Grade Level/Course: Grade 6
Lesson/Unit Plan Name: An Introduction to the Distributive Property
Rationale/Lesson Abstract: This lesson will use a variety of methods to introduce the distributive property.
Timeframe: 1 class period
Common Core Standard(s): 6.EE.3 **Apply the properties of operations to generate equivalent expressions.** ***For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x;*** *apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*

Instructional Resources/Materials: Pencil, paper, a copy of the warm-up for each student.

Activity/Lesson:

Example 1 (I do): Simplify the expression four ways: $3(2+4)$

"3 times the quantity 2 + 4"

Algebra Tiles

$3(2+4)$

"3 groups of $(2+4)$"

1st: 1 1 1 1 1 1
2nd: 1 1 1 1 1 1
3rd: 1 1 1 1 1 1

"Here's the first group of 2 + 4. Here's the second group. How many groups do we want?"

$= 3(2)+3(4)$ or $= 3(6)$
$= 6+12$ $= 18$
$= 18$

Note: Students don't have to separate the $(2+4)$ in their drawings. They can to draw 3 rows of 6 if they'd like.

Meaning of Multiplication

$3(2+4)$

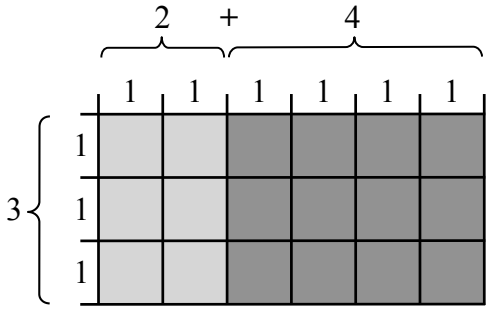
"3 groups of $(2+4)$"

$= (2+4)+(2+4)+(2+4)$
$= 6+6+6$
$= 18$

"Let's write the first group of 2 + 4. Add a second group of 2 + 4. How many groups do we want?"

Area Model

$3(2+4)$



$= 3(2)+3(4)$ or $= 3(6)$
$= 6+12$ $= 18$
$= 18$

"Notice the similarities between the area model and the algebra tiles."

Note: Teachers may want to draw a separate area model to represent $3(6)$.

Distributive Property

$3(2+4)$

$3(2+4)$
$= 3(2)+3(4)$
$= 6+12$
$= 18$

"Gave a 3 to both the 2 and the 4. We distributed the 3."

"To distribute means to give something to everyone in a group. In mathematics, the meaning of distribute is similar."

Distributive Property: The product of a number and the sum or difference of two numbers is equal to the sum or difference of the two products.

For all numbers $a, b,$ and c

$a(b+c) = ab + ac$

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

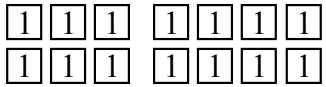
You Try 1: Find the product of $2(7)$ four different ways. Decompose the 7 first! (Allow students to decompose 7 however they want.)

$$2(7)$$
$$= 2(3+4)$$

Algebra Tiles

$2(3+4)$

"2 groups of $(3+4)$"



$= 2(3) + 2(4)$
$= 6 + 8$
$= 14$

or

$= 2(7)$
$= 14$

Meaning of Multiplication

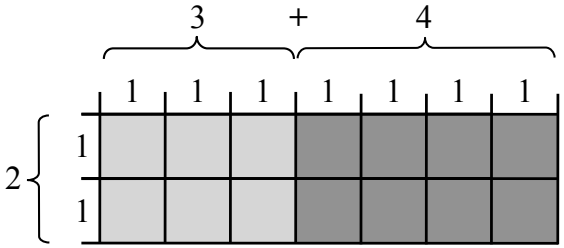
$2(3+4)$

"2 groups of $(3+4)$"

$= (3+4) + (3+4)$
$= 7 + 7$
$= 14$

Area Model

$2(3+4)$



$= 2(3) + 2(4)$
$= 6 + 8$
$= 14$

or

$= 2(7)$
$= 14$

Distributive Property

$2(3+4)$

$2(3+4)$
$= 2(3) + 2(4)$
$= 6 + 8$
$= 14$

Note: Have students who decomposed the 7 differently share their work with the class.

Example 2 (I do): Find the product of $5(27)$ three different ways.

$$5(27)$$
$$= 5(20+7)$$

Generic Area Model

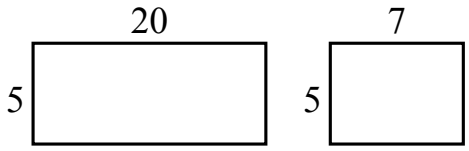
$5(20+7)$

Note: When the numbers are larger, it may be more efficient to show students a generic area model.

	20	7
5	$5(20)$ $= 100$	$5(7)$ $= 35$

$$= 100 + 35$$
$$= 135$$

Note: Students may want to separate the rectangles.



$$= 5(20) + 5(7)$$
$$= 100 + 35$$
$$= 135$$

Meaning of Multiplication

$5(20+7)$

"5 groups of $(20+7)$"

$$= (20+7)+(20+7)+(20+7)+(20+7)+(20+7)$$
$$= 20+20+20+20+20+7+7+7+7+7$$
$$= 5(20)+5(7)$$
$$= 100+35$$
$$= 135$$

Point out to students the connection between multiplication and repeated addition.

"5 groups of 20 plus 5 groups of 7"

Distributive Property

$5(20+7)$

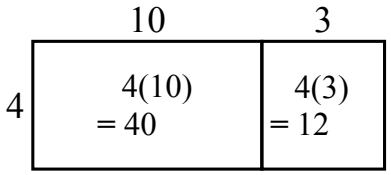
$$5(20+7)$$
$$= 5(20)+5(7)$$
$$= 100+35$$
$$= 135$$

You Try 2: Find the product of $4(13)$ three different ways.

$$4(13)$$
$$= 4(10+3)$$

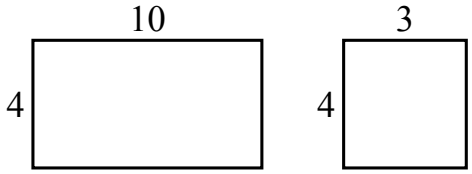
Generic Area Model

$4(10+3)$



$= 40+12$
$= 52$

———————— or ————————

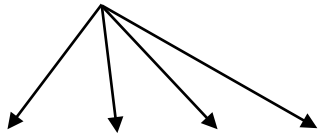


$= 4(10)+4(3)$
$= 40+12$
$= 52$

Meaning of Multiplication

$4(10+3)$

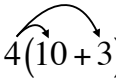
"4 groups of $(10+3)$"



$= (10+3)+(10+3)+(10+3)+(10+3)$
$= 10+10+10+10+3+3+3+3$
$= 4(10)+4(3)$
$= 40+12$
$= 52$

Distributive Property

$4(10+3)$



$4(10+3)$
$= 4(10)+4(3)$
$= 40+12$
$= 52$

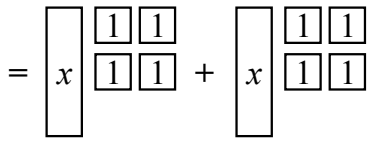
Note: Have students who decomposed the 13 differently share their work with the class.

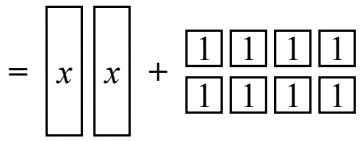
Example 3 (I do): Write an equivalent variable expression for $2(x+4)$.

Algebra Tiles

$2(x+4)$

"2 groups of $(x+4)$"





$= 2x+8$

Meaning of Multiplication

$2(x+4)$

"2 groups of $(x+4)$"

$= (x+4)+(x+4)$

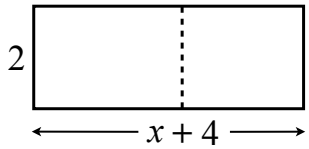
$= x+x+4+4$

$= 2(x)+2(4)$

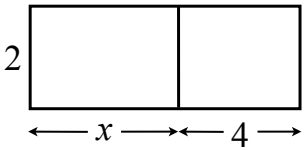
$= 2x+8$

Generic Area Model

$2(x+4)$



Area = $2(x+4)$



Area = $2(x)+2(4)$

$= 2x+8$

"$2(x+4)$ and $2(x)+2(4)$ represent the same area, so the expressions are equal."

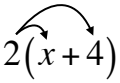
	x	4
2	$2(x)$ $=2x$	$2(4)$ $=8$

$= 2(x)+2(4)$

$= 2x+8$

Distributive Property

$2(x+4)$



$= 2(x)+2(4)$

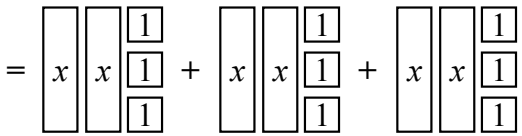
$= 2x+8$

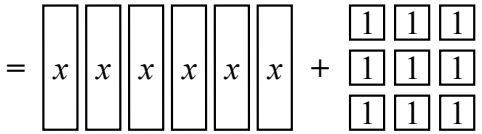
You Try 3: Write an equivalent variable expression for $3(2x+3)$.

Algebra Tiles

$3(2x+3)$

"3 groups of $(2x+3)$"



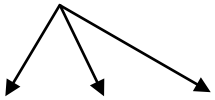


$= 6x + 9$

Meaning of Multiplication

$3(2x+3)$

"3 groups of $(2x+3)$"



$= (2x+3)+(2x+3)+(2x+3)$

$= 2x+2x+2x+3+3+3$

$= 3(2x)+3(3)$

$= 6x+9$

Generic Area Model

$3(2x+3)$

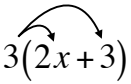
	$2x$	3
3	$3(2x)$ $= 6x$	$3(3)$ $= 9$

$= 3(2x)+3(3)$

$= 6x+9$

Distributive Property

$3(2x+3)$



$= 3(2x)+3(3)$

$= 6x+9$

Warm-Up: For answers A – H, bubble in "Yes" or "No" to indicate if the following are equivalent to $4(30+5)$.

A) $4(35)$ ◯ Yes ◯ No

B) $4(30)+5$ ◯ Yes ◯ No

C) $30+30+30+30+5+5+5+5$ ◯ Yes ◯ No

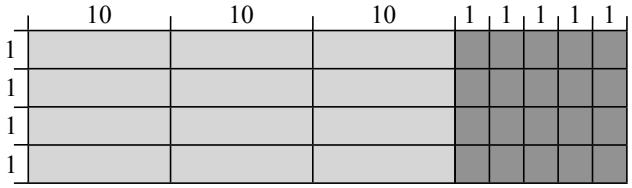
D) $(30+5)(30+5)(30+5)(30+5)$ ◯ Yes ◯ No

E) $4(30)+4(5)$ ◯ Yes ◯ No

F) $120+20$ ◯ Yes ◯ No

G) 435 ◯ Yes ◯ No

H)



◯ Yes ◯ No

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B) $4(30)+5$ ◯ Yes ◯ No

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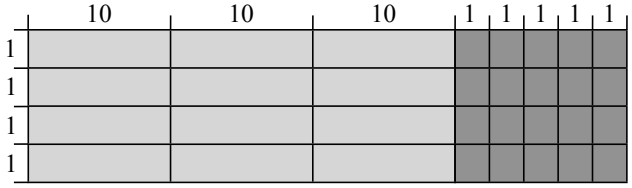
E) $4(30)+4(5)$ ◯ Yes ◯ No

F) $120+20$ ◯ Yes ◯ No

G) 435 ◯ Yes ◯ No

H)



◯ Yes ◯ No

Warm-Up Key: For answers A – H, bubble in "Yes" or "No" to indicate if the following are equivalent to $4(30+5)$.

A) $4(35)$ ● Yes ○ No

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C) $30+30+30+30+5+5+5+5$ ● Yes ○ No

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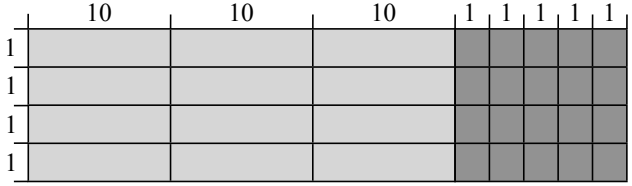
E) $4(30)+4(5)$ ● Yes ○ No

F) $120+20$ ● Yes ○ No

G) 435 ○ Yes ● No

H)



● Yes ○ No