

Name: _____

Date: _____

ALGEBRAIC PUZZLES COMMON CORE ALGEBRA I



The new Common Core Algebra I curriculum challenges us to make sense out of mathematical patterns by utilizing the tools of algebra. Today we will explore patterns and then see if we can justify them by manipulating algebraic expressions. Be mindful of your manipulations.

Exercise #1: Choose any number. Create the sum of *two more than three times the number* with *two less than two times the number*. What patterns is true of the result?

(a) Let's explore the pattern with numbers we know before working with algebraic expressions. Even using numbers, the English is a bit tricky to decipher. Let's do it together using a single number.

Let the number we choose be 3. Show the calculation as described in the problem.

(b) O.k. Now, let's set up a table using various values to see if we can find a pattern.

Number	Calculation	Results

PATTERN:

(c) Now, let's prove that the result that you see in the table will always be true. Let the number now be called x , write an expression that translates the verbal description given in the problem for our calculation.

Exercise #2 (Fluency Problem): If n represents a number, which of the following expressions represents the *sum of one more than twice the number and three less than 5 times the number*?

(1) $7n - 2$

(3) $2n + 7$

(2) $3n - 7$

(4) $5n + 4$



More interesting patterns can occur when products (multiplication) are brought in. Let's try one that involves a product.

Exercise #3: In this problem we will explore a calculation of the *difference* between *the product of a number and a number five larger than it* and *the product of the number and a number five less than it*. Will this reveal a pattern like the last one?

(a) Like before, let's explore the pattern with numbers we know before working with algebraic expressions.

Let the number we choose be 10. Show the calculation as described in the problem.

(b) O.k. Now, let's set up a table using various values to see if we can find a pattern.

Number	Calculation	Results

PATTERN:

(c) Now, let's prove that the result that you see in the table will always be true. Let the number now be called x , write an expression that translates the verbal description given in the problem for our calculation.



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ALGEBRAIC PUZZLES
COMMON CORE ALGEBRA I HOMEWORK

FLUENCY

1. Use the table below to find a pattern for the *sum of 4 times a number and twice the sum of the same number and 3*.

Number	Calculation	Results
1		
3		
5		

PATTERN:

Now, let's prove that the result that you see in the table will always be true. Let the number now be called x , write an expression that translates the verbal description given in the problem for our calculation.

2. Use the table below to find a pattern of the *difference of one more than six times a number and four more than three times the same number*.

Number	Calculation	Results
3		
5		
7		

Try to determine the pattern by allowing the number to be called x . Write an expression that translates the text in italics above and then mindfully manipulate to see the pattern. How would you describe the pattern to a younger student?



3. If t represents a number, which of the following represents the product of 2 more than 5 times a number and 4 less than 3 times a number? Be sure to test a value of t .

(1) $15t^2 + 26t - 8$

(3) $15t^2 - 8$

(2) $15t^2 - 14t - 8$

(4) $15t^2 - 26t - 8$

APPLICATIONS

4. The length of a rectangle is two less than three times a number x and the width is five more than that same number.

(a) Draw a diagram that represents the rectangle. Be sure to label the sides in terms of the unknown x .

(b) Using your diagram find what the perimeter of the rectangle is in terms of x . Write your answer as a simplified binomial.

(c) What is the area of the rectangle in terms of x ? Write your answer as a trinomial. Remember the formula for area of a rectangle is $A = l \cdot w$.

REASONING

5. When finding a pattern for the sum of two times a number n and four less than three times the same number, Cole does the following calculation and decides that the pattern is $3n$. Show why he is wrong and find the correct pattern. Be sure to explain.

Cole's work

Trial

$$n = 2$$

$$2(2) + 3(2) - 4 = 6$$

