Answer on Question #65541, Physics / Mechanics | Relativity |

A truck of mass 2000 kg moving on a highway experiences an average frictional force of 800 N. If its speed increases from 25 m/sec to 35 m/sec over a distance of 500 m, what is the force generated by the truck.

Solution

 $m = 2\ 000\ \text{kg}$ $F_f = 800\ \text{N}$ $v_1 = 25\ \text{m/sec}$ $v_2 = 35\ \text{m/sec}$ $L = 500\ \text{m}$ F - ?

We have a formula $m \cdot a = F - F_f$ from the Newton's second law. Therefore $F = F_f + m \cdot a$. We find the acceleration (*a*) from this well-known equation:

$$a=\frac{v_2^2-v_1^2}{2L}.$$

Finally

$$F = F_f + m \frac{v_2^2 - v_1^2}{2L}.$$

 $F = 800 + 2000 \cdot (35^2 - 25^2) / 1000 = 800 + 2 \cdot (35^2 - 25^2) = 800 + 2 \cdot 600 = 2000$ (N).

Answer: 2000 N

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