An amount of work equal to 2.18j is required to compress the spring in a spring-gun. What is the launch speed of a 1.57g marble?

Solution.

$$A = 2.18J, m = 1.57g = 1.57 \cdot 10^{-3}kg;$$

$$\upsilon - ?$$

By the law of conservation of energy: kinetic energy of the marble is equal the potential energy of the compressed spring:

$$W_k = W_p.$$

That the amount of work is required to compress the spring in a spring-gun, then:

$$W_p = A.$$

The kinetic energy of the marble:

$$W_k = \frac{m\upsilon^2}{2}.$$

Finally:

$$\frac{m\upsilon^2}{2} = A.$$

$$\upsilon = \sqrt{\frac{2A}{m}}.$$

$$\upsilon = \sqrt{\frac{2 \cdot 2.18}{1.57 \cdot 10^{-3}}} = 52.7 \left(\frac{m}{s}\right).$$

Answer: $\upsilon = 52.7 \frac{m}{s}$.