Related Rates

is being pumped into a spherical balloon at a rate of 4.5 cubic inches per minute. Find the rate of change of the radius when the radius is 2 inches.

V = volume of the balloon
r = radius
$\frac{dV}{dt} = \frac{9}{2}$

given rate $\frac{dV}{dt} = \frac{9}{2}$

find: $\frac{dr}{dt}$ when $r = 2$

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

$$\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}$$

$$\left(\frac{dV}{dt}\right)$$

$$\frac{dr}{dt} = \frac{1}{4\pi(2)^2}\left(\frac{9}{2}\right)$$

$$\approx 0.09 \text{ inches per minute}$$