## 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 $25 \mathrm{~m} / \mathrm{sec}$ to $35 \mathrm{~m} / \mathrm{sec}$ over a distance of 500 m , what is the force generated by the truck.

## Solution

$m=2000 \mathrm{~kg}$
$\mathrm{F}_{\mathrm{f}}=800 \mathrm{~N}$
$v_{1}=25 \mathrm{~m} / \mathrm{sec}$
$v_{2}=35 \mathrm{~m} / \mathrm{sec}$
$L=500 \mathrm{~m}$
$F-$ ?
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:

$$
a=\frac{v_{2}^{2}-v_{1}^{2}}{2 L} .
$$

Finally

$$
\begin{gathered}
F=F_{f}+m \frac{v_{2}^{2}-v_{1}^{2}}{2 L} . \\
F=800+2000 \cdot\left(35^{2}-25^{2}\right) / 1000=800+2 \cdot\left(35^{2}-25^{2}\right)=800+2 \cdot 600=2000(\mathrm{~N}) .
\end{gathered}
$$

Answer: 2000 N
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