

Answer on Question #50733, Physics, Mechanics - Kinematics - Dynamics

A man is moving with a 1500 kg car on a hilly road with 25 m/s velocity. The road creates an angle with ground 30 degree. But seeing a tree the car stops the car at 50m.what is the frictional force to stop the car? Use work energy theorem

Solution

By the work energy theorem:

$$E_k + E_p = W = FS$$

Where S – traveled distance, $h = S \sin \alpha$ - vertical distance

$$\frac{mv^2}{2} + mgh = FS$$

$$\frac{mv^2}{2} + mgS \sin \alpha = FS \rightarrow F = \frac{mv^2}{2S} + mg \sin \alpha$$

Finally, the frictional force is:

$$F = \frac{1500kg \cdot \left(25 \frac{m}{s}\right)^2}{2 \cdot 50m} + 1500kg \cdot 9.8 \frac{m}{s^2} \sin 30^\circ = 16725N$$

Answer: $F = 16725N$