In 1865, Jules Verne proposed sending men to the Moon by firing a space capsule from a $S = 220$ meter long cannon with a final velocity of $v_f = 10.97$ km/s.

What would be the initial velocity of the capsule, vi in meters per second?

Solution:

The distance

$$S = \frac{v_f^2 - v_i^2}{2a} = \frac{v_f^2 - v_i^2}{2(-g)}$$

Thus

$$v_i = \sqrt{v_f^2 + 2gS} = \sqrt{10970^2 + 2 \times 9.8 + 220} = 10970.19 \, \frac{m}{s}$$

Answer: $v_i = 10970.19 \, \frac{m}{s}$.