8. This is another problem that is easily solved using the principle of conservation of energy. We choose the bottom of the hill as the reference level for which the gravitational potential energy is zero. The ball starts from rest, so the initial kinetic energy is zero.

$$PE_1 + KE_1 = PE_2 + KE_2$$

$$m\,g\,h_1 + 0 = 0 + 1/2\,m\,(v_2)^2$$

$$g\,h_1 = 1/2\,(v_2)^2$$

Again we notice that the mass term cancels on each side of the equation, so the speed obtained at the bottom of the hill will be the same for any ball regardless of mass.

$$(9.8\text{ m/s}^2)\,(8.0\text{ m}) = (1/2)\,(v_2)^2$$

Again we multiply by 2 to isolate the unknown variable.

$$(v_2)^2 = 156.8\text{ m}^2/\text{s}^2$$

$$v_2 = 12.5\text{ m/s}$$