4 A cylindrical ice block of base radius r cm is melting in such a way that the total surface area, A cm^2, is decreasing at a constant rate of 72 cm^2/s. Given that the height is twice the radius and assuming that the ice block retains its shape, calculate the rate of change of r when $r = 5$. [4]

4 A cylindrical ice block of base radius r cm is melting in such a way that the total surface area, A cm^2, is decreasing at a constant rate of 72 cm^2/s. Given that the height is twice the radius and assuming that the ice block retains its shape, calculate the rate of change of r when $r = 5$. [4]

Given $\frac{dA}{dt} = 72 \text{ cm}^2/\text{s}$

$r = 5 \text{ cm}$

Question $\frac{dr}{dt} = ? \text{ cm/s}$

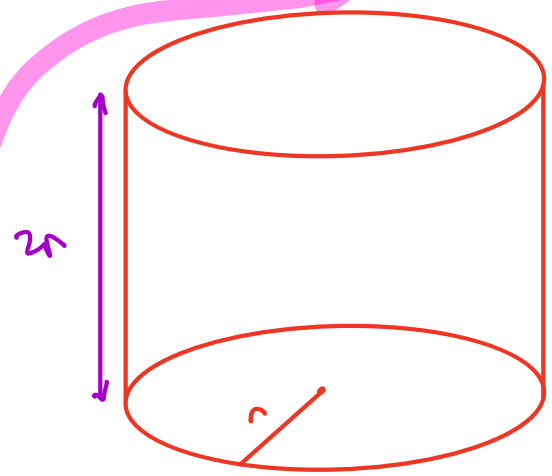
$\frac{dA}{dt} = \frac{dA}{dr} \times \frac{dr}{dt}$ Chain Rule

$72 = 12\pi(5) \times \frac{dr}{dt}$

$\frac{6}{5\pi} = \frac{dr}{dt}$

$\therefore \frac{dr}{dt} = \frac{6}{5\pi} \text{ cm/s}$ // Ans

we missing $\frac{dA}{dr}$



to get $\frac{dA}{dr}$,

$A = 2\pi r^2 + 2\pi r(2r)$

$A = 2\pi r^2 + 4\pi r^2$

$\therefore A = 6\pi r^2$

Hence, $\frac{dA}{dr} = 12\pi r$