Name _____

**Algebra 2**

5.2 Properties of Exponents and Radicals WS

*Note:* Assume all variables represent **non-zero** quantities.

**For problems 1-6:** Rewrite each expression using the properties of exponents. Simplify as much as possible, then write your final answer with rational exponents without negative exponents.

**1.** $\dfrac{m^4 n^{-3} p^{-1}}{m n^{-3} p^5}$

**2.** $\left(\dfrac{a^5 b^{-3} c^2}{a^6 b^9 c^8}\right)^0$

**3.** $\dfrac{\left(g h^5\right)^2 k^{-2}}{g^{-3}\left(h^{-1} k^4\right)^{-3}}$

**4.** $\left(\dfrac{r t^{-2} s^3}{r^3 t^{-2} s}\right)^{-2}$

**5.** $5x^{\frac{1}{3}}\left(x^{\frac{-2}{5}} y^{\frac{1}{4}}\right)^{\frac{-5}{2}}$

**6.** $\left(\dfrac{9}{81^{\frac{4}{5}}}\right)^{\frac{1}{2}}$

**For problems 7-20:** Simplify each radical expression, using absolute value bars when necessary. Write your answer in reduced radical form.

**7.** $\sqrt[5]{32x^{15}y^8}$

**8.** $\sqrt{48p^{17}q^8}$

**9.** $\sqrt[4]{192x^5y^8}$

**10.** $\sqrt[3]{\dfrac{24}{9m^5}}$

**11.** $\sqrt[3]{\dfrac{a^7b^3}{125a}}$

**12.** $\dfrac{12}{\sqrt{18x^4y^9}}$

**13.** $\dfrac{-4x}{1-\sqrt{x}}$

**14.** $\dfrac{5-\sqrt{2}}{2-\sqrt{3}}$

**15.** $\sqrt[3]{4a^2b} \cdot \sqrt[3]{10a^5b^2}$

**16.** $-2\sqrt{45} - 3\sqrt{20} - 2\sqrt{6}$

**17.** $-3\sqrt[3]{-3} + 2\sqrt[3]{162} + 3\sqrt[3]{81}$

**18.** $3\sqrt{3}\left(4 - 3\sqrt{5}\right)$

**19.** $\left(2\sqrt{x} + 2\right)\left(\sqrt{x} + 3\right)$

**20.** $\left(\sqrt{3} + \sqrt{5x}\right)\left(\sqrt{4} - 5\sqrt{x}\right)$

**21.** The length of a large storage box is $3x + \sqrt{48}$ cm and the width is $5 + \sqrt{12x}$.

**a.** Write an expression that represents the perimeter of the field.

**b.** Write an expression that represents the area of the field.