Name: _____ Date: _____

FACTORING BINOMIALS
N-GEN MATH® 7

In the last few lessons we have worked a lot with the **distributive property** to rewrite the product of a constant and an algebraic binomial. In this lesson we will look at **reversing** this process in order to **write a binomial** in its **factored form**. First let's review the distributive property.

***Exercise* #1:** Write each of the following products in simplest binomial form. Show your steps.

(a) $5(4x+3)$ (b) $7(3x+1)$ (c) $2(6x-5)$

What we want to do in this lesson is to reverse this process and write a binomial as a product. To do this we need to be able to identify **common factors** of the **constants** of the binomial.

***Exercise* #2:** Consider the binomial $6x+18$. The two constants are 6 and 18.

(a) Write both 6 and 18 as products in as many ways as possible (factor them). Circle any common factors and then list the common factors (do not include 1 as a common factor).

Factorizations of 6: Factorizations of 18: Common Factors:

(b) You should have found three common factors besides 1. Rewrite the binomial $6x+18$ as an **equivalent product** of the three and another binomial. One example is done for you below. Do the other two.

Common Factor of **2**: $6x+18=\mathbf{2}\cdot 3x+\mathbf{2}\cdot 9=\mathbf{2}(3x+9)$

Common Factor of _____: $6x+18=$ _____

Common Factor of _____: $6x+18=$ _____

(c) Which of the three **factorizations** of $6x+18$ involved the **greatest common factor**?

We can often write binomials in factored forms many different ways. We can always check to see if they are correct by using the distributive property.

***Exercise* #3:** Consider the binomial $8n+12$. One of the factorizations of the binomial below is incorrect (not equivalent). Determine which one and show how you know it is not equivalent.

I. $4(2n+3)$ II. $2(4n+6)$ III. $8(n+4)$

Sometimes we want to write a binomial as the product of the **greatest common factor** (gcf) of the binomial along with another binomial. This is known as **factoring the gcf "out"** of a binomial.

***Exercise* #4:** For each of the following binomials, identify its gcf and then write it as the product of its gcf with another binomial.

(a) $10x+15$

gcf = _____

factored form:

(b) $7y+28$

gcf = _____

factored form:

(c) $18n-30$

gcf = _____

factored form:

(d) $2W+2L$

gcf = _____

factored form:

(e) $6x-3y$

gcf = _____

factored form:

(f) $16w+40x$

gcf = _____

factored form:

(g) $24n+12$

gcf = _____

factored form:

(h) $63c+18d$

gcf = _____

factored form:

(i) $5x+5$

gcf = _____

factored form:

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FACTORING BINOMIALS
N-GEN MATH® 7 HOMEWORK

FLUENCY

1. Which of the following is *not* a common factor of the numbers 18 and 42?

   (1) 6 (3) 3

   (2) 2 (4) 7

   _____

2. Which of the following is *not* a correct factorization of the binomial $12x + 30$?

   (1) $2(6x + 15)$ (3) $12(x + 18)$

   (2) $3(4x + 10)$ (4) $6(2x + 5)$

   _____

3. If the binomial $8n + 20$ was written as an equivalent product of its greatest common factor and another binomial, which of the following would be the binomial in the product?

   (1) $2n + 5$ (3) $n + 12$

   (2) $5n + 7$ (4) $4n + 10$

   _____

4. For each of the following binomials, identify its gcf and then write it as the product of its gcf with another binomial.

   (a) $6x + 30$

   gcf = _____

   factored form:

   (b) $14n + 49$

   gcf = _____

   factored form:

   (c) $16y - 8$

   gcf = _____

   factored form:

5. Write each of the following binomials as the product of its gcf with another binomial.

(a) $8x + 24$ (b) $10w - 5$ (c) $2n + 16$

(d) $6y + 21$ (e) $44x + 55$ (f) $28e - 7$

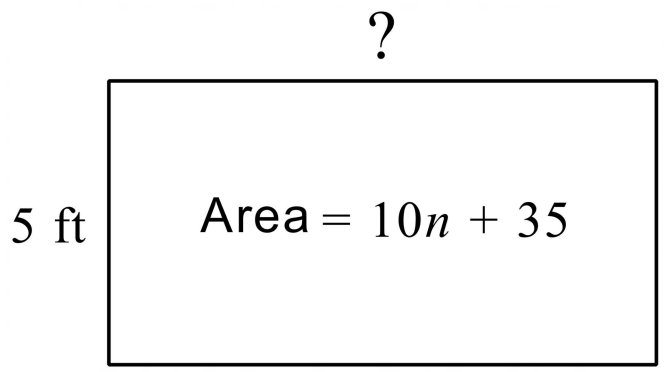
(g) $6x + 42y$ (h) $18m - 45n$ (i) $20c - 8d$

USING YOUR MATH

6. The area of a rectangle is given by the expression $10n + 35$, in square feet. Its width is 5 feet as shown. Its length is an unknown expression in terms of the variable n.

(a) Write the area of the rectangle as the product of 5 and another binomial.

(b) Explain why the binomial you wrote in (a) must be the length of the rectangle.



(c) Test to see if $10n + 35$ and your answer in (a) are equivalent by substituting $n = 2$ into both. Show your substitution and calculations.

$10n + 35$: Expression from (a):