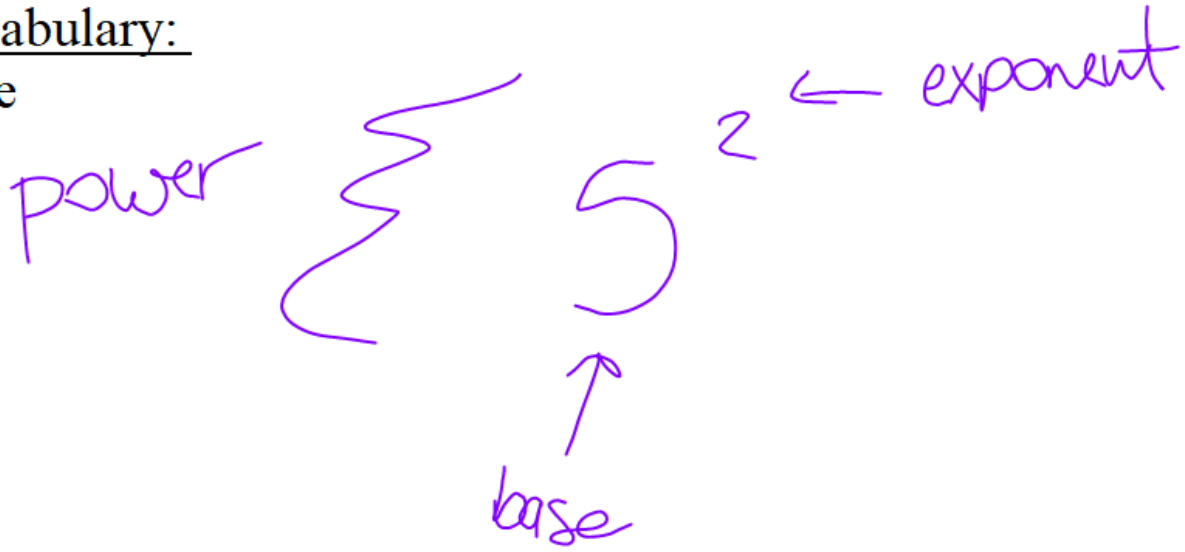
8.3 - Multiplication Properties of Exponents

Vocabulary:

Base



1 EXAMPLE Rewrite each expression using each base only once.

a. $7^3 \cdot 7^2$ $\quad +$

7^5

$7 \cdot 7 \cdot 7 \cdot 7 \cdot 7$

b. $4^4 \cdot 4^1 \cdot 4^{-2}$

4^3

c. $6^8 \cdot 6^{-8}$ $\quad +$

$6^0 = 1$

2 EXAMPLE Simplify each expression.

a. $p^2 \cdot p^1 \cdot p^5$

p^8

b. $2q^1 \cdot 3p^3 \cdot 4q^4$

q^{1+4}

$q^1 \cdot q^4$

$2 \cdot 3 \cdot 4 = 24 p^3 q^5$

7. $c^{-2} + c^{7}$

c^{5}

11. $3x^{2} \cdot x^{2}$

$3x^{4}$

3 EXAMPLE Simplify $(3 \times 10^{-3})(7 \times 10^{-5})$. Write the answer in scientific notation.

$3 \cdot 7 \qquad 10^{-3} \cdot 10^{-5}$

$21 \times 10^{-8+1}$

2.1×10^{-7}

$(5 \times 10^{7})(3 \times 10^{14})$

$15 \times 10^{21+1}$

1.5×10^{22}

OBJECTIVE 2

4 EXAMPLE The speed of light is 3×10^8 m/s. If there are 1×10^{-3} km in 1 m, and 3.6×10^3 s in 1 h, find the speed of light in km/h.

$$\text{Speed of light} = \frac{\text{meters}}{\text{seconds}} \cdot \frac{\text{kilometers}}{\text{meters}} \cdot \frac{\text{seconds}}{\text{hour}}$$

$$(3 \times 10^8)(1 \times 10^{-3})(3.6 \times 10^3)$$

$$10.8 \times 10^{8+1}$$

$$1.08 \times 10^9 \text{ km/h}$$

Lucy can run at a speed of 6 mi/hr. Find her speed in feet per second.

$$\frac{6\text{ miles}}{1\text{ hour}} \cdot \frac{5280\text{ ft.}}{1\text{ mile}} \cdot \frac{1\text{ hr.}}{3600\text{ sec.}} = \frac{31,680\text{ feet}}{3600\text{ sec.}} \div 3600 = \frac{8.8\text{ ft.}}{1\text{ sec.}}$$

Homework: pg. 443 # 2, 5, 8, 16, 17, 22, 26, 28, 34, 36, 44, 86

2) $5^{-13} \cdot 5^{5} \cdot 2^{5}$

$\frac{5^{-8} \cdot 2^{5}}{}$ $\frac{2^{5}}{5^{8}}$

5) 6^{9}

8) $3r^{5}$

16) $x^{-1}y^{3}$ $= \frac{y^{3}}{x^{1}}$

17) $45x^{7}y^{6}$

22) 6×10^{5}

26) 5.6×10^{-7}

28) ~~25.578×10^{12}~~ +1

2.5578×10^{13}

34) 11

36) 5

44) you need to add the powers, not multiply

86) 3.5×10^{-3}