

MORE STRUCTURE WORK COMMON CORE ALGEBRA I



The more you are able to see **structure** in the various **expressions** that you deal with, the easier it will be to manipulate complex expressions. We will work with structure throughout the course. We can now look at some larger structural issues that include equivalency.

Exercise #1: Consider the somewhat complex expression $x(x+4)+2(x+4)$.

- (a) Write an equivalent **trinomial** expression. Test the equivalency with a value of $x=1$. Show the test.
- (b) Write an equivalent expression that is in the form of a product of two binomials. Also test the equivalency with $x=1$.

Which type of equivalent expression we might need would depend on the context of what we were trying to do with the math. For now, we want to get practice with writing various expressions in an equivalent form, and being able to test that equivalency.

Exercise #2: Consider the expression $(x+4)(x-5)+(x+4)(x-2)$. Write an equivalent expression that is in the form of the product of two binomials. Test the equivalency with a value of x . Show your test.

Exercise #3: Which of the following is equivalent to the expression $(x-3)(2x+7)-(x-3)(x-4)$? Show the manipulations that lead to your choice.

- (1) $(x-3)(x+3)$ (3) $(x-6)(x+10)$
- (2) $(x-3)(x+11)$ (4) $(x-6)(x-4)$



Strangely enough, this type of manipulation, where there is a common binomial multiplying two other terms, is frequent enough that it is also a good skill to become **fluent** in. Get some additional practice in the next exercise. Be careful when subtraction is involved (see the last exercise!).

Exercise #4: Rewrite each of the following expressions as an equivalent product of two binomials.

(a) $x(x+5)+7(x+5)$

(b) $3x(x-2)-4(x-2)$

(c) $-2x(x+4)+x+4$

(d) $(x-6)(x+3)+(x+9)(x+3)$

(e) $(2x+1)(x-4)-(x+6)(x-4)$

Remember, that we want to always look for **mindful manipulations** in order to help us solve our problems. Sometimes we won't know whether those manipulations will pay dividends, but as long as we know we are making manipulations that retain **equivalency** then they are worth a try.

Exercise #5: The binomial $4n+1$ is equal to 7 for some value of n . What is the value of the expression shown below for the same value of n . Do not solve for n in this problem. Use mindful manipulations and look for structure to help solve this problem.

$$(3n+1)(4n+1)+(n+2)(4n+1)$$



Name: _____

Date: _____

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COMMON CORE ALGEBRA I HOMEWORK

FLUENCY

1. Rewrite each of the following expressions as an equivalent product of two binomials.

(a) $x(x+2)+3(x+2)$

(b) $x(x-1)-4(x-1)$

(c) $2x(x+4)+3(x+4)$

(d) $-2x(x+12)+3(x+12)$

(e) $3(x-5)+3x(x-5)$

(f) $-4x(x+3)+3x^2(x+3)$

(g) $(2x-7)(x+2)+(3x+7)(x+2)$

(h) $(2x+5)(x-4)-(x-4)(5x+2)$

2. Which of the following choices is equivalent to the expression $(x-2)(6-4x)+(5x+4)(x-2)$? Show the calculations that lead to your choice and check using a value of x .

(1) $(x-2)(x+2)$

(3) $(x-2)(x+10)$

(2) $(x-2)(9x+10)$

(4) $(x-2)(10-9x)$

3. If $x+2$ has a value of 5, then which of the following is the value of $x(x+2)+3(x+2)$? Show the work that leads to your answer.

(1) 30

(3) 15

(2) 25

(4) 10



APPLICATIONS

4. When figuring out the amount of mulch would be needed for Alex's back yard, he created an equation that approximates the number of bags, B , he'll use. If his equation is $B = 4(2x + 7) + 3(2x + 7)$ and $(2x + 7)$ is equal to 2, how many bags will he need? Show your mindful manipulations.#
5. Alex's friend Pablo comes up with an exact equation to find out how many bags he needs. Use his equation to find out how many bags will actually be needed if $B = x(2x + 7) + 3(2x + 7) + (x + 4)(2x + 7)$, where the quantity $(2x + 7)$ equals 4. Show how you arrive at your answer.

REASONING

6. In most of the previous examples there were only two terms. Extend your work with using the Distributive Law "backwards" and write the following as a product of binomials.
- (a) $x(x + 2) + 3(x + 2) + 4x(x + 2)$ (b) $2x(x - 5) + 3(x - 5) + (x - 1)(x - 5)$
7. Write $x(x - 2) + 3(2 - x)$ as a product of binomials. Hint: you may want to manipulate $(2 - x)$ first. Check to see if you have written an equivalent expression by testing $x = 5$.

