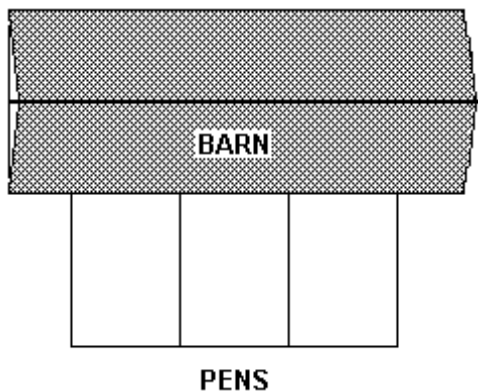


Optimization Problems

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

- 1) A carpenter is building a rectangular room with a fixed perimeter of 100 feet. What are the dimensions of the largest room that can be built? What is its area? 1) _____
 A) 10 ft by 90 ft; 900 ft² B) 25 ft by 25 ft; 625 ft²
 C) 50 ft by 50 ft; 2500 ft² D) 25 ft by 75 ft; 1875 ft²
- 2) A carpenter is building a rectangular room with a fixed perimeter of 400 feet. What are the dimensions of the largest room that can be built? What is its area? 2) _____
 A) 100 ft by 100 ft; 10,000 ft² B) 100 ft by 300 ft; 30,000 ft²
 C) 200 ft by 200 ft; 40,000 ft² D) 40 ft by 360 ft; 14,400 ft²
- 3) From a thin piece of cardboard 30 inches by 30 inches, square corners are cut out so that the sides can be folded up to make a box. What dimensions will yield a box of maximum volume? What is the maximum volume? Round to the nearest tenth, if necessary. 3) _____
 A) 10 in. by 10 in. by 10 in.; 1000 in.³ B) 20 in. by 20 in. by 10 in.; 4000 in.³
 C) 20 in. by 20 in. by 5 in.; 2000 in.³ D) 15 in. by 15 in. by 7.5 in.; 1687.5 in.³
- 4) From a thin piece of cardboard 10 inches by 10 inches, square corners are cut out so that the sides can be folded up to make a box. What dimensions will yield a box of maximum volume? What is the maximum volume? Round to the nearest tenth, if necessary. 4) _____
 A) 6.7 in. by 6.7 in. by 3.3 in.; 148.1 in.³ B) 3.3 in. by 3.3 in. by 3.3 in.; 37 in.³
 C) 5 in. by 5 in. by 2.5 in.; 62.5 in.³ D) 6.7 in. by 6.7 in. by 1.7 in.; 74.1 in.³
- 5) A farmer decides to make three identical pens with 88 feet of fence. The pens will be next to each other sharing a fence and will be up against a barn. The barn side needs no fence. 5) _____

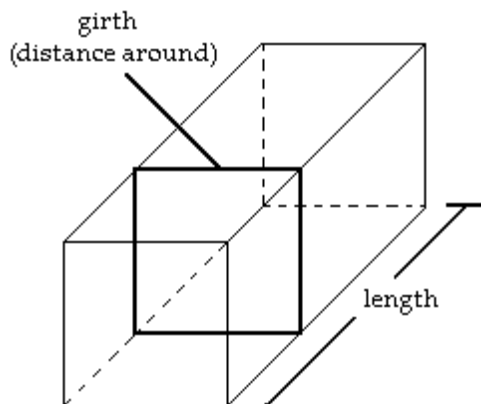


What dimensions for the total enclosure (rectangle including all pens) will make the area as large as possible?

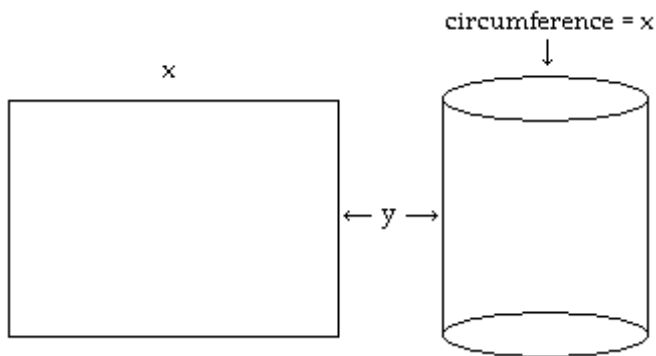
- | | |
|-------------------------|-------------------|
| A) 14.67 ft by 73.33 ft | B) 11 ft by 44 ft |
| C) 11 ft by 11 ft | D) 22 ft by 22 ft |

- 12) The cost of a computer system increases with increased processor speeds. The cost C of a system as a function of processor speed is estimated as $C = 5S^2 - 4S + 1000$, where S is the processor speed in MHz. Find the processor speed for which cost is at a minimum. 12) _____
- A) 0.2 MHz B) 0.4 MHz C) 3.2 MHz D) 8 MHz

- 13) A private shipping company will accept a box for domestic shipment only if the sum of its length and girth (distance around) does not exceed 114 inches. What dimensions will give a box with a square end the largest possible volume? 13) _____



- A) 19 in. by 38 in. by 38 in. B) 38 in. by 38 in. by 38 in.
C) 19 in. by 19 in. by 38 in. D) 19 in. by 19 in. by 95 in.
- 14) A rectangular sheet of perimeter 27 centimeters and dimensions x centimeters by y centimeters is to be rolled into a cylinder as shown in the figure. What values of x and y give the largest volume? 14) _____



- A) $x = 10$ cm; $y = \frac{7}{2}$ cm B) $x = 9$ cm; $y = \frac{9}{2}$ cm
C) $x = 8$ cm; $y = \frac{11}{2}$ cm D) $x = 11$ cm; $y = \frac{5}{2}$ cm
- 15) If the price charged for a candy bar is $p(x)$ cents, then x thousand candy bars will be sold in a certain city, where $p(x) = 113 - \frac{x}{14}$. How many candy bars must be sold to maximize revenue? 15) _____
- A) 1582 candy bars B) 791 candy bars
C) 1582 thousand candy bars D) 791 thousand candy bars

Answer Key

Testname: OPTIMIZATION PROBLEMS

- 1) B
- 2) A
- 3) C
- 4) D
- 5) B
- 6) D
- 7) D
- 8) C
- 9) C
- 10) A
- 11) A
- 12) B
- 13) C
- 14) B
- 15) D