# 3.1 Algebraic Expressions

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## ESSENTIAL QUESTION

How can you write and evaluate an expression that represents a real-life problem?

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## COMMON CORE STATE STANDARDS

6.EE.2c Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

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$5 + 7$ ← Expression

$5x + 7$ ← Algebraic Expression

ALGEBRAIC EXPRESSION ->an expression that may contain numbers, operations, and one or more symbols (letters)

Parts of an Algebraic expression separated by addition and subtraction symbols are called TERMS

$2x^2 + 5 - x$

$2x^2$ is a term

5 is a term

$x$ is a term

4

VARIABLE -> A symbol that represents one or more numbers.

$5p + 4$

COEFFICIENT-> Number in front of a variable.

CONSTANT-> A term without a variable.

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EXAMPLE 1 Identifying Parts of an Algebraic Expression

Identify the terms, coefficients, and constants in each expression.

$5x + 3$

Terms → $5x, 3$

Coefficients → 5

Constants → 3

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**EXAMPLE 1** Identifying Parts of an Algebraic Expression

Identify the terms, coefficients, and constants in each expression.

$2r^2 + y + 3$

Terms → $2r^2$, $y$, $3$

Coefficients → $2$, $1$

Constants → $3$

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**On Your Own**

Identify the terms, coefficients, and constants in each expression.

$12 + 10c$

Terms → $12$, $10c$

Coefficients → $10$

Constants → $12$

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**On Your Own**

Identify the terms, coefficients, and constants in each expression.

$15 + 3w + \frac{1}{2}$

Terms → $15$, $3w$, $\frac{1}{2}$

Coefficients → $3$

Constants → $15$, $\frac{1}{2}$

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**On Your Own**

Identify the terms, coefficients, and constants in each expression.

$z^2 + 9z$

Terms → $z^2$, $9z$

Coefficients → $9$

Constants → none

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**EXAMPLE 2** Writing Algebraic Expressions Using Exponents

Write the expression using exponents.

$d \cdot d \cdot d \cdot d$

$d^4$

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**EXAMPLE 2** Writing Algebraic Expressions Using Exponents

Write the expression using exponents.

$1.5 \cdot h \cdot h \cdot h$

$1.5h^3$

12

**EXAMPLE 4** Evaluating an Expression with Two Variables

*Evaluate* $a \div b$ *when* $a = 16$ *and* $b = \frac{2}{3}$

$a \div b$

$16 \div \frac{2}{3}$

$8 \cdot \frac{3}{2}$

$24^{1}$

19

**On Your Own**

*Evaluate* $p \div q$ *when* $p = 24$ *and* $q = 8$

$p \div q$

$24 \div 8$

$3$

20

**On Your Own**

*Evaluate* $q + p$ *when* $p = 24$ *and* $q = 8$

$q + p$

$8 + 24$

$32$

21

**On Your Own**

*Evaluate* $p - q$ *when* $p = 24$ *and* $q = 8$

$p - q$

$24 - 8$

$16$

22

**On Your Own**

*Evaluate* $pq$ *when* $p = 24$ *and* $q = 8$

$p\,q$

$24 \cdot 8$

$192$

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**EXAMPLE 3** Evaluating Expressions with Two Operations

*Evaluate* $3x - 14$ *when* $x = 5$

$3 \times -14$

$3 \cdot 5 - 14$

$15 - 14$

$1$

24

## On Your Own

Write the expression using exponents.

$j \cdot j \cdot j \cdot j \cdot j \cdot j$

$j^6$

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## On Your Own

Write the expression using exponents.

$9 \cdot k \cdot k \cdot k \cdot k \cdot k \cdot k$

$9k^6$

14

**EXAMPLE 3** Evaluating Algebraic Expressions

*Evaluate the expression* $k + 10$ *when* $k = 25$

$k + 10$

$25 + 10$

$35$

15

**EXAMPLE 3** Evaluating Algebraic Expressions

*Evaluate the expression* $4 \cdot n$ *when* $n = 12$

$4 \cdot n$

$4 \cdot 12$

$48$

16

## On Your Own

*Evaluate* $24 + c$ *when* $c = 9$

$24 + 9$

$33$

17

## On Your Own

*Evaluate* $d - 17$ *when* $d = 30$

$d - 17$

$30 - 17$

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**EXAMPLE 3 Evaluating Expressions with Two Operations**

*Evaluate* $z^2 + 8.5$ *when* $z = 2$

$2^2 + 8.5$

$2 + 8.5$

$4 + 8.5$

$12.5$

25

**On Your Own**

*Evaluate* $5y + 1$ *when* $y = 6$

$5y + 1$

$5 \cdot 6 + 1$

$30 + 1$

$31$

26

**On Your Own**

*Evaluate* $30 - 24 \div y$ *when* $y = 6$

$30 - 24 \div y$

$30 - 24 \div 6$

$30 - 4$

$26$

27

**On Your Own**

*Evaluate* $y^2 - 7$ *when* $y = 6$

$y^2 - 7$

$6^2 - 7$

$36 - 7$

$29$

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**On Your Own**

*Evaluate* $1.5 + y^2$ *when* $y = 6$

$1.5 + y^2$

$1.5 + 6^2$

$1.5 + 36$

$37.5$

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**EXAMPLE 4 Real-Life Application**

You are saving money to buy a skateboard. You begin with \$45 and you save \$3 each week. The expression $45 + 3w$ gives the amount of money you save after $w$ weeks.

a. How much will you have after 4 weeks, 10 weeks, and 20 weeks?

b. After 20 weeks, can you buy the skateboard? Explain.

| Number of weeks | $45 + 3w$ | |
|---|---|---|
| 4 | $45 + 3(4)$ | $45 + 12 = 57$ |
| 10 | $45 + 3(10)$ | $45 + 30 = 75$ |
| 20 | $45 + 3(20)$ | $45 + 60 = 105$ |


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You will not have enough to buy the \$125 skateboard because you