INTERMEDIATE ALGEBRA

GPS # 31 **7.2 SIMPLIFYING RADICAL EXPRESSIONS** **NAME:** Kelly Fenton

Useful Guidelines:

If $\sqrt[n]{a}$ and $\sqrt[n]{b}$ are real numbers, and $b \neq 0$ and n is a natural number, then

* $\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$ and $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$. For example: $\sqrt[4]{8} \cdot \sqrt[4]{2} = \sqrt[4]{8 \cdot 2} = 2$ and $\sqrt[3]{\frac{8}{27}} = \frac{\sqrt[3]{8}}{\sqrt[3]{27}} = \frac{2}{3}$

* Rationalizing the Denominator:
  Writing the quotient without a radical expression in the denominator.

Evaluate the following:

1. a) $\sqrt[3]{9} \cdot \sqrt[3]{3} = \sqrt[3]{27} = 3$ b) $\sqrt[3]{16} \cdot \sqrt[3]{4} = \sqrt[3]{64} = 4$ c) $\sqrt[5]{9t} \cdot \sqrt[5]{5} = \sqrt[5]{45t}$

   d) $\sqrt[2]{4m} \cdot \sqrt[2]{3pq} = \sqrt{12mpq}$ e) $\sqrt[4]{10} \cdot \sqrt[4]{5} = \sqrt[4]{50}$ f) $\sqrt[5]{4x} \cdot \sqrt[3]{y}$ not same = Can not Simplify

Assume all variables represent positive real numbers. Simplify the following (if possible):

2. a) $\sqrt[3]{-\frac{64}{8}} = \frac{\sqrt[3]{(-4)^3}}{\sqrt[3]{(2)^3}} = \frac{-4}{2} = -2$ (Keep neg. to only one either 64 or 8) b) $\sqrt[2]{\frac{81}{49}} = \frac{9}{7}$ c) $\sqrt[4]{\frac{81}{16}} = \frac{\sqrt[4]{(3)^4}}{\sqrt[4]{(2)^4}} = \frac{3}{2}$

   d) $\sqrt[3]{-\frac{k^{9 \cdot \frac{1}{3}}}{125}} = \frac{-k^3}{5} = \frac{-k^3}{5}$ e) $\sqrt[2]{\frac{64m^{4 \cdot \frac{1}{2}}}{a^2}} = \frac{8m^2}{a}$ f) $\sqrt[4]{\frac{x^{4 \cdot \frac{1}{4}}}{16y^{8 \cdot \frac{1}{4}}}} = \frac{x}{2y^2}$

3. a) $\sqrt[3]{54} = \sqrt[3]{(2)(27)} = \sqrt[3]{2} \cdot \sqrt[3]{27} = 3\sqrt[3]{2}$ b) $-\sqrt[3]{32} = -\sqrt[3]{(8)(4)} = -\sqrt[3]{8} \cdot \sqrt[3]{4} = -2\sqrt[3]{4}$ c) $-\sqrt[2]{11}$ = Can not Simplify

   d) $\sqrt[2]{4x^3} = \sqrt{4} \cdot \sqrt{x^3} = 2\sqrt{x^3}$ e) $\sqrt[3]{27p^5q^4} = \sqrt[3]{27} \cdot \sqrt[3]{p^5} \cdot \sqrt[3]{q^4} = 3\sqrt[3]{p^3p^2q^3q} = 3\sqrt[3]{(pq)^3}\sqrt[3]{p^2q} = 3pq\sqrt[3]{p^2q}$ f) $-\sqrt[4]{32a^5} = \sqrt[4]{2^4 \cdot 2^1 \cdot a^4 \cdot a^1} = -2a\sqrt[4]{2a}$

4. Rationalize each denominator. Assume that all variables are positive.

   a) $\frac{7}{\sqrt{3}} = \frac{\sqrt{3}}{\sqrt{3}} = \frac{7\sqrt{3}}{3}$ b) $\frac{5}{2\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{5\sqrt{2}}{4}$ ($\sqrt{4} = 2 \cdot 2$) c) $\frac{7\sqrt{3}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{7\sqrt{15}}{5}$

   d) $\frac{4\sqrt{a}}{\sqrt{b}} \cdot \frac{\sqrt{b}}{\sqrt{b}} = \frac{4\sqrt{ab}}{b}$ e) $\sqrt{\frac{9m^2}{n}} = \frac{\sqrt{9m^2}}{\sqrt{n}} = \frac{3m}{\sqrt{n}} \cdot \frac{\sqrt{n}}{\sqrt{n}} = \frac{3m\sqrt{n}}{n}$ f) $\frac{2xy}{\sqrt{x^3}} = \frac{2xy}{x\sqrt{x}}$ ($x^2 \cdot x = x^3$) $= \frac{2y}{\sqrt{x}} \cdot \frac{\sqrt{x}}{\sqrt{x}} = \frac{2y\sqrt{x}}{x}$