

DIRECTIONS: No calculators may be used. Be sure to *show ALL of your work*. Depending on the problem, you may receive **NO CREDIT** if no work is shown even if the answer is correct. Don't take that chance. I do provide SCRATCH PAPER, but you need to be sure to COPY OVER onto this document any work that you want me to check. If your answer is a fraction, reduce it to lowest terms. If there is a blank, write your answer in the blank, otherwise **circle your answer**. Once the test is returned, the **KEY** will be available outside my office. Use the key to check and correct your work. **Keep this test** to study from for the final exam.

RADICALS AND RATIONAL EXPONENTS - Rewrite each of the following expressions. If it is a radical expression, rewrite it as an expression with a rational exponent. If it is an expression with a rational exponent, rewrite it as a radical expression.

1. Rewrite using a rational exponent: $\sqrt[7]{x^4}$ 2. Rewrite as a radical expression: $x^{\frac{2}{3}}$

RADICALS - For each radical below, find a value if possible. If the radical yeilds a result that is *irrational* or *not real* so state.

3. Follow the directions in the box above for each of the following:

- $\sqrt{64}$ _____
- $\sqrt{-64}$ _____
- $-\sqrt{64}$ _____
- $\sqrt[3]{-64}$ _____
- $\sqrt{10}$ _____

EXPRESSIONS WITH RATIONAL EXPONENTS

4. Find the value of $64^{\frac{2}{3}}$ 5. Find the value of $81^{-\frac{3}{4}}$

EXPRESSIONS WITH RATIONAL EXPONENTS - Simplify the following expressions involving exponents. Write your answer with no negative exponents.

6. $x^{\frac{2}{3}} \cdot x^{\frac{1}{2}}$

7. $\frac{11^{\frac{1}{7}}}{11^{-\frac{2}{7}}}$

RADICAL EXPRESSIONS - Simplify the following as far as possible.

8. $\sqrt{18}$

9. $\sqrt[3]{54}$

10. $\sqrt{75x^{11}y^{14}}$

11. $(\sqrt{6} + 2)(\sqrt{2} - 3)$

RATIONAL EXPRESSIONS AND EQUATIONS - For all of the problems on this page, determine if each is an expression or an equation. If it is an equation, solve it. If it is an expression, simplify it as far as possible.

12. $\frac{6}{x} - \frac{2}{3x}$

13. $\frac{x-4}{5} = \frac{x+3}{6}$

14. $\frac{-5}{x+5} = \frac{x}{x+5} + 2$

15. $\frac{2x^2 - 3x}{20x^2 - 5x} \div \frac{2x^2 - 5x + 3}{4x^2 + 11x - 3}$

16. $\frac{\frac{1}{9} - \frac{1}{x^2}}{\frac{1}{3} + \frac{1}{x}}$

17. $\frac{x}{x-2} + \frac{3}{x+2} = \frac{8}{x^2-4}$

APPLICATIONS - Be sure to state your units with your answer. If an answer is an improper fraction write it as a mixed number in reduced form instead.

18. Samantha can row 4 miles per hour in still water. It takes as long to row 8 miles upstream as 24 miles downstream. How fast is the current?

19. With a riding lawn mower, Bob, the grounds-keeper at a large park, can cut the lawn in 8 hours. With a small mower, his assistant Andrew needs 14 hours to cut the same lawn. If both Andrew and Bob work on the lawn, how long will it take to cut it?

20. One roofer can put a new roof on a house three times faster than another. Working together they can roof a house in 4 days. How long would it take the slower roofer working alone?