Simplify each. Don't give answers with rounded decimals (this means if necessary give fractional answers in reduced form).

Remember that $Q^{\frac{7}{5}} = \sqrt[5]{Q^7}$ or $\sqrt[5]{Q}^7$

and that $(B^6)^3 = B^{6 \cdot 3} = B^{18}$

1. $(27^{\frac{4}{3}})^{-2}$

$\downarrow$

$= (\sqrt[3]{27})^4$

$= 3^4 \longrightarrow (3^4)^{-2} = \frac{1}{(3^4)^2} = \frac{1}{3^8} = \boxed{\frac{1}{6561}}$

2. $(27^2)^{\frac{-2}{3}} = 27^{2 \cdot -\frac{2}{3}} = 27^{-\frac{4}{3}}$

$= \frac{1}{27^{4/3}} = \frac{1}{(\sqrt[3]{27})^4}$

$= \frac{1}{3^4} = \boxed{\frac{1}{81}}$

3. $(8^{\frac{-5}{6}})^2 = 8^{\frac{-5}{6} \cdot 2} = 8^{-\frac{5}{3}}$

$= \frac{1}{8^{5/3}} = \frac{1}{(\sqrt[3]{8})^5}$

$= \frac{1}{2^5} = \boxed{\frac{1}{32}}$

4. $(12^{\frac{3}{4}})^2$

$= 12^{\frac{3}{4} \cdot 2} = 12^{\frac{3}{2}} = (\sqrt{12})^3 = (2\sqrt{3})^3$

$= 8 \cdot 3\sqrt{3}$

$= \boxed{24\sqrt{3}}$

Sec 7-2

Multiplying and Dividing Radical Expressions

If $\sqrt[n]{a}$ and $\sqrt[n]{b}$ are real #'s, then

$$\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$$

The reverse is also true:

$$\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$$

When n is even both a and b must be positive

Simplify each. Assume that all variables are positive.

1. $\sqrt{3w^3} \cdot \sqrt{8w^6}$

$$= \sqrt{24 w^9}$$

$$\overset{4 \cdot 6}{=}$$

$$\boxed{2w^4 \sqrt{6w}}$$