

Lesson #5: Translating Between Words and Algebraic Expressions

Creating Expressions from Words

- * Algebraic Expression (or Variable expressions) are expressions that contain at least one Variable.
- * Numeric Expressions contains only numbers and operations.
- * Being able to read a statement, question, phrase and create an expression or equation is a critical part to being able to understand and solve different equations.
- * So lets practice doing just that, and practice creating Expressions from words, and from Expressions to words.

Translating Words and Phrases into Algebraic Expressions

Addition: (You should be looking for these words, phrases for addition)

Keywords: Sum, total, more than, added, increased, plus.

Phrases: 4 added to a number $\Rightarrow 4 + x$ or $x + 4$
 7 increased by a number $\Rightarrow 7 + x$ or $x + 7$

Subtraction: (You should be looking for these words, phrases for subtraction)

Keywords: less, Minus, decreased by, difference, less than.

Phrases: the difference of 5 and a number $\Rightarrow 5 - x$
 8 Less than a number $\Rightarrow x - 8$

(order matters in subtraction, so be sure that you have the variable and constants in the right places, otherwise it will be wrong.)

Multiplication: (You should be looking for these words, phrases, for multiplication.)

Keywords: product, times, multiplied

Phrases: the product of a number and 12 \Rightarrow $12(x)$ or $(x)12$
a number times 3 \Rightarrow $3x$ or $x3$

(order doesn't matter in Multiplication because it is commutative so it can be also written in reverse order and still be true.)

Division: (You should be looking for these words, phrases, for division)

Keywords: quotient, divided by, divided into

Phrases: the quotient of a number and 6 \Rightarrow $x \div 6$
10 divided by a number \Rightarrow $\frac{10}{x}$

(order is very important in division, it is not commutative, so be sure that you have the variables and constants in the right places, otherwise it will be wrong.)

* Now, lets practice

Translating Words to Algebraic Expressions

① y is increased by 12 \Rightarrow $y + 12$

② 8 less than the quotient of m and 15. $\frac{m}{15} - 8$

③ the product of x and 4 \Rightarrow $4x$ or $x4$

④ x decreased by 7 \Rightarrow $x - 7$

⑤ the product of 12 and n \Rightarrow $12n$ or $n12$

⑥ 3 less than the quotient of z and 24 \Rightarrow $\frac{z}{24} - 3$

7) 5 more than 3 times some number $\Rightarrow 3x + 5$

8) 18 less than 6 times some number $\Rightarrow 6x - 18$

9) James is 6 years younger than Lydia who is x years old. Write the expression that shows James's age. $\Rightarrow x - 6$

10) Sylvia is 4 years the elder of Omar, who is y years old. Write the expression that will show Sylvia's age. $\Rightarrow y + 4$

11) James is 6 years younger than Lydia who is x years old. Maria is twice James age. Write an expression to show Maria's age. $\Rightarrow 2(x - 6)$

* Now that we can take words and translate them into Algebraic expressions, lets try taking algebraic expressions and translating them back into words.

1) $m + 7 \Rightarrow$ 7 more than n or the sum of 7 and n

2) $y - 9 \Rightarrow$ 9 less than y or the difference of y and 9

3) $5n \Rightarrow$ the product of 5 and n or 5 times n

4) $x \div 3 \Rightarrow$ x divided by 3 or the quotient of x and 3

5) $27 - \frac{1}{2}(18) \Rightarrow$ the difference of 27 and one-half of 18 or 27 minus 18 divided by 2

6) $b + 12 \Rightarrow$ 12 more than b or the sum of 12 and b

7) $p - 7 \Rightarrow$ 7 less than p or the difference of p and 7

(8) $21x$ \Rightarrow the product of 21 and x 21 times x

(9) $y \div 8$ or $\frac{y}{8}$ \Rightarrow y divided by 8 the quotient of y and 8.

(10) $10 - \frac{1}{2}(x)$ = the difference of 10 and one-half of some number or x .
10 minus some number or x divided by 2.

* Now that we can go back and forth lets try a couple word problems to give you some real life examples:

(1) Jayne is saving money to buy a car. She has x dollars saved and is saving y dollars per week. Write an algebraic expression to represent the total amount of money she will have saved after 52 weeks?

x = dollar's already saved

y = dollars saved each week

52 = total weeks

amount saved after 52 weeks: \Rightarrow $x + 52y$

(2) Jayne has saved x dollars. Write an algebraic expression to represent the total amount of money she will have saved if she saves \$75 per week for y number of weeks.

x = dollar's already saved

y = number of weeks

75 = dollars saved per week

amount saved after y weeks \Rightarrow $x + 75y$

* After, touch base on Simplifying Expressions by combining like terms. (Review from yesterday)

Lesson Review: Simplifying Expression: Using Properties and Rules and Combining Like terms.

* What are like terms?

- When two or more terms that have the same variable or variables raised to the same power are considered like terms (these like terms are able to be combined to simplify the expressions.)

For example: Simplify the following expressions

① $7x + 5x \Rightarrow 12x$

② $x^5 + y^3 + 2x^5 + y^3 = 3x^5 + 2y^3$

③ $-4y - (-3y) + 5y \Rightarrow -4y + 3y + 5y = 4y$

④ $6xy - 3a + 4yx \Rightarrow 6xy - 3a + 4xy \Rightarrow$

⑤ $4y + 9y \Rightarrow 13y$
 $10xy - 3a$

⑥ $-3n - (-10n) + 8n \Rightarrow -3n + 10n + 8n = 15n$

⑦ $12xy - 4a + 2yx \Rightarrow 12xy - 4a + 2xy \Rightarrow 14xy - 4a$