1.1 Lesson

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Lesson Tutorials
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Key Vocabulary
numerical expression, *p. 4*
algebraic expression, *p. 4*
evaluate, *p. 4*

A **numerical expression** contains only numbers and operations. An **algebraic expression** may contain numbers, operations, and one or more variables. Here are some examples.

Numerical Expression	*Algebraic Expression*
$15 + 9 \cdot 3$	$45 \div p - q$

To **evaluate** an algebraic expression, substitute a number for each variable. Then use the order of operations to find the value of the numerical expression.

EXAMPLE 1 Evaluating Algebraic Expressions

a. Evaluate $k + 10$ when $k = 25$.

$k + 10 = 25 + 10$ — Substitute 25 for k.

$= 35$ — Add 25 and 10.

b. Evaluate $4 \cdot n$ when $n = 12$.

$4 \cdot n = 4 \cdot 12$ — Substitute 12 for n.

$= 48$ — Multiply 4 and 12.

Study Tip
You can write the product of 4 and n in several ways.
$4 \cdot n$
$4n$
$4(n)$

On Your Own

1. Evaluate $24 + c$ when $c = 9$.
2. Evaluate $d - 17$ when $d = 30$.

EXAMPLE 2 Evaluating an Expression with Two Variables

Evaluate $a \div b$ when $a = 27$ and $b = 3$.

$a \div b = 27 \div 3$ — Substitute 27 for a. Substitute 3 for b.

$= 9$ — Divide 27 by 3.

On Your Own

Evaluate the expression when $p = 24$ and $q = 8$.

3. $p \div q$
4. $q + p$
5. $p - q$
6. pq

Now You're Ready
Exercises 8–19

Multi-Language Glossary at BigIdeasMath.com.

Extra Example 3

a. Evaluate $\frac{t}{5} + 6$ when $t = 45$. 15

b. Evaluate $v^2 - 4$ when $v = 9$. 77

On Your Own

7. 31 **8.** 26

9. 29 **10.** 37.5

Extra Example 4

Your uncle gives you $10 and you save $2 a week. The expression $10 + 2w$ gives the amount you save after w weeks.

a. How much money will you have saved after 2 weeks, 5 weeks, and 10 weeks? $14, $20, $30

b. After 10 weeks, do you have enough money to buy a video game that costs $25? Explain. Yes, after 10 weeks you have $30 and the video game costs $25.

On Your Own

11. Yes.
Because $45 + 4(20) = 125$, you will be able to buy the skateboard.

Laurie's Notes

Example 3

- Students are asked to evaluate expressions involving more than one operation. They will need to remember the order of operations.
- Write the expression from the example and ask how many operations will be performed.

? "What operation should you do first?" Part a. multiplication
Part b. exponent

- This question usually elicits a comment about the order of operations, at which time you can probe for understanding.

On Your Own

- Students should work the questions and then share their answers either orally, on individual white boards, or at the board. Check students' work looking for errors with the order of operations.

Example 4

- Work through the example. Model the strategy from yesterday's class. Money saved ($) = amount at the beginning ($) + $3 per week × # of weeks
- This example is good practice for students to set up a table to help to organize their work.

On Your Own

? "Describe what changes in the example to produce the expression $45 + 4w$." saving $4 per week instead of $3

Words of Wisdom

- If students are having difficulty, determine if the problem is a matter of computation, reading comprehension, order of operations, or some other difficulty.

Closure

- **Exit Ticket:** In Question 11, you found that by saving $4 per week for 20 weeks you would have enough to purchase a skateboard. Will you have enough after 40 weeks to purchase two skateboards? Justify your answer. No. Initially you had $45 at the beginning, and you were adding 4 dollars a week to it. Unless you had another $45 to add in, you would not be able to afford 2 skateboards.

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