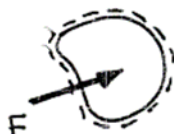


PROBLEM 2.9

KNOWN: An object of known mass accelerates from a given initial velocity to a given final velocity due to the action of a resultant force.

FIND: Determine the work done by the resultant force.

SCHEMATIC & GIVEN DATA:



$$m = 2 \text{ kg}$$

$$V_1 = 200 \text{ m/s}$$

$$V_2 = 500 \text{ m/s}$$

ENGR. MODEL: (1) The object is a closed system. (2) The resultant force is the only interaction between the object and its surroundings.

ANALYSIS: By assumption (2), the work of the resultant force must equal the change in kinetic energy. Thus, using Eq. 2.6

$$\textcircled{1} \quad \text{work} = \frac{1}{2} m (V_2^2 - V_1^2)$$

$$= \frac{1}{2} (2 \text{ kg}) (500^2 - 200^2) \frac{\text{m}^2}{\text{s}^2} \left| \frac{1 \text{ N}}{1 \text{ kg} \cdot \text{m}/\text{s}^2} \right| \left| \frac{1 \text{ kJ}}{10^3 \text{ N} \cdot \text{m}} \right|$$

$$= 210 \text{ kJ} \leftarrow \text{work}$$

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1. The increase in kinetic energy of the object is the result of energy transferred to it by the work of the resultant force.