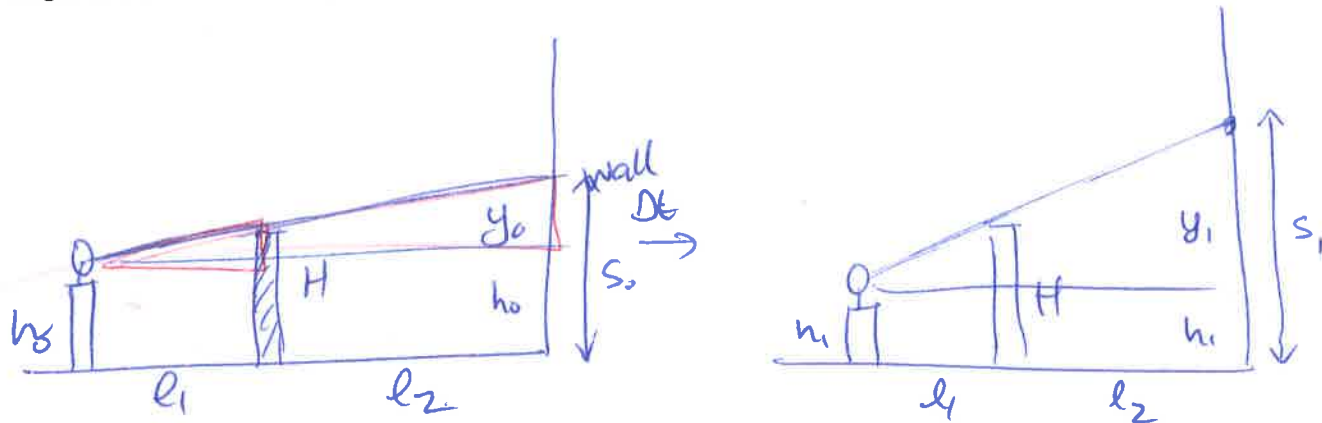


In Class Evidence

1. A candle is placed a distance l_1 from a thin block of wood of height H . The block is a distance l_2 from a wall. The candle burns down so that the height of the flame, h , decreases at the rate of 3 cm/hr. Find the rate at which the length of the shadow cast by the block on the wall increases.



$$\Delta s = s_1 - s_0$$

$$\Delta s = y_1 + h_c - y_0 - h_0 = \Delta y + \Delta h$$

$$\frac{y}{l_1 + l_2} = \frac{H - h}{l_1} \quad \frac{d}{dt} (y l_1 = (H - h)(l_1 + l_2))$$

$$l_1 \frac{dy}{dt} = (l_1 + l_2) \left(-\frac{dh}{dt} \right)$$

$$\frac{ds}{dt} = \frac{dy}{dt} + \frac{dh}{dt}$$

$$= \left(\frac{l_1 + l_2}{l_1} \right) \left(-\frac{dh}{dt} \right) + \frac{dh}{dt}$$

$$\frac{ds}{dt} = -\frac{l_2}{l_1} \frac{dh}{dt} = 3 \frac{l_2}{l_1} \text{ cm/hr}$$

2. Coffee is draining from a conical filter into a cylindrical coffee pot at a rate of $10 \text{ in}^3/\text{min}$. If the filter and coffee pot each have a height and radius of 6 inches. In the instant that the coffee in the filter is 5 inches deep:
- How fast is the level in the pot rising?
 - How fast is the level in the cone filter falling?

Textback problem

