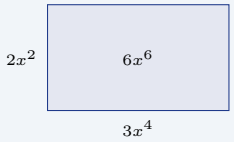
Multiplying Monomials

Name: _____	Date: _____	Score: _____ / 18

Quick Review and Helpful Hints

A **monomial** is a single term such as $5x^3$. To multiply monomials, do two simple things: **multiply the coefficients** (the numbers in front), and for matching bases **add the exponents** ($x^a \cdot x^b = x^{a+b}$). Handle each different letter on its own, and watch the signs.

Example: Multiply $(2x^2)(3x^4)$. **Work:** Multiply the coefficients: $2 \times 3 = 6$. The bases are the same, so *add* the exponents: $2 + 4 = 6$. Together that gives $6x^6$. **Answer:** $6x^6$



Area model: $2x^2 \times 3x^4 = 6x^6$.

Practice Problems

Multiply and simplify each expression.

1. Multiply: $(3x^2)(4x^3)$. _____
2. Multiply: $(5a)(2a^4)$. _____
3. Multiply: $(2x^3)(6x)$. _____
4. Multiply: $(-3y^2)(4y^5)$. _____
5. Multiply: $(7m^4)(m^2)$. _____
6. Multiply: $(4x^2)(5x^2)$. _____
7. Multiply: $(2a^3)(3a^3)(a)$. _____
8. Multiply: $(-2x)(-5x^4)$. _____
9. Multiply: $(6p^2)(2p^5)$. _____
10. Multiply: $(3x^2y)(4xy^3)$. _____
11. Multiply: $(5a^2b)(2ab^2)$. _____
12. Multiply: $(-4m^3)(3m)$. _____
13. Multiply: $(x^4)(x^5)(x)$. _____
14. Multiply: $(8t^2)(2t^6)$. _____

Word Problems

15. A rectangle is $4x^2$ units long and $3x^3$ units wide. Write a simplified expression for its area. _____
16. A square has a side length of $5x^2$ units. Write a simplified expression for its area. _____
17. A bookshelf holds $2x^3$ books per shelf, and there are $4x$ shelves. Write a simplified expression for the total number of books. _____
18. A rectangle is $6a^3$ cm long and $2a$ cm wide. Write a simplified expression for its area. _____

Answer Keys

1. $12x^5$	**7.** $6a^7$	**13.** x^{10}
2. $10a^5$	**8.** $10x^5$	**14.** $16t^8$
3. $12x^4$	**9.** $12p^7$	**15.** $12x^5$
4. $-12y^7$	**10.** $12x^3y^4$	**16.** $25x^4$
5. $7m^6$	**11.** $10a^3b^3$	**17.** $8x^4$
6. $20x^4$	**12.** $-12m^4$	**18.** $12a^4$

Step-by-Step Explanations

1. Multiply the number parts and the variable parts separately: $3 \times 4 = 12$, and for the matching base x add the exponents $(2 + 3 = 5)$. That gives $12x^5$.
2. Multiply coefficients $(5 \times 2 = 10)$ and add exponents $(1 + 4 = 5)$: $10a^5$.
3. $2 \times 6 = 12$ and $3 + 1 = 4$, so $12x^4$.
4. Watch the sign: $-3 \times 4 = -12$, and $2 + 5 = 7$, giving $-12y^7$.
5. The second factor has an unwritten coefficient of 1: $7 \times 1 = 7$ and $4 + 2 = 6$, so $7m^6$.
6. $4 \times 5 = 20$ and $2 + 2 = 4$, so $20x^4$.
7. Multiply all the coefficients $(2 \times 3 \times 1 = 6)$ and add all the exponents $(3 + 3 + 1 = 7)$: $6a^7$.
8. Two negatives make a positive: $-2 \times -5 = 10$, and $1 + 4 = 5$, giving $10x^5$.
9. $6 \times 2 = 12$ and $2 + 5 = 7$, so $12p^7$.
10. Group by base: $3 \times 4 = 12$, $x^{2+1} = x^3$, and $y^{1+3} = y^4$, so $12x^3y^4$.
11. $5 \times 2 = 10$, $a^{2+1} = a^3$, and $b^{1+2} = b^3$, giving $10a^3b^3$.
12. $-4 \times 3 = -12$ and $3 + 1 = 4$, so $-12m^4$.
13. Add every exponent: $4 + 5 + 1 = 10$, so x^{10}.
14. $8 \times 2 = 16$ and $2 + 6 = 8$, so $16t^8$.
15. Area is length times width: $(4x^2)(3x^3) = 12x^5$ square units.
16. A square's area is its side squared: $(5x^2)(5x^2) = 25x^4$.
17. Books per shelf times the number of shelves: $(2x^3)(4x) = 8x^4$.
18. Area is length times width: $(6a^3)(2a) = 12a^4$ square cm.

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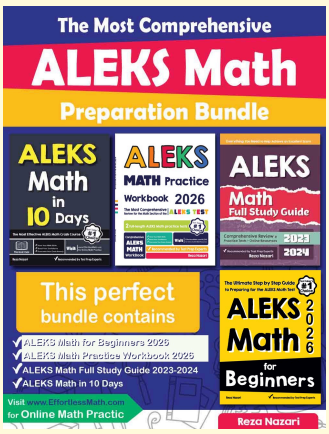

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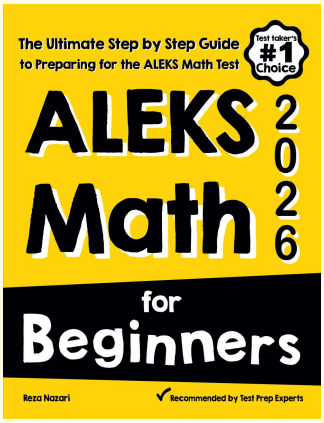

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