

Solutions

Each answer shows the steps, then the **result**.

2.1

- Perimeter $2x + 2w = 24 \Rightarrow \text{length} = 12 - x$; $A = x(12 - x) = 12x - x^2$

2.2

- Height from $x^2h = 32$, so $h = 32/x^2$; $S = x^2 + 4x\left(\frac{32}{x^2}\right) = x^2 + \frac{128}{x}$

2.3

- $0 < y < 20$

3.1 B

- reduce to a single variable using the constraint before differentiating

3.2

(a)

- $h = \frac{355}{\pi r^2}$; $S(r) = 2\pi r^2 + 2\pi r\left(\frac{355}{\pi r^2}\right) = 2\pi r^2 + \frac{710}{r}$

(b)

- $r > 0$

3.3

- $h = \frac{600 - x^2}{4x}$; $V = x^2h = x^2\left(\frac{600 - x^2}{4x}\right) = \frac{600x - x^3}{4} = 150x - \frac{1}{4}x^3$