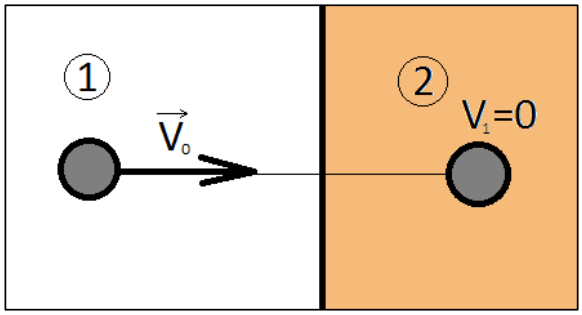
A lead bullet moving 500 m/s hits a wooden block and stops. Find its change in temperature if 1/10 of the energy is changed to heat in the bullet.

(specific heat capacity of lead $c = 130\ \frac{J}{kg*℃}$)

Solution: the energy of the bullet before it enters the wooden block is the kinetic energy of a bullet:

$E_0 = \frac{mV_0^2}{2}, \quad V_0 = 500\frac{m}{s} - \ velocity\ of\ the\ bullet\ before\ it\ stops$



By condition, one tenth of energy changed to heat:

$$Q = \frac{1}{10}\ E_0 = \frac{1}{20}mV_0^2\ (1)$$

Equation for the thermal process of bullet:

$Q = c * m * \Delta t\ (2)$,

$c -$ specific heat capacity of lead,

$\Delta t -$ change in temperature

(1) =(2):

$$\frac{1}{20}mV_0^2 = c * m * \Delta t$$

$$\Delta t = \frac{V_0^2}{20c} = \frac{500\frac{m}{s} * 500\frac{m}{s}}{20 * 130\ \frac{J}{kg * ℃}} = 96.15℃$$

Answer: change in temperature is $96.15℃$