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

1. $(8^{\frac{-5}{6}})^2$

$\left(\frac{1}{8^{\frac{5}{6}}}\right)^2 = \frac{1}{(8^{\frac{5}{6}})^{\frac{2}{1}}} = 8^{\frac{1}{5/3}}$

$= \frac{1}{(\sqrt[3]{8})^5} = \frac{1}{2^5}$

$= \boxed{\frac{1}{32}}$

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

$\frac{1}{(27^2)^{2/3}} = \frac{1}{27^{4/3}} = \frac{1}{(\sqrt[3]{27})^4}$

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

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

$((\sqrt[3]{27})^4)^{-2}$

$(3^4)^{-2} = 81^{-2} = \boxed{\frac{1}{6561}}$

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

$12^{\frac{3}{2}}$

$(\sqrt{12})^3$ (4, 3)

$(2\sqrt{3})^3 = 8 \cdot 3\sqrt{3} = \boxed{24\sqrt{3}}$

Sec 7-2

Multiplying and Dividing Radical Expressions

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

Multiply then simplify

$\sqrt{24w^9}$

$4 \cdot 6$, $w^8 w^1$

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

Simplify then multiply

$w\sqrt{3w} \cdot 2w^3\sqrt{2}$

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

2. $\sqrt{5m^7n^4} \cdot \sqrt{15mn^5}$

5, $5 \cdot 3$

5^2

$5m^4n^4\sqrt{3n}$

$\sqrt{75m^8n^9}$

25, 3

3. $\sqrt{30g^7h^{12}} \cdot \sqrt{18g^4h^8}$

$6 \cdot 5$ $\quad$ $6 \cdot 3$

$\sqrt{540g^{11}h^{20}}$

$36 \cdot 15$

$6g^5h^{10}\sqrt{15g}$

4. $\sqrt[2]{7a} \cdot \sqrt[3]{7a}$

$(7a)^{1/2} \cdot (7a)^{1/3}$

$7a^{1/2+1/3} = 7a^{\frac{3}{6}+\frac{2}{6}} = 7a^{5/6} = \sqrt[6]{(7a)^5}$ or $\left(\sqrt[6]{7a}\right)^5$

5. $\sqrt[3]{9Q^4R^2} \cdot \sqrt[3]{6Q^5R^8}$

$3 \cdot 3$ $\quad$ $3 \cdot 2$

$\sqrt[3]{54Q^9R^{10}}$

$27 \cdot 2$

$3Q^3R^3\sqrt[3]{2R}$

$2^3 = 8$

$3^3 = 27$

~~4^3~~

~~5^3~~

6. $\sqrt[4]{18m^6n^3} \cdot \sqrt[4]{45m^9n^{13}}$

$2 \cdot 9$ $\quad$ $9 \cdot 5$

$\sqrt[4]{810\,m^{15}n^{16}}$

$81 \cdot 10$ $\quad$ 3^4

$3m^3n^4\sqrt[4]{10m^3}$

$2^4 = 16$

$3^4 = 81$

~~$4^4 = 256$~~

~~$5^4 = 625$~~

7. $\sqrt[5]{8c^6d^{13}} \cdot \sqrt[5]{12c^7d^3}$

$2 \cdot 2 \cdot 2$ $\quad$ $2 \cdot 2 \cdot 3$

$\sqrt[5]{96\,c^{13}d^{16}}$

$32 \cdot 3$

$2c^2d^3\sqrt[5]{3c^3d}$

$2^5 = 32$

~~$3^5 = 243$~~

4^5