Graph the following functions, without a graphing calculator, and label the given items.

1. \( y = \sqrt{x - 2} + 3 \)  
   D:  
   R:  
   Starting Point:  
   Translation:  
   End Behavior:  

2. \( y = -\sqrt{x + 1} - 4 \)  
   D:  
   R:  
   Starting Point:  
   Translation:  
   End Behavior:  

3. \( y = \frac{3}{2}x + 2 - 5 \)  
   D:  
   R:  
   Turning Point:  
   Translation:  
   End Behavior:  

4. \( y = -\frac{3}{2}x - 5 + 2 \)  
   D:  
   R:  
   Turning Point:  
   Translation:  
   End Behavior:  

For questions 5-6, write the equation of the translated function.

5.  

6.  

5.  

6.  

7. Describe what each part of the translated function \( f(x) = a\sqrt{x-h} + k \) does to the parent function \( f(x) = \sqrt{x} \).

Solve the following radical equations. Be sure to check your solutions.

8. \( \sqrt{2x-7} = x-5 \)  

8. ______________________

9. \( \sqrt{2x+3} = \sqrt{x+1} + 1 \)  

9. ______________________

10. When solving the equation \( x + 3 = \sqrt{-3x-5} \), you get \( x = -7 \) and \( x = -2 \). Determine which is the extraneous solution and explain why.

11. Find the solutions to the system.

\[ \frac{1}{3}x + 7 = \sqrt[3]{x + 4} + 5 \]  

11. ______________________
12. A particular jeweler uses the formula \( d = \frac{\sqrt[3]{4w}}{0.02847} \) to relate the average diameter \( (d) \) of a cultured pearl in millimeters to its weight \( (w) \) in carats. The jeweler sells the pearls to customers for $3.50 per carat. How much would a cultured pearl with a 7.1 mm average diameter cost?

13. Let \( f(x) = 16x^5 \) and \( g(x) = \frac{4}{x} \). Find \( g(f(x)) \).

   a. \( g(f(x)) = \frac{5\sqrt{x}}{4x} \)
   b. \( g(f(x)) = \frac{16\cdot\sqrt[5]{16x}}{x} \)
   c. \( g(f(x)) = \frac{\sqrt[5]{16x}}{4x} \)
   d. \( g(f(x)) = \frac{64\cdot\sqrt[5]{x^2}}{x} \)

14. Determine whether \( f(x) = x - 3 \) and \( g(x) = -x + 3 \) are inverse functions.

   a. \( f(x) \) and \( g(x) \) are inverse functions because \( f(x) - g(x) = 0 \)
   b. \( f(x) \) and \( g(x) \) are inverse functions because \( f(g(x)) = x \)
   c. \( f(x) \) and \( g(x) \) are not inverse functions because \( f(g(x)) \) does not equal \( x \)
   d. \( f(x) \) and \( g(x) \) are inverse functions because \( f(g(x)) = -x \)

15. Solve: \( 1.25^{2x+1} = \left( \frac{125}{64} \right)^{-x-3} \)
Answer Key

1. \[ y = \sqrt{x - 2} + 3 \]
   D: \( x \geq 2 \)
   R: \( y \geq 3 \)
   Starting Point: (2,3)
   Translation: 2R, 3U
   End Behavior:
   \[ x \to +\infty \Rightarrow f(x) \to +\infty \]
   \[ x \to 2 \Rightarrow f(x) \to 3 \]

2. \[ y = -\sqrt{x + 4} - 1 \]
   D: \( x \geq -1 \)
   R: \( y \leq -4 \)
   SP: (-1,-4)
   Trans: 1L, 4D
   End Behavior:
   \[ x \to -1 \Rightarrow f(x) \to -4 \]
   \[ x \to +\infty \Rightarrow f(x) \to -\infty \]

3. \[ y = \sqrt[3]{x + 2} - 5 \]
   D: All Real #'s
   R: All Real #'s
   Turning Point: (-2,-5)
   Translation: 2L, 5D
   End Behavior:
   \[ x \to -\infty \Rightarrow f(x) \to -\infty \]
   \[ x \to +\infty \Rightarrow f(x) \to +\infty \]

4. \[ y = -\sqrt[3]{x - 5} + 2 \]
   D: All Real #'s
   R: All Real #'s
   Turning Point: (5,2)
   Trans: 5R, 2U
   End Behavior:
   \[ x \to -\infty \Rightarrow f(x) \to +\infty \]
   \[ x \to +\infty \Rightarrow f(x) \to -\infty \]

5. \[ f(x) = -\sqrt{x + 6} - 1 \]
6. \[ f(x) = \sqrt[3]{x + 6} + 1 \]
7. If \( a \) is > 1 there is a vertical stretch. If 0<\( a <1 \) there is a vertical compression. If \( a \) is negative then the graph is reflected. \( h \) moves the graph right or left (don’t forget to change the sign). \( k \) moves the graph up or down.
8. 8
9. 3,-1
10. \( x = -7 \) is extraneous because square roots cannot equal a negative number
11. 
   (-3, 6)

12. $8.92
13. A
14. C
15. -2