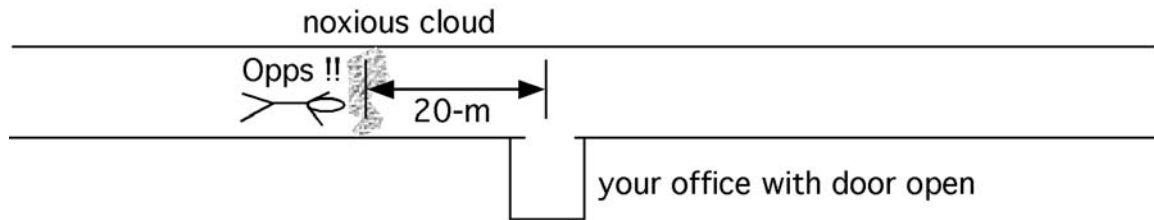


Problem 3.2

A friend of yours is coming to meet you at your office, which is located mid-way along a very long (100-m) hallway. In preparation for a small prank, he is carrying a vial containing 10-g of a noxious smelling gas. He trips 20-m before reaching your office door, and the vial breaks. The gas rapidly mixes vertically and horizontally within the hallway, which is 2-m wide and 3-m high. The human nose will detect the gas at concentrations greater than 10- $\mu\text{g}/\text{l}$. Assume an isotropic diffusion, $D = 0.05 \text{ m}^2/\text{s}$.



What [governing equation](#) describes the evolution of the gas concentration in the hall?

At [what time](#) after the spill do you smell the gas?

[When](#) does the smell, as perceived by humans, disappear from the hallway?