

These examples are NOT the same ones provided in class.

## Properties of Rational Exponents

Property	Example #1	Example #2
$a^m \cdot a^n = a^{m+n}$	$x^2 \cdot x^3$ $= x^{2+3}$ $= x^5$	$x^{1/4} \cdot x^{3/2}$ $= x^{1/4 + 3/2}$ <p style="text-align: right;">← need common denominator</p> $= x^{1/4 + 6/4} = x^{7/4}$
$(a^m)^n = a^{mn}$	$(x^3)^2$ $= x^{3 \cdot 2} = x^6$	$(9^{1/2})^3$ $= 9^{1/2 \cdot 3/1}$ $= 9^{3/2} = (\sqrt{9})^3 = 27$
$(ab)^m = a^m b^m$	$(2x)^3$ $= 2^3 x^3$ $= 8x^3$	$(25x)^{1/2}$ $= 25^{1/2} x^{1/2}$ $= \sqrt{25} \cdot \sqrt{x} = 5\sqrt{x}$
$a^{-m} = \frac{a}{a^m}$	$x^{-4}$ $= \frac{1}{x^4}$	$\frac{1}{4^{-1/2}} = 4^{1/2} = \sqrt{4} = 2$
$\frac{a^m}{a^n} = a^{m-n}$	$\frac{x^4}{x^3} = x^{4-3} = x^1$	$\frac{16^{5/8}}{16^{3/8}} = 16^{5/8 - 3/8} = 16^{2/8} = 16^{1/4}$ $= \sqrt[4]{16} = 2$
$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$	$\left(\frac{4}{x}\right)^2 = \frac{4^2}{x^2} = \frac{16}{x^2}$	$\left(\frac{16}{49}\right)^{1/2} = \frac{16^{1/2}}{49^{1/2}} = \frac{\sqrt{16}}{\sqrt{49}}$ $= \frac{4}{7}$

$$\begin{aligned}
 1.) & 9^{\frac{1}{6}} \cdot 9^{\frac{2}{6}} \\
 &= 9^{\frac{1}{6} + \frac{2}{6}} \\
 &= 9^{\frac{3}{6}} \\
 &= 9^{\frac{1}{2}} \\
 &= \sqrt{9} = \textcircled{3}
 \end{aligned}$$

$$\begin{aligned}
 4.) & (64 \cdot 49)^{\frac{1}{2}} \\
 &= 64^{\frac{1}{2}} \cdot 49^{\frac{1}{2}} \\
 &= \sqrt{64} \cdot \sqrt{49} \\
 &= 8 \cdot 7 \\
 &= \textcircled{56}
 \end{aligned}$$

$$\begin{aligned}
 7.) & 7^{\frac{3}{4}} \cdot 7^{\frac{1}{4}} \\
 &= 7^{\frac{3}{4} + \frac{1}{4}} \\
 &= 7^{\frac{4}{4}} \\
 &= \textcircled{7}
 \end{aligned}$$

$$\begin{aligned}
 2.) & 4^{\frac{2}{8}} \cdot 4^{\frac{1}{4}} \\
 &= 4^{\frac{2}{8} + \frac{1}{4} \cdot \frac{2}{2}} \\
 &= 4^{\frac{2}{8} + \frac{2}{8}} \\
 &= 4^{\frac{4}{8}} \\
 &= 4^{\frac{1}{2}} = \sqrt{4} = \textcircled{2}
 \end{aligned}$$

$$\begin{aligned}
 5.) & (3^{\frac{3}{4}})^4 \\
 &= 3^{\frac{3}{4} \cdot 4} \\
 &= 3^{\frac{12}{4}} \\
 &= 3^3 = \textcircled{27}
 \end{aligned}$$

$$\begin{aligned}
 8.) & (5^{\frac{1}{4}})^{\frac{4}{3}} \\
 &= 5^{\frac{1}{4} \cdot \frac{4}{3}} \\
 &= 5^{\frac{4}{12}} \\
 &= \textcircled{5^{\frac{1}{3}} \text{ or } \sqrt[3]{5}}
 \end{aligned}$$

$$\begin{aligned}
 3.) & \frac{81^{\frac{5}{8}}}{81^{\frac{3}{8}}} \\
 &= 81^{\frac{5}{8} - \frac{3}{8}} \\
 &= 81^{\frac{2}{8}} \\
 &= 81^{\frac{1}{4}} \\
 &= \sqrt[4]{81} = \textcircled{3}
 \end{aligned}$$

$$\begin{aligned}
 6.) & 125^{-\frac{1}{3}} \\
 &= \frac{1}{125^{\frac{1}{3}}} \\
 &= \frac{1}{\sqrt[3]{125}} = \textcircled{\frac{1}{5}}
 \end{aligned}$$

$$\begin{aligned}
 9.) & \frac{8^{\frac{3}{2}}}{8^{\frac{1}{2}}} \\
 &= 8^{\frac{3}{2} - \frac{1}{2}} \\
 &= 8^{\frac{2}{2}} \\
 &= \textcircled{8}
 \end{aligned}$$