Problem Set #1.4 – Commutative, Associative, and Distributive Properties

Name: _____ Class: _____

1. Insert parentheses to make each statement true.

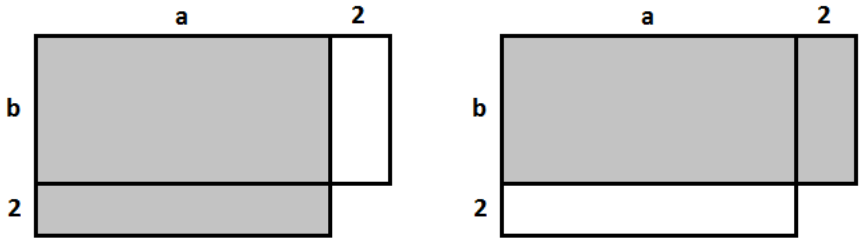
   a. $2+3\bullet 4^2+1=81$

   b. $2+3\bullet 4^2+1=85$

   c. $2+3\bullet 4^2+1=51$

   d. $2+3\bullet 4^2+1=53$

2. Given that $a>b$, which of the shaded regions is larger? Explain your reasoning.



3. Consider the expressions 851 x 29 and 849 x 31. Which would result in a larger product? Use a diagram to demonstrate your result.

4. Use the area models to represent and find the products of the following expressions.

   a. $(4+x)(x+7)$

   b. $7(x-3)$

   c. $-2(x+4)$

   d. $(2x+4)(x+9)$

e. $a(a - x - 1)$

f. $3m(m + 2)$

g. $(a - 4)(a - 4)$

h. $(3 - h + a)(a - 12)$

5. The following portion of a flow diagram shows that the expression $\boldsymbol{ab + cd}$ is equivalent to the expression $\boldsymbol{dc + ba}$**.** Fill in each circle with the appropriate symbol: Either C_+ (for the "Commutative Property of Addition") or $C_\times$ (for the "Commutative Property of Multiplication").

6. Fill in the blanks of this proof showing that $(w + 5)(w + 2)$ is equivalent to $w^2 + 7x + 10$. Write either "Commutative Property," "Associative Property," or "Distributive Property" in each blank.

$(w + 5)(w + 2) = (w + 5)w + (w + 5) \cdot 2$ _____

$= w(w + 5) + (w + 5) \cdot 2$ _____

$= w(w + 5) + 2 \cdot (w + 5)$ _____

$= w^2 + w \cdot 5 + 2(w + 5)$ _____

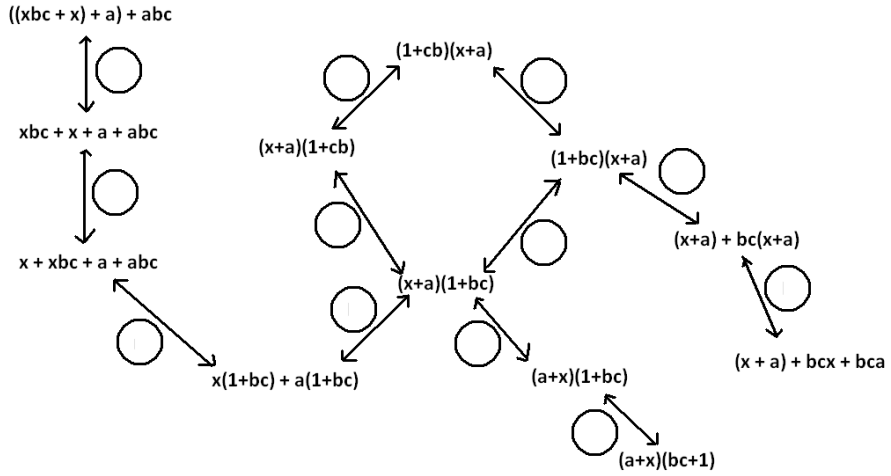
$= w^2 + 5w + 2(w + 5)$ _____

$= w^2 + 5w + 2w + 10$ _____

$= w^2 + (5w + 2w) + 10$ _____

$= w^2 + 7w + 10$

7. Fill in each circle of the following flow diagram with one of the letters: C for Commutative Property (for either addition or multiplication), A for Associative Property (for either addition or multiplication), or D for Distributive Property.



8. What is a quick way to see that the value of the sum 53 + 18 + 47 + 82 is 200? Did you use the associative and commutative properties of addition to answer the question?

9. If $ab = 37$ and $xy = \frac{1}{37}$,

   a. what is the value of the product $x \cdot b \cdot y \cdot a$?

   b. Give some indication as to how you used the commutative and associative properties to evaluate $x \cdot b \cdot y \cdot a$.

10. The following is a proof of the algebraic equivalency of $(2x)^3$ and $8x^3$. Fill in each of the blanks with either the statement "Commutative Property" or "Associative Property."

$$
\begin{aligned}
(2x)^3 &= 2x \cdot 2x \cdot 2x \\
&= 2(x \cdot 2)(x \cdot 2)x && \text{\_\_\_\_\_} \\
&= 2(2x)(2x)x && \text{\_\_\_\_\_} \\
&= 2 \cdot 2(x \cdot 2)x \cdot x && \text{\_\_\_\_\_} \\
&= 2 \cdot 2(2x)x \cdot x && \text{\_\_\_\_\_} \\
&= (2 \cdot 2 \cdot 2)(x \cdot x \cdot x) && \text{\_\_\_\_\_} \\
&= 8x^3
\end{aligned}
$$