

4.6: Applied Optimization

Solve the problem.

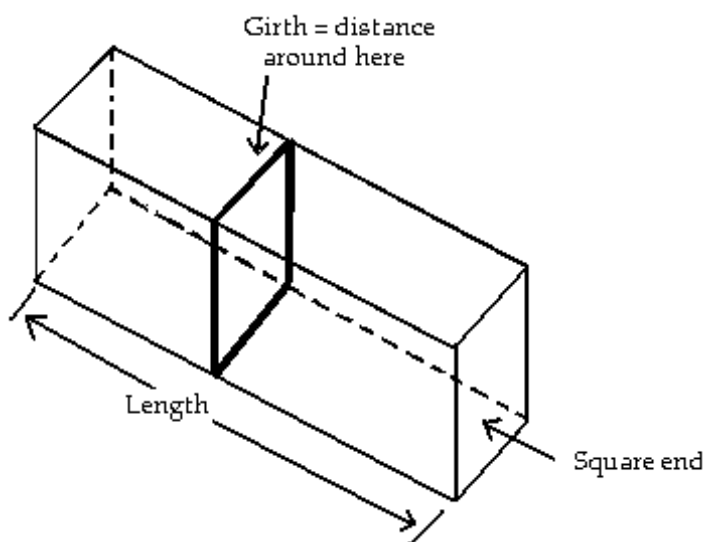
1) A company is constructing an open-top, square-based, rectangular metal tank that will have a volume of 43 ft^3 . What dimensions yield the minimum surface area? Round to the nearest tenth, if necessary.

1) _____

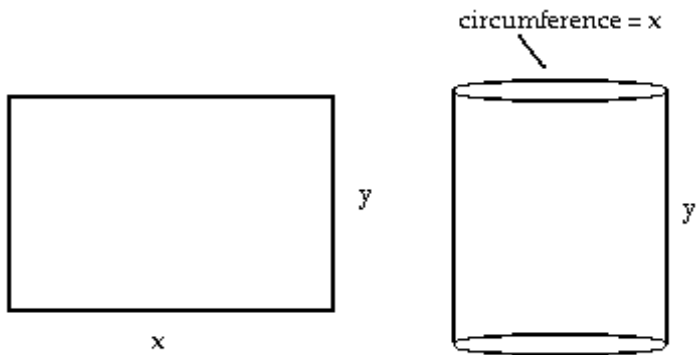
A) $4.4 \text{ ft} \times 4.4 \text{ ft} \times 2.2 \text{ ft}$ B) $9.3 \text{ ft} \times 9.3 \text{ ft} \times 0.5 \text{ ft}$ C) $5.1 \text{ ft} \times 5.1 \text{ ft} \times 1.7 \text{ ft}$ D) $3.5 \text{ ft} \times 3.5 \text{ ft} \times 3.5 \text{ ft}$

2) 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 120 in. What dimensions will give a box with a square end the largest possible volume?

2) _____

A) $20 \text{ in.} \times 40 \text{ in.} \times 40 \text{ in.}$ B) $20 \text{ in.} \times 20 \text{ in.} \times 100 \text{ in.}$ C) $20 \text{ in.} \times 20 \text{ in.} \times 40 \text{ in.}$ D) $40 \text{ in.} \times 40 \text{ in.} \times 40 \text{ in.}$

3) A rectangular sheet of perimeter 39 cm and dimensions x cm by y cm is to be rolled into a cylinder as shown in part (a) of the figure. What values of x and y give the largest volume? 3) _____

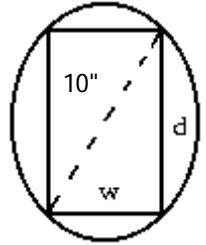


- A) $x = 14$ cm; $y = \frac{11}{2}$ cm
- B) $x = 13$ cm; $y = \frac{13}{2}$ cm
- C) $x = 15$ cm; $y = \frac{9}{2}$ cm
- D) $x = 12$ cm; $y = \frac{15}{2}$ cm

4) Determine the dimensions of the rectangle of largest area that can be inscribed in a semicircle of radius 3. 4) _____

- A) $h = 3\sqrt{2}$, $w = \sqrt{2}$
- B) $h = \sqrt{2}$, $w = 3\sqrt{2}$
- C) $h = 3\sqrt{2}$, $w = \frac{3\sqrt{2}}{2}$,
- D) $h = \frac{3\sqrt{2}}{2}$, $w = 3\sqrt{2}$

5) The stiffness of a rectangular beam is proportional to its width times the cube of its depth. Find the dimensions of the stiffest beam that can be cut from a 10-in.-diameter cylindrical log. (Round answers to the nearest tenth.) 5) _____



- A) $w = 6.0$ in.; $d = 9.7$ in.
- B) $w = 5.0$ in.; $d = 8.7$ in.
- C) $w = 6.0$ in.; $d = 7.7$ in.
- D) $w = 4.0$ in.; $d = 9.7$ in.

Answer Key

Testname: PRACTICE18

- 1) A
- 2) C
- 3) B
- 4) D
- 5) B