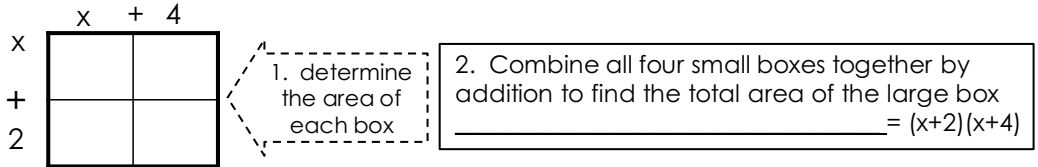


Multiplying Binomials

Steps for the box method

1. Find the area of each small box.
2. Find the area of the large box by combining the areas of all four small boxes.

A. EXAMPLE: Use the box method to find the product of $(x+4)(x+2)$ by finding the area of each individual box and then adding them together. Each binomial has two terms. The side lengths of the small boxes will be represented by the terms from each binomial.



B. As you work through the problems below, think about what is happening mathematically with the two binomials. How is the area of each small box determined? Try to recognize patterns or repeated procedures and attempt to derive a procedure to multiply the binomials that does not require the use of boxes.

Directions: Use the box method to find the product of the binomials.

<p>1. $(x+3)(x+5)$</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">x</td> <td style="text-align: center;">+</td> <td style="text-align: center;">5</td> </tr> <tr> <td style="padding-right: 10px;">x</td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td></td> </tr> <tr> <td style="padding-right: 10px;">+</td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td></td> </tr> <tr> <td style="padding-right: 10px;">3</td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td></td> </tr> </table> <p>Answer=_____</p>		x	+	5	x				+				3				<p>2. $(x+4)(x-3)$</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">x</td> <td style="text-align: center;">-</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="padding-right: 10px;">x</td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td></td> </tr> <tr> <td style="padding-right: 10px;">+</td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td></td> </tr> <tr> <td style="padding-right: 10px;">4</td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td></td> </tr> </table> <p>Answer=_____</p>		x	-	3	x				+				4			
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<p>3. $(x+1)(x-7)$</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> </tr> </table> <p>Answer=_____</p>					<p>4. $(x-2)(2x-6)$</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> </tr> </table> <p>Answer=_____</p>																												

C. Looking back at your work from part B, the box method, think about any patterns or repeated procedures that you did. For example, How did you find the area of just one box?

Describe a procedure that **does not** require the use of boxes to find the product of the two binomials below.

To multiply $(x+4)(x+6)$ _____

D. Apply the method you described in part C to find the products below. DO NOT use the box method.

a. $(x+6)(x+7)$

b. $(x+2)(x-5)$

c. $(3x+1)(x-3)$

d. $(x-2)(x-4)$

e. $(2x+5)(x-6)$

f. $(4x+8)(2x-3)$

Key

Area Model (Box Method)

I. Use the area model (box method) to find the product of the binomial below.

$$(x+2)(x+4) \quad \text{*Find the product by finding the total area of the boxes.}$$

1. Each binomial will represent the lengths of each side of the large box, so you'll have a "x+2" by "x+4" rectangle.
2. Each binomial has two terms. The side lengths of the small boxes will be represented by the terms from each binomial.
3. Find the area of each small box.
4. Find the area of the large box by combining the areas of all four small boxes.

	x	$+ 4$	
x	x^2	$4x$	$(x+2)(x+4) = \underline{\hspace{2cm} x^2 + 6x + 8 \hspace{2cm}}$
$+$	$2x$	8	
2			

II. As you work through the problems below, think about what is happening mathematically with the two binomials. Try to recognize patterns or repeated procedures and attempt to derive a procedure that does not require the use of boxes.

Use the area model (box method) to find the product of the binomials.

1. $(x+3)(x+5)$

	x	$+ 5$	
x	x^2	$5x$	
$+$	$6x$	15	
3			

Answer = $\underline{x^2 + 11x + 15}$

2. $(x+4)(x-3)$

	x	$- 3$	
x	x^2	$-3x$	
$+$	$4x$	-12	
4			

Answer = $\underline{x^2 + x - 12}$

3. $(x+1)(x-7)$

	x	$- 7$	
x	x^2	$-7x$	
$+$	x	-7	
1			

Answer = $\underline{x^2 - 6x - 7}$

4. $(x-2)(2x-6)$

	$2x$	$- 6$	
x	$2x^2$	$-6x$	
-2	$-4x$	12	

Answer = $\underline{2x^2 - 10x + 12}$

III. Looking back at your work/steps from part II using the box method, think about any patterns or repeated procedures that you did.

Describe a procedure that does not require the use of boxes to find the product of the binomial below.

$$(x+4)(x+6)$$

Answers will vary. Students should write something similar to the FOIL method. For example, distribute (multiply) the x in the first binomial to the terms in the other binomial. Then distribute (multiply) the 4 from the first binomial to the terms in the other binomial.

IV. Apply the method you described in part III to find the products below.

a. $(x+6)(x+7)$

b. $(x+2)(x-5)$

c. $(3x+1)(x-3)$

$$x^2 + 13x + 42$$

$$x^2 - 3x - 10$$

$$3x^2 - 8x - 9$$