

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## TRANSLATING ENGLISH TO ALGEBRA COMMON CORE ALGEBRA I



There will be many instances when we have to translate phrases from English into mathematical expressions. This is a skill that takes a lot of practice and time to get good at. In this lesson we will begin to build this fluency.

**Exercise #1:** It is important to be able to recognize addition and subtraction in phrases. First, let's begin with some numerical work and then transition to expressions that contain variables.

- (a) Write a calculation and a result that represents a number that is 5 greater than 3.
- (b) Write a calculation and a result that represents a number that is 2 less than 9.
- (c) Write a calculation and a result that represents the sum of  $-3$  and 8.
- (d) Write a calculation and a result that represents the difference of 20 and 12.
- (e) If  $x$  represents a number, write an expression that represents a number 10 greater than  $x$ .
- (f) If  $n$  represents a number, write an expression that represents a number that is 5 less than  $n$ .
- (g) If  $y$  represents a number, write an expression that represents the sum of  $y$  and a number one greater than  $y$ .
- (h) If  $n$  represents a number, write an expression that represents the difference between a number one larger than  $n$  and one smaller than  $n$ . Be careful.

We also need to be able to translate multiplication and division. Multiplication is typically easier to spot and translate. Let's get some practice.

**Exercise #2:** Translate each verbal statement into an expression and evaluate the expression if it is numerical.

- (a) Write an expression for a number that is five times greater than 2.
- (b) If  $n$  represents a number, then write an expression for a number that is twice  $n$ .
- (c) Write an expression for the quotient (or ratio) of 12 and 3.
- (d) If  $x$  represents a number, write an expression for the ratio of  $x$  to 5.



Now we want to be able to put operations together to create more complex expressions. These can be tricky. It is always important to read them carefully, think about your order of operations, and check with a real number.

**Exercise #3:** Translate each of the following statements into an algebraic expression.

- (a) If  $x$  represents a number, then write an expression for a number that is three more than twice the value of  $x$ .
- (b) If  $n$  represents a number, then write an expression for two less than one fourth of  $n$ .
- (c) If  $s$  represents Sally's age and her father is 4 years less than five times her age, then write an expression for her father's age in terms of the variable  $s$ .
- (d) If  $x$  represents a number, then write an expression for three times the sum of  $x$  and 10.
- (e) If  $n$  represents a number, then write an expression for 7 less than four times the difference of  $n$  and 5.
- (f) If  $x$  represents a number, then write an expression for the ratio of 3 less than  $x$  to 2 more than  $x$ .
- (g) If  $x$  represents a number, then write an expression for the sum of twice  $x$  with twice a number one larger than  $x$ .
- (h) If  $n$  represents a number, then write an expression for the quotient of twice  $n$  with three less than  $n$ .
- (i) If  $y$  represents a number, then write an expression for three-quarters of the difference of  $y$  and 8.
- (j) If  $x$  represents a number, then write an expression for one half the sum of  $x$  and 4.

**Exercise #4:** Neat patterns can occur repeatedly when you play around with numbers. A fairly easy one occurs when you add a number to one less and one more than the number. Do this for a few numbers,  $x$ , and record the results. Then, prove a general pattern by writing an expression for the sum of a number with a number one less and a number one more than it.

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| <b>CALCULATIONS:</b> |
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| $x$ | sum |
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| <b>ALGEBRAIC EXPRESSION:</b> |
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**TRANSLATING ENGLISH TO ALGEBRA**  
**COMMON CORE ALGEBRA I HOMEWORK**

**FLUENCY**

1. Translate each of the following statements into an algebraic expression.

- (a) If  $x$  represents a number, then write an expression for a number that is three more than the number.
- (b) If  $x$  represents a number, then write an expression for a number that is eight less than twice the value of  $x$ .
- (c) If  $x$  represents a number, then write an expression for a number that is three more than one third the value of  $x$ .
- (d) If  $n$  represents a number, then write an expression for two less than one fourth of  $n$ .
- (e) If  $g$  represents Gregs's age and his daughter is 4 years less than one half his age, then write an expression for his daughter's age in terms of the variable  $g$ .
- (f) If  $y$  represents a number, then write an expression for negative two times the sum of  $y$  and 7.
- (g) If  $n$  represents a number, then write an expression for three times the difference of the number and six increased by four times the number.
- (h) If  $k$  represents a number, then write an expression for the ratio of 3 less than  $k$  to 2 more than  $k$ .
- (i) If  $n$  represents a number, then write an expression for the difference of three times the number after it was increased by 3 and twice that number.
- (j) If  $h$  represents a number, then write an expression for the quotient of twice  $h$  and 10 more than  $h$ .
- (k) If  $x$  represents a number, then write an expression for one half the sum of  $x$  and 7.
- (l) If  $x$  represents a number, then write an expression for 7 more then one half the number.



## APPLICATIONS

2. The Miller family made mathematical statements out of their ages as follows. Tom is four less than twice Gary's age. Rebecca is the youngest and she is two less than half Gary's age after it was increased by three. Sam's age is the ratio of seven more than Gary's age to eight less than Gary's age.

(a) Translate each of the Miller family members ages into algebraic expressions in terms of Gary's age,  $g$ .

Tom's Age:

Rebecca's Age:

Sam's Age:

(b) If Gary is 11 years old how old are each of the family members?

(c) Using Gary's age come up with an expression that represents your age in terms of  $g$ . Be creative! For example, if Mr. Weiler is 43 years old, then his age would be  $4g - 1$ .

## REASONING

Our future work in this course will necessitate that we work with what are known as **consecutive integers**. Integers are the set of positive and negative whole numbers (as well as zero).

**The Integers:**  $\{\dots -4, -3, -2, -1, 0, 1, 2, 3, 4\dots\}$

**Consecutive integers** are lists of integers that increase by one unit between each.

3. Fill in the pattern with consecutive integers:

(a) 2, 3, \_\_\_\_\_, 5, \_\_\_\_\_, \_\_\_\_\_, 8

(b)  $n, n+1, \_\_\_\_\_\_, n+3, \_\_\_\_\_\_, \_\_\_\_\_\_$

4. We can also talk about **consecutive even integers** and **consecutive odd integers**. Fill in the patterns.

(a) 5, 7, 9, \_\_\_\_\_, 13, \_\_\_\_\_, \_\_\_\_\_

(b)  $-10, -8, \_\_\_\_\_\_, \_\_\_\_\_\_, -2, \_\_\_\_\_\_$

5. Regardless of whether we have consecutive even integers or consecutive odd integers, to get from one to another you add what number? If  $n$  represents the first in a list of consecutive even (or odd) integers, write out the next three terms.

What do we add?

$n, \_\_\_\_\_\_, \_\_\_\_\_\_, \_\_\_\_\_\_$

