Answer on Question #50587 – Math – Calculus

The volume, V cm^3, of a cube at time t seconds is given by

$$V = \left(4 + \frac{1}{3}t\right)^3.$$

The rate at which its volume is increasing at the instant when t = 2.

Solution

The rate of change of volume V is

$$\frac{dV}{dt}(t) = \frac{d}{dt}\left(\left(4 + \frac{1}{3}t\right)^3\right) = 3\left(4 + \frac{1}{3}t\right)^2 \frac{d}{dt}\left(4 + \frac{1}{3}t\right) = 3\left(4 + \frac{1}{3}t\right)^2 \frac{1}{3} = \left(4 + \frac{1}{3}t\right)^2.$$

The rate at which its volume is increasing at the instant when $t = 2$ is

$$\frac{dV}{dt}(2) = \left(4 + \frac{1}{3}2\right)^2 = \left(\frac{14}{3}\right)^2 = 21.78\ \frac{cm^3}{s}.$$

Answer: $21.78\ \frac{cm^3}{s}$.