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Problem Solving with Properties of Multiplication

I. Review of Properties

Identity: $7 \times 1 = 7$

Commutative: $9265 \times 129 = 129 \times 9265$

Associative: $(3 \times 4) \times 5 = 3 \times (4 \times 5)$

Distributive: $5 \times (6+2) = (5 \times 6) + (5 \times 2)$

II. Problems

1. Compute $456 + 456 + 456 + 456 + 456 + 456 + 456 + 456 + 456 + 456$.

2. Compute $(17 \times 13) + (51 \times 13) + (32 \times 13)$.

3. Compute $9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 \times 0$.

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4. Compute (475 × 100) + (25 × 100).

5. Compute (1990 × 1991) - (1989 × 1990).

6. Compute 27 × 399. (Hint: can you rewrite 399 as the difference of two numbers?)

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7. Compute 999×345.

8. Joe, Sally, and George have 4, 2, and 11 apples, respectively. There is a magic apple multiplier machine that takes in a group of apples and doubles the quantity. All 3 friends want to increase their total number of apples. Joe proposes that each one of them take turns in putting their share of apples in the machine. (So Joe puts his 4 apples in, gets 8 back, then Sally puts her 2 in, gets 4 back, etc.). However, Sally says that it's quicker to have all of them combine their apples in the beginning and input the combined group of apples in the machine.

    a. How many apples will each method output?

    b. Will Joe and Sally's methods return the same total number of apples among all 3 of them?

    c. Which property does this demonstrate?