Effect of Friction

You will have noticed that the ball fails to stay on the track, despite being released from the height predicted in Question 4. The error results from our incorrect assumption about the ramp being frictionless - friction between the track and the ball imparts an angular speed $\omega(=v/r)$ to the ball. Thus, the ball has translational *and* rotational K.E., and the correct expression for speed at the bottom of the ramp is:

a.) $\left(\dfrac{7}{10}\right)v_b^2 = gh$ b.) $\left(\dfrac{9}{10}\right)v_b^2 = gh$ c.) $v_b^2 = gh$

d.) $v_b^2 = \sqrt{gh}$ e.) $\left(\dfrac{3}{10}\right)v_b^2 = gh$