1. Width = 4, Height = 8. \((-2 \leq x \leq 2, 0 \leq y \leq 8\) \(A_{\text{max}} = 32\).

2. 5 m perpendicular to the river by 10 m parallel to the river. \(A_{\text{max}} = 50\) m\(^2\).

3. Width = 10 in, length = 20 in, height = 20/3 in. \(V_{\text{max}} = 4000/3\) in\(^3\).

4. Base = 4 in \times 4 in, height = 2 in. \(A_{\text{min}} = 48\) in\(^2\).

5. Radius of can = \(10/\sqrt[3]{2\pi} \approx 5.419\) cm, height = \(10\sqrt[3]{4/\pi} \approx 10.839\) cm.

6. Width = \(2r/\sqrt{3}\), depth = \(2r\sqrt{2/3}\).

7. Maximum reaction at \(x = a/2\).

8. a. Optimal concentration \(c = 0.1\) M, \(P_{\text{max}} = 50\) organisms/cm\(^2\).
   
   b.

   ![Graph](image)

9. Maximum profit when \(x = r/2\) is the harvesting effort, resulting in \(K/2\) fish in the population.

   Maximum number of fish when harvesting effort \(x = 0\), with equilibrium population of fish at \(K\), the carrying capacity.
10. a. Optimal age is $x = e \cdot b^{-1/c}$. For parameters in Part b. this is $x = 0.582$.

b.