27. (a) We want to calculate the force that the scale exerts on the marbles. This is the sum of the force that holds the marbles already on the scale against the downward force of gravity and the force that brings the falling marbles to rest. At the end of time t, the number of marbles on the scale is Rt. At this moment, the gravitational force on them is $Rtmg$ and the upward force of the scale that holds them is $F_1 = Rtmg$. Just before striking the scale, a marble that fell from height h has speed $v = \sqrt{2gh}$ and momentum $p = m\sqrt{2gh}$. To stop the falling marbles, the scale must exert an upward force $F_2 = Rp = Rm\sqrt{2gh}$. The total force of the scale on the marbles is

$$F = F_1 + F_2 = Rtmg + Rm\sqrt{2gh} = Rm\left(gt + \sqrt{2gh}\right) .$$

(b) For the given data (using SI units, so $m = 0.0045$ kg), we find

$$F = (100)(0.0045)\left((9.8)(10.0) + \sqrt{2(9.8)(7.60)}\right)$$

which yields $F = 49.6$ N. Assuming the scale is calibrated to read in terms of an equivalent mass, its reading is $F/g = 49.6/9.8 = 5.06\,\text{kg}$.