AP Calculus Name____________________Pd.__
Optimization Day 7 Application of
Derivatives

1. A box with a square base and open top must have a volume of 32,000 cm^3. Find the dimensions of the box that minimize the amount of material used. **Answer:** $40 \cdot 40 \cdot 20$

2. If 1200 cm^2 of material is available to make a box with a square base and an open top, find the largest possible volume of the box. **Answer:** $20 \cdot 10$

3. A rectangular storage container with an open top is to have a volume of 10 m^3. The length of its base is twice the width. Material for the base costs $10 per square meter. Material for the sides cost $6 per square meter. Find the cost of materials for the cheapest such container. **Answer:** $163.54

4. Find the dimensions of the rectangle of largest area that can be inscribed in a circle of radius r. **Answer:** $\ell \cdot w = 2r\sqrt{\frac{1}{2}} \cdot 2r\sqrt{\frac{1}{2}}$

AP Calculus Name____________________Pd.__
Optimization Day 7 Application of
Derivatives

5. Find the point on the parabola $y = x^2 - 6$ that is closest to the point (0, 3).

Answer: $\left(\pm\sqrt{\frac{17}{2}}, \frac{5}{2}\right)$

6. A farmer has 3600 ft of fencing and wants to fence off a rectangular field that borders a straight river. He needs no fencing along the river. What are the dimensions of the field that has the largest area? **Answer:** $900 \cdot 1800 \cdot 900$

7. A rectangular storage container with open top is to have a volume of 800 m^3. The length of its base is three times the width. Material for the base costs \$25 per square meter. Material for the sides costs \$15 per square meter. Find the cost of materials for the cheapest such container. **Answer:** \$8033.20