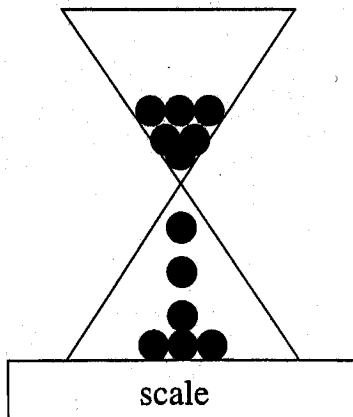


## Problem 2 (5 points)



An hour glass of sand sits on a scale. Initially all the sand (of total mass  $m$ ) in the glass (of mass  $M$ ) is held in the upper reservoir. At  $t = 0$ , the sand is released and it falls at a constant rate  $dm/dt = \lambda$  to the bottom of the lower reservoir, as shown. Find the reading of the scale as a function of time...

- (a) (1 point) From the time  $t = 0$  at which the sand is released, until the time  $t = t_1$  at which it starts to arrive at the bottom of the reservoir.
- (b) (1 point) From  $t = t_1$  until the time  $t = t_2$  at which all of the sand has left the upper reservoir.
- (c) (1 point) From  $t = t_2$  until the time  $t = t_3$  at which all the sand has reached the bottom.
- (d) (1 point) For all times  $t > t_3$ .
- (e) (1 point) Sketch the reading of the scale as a function of time, assuming that  $m < M$ .