

$$mv_o^2/2 = mg2r$$

$$v_o = \sqrt{4gr} = 2\sqrt{gr}$$

$$a = g = v_2^2/r$$

$$mv_o^2/2 = mv_2^2/2 + mg2r$$

$$v_o^2 = gr + 4gr = 5gr$$

$$v_o = \sqrt{5gr}$$