

1-2 Study Guide and Intervention

Variables and Expressions

Translate Verbal Phrases An **algebraic expression** is a combination of variables, numbers, and at least one operation. A **variable** is a letter or symbol used to represent an unknown value. To translate verbal phrases with an unknown quantity into algebraic expressions, first define the variable.

Algebraic Expressions		
The letter x is most often used as a variable.	$7d$ means $7 \times d$. mn means $m \times n$.	$\frac{b}{5}$ means $b \div 5$.
$x + 3$	$7d - 2$ mn	$\frac{b}{5}$

Example Translate each phrase into an algebraic expression.

a. five inches longer than the length of a book

Words five inches longer than the length of a book

Variable Let b represent the length of the book.

Expression $b + 5$

b. two less than the product of a number and eight

Words two less than the product of a number and eight

Variable Let n represent the unknown number.

Expression $8n - 2$

Exercises

Translate each phrase into an algebraic expression.

1. eight inches taller than Mycala's height
2. twelve more than four times a number
3. the difference of sixty and a number
4. three times the number of tickets sold
5. fifteen dollars more than a saved amount
6. the quotient of the number of chairs and four
7. a number of books less than twenty-three
8. five more than six times a number
9. seven more boys than girls
10. twenty dollars divided among a number of friends minus three

1-2 Study Guide and Intervention *(continued)***Variables and Expressions**

Evaluate Expressions To evaluate an algebraic expression, replace the variable(s) with known values and follow the order of operations.

Substitution Property of Equality

Words If two quantities are equal, then one quantity can be replaced by the other.

Symbols For all numbers a and b , if $a = b$, then a may be replaced by b .

Example**ALGEBRA Evaluate each expression if $r = 6$ and $s = 2$.****a. $8s - 2r$**

$$\begin{aligned} 8s - 2r &= 8(2) - 2(6) && \text{Replace } r \text{ with 6 and } s \text{ with 2.} \\ &= 16 - 12 \text{ or } 4 && \text{Multiply. Then subtract.} \end{aligned}$$

b. $3(r + s)$

$$\begin{aligned} 3(r + s) &= 3(6 + 2) && \text{Replace } r \text{ with 6 and } s \text{ with 2.} \\ &= 3 \cdot 8 \text{ or } 24 && \text{Evaluate the parentheses. Then multiply.} \end{aligned}$$

c. $\frac{5rs}{4}$

$$\begin{aligned} \frac{5rs}{4} &= 5rs \div 4 && \text{Rewrite as a division expression.} \\ &= 5(6)(2) \div 4 && \text{Replace } r \text{ with 6 and } s \text{ with 2.} \\ &= 60 \div 4 \text{ or } 15 && \text{Multiply. Then divide.} \end{aligned}$$

Exercises**ALGEBRA Evaluate each expression if $x = 10$, $y = 5$, and $z = 1$.**

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|---------------------|------------------|--------------|------------------------|
| 1. $x + y - z$ | 2. $\frac{x}{y}$ | 3. $2x + 4z$ | 4. $xy + z$ |
| 5. $\frac{6y}{10z}$ | 6. $x(2 + z)$ | 7. $x - 2y$ | 8. $\frac{(x + y)}{z}$ |

ALGEBRA Evaluate each expression if $r = 2$, $s = 3$, and $t = 12$.

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|--------------------------|--------------------|----------------------|-------------------------|
| 9. $2t - rs$ | 10. $\frac{t}{rs}$ | 11. $t(4 + r)$ | 12. $4s + 5r$ |
| 13. $\frac{5t}{(r + 3)}$ | 14. $(t - 2s)7$ | 15. $\frac{10t}{4s}$ | 16. $(t + r) - (r + s)$ |