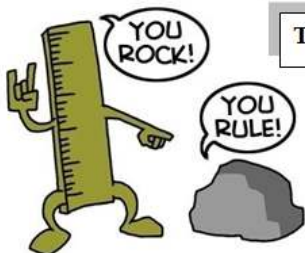


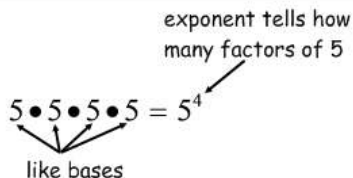
$$y + y + y + y = 4y$$

$$y \cdot y \cdot y \cdot y = y^4$$

III. Multiplying with exponents



The Rule: When multiplying, you **add** the exponents for like bases.



Add

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Model Problems:

1) $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 =$ 4⁶ or 2¹²

(Handwritten: 2, 2, 2, 2, 2, 2)

2) $3 \cdot 3 \cdot 3 \cdot 3 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 =$ 3⁴ · 6⁵ or 2⁵ · 3⁹

(Handwritten: 2, 3, 2, 3, 2, 3, 2, 3, 2, 3)

3) $12 \cdot 12 \cdot 12 \cdot 12 \cdot 5 \cdot 5 =$ 5² · 12⁴

4) $7 \cdot 3 \cdot 3 \cdot 3 \cdot 7 \cdot 7 \cdot 7 \cdot 8 \cdot 8 =$ 3³ · 7⁴ · 8²

5) $4 \cdot 3 \cdot 2 \cdot 2 \cdot 4 \cdot 3 \cdot 4 \cdot 3 \cdot 2 =$ 2³ · 3³ · 4³

(Handwritten: 2, 2, 2, 2, 2)

2⁹ · 3³

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6) $x \cdot x \cdot x \cdot x \cdot x = x^5$

7) $9^2 \cdot 3^3 = 3^7$

8) $5 \cdot 25 \cdot 5^2 \cdot 5^2 = 5^7$


9) $6^4 \cdot 6^2 \cdot 6 = 6^8$

10) $x^1 \cdot x^2 \cdot x^1 = x^4$

11) $a^3 \cdot a^1 \cdot a^2 \cdot a^1 = a^7$

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Multiplying Monomials



The Rule: When multiplying, you **add** the exponents for like bases.

Process

- (1) Use the commutative and associative properties to rearrange and group the factors. (This can be done mentally)
- (2) Multiply the numerical coefficients
- (3) When variable factors are powers with the same base, multiply them by adding exponents
- (4) Multiply the products obtained in steps 2 and 3

Examples:

1. $5x^2(4xy) =$

$5 \cdot x \cdot x \cdot 4 \cdot x \cdot y = 20x^3y$

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2. $(12m^3n^5)(-2n^6m)(3) =$
 $12 \cdot m \cdot m \cdot m \cdot n \cdot n \cdot n \cdot n \cdot n \cdot 2 \cdot n \cdot n \cdot n \cdot n \cdot n \cdot m \cdot 3 = -72m^4n^{11}$

3. $(7a)(3ab^2)(2b^4c) = 42a^2b^6c$

4. $(x^3y)(x^3y) = x^6y^2$

5. $(-3m^4n)(4x)(5yx) = -60m^4nx^2y$

6. $(\frac{1}{2}x^5y^3)(8xy^3)(-2xyz) = -8x^5y^7z$



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Whiteboard Practice:

$a^4 \cdot a \cdot a^2 = a^7$

$5^1 \cdot 5^2 \cdot 25^2 = 5^5$

$4^3 \cdot 2^2 \cdot 2 = 4^3 \cdot 2^3$
 $4 \cdot 4 \cdot 4$
 $2^2 \cdot 2^1 \cdot 2^1$ (2^3)

$5x^2 \cdot 10x^4 = 50x^6$

$(12x^2y)(2xy) = 24x^3y^2$


$(5a^4b^2)(6ab^5) = 30a^5b^7$

$x^a \cdot x^{2a} = x^{3a}$

$x^2 \cdot x^3 = x^5$

$x^3 \cdot x^8 = x^{11}$

$x^{2a} \cdot x^{9c} = x^{11a}$



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