standing on the edge of a cliff $h = 32.5$m high, you drop a ball. Later you throw a second ball downward with initial speed of $u = 11$ m/s. Which ball has greater increase in speed when in reaches base of the cliff or do they travel at same speed. Verify your answer with a calculation.

Solution:

The displacement of the ball

$$h = \frac{v_f^2 - v_i^2}{2g}$$

So, final speed of the first ball

$$v_1 = \sqrt{2gh} = \sqrt{2 \times 9.8 \times 32.5} = 25.24 \frac{m}{s}$$

The change of it speed

$$\Delta v_1 = 25.24 - 0 = 25.34 \frac{m}{s}$$

The final speed of the second ball

$$v_2 = \sqrt{u^2 + 2gh} = 27.53 \frac{m}{s}$$

The change of the second ball speed

$$\Delta v_2 = 27.53 - 11 = 16.53 \frac{m}{s}$$

Thus

$$\Delta v_1 > \Delta v_2$$

Answer: $\Delta v_1 > \Delta v_2$