Solve each equation. Write all answers in simplified root form.

1. \(x^3 = 125\)  
2. \(5x^4 = 1080\)  
3. \((x - 5)^3 = 256\)

4. \(3x^5 = -72\)  
5. \(2x^6 - 72 = 282\)  
6. \(4(x - 7)^2 + 4 = 1\)

7. \(x^6 + 36 = 100\)  
8. \(- (x - 6)^3 - 4 = -3\)  
9. \(x^5 = -48\)

Solve each problem. Decimal answers are okay!

10. The shot put used in men’s shot put has a volume of about 905 cubic centimeters. Find the radius of the shot put using the formula \(V = \frac{4}{3}\pi r^3\).
11. A weir is a dam that is built across a river to regulate the flow of water. The flow rate $Q$ (in cubic feet per second) can be calculated using the formula $Q = 3.367ld^2$ where $l$ is the length (in feet) of the bottom of the spillway and $d$ is the depth (in feet) of the water on the spillway. Determine the flow rate $Q$ of a weir with a spillway that is 20 feet long and has a water depth of 5 feet.

12. An exercise ball is made from 7854 square centimeters of material. Find the diameter of the ball. Use the formula $S = \frac{4}{3}\pi r^2$ for the surface area of the sphere.

Review: Simplify each radical expression.

13. $3\sqrt{336}$
14. $3\sqrt{3x} + \sqrt{27x}$
15. $\frac{1}{\sqrt{2}}$
16. $\frac{3\sqrt{5}}{2 - \sqrt{5}}$
17. $(\sqrt{x - 3} + 2)^2$
18. $(3 - 2\sqrt{5})(1 + \sqrt{2})$