $2w^2 - 15$

15. $5w - \frac{1}{3}w$

Answer Key

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1. 18

2. $6\frac{2}{3}$

3. 17

4. 27

5. 48

6. 0

7. 7

8. 160

9. 27

10. –10

11. 68

12. 3

13. 28

14. 147

15. 42