1. Simplify.

$$\sqrt[3]{18m^5n} \cdot \sqrt[3]{30m^2n^7} \cdot \sqrt[3]{12mn^8}$$

$6 \cdot 3$ $\quad 6 \cdot 5$ $\quad 6 \cdot 2$

$$= \sqrt[3]{6^3 \cdot 30m^8n^{16}}$$

$$= 6m^2n^5\sqrt[3]{30m^2n}$$

2. Write each in radical form.

a) $8(11m^5)^{\frac{7}{6}}$

$$= 8\left(\sqrt[6]{11m^5}\right)^7$$

OR

$$= 8\sqrt[6]{(11m^5)^7}$$

OR

$$= 8\left(\sqrt[6]{11^7m^{35}}\right)$$

b) $7bc^{\frac{1}{2}}$

$$= 7b\sqrt{c}$$

3. Simplify each, use absolute value symbols where necessary.

a) $\sqrt[5]{160c^8d^{13}}$

$$= \sqrt[5]{32 \cdot 5c^8d^{13}}$$

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

b) $\sqrt[4]{27w^{12}x^{27}y^{23}}$

$$= x^6|w^3||y^5| \cdot \sqrt[4]{27x^3y^3}$$

or

$$= x^6|w^3y^5|\sqrt[4]{27x^3y^3}$$

4. Simplify. Assume all variables are positive. No decimals. Give fractional answers in reduced form.

a) $(3w^{-\frac{5}{2}})^4 = \left(\frac{3}{w^{\frac{5}{2}}}\right)^4 = \frac{81}{w^{10}}$

b) $\left(\frac{-8w^4x^{-7}}{w^{-5}x^{-2}}\right)^{-\frac{4}{3}}$

$$= \left(\frac{-8w^9}{x^5}\right)^{-\frac{4}{3}} = \left(\frac{x^5}{-8w^9}\right)^{\frac{4}{3}} = \frac{x^{\frac{20}{3}}}{\left(\sqrt[3]{-8}\right)^4 w^{12}}$$

$$= \frac{x^{20/3}}{16w^{12}}$$

5. Rationalize the denominator. Assume all variables are positive.

$$\frac{24x^3}{\sqrt[4]{18x^5y^{22}z^{15}}} \cdot \frac{\sqrt[4]{3^3\cdot 2^3x^3y^2z}}{\sqrt[4]{3^3\cdot 2^3x^3y^2z}} = \frac{24x^3\sqrt[4]{72x^3y^2z}}{3\cdot 2\,x^2y^6z^4}$$

$18 = 3^2\cdot 2$

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$$\sqrt[4]{3^4\cdot 2^4x^8y^{24}z^{16}}$$

$$= \frac{4x\sqrt[4]{72x^3y^2z}}{y^6z^4}$$