INTERMEDIATE ALGEBRA

GPS # 32 **7.3 OPERATIONS ON RADICAL EXPRESSIONS I** **NAME:** Kelly Fenton

Good Job

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: $\sqrt[4]{8}\cdot\sqrt[4]{2}=\sqrt[4]{8\cdot2}=2$ and $\sqrt[3]{\frac{8}{27}}=\frac{\sqrt[3]{8}}{\sqrt[3]{27}}=\frac{2}{3}$

* NOTE: $\sqrt[n]{a}+\sqrt[n]{b}\neq\sqrt[n]{a+b}$ and $\sqrt[n]{a}-\sqrt[n]{b}\neq\sqrt[n]{a-b}$

Only radical expression with the same index and the same radicand may be combined (combining the like terms or same family only).

For example: $\sqrt[3]{5}+2\sqrt[3]{5}+4\sqrt[3]{7}+2\sqrt[3]{7}=3\sqrt[3]{5}+6\sqrt[3]{7}$.

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

1. a) $\sqrt[3]{15}+6\sqrt[3]{15}$ same

$1 \quad 6$

$=7\sqrt[3]{15}$

b) $\sqrt[2]{20}-\sqrt[2]{45}=\sqrt{4.5}-\sqrt{9.5}$

$=\sqrt{4}\cdot\sqrt{5}-\sqrt{9}\cdot\sqrt{5}$

$=2\sqrt{5}-3\sqrt{5}$ same

$=-\sqrt{5}$

c) $2\sqrt[2]{45a}+\sqrt[2]{20a}$

$=2\sqrt{(9)(5)a}+\sqrt{(4)(5)a}$

$=6\sqrt{5a}+2\sqrt{5a}$

$=8\sqrt{5a}$

d) $3\sqrt[2]{5}-5\sqrt[2]{2}$

Can not simplify

2. a) $3\sqrt[3]{16}-2\sqrt[3]{250}$

$=3\sqrt[3]{8\cdot2}-2\sqrt[3]{125\cdot2}$ (2) (5)

$=6\sqrt[3]{2}-10\sqrt[3]{2}$

$=-4\sqrt[3]{2}$

b) $5\sqrt[2]{12}-3\sqrt[2]{27}$

$=5\sqrt{4\cdot3}-3\sqrt{9\cdot3}$ (2) (3)

$=10\sqrt{3}-9\sqrt{3}$

$=\sqrt{3}$

c) $\sqrt[4]{81x^2y}+\sqrt[4]{16x^6y^5}$

$=3\sqrt[4]{x^2y}+\sqrt{(2^4)(x^2x^4)(y^4y^1)}$

$=3\sqrt[4]{x^2y}+2xy\sqrt[4]{x^2y}$

$=(3+2xy)\sqrt[4]{x^2y}$

d) $\sqrt[3]{8m^2n}+3\sqrt[3]{m^5n^7}$

$=2\sqrt[3]{m^2n}+3\sqrt[3]{(m^3m^2)(n^3n^3n^1)}$

$=2\sqrt[3]{m^2n}+3mn^2\sqrt[3]{m^2n}$

$=(2+3mn^2)\sqrt[3]{m^2n}$

3. a) $2\sqrt[2]{\frac{32}{25}}+3\sqrt[2]{\frac{32}{8}}=2\frac{\sqrt{32}}{\sqrt{25}}+3\frac{\sqrt{32}}{\sqrt{8}}$

$=2\frac{\sqrt{(16)(2)}}{5}+3\frac{\sqrt{(16)(2)}}{\sqrt{(4)(2)}}=\frac{8\sqrt{2}}{5}+\frac{\overset{6}{\cancel{12}}\cancel{\sqrt{2}}}{\cancel{2\sqrt{2}}}=\frac{8\sqrt{2}}{5}+6$

c) $\sqrt[3]{\frac{8x^3}{x^{12}}}+\sqrt[3]{\frac{16}{x^9}}=\frac{\sqrt[3]{8x^3}}{\sqrt[3]{x^{12}}}+\frac{\sqrt[3]{16}}{\sqrt[3]{x^9}}=\frac{2x}{\sqrt[3]{x^{12}}}+\frac{\sqrt[3]{(8)(2)}}{x^3}=\frac{2x^1}{x^4}+\frac{2\sqrt[3]{2}}{x^3}$ (x^1-x^4)

$=\frac{2}{x^3}+\frac{2\sqrt[3]{2}}{x^3}=\frac{2+2\sqrt[3]{2}}{x^3}$