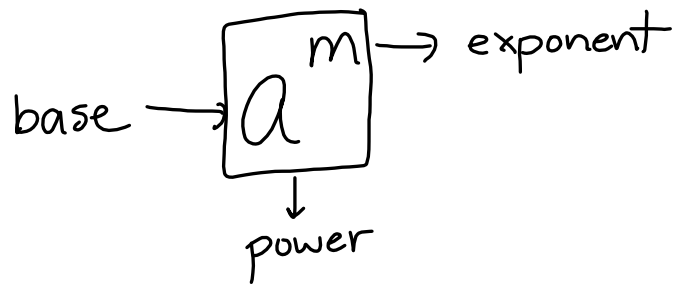


Sec. 7.2 Multiplying Powers With the Same Base



Product of Powers

$$a^m \cdot a^n = a^{\underline{m+n}} \text{ add the exponents}$$

$$\begin{aligned} x^4 \cdot x^3 &= (x \cdot x \cdot x \cdot x)(x \cdot x \cdot x) \\ &= x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \end{aligned}$$

$$x^{4+3} = x^7$$

Problem 1: Write as a single power

$$a. \quad 9^5 \cdot 9^3 = 9^{5+3} = 9^8$$

$$b. \quad (-3)^{-2} \cdot (-3)^{10} = (-3)^{-2+10} = (-3)^8$$

Problem 2: Simplify.

$$\begin{aligned} \text{a. } 6b^3 \cdot 3b^{-8} \\ 6 \cdot 3 \cdot b^3 \cdot b^{-8} \\ 18 b^{3+(-8)} \\ 18b^{-5} \\ \frac{18}{b^5} \end{aligned}$$

$$\begin{aligned} \text{b. } 4c \cdot 3d^5 \cdot 2c^3 \\ 4 \cdot 3 \cdot 2 c \cdot c^3 d^5 \\ 24 c^{1+3} d^5 \\ 24c^4 d^5 \end{aligned}$$

$$\begin{aligned} \text{c. } 4z^5 \cdot 9z^{-12} \\ 4 \cdot 9 z^5 \cdot z^{-12} \\ 36 z^{-7} \\ \frac{36}{z^7} \end{aligned}$$

$$\begin{aligned} \text{d. } j^2 \cdot k^{-2} \cdot 12j \\ 12 j^2 j^1 k^{-2} \\ \frac{12j^3}{k^2} \end{aligned}$$

Problem 3:

The speed of light is about 3×10^8 meters per second. How far would a beam of light travel in 8.64×10^4 seconds (1 day)

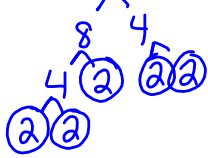
$$\begin{aligned} (3 \times 10^8)(8.64 \times 10^4) \\ 3 \cdot 8.64 \times 10^8 \cdot 10^4 \\ 25.92 \times 10^{12} \\ 2.592 \times 10^1 \times 10^{12} \\ 2.592 \times 10^{13} \end{aligned}$$

$$\begin{aligned} \text{b. } (0.5 \times 10^{-6})(0.3 \times 10^{-2}) \\ 0.5 \cdot 0.3 \times 10^{-6} \cdot 10^{-2} \\ 0.15 \times 10^{-8-1} \\ 1.5 \times 10^{-1} \times 10^{-8} \\ 1.5 \times 10^{-9} \end{aligned}$$

$$\begin{aligned} \text{c. } (9 \times 10^7)(3 \times 10^{-16}) \\ 9 \cdot 3 \times 10^7 \cdot 10^{-16} \\ 27 \times 10^{-9+1} \rightarrow 2.7 \times 10^1 \times 10^{-9} \\ 2.7 \times 10^{-8} \quad | \leq x < 10 \end{aligned}$$

Problem 4: Simplify

$$a. 32^{\frac{1}{5}} = (2 \cdot 2 \cdot 2 \cdot 2 \cdot 2)^{\frac{1}{5}} = 2$$



$$(2^5)^{\frac{1}{5}} = 2^{5 \cdot \frac{1}{5}} = 2^1 = 2$$

$$b. 27^{\frac{1}{3}} = (3 \cdot 3 \cdot 3)^{\frac{1}{3}} = 3$$

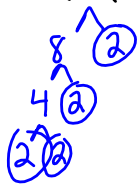


Problem 5: Simplify

$$a. 4^{\frac{3}{2}} = (2 \cdot 2)^{\frac{3}{2}} = 2^3 = 2 \cdot 2 \cdot 2 = 8$$



$$b. 16^{\frac{3}{4}} = (2 \cdot 2 \cdot 2 \cdot 2)^{\frac{3}{4}} = 2^3 = 8$$



Problem 6: Simplify

$$a. (3a^{\frac{1}{2}} \cdot b^{\frac{1}{5}})(3a^{\frac{3}{4}} \cdot b^{\frac{2}{5}})$$

$$3 \cdot 3 a^{\frac{1}{2}} \cdot a^{\frac{3}{4}} \cdot b^{\frac{1}{5}} \cdot b^{\frac{2}{5}}$$

$$9a^{\frac{5}{4}} b^{\frac{3}{5}}$$

$$b. (8b^{\frac{2}{3}} \cdot 9t^{\frac{1}{5}})(8b^{\frac{5}{3}} \cdot 9t^{\frac{3}{5}})$$

$$8 \cdot 9 \cdot 8 \cdot 9 \cdot b^{\frac{2}{3}} \cdot b^{\frac{5}{3}} \cdot t^{\frac{1}{5}} \cdot t^{\frac{3}{5}}$$

$$5184b^{\frac{7}{3}} t^{\frac{4}{5}}$$

