Air is being blown into a spherical balloon at a rate of $1000 cm^3/s$. How fast is the radius growing when $r = 8cm$? What about the surface area?

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$V = \frac{4}{3}\pi r^3$, $SA = 4\pi r^2$

$\frac{dV}{dt} = 1000$

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

$\frac{dV}{dt} = \frac{dV}{dr} \times \frac{dr}{dt}$

$1000 = 4\pi(8)^2 \times \frac{dr}{dt}$

$\therefore \frac{dr}{dt} = \frac{250}{\pi \cdot 64}$

$= \frac{125}{32\pi}$ cm/s

$\therefore \frac{dSA}{dt} = \frac{dSA}{dr} \times \frac{dr}{dt}$

$= 8\pi r \times \frac{125}{32\pi}$

$= \frac{125(8)}{4}$

$= 250\ cm^2/s$