$x = \dfrac{\quad}{2a}$ Name: _____ Block: _____

Pre-Calculus 11: Radicals Quiz #1

Full credit will only be awarded for all work shown in a neat and organized manner.

1. Find all solutions to the following (if they exist):

a. $x^4 = 625 = 5^4$

625 → 5, 125 → 5, 25 → 5, 5

$x = \pm\sqrt[4]{5^4}$

$x = \pm 5$

b. $x^3 = -729 = -9^3$

729 → 9, 81 → 9, 9

$x = -\sqrt[3]{9^3}$

$x = -9$

2. **EXPLAIN** which is the correct answer to $\sqrt{x^8y^6z^2} =$

$x^4y^3|z|$ $\quad$ $x^4|y|^3|z|$ $\quad$ $|x|^4y^3|z|$ $\quad$ $|x|^4|y|^3z$

Since the powers on y and z are odd, they could be negative if y or z are negative, but we know answer should be positive so they need absolute value brackets

3. Express each radical in simplest radical form. All variables represent positive real numbers.

a. $\sqrt{450n^5m^{12}} = \sqrt{2\cdot5^2\cdot3^2\cdot n^5m^{12}}$

450 → 10, 45 → 2, 5, 5, 9 → 3, 3

$= 5\cdot3\cdot n^2\cdot m^6\sqrt{2n}$

$= 15n^2m^6\sqrt{2n}$

b. $\sqrt[3]{-432x^7y^2} = \sqrt[3]{-2^4\cdot3^3\cdot x^7\cdot y^2}$

432 → 2, 216 → 6, 36 → 2, 3, 6, 6 → 2, 3, 2, 3

$= -2\cdot3\cdot x^2\sqrt[3]{2xy^2}$

$= -6x^2\sqrt[3]{2xy^2}$

c. $\dfrac{\sqrt[4]{81x^3y^6}}{\sqrt[4]{8x^7y^7}} = \dfrac{\sqrt[4]{3^4\cdot x^3y^6}}{\sqrt[4]{2^3\cdot x^7y^7}}$

$= \dfrac{3y\sqrt[4]{x^3y^2}}{xy\sqrt[4]{8x^3y^3}}$

$= \dfrac{3}{x}\sqrt[4]{\dfrac{x^3y^2}{8x^3y^3}} = \dfrac{3}{x}\sqrt[4]{\dfrac{1}{8y}}$

c. $\left(2x\sqrt{12x^5y}\right)\left(3\sqrt{24xy^4}\right)$

$= 6x\sqrt{4\cdot3x^5y}\cdot\sqrt{4\cdot6xy^4}$

$= 6x\cdot2\cdot x^2\sqrt{3xy}\cdot2\cdot y^2\sqrt{6x}$

$= 24x^3y^2\cdot\sqrt{18x^2y}$

$= 24x^3y^2\cdot\sqrt{9\cdot2x^2y} = 72x^4y^2\sqrt{2y}$

a. $-9a^2b\sqrt{4a^3b^2}$

$= -\sqrt{(9a^2b)^2 \cdot 4a^3b^2}$

$= -\sqrt{324a^7b^4}$

b. $-\frac{4x^3}{y^2}\sqrt[3]{\frac{x^4y}{2}}$

$= \sqrt[3]{\left(-\frac{4x^3}{y^2}\right)^3 \cdot \frac{x^4y}{2}} = \sqrt[3]{-\frac{64x^{13}y}{2y^6}} = \sqrt[3]{-\frac{32x^{13}}{y^5}}$

5. Simplify each expression. All variables represent positive real numbers.

a. $7\sqrt{54} + 3\sqrt{6}$

$= 7 \cdot \sqrt{9 \cdot 6} + 3\sqrt{6}$

$= 21\sqrt{6} + 3\sqrt{6} = 24\sqrt{6}$

b. $2\sqrt[3]{32} - 6\sqrt[3]{54}$

$= 2\sqrt[3]{2^5} - 6\sqrt[3]{27 \cdot 2}$

$= 4\sqrt[3]{4} - 18\sqrt[3]{2}$

c. $xy\sqrt[3]{81x^2y^3} + x\sqrt[3]{24x^2y^6}$

$= xy\sqrt[3]{27 \cdot 3 \cdot x^2y^3} + x\sqrt[3]{8 \cdot 3 \cdot x^2y^6} = 3xy^2\sqrt[3]{3x^2} + 2xy^2\sqrt[3]{3x^2}$

$= 5xy^2\sqrt[3]{3x^2}$

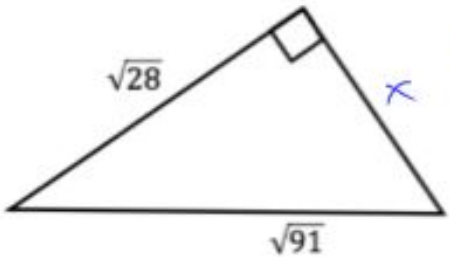
d. $4\sqrt{32x^3} - 9x\sqrt{50x^2} - 2\sqrt{20x^4} + x\sqrt{18x}$

$= 4\sqrt{16 \cdot 2x^3} - 9x\sqrt{25 \cdot 2x^2} - 2\sqrt{4 \cdot 5x^4} + x\sqrt{9 \cdot 2x}$

$= 16x\sqrt{2x} - 45x^2\sqrt{2} - 4x^2\sqrt{5} + 3x\sqrt{2x}$

$= 19x\sqrt{2x} - 45x^2\sqrt{2} - 4x^2\sqrt{5}$

6. Find the perimeter of the right triangle



$x^2 = (\sqrt{91})^2 - (\sqrt{28})^2 = 91 - 28 = 63$

$x = \sqrt{63}$

$P = \sqrt{28} + \sqrt{63} + \sqrt{91}$

$= \sqrt{4 \cdot 7} + \sqrt{9 \cdot 7} + \sqrt{7 \cdot 13}$

$= 2\sqrt{7} + 3\sqrt{7} + \sqrt{91}$

$= 5\sqrt{7} + \sqrt{91}$