Answer on question #63304, Physics / Mechanics — Relativity

Question A Ford Focus of weight 9800 N (=1000 kg) is moving at 25.0 m/sec along a level road surface. The driver applies the brakes and it slows to 18.0 m/sec over a distance of 70.0 meters. How much work did the braking force do on the car? You may assume that friction and drag are negligible and that weight and normal force cancel out, making the braking force the net force on the car. Select one:
a. -150,500 J
b. -2150 J
c. -162,000 J
d. -475,000 J
e. -312,500 J

Solution Lets find the deceleration. This can be done from equation for velocity and displacement:

$$\Delta v = at$$

$$s = at^2/2$$

From first equation:

$$t = \frac{\Delta v}{a}$$

Then the second becomes

$$s = a\frac{\Delta v^2}{2a^2}$$

Hence, deceleration is

$$a = \frac{\Delta v^2}{2s}$$

$$a = \frac{(25 - 18)^2}{2 \cdot 70} = 0.35 m/s^2$$

Then, the work is

$$A = -FS = maS = -1000 \cdot 0.35 \cdot 70 = -24500 \, J$$

There is no correct answer in a–e. Correct answer is -24500 J.