

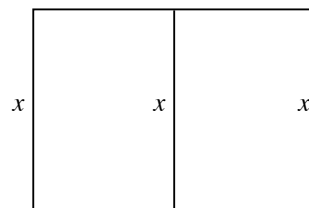
Please read directions carefully. Raise your hand if you are not sure what a problem is asking. You must explain your work thoroughly and unambiguously to receive full credit on questions or parts of questions designated as **Work and Answer**.

**No calculators or notes are allowed on this quiz.**

**Multiple Choice.** (10 points) *Circle the letter of the best answer.*

- Tinkle Winkle Company makes wooden music boxes with glass tops. Wood costs \$4 per square foot and glass costs \$2.50 per square foot. The music mechanism requires 10 cubic inches of space inside each music box. Tinkle Winkle Company wishes to figure out the dimensions of a music box which will minimize the cost per box. The objective of the problem is
  - to minimize the surface area of each music box
  - to maximize the profit from selling the music boxes
  - to minimize the cost of producing the music boxes
  - to maximize the volume of each music box
- A contractor wishes to build a rectangular enclosure with a partition, as shown. She has 4000 ft. of fencing and wishes to maximize the area enclosed. The formula for the area in terms of the width  $x$  is

- $A(x) = x(2000 - \frac{3}{2}x)$
- $A(x) = x(4000 - x)$
- $A(x) = x(8000 - 3x)$
- $A(x) = 3x + 2y$



**Work and Answer.** (10 points) *You must show all relevant work to receive full credit. You may use the back if you need more room.*

If 2400 cm<sup>2</sup> of sheet metal are available to make a box with a square base and open top, the volume of the box is  $V(x) = 600x - \frac{1}{4}x^3$  (where  $x$  represents the length of the base of the box). Use this formula to find the value of  $x$  that will give the largest possible volume of the box.