

Exercise 56

A spherical balloon is being inflated and the radius of the balloon is increasing at a rate of 2 cm/s.

- (a) Express the radius r of the balloon as a function of the time t (in seconds).
 - (b) If V is the volume of the balloon as a function of the radius, find $V \circ r$ and interpret it.
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Solution

The radius grows a rate of 2 centimeters per second.

$$r(t) = 2t \text{ cm}$$

The volume of a sphere is given by

$$V(r) = \frac{4}{3}\pi r^3$$

as a function of radius. The composition $V \circ r$ gives the volume (in cubic centimeters) as a function of time.

$$V \circ r = V(r(t)) = \frac{4}{3}\pi[r(t)]^3 = \frac{4}{3}\pi(2t \text{ cm})^3 = \frac{32}{3}\pi t^3 \text{ cm}^3$$