Name: _____ Points: _____

1. Rational Exponents

a. The expression $a^{\frac{1}{n}}$ in radical form is written as _____ .

b. The expression $a^{\frac{m}{n}}$ in radical form is written as _____ .

2. Simplify the expression, if possible.

a. $81^{\frac{3}{4}}$ b. $-81^{\frac{3}{4}}$ c. $(-81)^{\frac{3}{4}}$

d. $81^{-\frac{3}{4}}$ e. $-81^{-\frac{3}{4}}$ f. $(-81)^{-\frac{3}{4}}$

3. Convert each expression to radical notation.

a. $8y^{\frac{2}{5}}$ b. $(8y)^{\frac{2}{5}}$ c. $4x^{-\frac{5}{6}}$

d. $(4x)^{-\frac{5}{6}}$ e. $-4x^{-\frac{5}{6}}$ f. $(-4x)^{-\frac{5}{6}}$

4. Simplify the expression by using the properties of rational exponents. Write the final answer using positive exponents only.

a. $\dfrac{-7a^{-\frac{2}{5}}}{a^{\frac{3}{4}}}$ b. $(4x^{\frac{4}{7}}y^{-\frac{1}{3}})^{\frac{7}{2}}$

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c. $\left(\frac{-27b^4c^{-5}}{b^{-2}c}\right)^{\frac{2}{3}}$

d. $(4x^{\frac{4}{7}}y^{-\frac{1}{3}})^{\frac{7}{2}}$

4. Simplify the radicals. Assume all variables are positive.

a. $\sqrt{54x^5yz^6}$

b. $-3a\sqrt{27a^4b^7c^2}$

c. $\sqrt{\frac{3x^4y^5}{300xy^3}}$

d. $5t\sqrt[3]{75r^8st^6}$

Radicals, specifically square roots, date back as far as c.1650 B.C., from the time of Egypt's Middle Kingdom. The Rhind Papyrus makes references to square roots since they are tied to the diagonals of squares and rectangles; often applicable in the construction of a temple. The "Rhind Papyrus" is named after Henry Rhind, a Scottish lawyer, who purchased it in Egypt in 1858. It was placed in the British Museum in London, England, in 1864 and is still there today; a fragment is also in the collection of the Brooklyn Museum on Eastern Parkway. The Rhind Papyrus, according to the British Museum website, is a "list of practical problems encountered in administrative and building works. The text contains 84 problems concerned with numerical operations, practical problem-solving, and geometrical shapes."

References:
Robins, G. & Shute, C. (1990). *The Rhind Mathematical Papyrus: An ancient Egyptian text.* New York, NY: Dover.
The British Museum; downloaded on 8/1/ 2011, from
http://www.britishmuseum.org/explore/highlights/highlight_objects/aes/r/rhind_mathematical_papyrus.aspx

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