Name: _____________________  Chapter 4 Practice Test – Roots and Powers

PART 1: NO CALCULATOR
Complete answer. Show all of your work for full marks.

1. Write each mixed radical as an entire radical.
   a) \(6\sqrt{5}\)  
   b) \(2\sqrt{5}\)  
   c) \(8\sqrt{2}\)  
   d) \(3\sqrt{6}\)

2. Write each power as a radical.
   a) \(42^5\)  
   b) \(\left(\frac{3}{4}\right)^{\frac{1}{5}}\)

3. Write each radical as a power.
   a) \(\sqrt[9]{\left(\frac{3}{4}\right)^3}\)  
   b) \(\left(\sqrt[3]{7}\right)^3\)
4. Write each power with a positive exponent

a) \( \left( \frac{125}{8} \right)^{\frac{2}{3}} \) 

b) \( \left( \frac{4}{5} \right)^{-6} \) 

c) \( -2^{-7} \)

5. Write each power with a positive exponent and evaluate.

a) \( 2^{-4} \)

b) \( \left( \frac{2}{3} \right)^{-3} \)

6. Find the mistake(s) in the following question and write the correct solution.

\[
\left( s^{-1} t^{\frac{1}{2}} \right) \left( s^{4} t^{3} \right) \\
= s^{-1} \cdot s^{4} \cdot t^{\frac{1}{2}} \cdot t^{3} \\
= s^{3} \cdot t^{\frac{7}{2}} \\
\text{Correct solution:} \\
= s^{3} \cdot t^{\frac{7}{2}} \\
\]
PART 2: CALCULATOR PERMITTED

Complete answer. Show all of your work for full marks.

1. Classify the following numbers as rational or irrational. Justify your answer.
   a) \(-\sqrt{64}\)  
   b) \(\sqrt{32}\)
   c) \(2\pi\)  
   d) \(\sqrt[4]{\frac{121}{64}}\)

2. Write each radical in simplest form (mixed radical).
   a) \(\sqrt{108}\)  
   b) \(\sqrt{98}\)
   c) \(\sqrt[3]{80}\)  
   d) \(\sqrt[3]{250}\)
3. **Place** each number on a **number line**. Then, **order the numbers** from least to greatest.

\( 5\sqrt{2}, \sqrt{48}, 3\sqrt{2}, \sqrt{14}, 6\sqrt{3} \)

Order from least to greatest: ___________________________________________________________

4. A person wants $30,000 in 7 years. The interest rate for the savings account is 2.7% compounded annually.

The money \( C \), in dollars, they must invest now is given by the formula: \( C = 30000(1.027)^{-7} \).

How much do they need to invest now to have $30,000 in 7 years?

5. **Evaluate** the following expression: \( (a^{-2})(b^{-3})(a^3b^{-4}) \) when \( a = -1 \) and \( b = 3 \).
6. Simplify each question and express your answer with positive exponents.

\begin{align*}
a) \quad & m^{-2}n^6 \cdot m^3n^{-8} \\
\text{b) } \quad & \frac{12p^3q^{-7}}{15pq^9} \\
\text{c) } \quad & \left(64a^{12}b^{15}\right)^{\frac{1}{3}} \\
\text{d) } \quad & \left(\frac{36x^4y^3}{4x^8y^{-1}}\right)^{\frac{1}{2}} \\
\text{e) } \quad & \left(\frac{5}{2a^{-4}b^7}\right)^{-3} \\
\text{f) } \quad & \frac{3a^{-3}b^7c^{-6}}{12a^6b^{-3}c^5}
\end{align*}