Algebra 2
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Recall:
Domain = the set of all x-values for a function.
Range = the set of all y-values for a function.
Radicand = the quantity inside the radical sign.

1. Even Indexed Radicals may not contain a negative value. The range is all non-negative values.

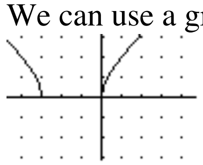
2. Odd Indexed Radical may contain any real value. The range is all real values.

3. $f(x) = \sqrt[4]{x-7}$ Since the index, 4, is even, $x - 7 \geq 0 \rightarrow x \geq 7 \rightarrow$ Domain: $x \geq 7$
Range: $y \geq 0$

4. $h(x) = \sqrt[5]{2x-3}$ Since the index, 5, is even, Domain: All Real Numbers
Range: All Real Numbers

5. $f(x) = \sqrt[6]{3x+12} + 7$ Since the index, 6, is even, $3x + 12 \geq 0 \rightarrow 3x \geq -12 \rightarrow$ Domain: $x \geq -4$
Because the function is 7 units up, Range: $y \geq 0 + 7 \rightarrow y \geq 7$

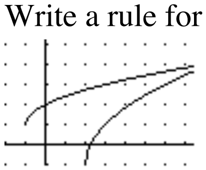
6. $f(x) = \sqrt{x^2 + 3x}$ Since the index, 2, is even, $x^2 + 3x \geq 0 \rightarrow x(x+3) \geq 0$
We can use a graphing calculator to graph the function.



Domain: $x \leq -3$ and $x \geq 0$
Range: $y \geq 0$

7. $f(x) = 2\sqrt[3]{x-5} - 6$. Write the function $g(x)$ that is a translation 7 units left, 10 units up, followed by a horizontal shrink by a factor of 1/3.
Answer: $g(x) = 2\sqrt[3]{3x+2} + 4$

8. Write a rule for $g(x)$, based on the graphs of $f(x)$ and $g(x)$. The top graph represents $f(x) = \sqrt{x+1} + 1$.



Solution: There is a translation 3 units right and 2 units down. Notice that from the start of $f(x)$, 1 unit right results in 1 unit up. From the start of $g(x)$, 1 unit right results in 2 units up, so there is a vertical stretch by a factor of 2. Therefore: $g(x) = 2\sqrt{x-2} - 1$.

#'s 1-6: Use a graphing calculator to find the domain and range of the function.

1. $g(x) = \sqrt{x^2 + x}$ ____________________

2. $f(x) = \sqrt[3]{x^2 + x}$ ____________________

3. $f(x) = \sqrt[3]{x^2 + x}$ ____________________

4. $f(x) = \sqrt[3]{3x^2 - x}$ ____________________

5. $f(x) = \sqrt{2x^2 + x + 1}$ ____________________

6. $h(x) = \sqrt[3]{\frac{1}{2}x^3 - 3x + 4}$ ____________________

#'s 7-10: Choose from the following missing words: *sometimes*, *always*, or *never*.

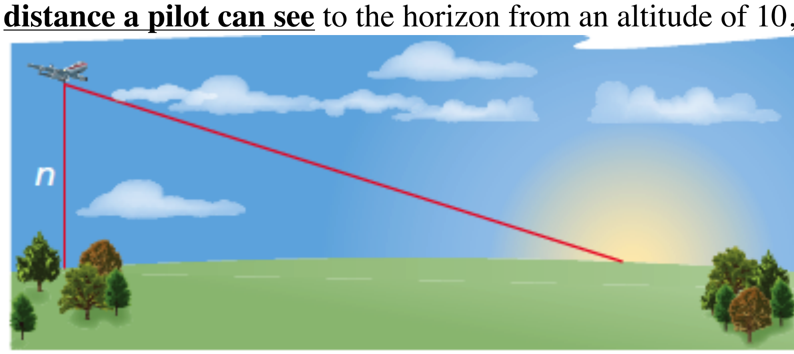
7. The domain of the function $y = a\sqrt{x}$ is __ $x \geq 0$. ____________________

8. The range and domain of the function $y = a\sqrt{x}$ is __ $y \geq 0$. ____________________

9. The domain and range of the function $y = \sqrt[3]{x - h} + k$ are ___ all real numbers. ____________________

10. The domain of the function $y = a\sqrt{(-x)} + k$ is ___ $x \geq 0$. ____________________

11. The distance (in miles) a pilot can see to the horizon can be approximated by $E(n) = 1.22\sqrt{n}$, where n is the plane's altitude (in feet above sea level) on Earth. The function $M(n) = 0.75E(n)$ approximates the distance a pilot can see to the horizon n feet above the surface of Mars. **Write a rule for *M***. What is the **distance a pilot can see** to the horizon from an altitude of 10,000 feet above Mars?



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12. If you know the speed of sound waves v (in meters per second) in air, you can approximate the air temperature K (in kelvin) by using the equation $K(v) = \dfrac{v^2}{402.3}$. The function $C(v) = K(v) - 273.15$ approximates the air temperature (in degrees Celsius) when sound waves travel v meters per second. Write a rule for C. What is the air temperature (in degrees Celsius) when sound waves travel 350 meters per second?

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Write the rule for g described by the transformation of the graph f.

13. Let g be a vertical stretch by a factor of 2, followed by a translation 2 units up of the graph of $f(x) = \sqrt{x} + 3$.

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14. Let g be a reflection in the y-axis, followed by a translation 1 unit right of the graph of $f(x) = 2\sqrt[3]{x-1}$.

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15. Let g be a horizontal shrink by a factor of 2/3, followed by a translation 4 units left of the graph of $f(x) = \sqrt{6x}$.

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16. Let g be a translation 1 unit down and 5 units right, followed by a reflection in the x-axis of the graph of $f(x) = -\dfrac{1}{2}\sqrt[4]{x} + \dfrac{3}{2}$.

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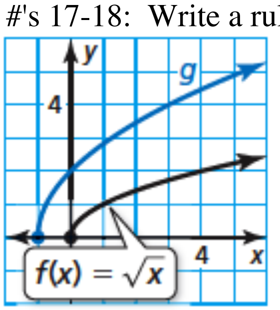
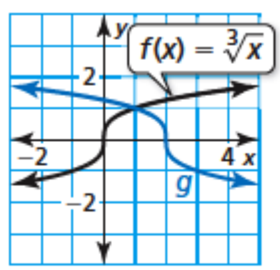
#'s 17-18: Write a rule for g.





17. ____________________.

18. ____________________.

#'s 19-22: Write a rule for g that represents the indicated transformation of the graph of f.

19. $f(x) = 2\sqrt{x}$, $g(x) = f(x+3)$ ____

20. $f(x) = \dfrac{1}{3}\sqrt{x-1}$, $g(x) = -f(x) + 9$ ____

21. $f(x) = -\sqrt{x^2 - 2}$, $g(x) = -2f(x+5)$ ____

22. $f(x) = \sqrt[3]{x^2 + 10x}$, $g(x) = \dfrac{1}{4}f(-x) + 6$ ____