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Name: _____
Date: _____ Class: Math 3 Honors, per: _____

Radical Functions Study Guide & Review

Objective: I can identify the domain, range, intercepts, increasing interval, and decreasing interval of radical functions from equations.

1. For $f(x) = \sqrt{x-4}+2$, find the domain and range.	**2.** For $g(x) = -\sqrt{x+3}+5$, find the domain and range.
3. For $h(x) = 2\sqrt{x+1}-6$, find the x-intercept and y-intercept.	**4.** For $p(x) = -3\sqrt{x-2}+9$, find the x-intercept and y-intercept, if they exist.
5. For $f(x) = \sqrt{x+5}-1$, state the increasing interval and decreasing interval.	**6.** For $g(x) = -2\sqrt{x-7}+4$, state the increasing interval and decreasing interval.
7. For $r(x) = \sqrt[3]{x-1}+2$, find the domain, range, x-intercept, and y-intercept.	**8.** For $s(x) = \sqrt{2x+8}-3$, find the domain, range, x-intercept, and y-intercept.
9. For $m(x) = \sqrt{12-3x}+1$, find the domain, range, and interval of increase/decrease.	**10.** For $n(x) = -\sqrt{x-1}-4$, find the domain, range, and all intercepts.

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Objective: I can analyze transformations of radical functions, including horizontal shifts, vertical shifts, reflections, stretches, and compressions.

11. Describe the transformations from $y = \sqrt{x}$ to $y = \sqrt{x-6}+3$.	**12.** Describe the transformations from $y = \sqrt{x}$ to $y = -\sqrt{x+4}-2$.
13. Describe the transformations from $y = \sqrt{x}$ to $y = 4\sqrt{x+1}$.	**14.** Describe the transformations from $y = \sqrt{x}$ to $y = -\frac{1}{2}\sqrt{x-3}+7$.
15. Write the equation formed by shifting $y = \sqrt{x}$ right 5, down 1, and vertically stretching by a factor of 3.	**16.** Write the equation formed by reflecting $y = \sqrt{x}$ over the x-axis, shifting left 2, and shifting up 6.
17. For $f(x) = 3\sqrt{x-4}-2$, state the endpoint and describe the direction of the graph.	**18.** For $g(x) = -2\sqrt{x+7}-5$, state the endpoint and describe the direction of the graph.
19. Describe the transformations from $y = \sqrt[3]{x}$ to $y = 2\sqrt[3]{x-1}-4$.	**20.** Write a square-root function with endpoint $(3,-2)$ that passes through $(7,4)$.

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Objective: I can graph radical functions and write radical function equations from key features.

21. For $f(x) = \sqrt{x-1}+3$, list five key points using parent points $0, 1, 4, 9, 16$.	**22.** For $g(x) = -\sqrt{x+2}+4$, list five key points using parent points $0, 1, 4, 9, 16$.
23. For $h(x) = 2\sqrt{x+4}-1$, list five key points and state the domain and range.	**24.** Write the function with endpoint $(-5, 2)$, vertical compression by $\frac{1}{3}$, and reflection over the x-axis.
25. Write a square-root function with endpoint $(1, -3)$ that passes through $(10, 3)$.	**26.** Write a cube-root function with center $(2, -1)$, vertical stretch 4, and reflection over the x-axis.
27. For $y = \sqrt{x+6}-4$, find the domain, range, x-intercept, and y-intercept.	**28.** For $f(x) = \sqrt{9-x}+1$, find the domain, range, intercepts, and increasing/decreasing interval.
29. Find the inverse of $f(x) = \sqrt{x-5}+2$ and state the domain of f^{-1}.	**30.** A square-root graph has endpoint $(4, 1)$ and opens right and downward. Write a possible equation.

Radical Functions Study Guide & Review

Objective: I can solve radical equations algebraically and check for extraneous solutions.

31. Solve: $\sqrt{x+5} = 7$.	**32.** Solve: $\sqrt{2x-1} + 3 = 8$.
33. Solve: $2\sqrt{x-4} - 6 = 0$.	**34.** Solve and check: $\sqrt{x+1} = x - 1$.
35. Solve and check: $\sqrt{3x+4} = x + 2$.	**36.** Solve and check: $\sqrt{x+6} + 2 = x$.
37. Solve: $\sqrt{x+1} + \sqrt{x-4} = 5$.	**38.** Solve: $\sqrt[3]{2x-1} = 3$.
39. Solve and check: $(x+2)^{\frac{1}{2}} = x$.	**40.** Solve: $\sqrt{4x+9} - \sqrt{x+2} = 1$.

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Radical Functions Study Guide & Review

Objective: I can solve and interpret radical function problems involving inequalities, inverse functions, compositions, systems, and applications.

41. Solve the inequality: $\sqrt{x-2} < 4$.	**42.** Solve the inequality: $-\sqrt{x+1} + 5 \geq 2$.
43. Solve the inequality: $\sqrt{2x+3} \geq x$.	**44.** Find the inverse of $f(x) = 2\sqrt{x-1}+3$ and state the domain of the inverse.
45. If $f(x) = \sqrt{x+4}$ and $g(x) = x^2 - 1$, find $(f \circ g)(x)$ and its domain.	**46.** If $f(x) = \sqrt{x-3}$ and $g(x) = \sqrt{x+1}$, find $(f \circ g)(x)$ and its domain.
47. Find the intersection of $y = \sqrt{x+2}$ and $y = x$.	**48.** A dropped-object model is $t(d) = \sqrt{\frac{d}{16}}$, where d is distance in feet. Find $t(144)$ and the contextual domain.
49. The radius of a sphere is $r(V) = \sqrt[3]{\frac{3V}{4\pi}}$. Find $r(36\pi)$.	**50.** A square garden has side length $s(x) = \sqrt{x+5}$. Find the domain in context and solve $s(x) = 9$.

Other topics for review:

- Know square-root and cube-root parent graphs and their transformations.
- Remember that even-index radicals require the radicand to be nonnegative.
- Check radical equation solutions because squaring can create extraneous solutions.
- Review interval notation, intercepts, inverse functions, and composition of functions.
- Be able to explain increasing and decreasing intervals from equations and graphs.