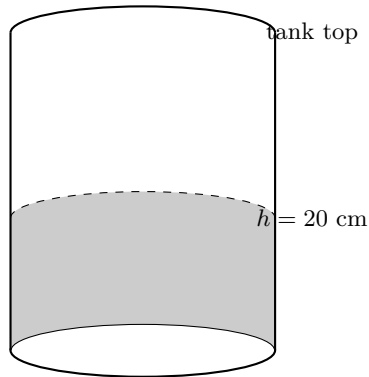


Question 3**Problem:**

Water is being poured into a cylindrical tank at a rate of $500 \text{ cm}^3/\text{s}$. The tank has a radius of 10 cm. How fast is the water level rising when the water is 20 cm deep?



Question 3 - Solution

The volume of a cylinder is:

$$V = \pi r^2 h$$

Given: $\frac{dV}{dt} = 500$, $r = 10$, $h = 20$

We differentiate with respect to time:

$$\frac{dV}{dt} = \pi r^2 \frac{dh}{dt} \Rightarrow 500 = \pi (10)^2 \frac{dh}{dt} \Rightarrow 500 = 100\pi \frac{dh}{dt} \Rightarrow \frac{dh}{dt} = \frac{500}{100\pi} = \frac{5}{\pi}$$

Answer:

$\frac{dh}{dt} = \frac{5}{\pi} \text{ cm/sec}$
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