

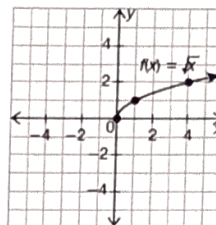
Are you the Keymaster?

Review - Radicals & Rational Exponents

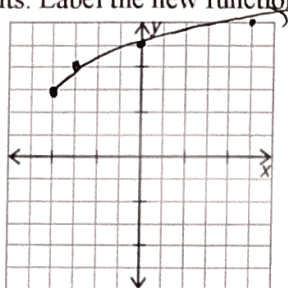
Use a separate sheet of paper. No work/answers written on this paper will be graded. You must show all work to receive credit!

1. (2.0) Find all the real square roots of $-\frac{4}{25}$. *None*
2. (2.0) Find the real-number root: $\sqrt[3]{-\frac{8}{125}}$ $-\frac{2}{5}$
3. (3.0) Simplify the radical expression: $\sqrt[4]{625x^{12}y^{16}}$ $5x^3y^4$
4. (2.0) Multiply and simplify: $\sqrt{22} \cdot \sqrt{2}$ $2\sqrt{11}$
5. (4.0) Simplify $\sqrt[3]{32a^{10}b^9}$. $2a^3b^3\sqrt[3]{4a}$
6. (4.0) Multiply and simplify $\sqrt[3]{7x^7} \cdot \sqrt[3]{9x^4}$. $x^3\sqrt[3]{63x^2}$
- #7-8. Divide and simplify. Assume that all variables are positive.
7. (3.0) $\frac{\sqrt[3]{162x^{19}}}{\sqrt[3]{2x}}$ $3x^6\sqrt[3]{3}$
8. (3.0) $\frac{\sqrt{120x^{18}}}{\sqrt{5x}}$ $2x^8\sqrt{6x}$
- #9-11. Rationalize the denominator of the expression.
9. (3.0) $\frac{\sqrt{6x^{12}y^9}}{\sqrt{5x^6y^4}}$ $\frac{3x^2\sqrt{30y}}{5}$
10. (4.0) $\frac{\sqrt[3]{5}}{\sqrt[3]{7}}$ $\frac{\sqrt[3]{245}}{7}$
11. (4.0) $\frac{5-\sqrt{3}}{4+\sqrt{3}}$ $\frac{17-9\sqrt{3}}{13}$
- #12-13. Add if possible.
12. (2.0) $6\sqrt{5x} + 3\sqrt{5x}$ $9\sqrt{5x}$
13. (2.0) $5\sqrt[4]{2x} + 5\sqrt[4]{7x}$ *Nope*
- #14-17. Simplify.
14. (3.0) $2\sqrt{80} + \sqrt{50} - 3\sqrt{20}$ $2\sqrt{5} + 5\sqrt{2}$
15. (2.0) $17^{\frac{1}{2}} \cdot 17^{\frac{1}{2}}$ 17
16. (3.0) $10^{\frac{1}{3}} \cdot 100^{\frac{1}{3}}$ 10
17. (2.0) $27^{\frac{2}{3}}$ 9
- #18-20. Multiply.
18. (3.0) $(-4 - \sqrt{2})(-7 + \sqrt{2})$ $26 + 3\sqrt{2}$
19. (3.0) $(-2 + \sqrt{5})^2$ $9 - 4\sqrt{5}$
20. (3.0) $(\sqrt{7} + \sqrt{2})(\sqrt{7} - \sqrt{2})$ 5
21. (4.0) Write $(8a^{-9})^{-\frac{2}{3}}$ in simplest form. $\frac{a^6}{4}$
- #22-24. Solve the equation.
22. (3.0) $\sqrt{x+5} - 3 = 6$ 76
23. (4.0) $(x+6)^{\frac{2}{5}} = 4$ 26
24. (4.0) $3(x-3)^{\frac{4}{3}} - 7 = 41$ 11
- #25-26. Solve. Check for extraneous solutions.
25. (3.0) $2x = \sqrt{30-2x}$ $5/2$
26. (3.0) $(7x-2)^{\frac{1}{3}} = (6-4x)^{\frac{1}{3}}$ $8/11$
27. (3.0) Joan's bedroom has a width of $\sqrt{5} m$ and a length of $5\sqrt{5} m$. What is the perimeter of the room? And what is the surface area of the floor? $P: 12\sqrt{5}m$ $A: 25m^2$
28. (2.0) Consider the function $f(x) = \sqrt[3]{x}$.
 - a. Describe the combination of transformations of this function that you can use to obtain the graph of the function $g(x) = \sqrt[3]{x+2} - 6$ from the graph of $f(x)$. $\leftarrow 2 \downarrow 6$
 - b. Describe the combination of transformations that you can use to obtain the graph of the function $h(x) = 2\sqrt[3]{x-3}$ from the graph of $f(x)$. $\sqrt[3]{}: 2 \rightarrow 3$

29. (2.0) The graph of the square root function, $f(x) = \sqrt{x}$, is shown.



a. Sketch the graph obtained by shifting the graph of $f(x)$ to the left 4 units and up 3 units. Label the new function $g(x)$.



b. Write an equation for the function $g(x)$.

$$g(x) = \sqrt{x+4} + 3$$

30. (3.0) Write the exponential expression $(4x)^{\frac{4}{3}}$ in radical form.

$$\sqrt[3]{4x^4}$$

#31 - 32. Sketch a graph the function.

31a. (2.0) $y = \frac{1}{4}\sqrt{x-1} + 4$



31b. (2.0) $y = -\sqrt{x+2} - 1$



32a. (2.0) $y = -3\sqrt[3]{x+1} - 2$



32b. (2.0) $y = \sqrt[3]{x-4} + 3$



Applications of Rational Functions Review:

Multiply or divide. State any restrictions on the variables.

33. $\frac{a^2}{a+3} \cdot \frac{a^2-2a-15}{a^2-1a} \cdot \frac{a^2-5a}{a-1}$

34. $\frac{w+2}{w+1} \div \frac{w-5}{w^2+3w+2} \cdot \frac{(w+2)^2}{w-5}$

Find the least common denominator.

35. $\frac{3}{x^2+x-12}; \frac{x}{x^2+2x-15} \quad (x+4)(x-3)(x+5)$

36. $\frac{3x}{x^2-11x+30}; \frac{-2}{x^2-10x+24} \quad (x-5)(x-4)(x-6)$

Add or subtract. Simplify if possible.

37. $\frac{7}{c+4} + \frac{1}{c^2-16} \quad \frac{7c-27}{c^2-16}$

38. $\frac{w^2-11w+24}{w^2-7w+12} - \frac{3}{w-4} \quad \frac{w^2-14w+35}{w^2-7w+12}$

39. Matthew can row 7 miles downstream in the same time it takes him to row 3 miles upstream. He rows downstream 5 miles/hour faster than he rows upstream. Find Matthew's rowing rate each way. Round your answers to the nearest tenth, if necessary. (Hint: You will need to make a table and use $d = rt$.)

DS: 8.8 mph US: 3.8 mph

Graphs of Rational Functions review

#40- 43: Use algebra to determine the vertical asymptotes and/or removable discontinuities (holes) and/or roots (if any) of each function. State the domain and range

40. $y = \frac{(x-4)(x+5)}{(x+5)(x-5)}$ VA: $x=5$ D: $x \neq 5$ or 5 RD: $x=5$ R: $y \neq 1$
 41. $y = \frac{x^2+2x+1}{x^2+x-6}$ VA: $x=3, 2$ D: $x \neq 3$ or 2 RD: $x=-1$ R: $y \neq 1$
 42. $y = \frac{6}{x^2-25}$ VA: $x=5, -5$ R: $(-\infty, \infty)$ D: $x \neq 5$ or 5

Polynomials Review: #43 - 45

43. Factor $x^3 + 216$

$$(x+6)(x^2-6x+36)$$

44. Find all the roots of the polynomial equation.

$$y = x^3 + 6x^2 + x - 34$$

$$x = 2, 4 \pm 2i$$

45. Given the zeros: $x = 2, x = -3, x = 4$, write out the polynomial function in standard form.

$$f(x) = x^3 - 3x^2 - 10x + 24$$