

## I-93

A man of mass  $m$ , concerned about his weight, decides to weigh himself in an elevator. He stands on a bathroom scale in an elevator moving upward at speed  $v$ . As the elevator reaches his floor, it slows to a stop over a distance,  $d$ . Determine the reading on the bathroom scale ( $F_{\text{scale}}$ ) as a function of  $m$ ,  $v$ ,  $d$ , and  $g$ .

### Motion Diagram

#### Free-Body Diagram



### Motion Information

Event 1:

$t_1 =$

$r_1 =$

$v_1 =$

$a_{12} =$

Event 2:

$t_2 =$

$r_2 =$

$v_2 =$



### Mathematical Analysis

### Questions

If  $v = 0$  m/s, what should  $F_{\text{scale}}$  equal? Does your function agree with this observation?

If  $d = \infty$ , what should  $F_{\text{scale}}$  equal? Does your function agree with this observation?

For what stopping distance,  $d$ , would the bathroom scale read 0 N? Would the scale also read 0 N for this stopping distance if the elevator was initially moving downward?

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