Answer on Question #47855, Physics, Computational Physics

A truck moving at 5 m/s is about to accelerate at the rate of 2 m/s in 3s. After 3s the driver saw an old lady about to cross the road and it took 0.8 sec before it hits the brake. If the maximum braking deceleration is 5m/s^2 and its distance of the truck to the old lady is 50m. Does the old lady hit by the truck?

Solution:

Given:

$v_1 = 5$ m/s,
$a_1 = 2$ m/s^2,
$t_1 = 3$ s,
$t_2 = 0.8$ s,
$a_2 = -5$ m/s^2,
$D = 50$ m,

The kinematic equation that describes an object's motion is:

$$v_2 = v_1 + a_1 t = 5 + 2 \cdot 3 = 11 \text{ m/s}$$

The distance covered before driver hits the brake

$$d_1 = v_2 t_2 = 11 \cdot 0.8 = 8.8 \text{ m}$$

The kinematic equation that describes braking deceleration:

$$d_2 = \frac{v_f^2 - v_2^2}{2a_2} = \frac{0 - 11^2}{-2 \cdot 5} = 12.1 \text{ m}$$

Thus, before stop truck covered distance

$$d = d_1 + d_2 = 8.8 + 12.1 = 20.9 \text{ m}$$

$$d < 50 \text{ m}$$

Answer: Truck does not hit the old lady.