$2x - 9$

What does $2x$ mean?

$2$ times $x$

What is $-9$?

Can you simplify the expression?
$3x - 9y + 4z$
Important words to know:

**Algebra:** The branch of mathematics that involves expressions with variables.

**Variables:** a letter that represents a number

**Coefficient:** number that multiplies the variable

**Constant:** remains the same (not linked to a variable)

**Expression:** No = sign, you can evaluate expressions

**Term:** parts of expressions separated by a + or -

**Simplify:**
Use the Distributive Property

Words: The Distributive Property states that to multiply a sum or difference by a number, multiply each term inside the parentheses by the number outside the parentheses.

Symbols:
- \( ab + c = ab + ac \)
- \( ab - c = ab - ac \)

Examples:
- \( 4(6 + 2) = 4 \cdot 6 + 4 \cdot 2 \)
- \( 3(7 - 5) = 3 \cdot 7 - 3 \cdot 5 \)

\[ 2(x + 2) = 2(x) + 2(2) \] Distributive Property
\[ = 2x + 4 \] Multiply.

The expressions \( 2(x + 2) \) and \( 2x + 4 \) are equivalent expressions. No matter what \( x \) is, these expressions have the same value.

Use the Distributive Property to rewrite each expression.

2. \( 4(x + 7) \) → \( 4x + 28 \)

3. \( 6(x - 5) \) → \( 6x - 30 \)

4. \( -2(x - 8) \) → \( -2x + 16 \)

5. \( \frac{1}{3}(x - 6) \)

6. \( \frac{1}{3}(x - 6) \)

You Try:

Identify Structure: Use the Distributive Property to rewrite each expression. (Examples 2–6)

7. \( 3(-4x + 8) = \) \( -12x + 24 \)

8. \( 4(x - 6y) = \) \( 4x - 24y \)

9. \( 6(5 - q) = \) \( 30 - 6q \)

10. \( \frac{1}{2}(c - 8) = \) \( \frac{1}{2}c - 4 \)

11. \( -3(5 - b) = \) \( -15 + 3b \)

12. \( (d + 2)(-7) = \) \( -7d - 14 \)
AIM simplify expressions using the distributive property.

7. \((2 + g)g\)  
8. \(4(h - 5g)\)

9. \(-7(5 - n)\)  
10. \(8(2m + 1)\)

13. DINING OUT The table shows the different prices at a diner.

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandwich</td>
<td>$5</td>
</tr>
<tr>
<td>Drink</td>
<td>$2</td>
</tr>
<tr>
<td>Dessert</td>
<td>$3</td>
</tr>
</tbody>
</table>

a. Write two equivalent expressions for the total cost if two customers order each of the items.

b. What is the total cost for both customers?

13. \(-7(8n - m)\)  
14. \((6 + d)(-6)\)

15. \((4c + 2d)(-2)\)  
16. \(-2(3f - 5g)\)

17. TRAIN RIDE Mr. and Mrs. Caputo are taking their family into the city on the train. The cost per person is $5.80. If there are 4 members in their family, how much does the train trip cost? Justify your answer by using the Distributive Property.
Simplify the following expressions using the distributive property.

1) $3(x - 4)$  
2) $\frac{1}{2}(2x - 8)$  
3) $-7(y - 2x)$  
4) $\frac{1}{3}(9 - 3x)$  
5) $0.2(3x + 1)$

6) Analyze the Results:
Tell whether the pairs of expression are equivalent. If they are not equivalent explain where the mistake was made.

a) $3(a + 1)$ and $3a + 3$  
b) $4(b + 1)$ and $4b + 1$  

c) $-3(2c - 4)$ and $-6c - 12$  
d) $-5(2 - d)$ and $5d - 10$

7) A friend decides that $\frac{2}{3}(3x + 9) = 2x + 6$. Is your friend right? How can you check?