1. The platform $P$, shown in Fig. (a), has negligible mass and is tied down so that the 0.4 m long cords keep a 1 m long spring compressed 0.6 m when nothing is on the platform. If a 2-kg block is placed on the platform and released from rest after the platform is pushed down 0.1 m, Fig. (b), determine the maximum height $h$ the block rises in the air, measured from the ground.

2. The motion of a 3250-kg boat is arrested using a bumper which provides a resistance as shown in the graph. Determine the maximum distance the boat dents the bumper if its approaching speed is 0.9 m/s.
3. A 1200-kg car has a velocity of $v_f = 100\text{km/h}$ when the driver sees an obstacle in front of the car. If it takes 0.75 s for him to react and lock the brakes, causing the car to skid, determine the distance the car travels before it stops. The coefficient of kinetic friction between the tires and the road is $\mu_k = 0.25$.

4. Determine the velocity of the 30-kg block $A$ if the two blocks are released from rest and the 20-kg block $B$ moves 0.6 m up the incline. The coefficient of kinetic friction between both blocks and the inclined planes is $\mu_k = 0.10$.

5. Packages having a mass of 7.5 kg are transferred horizontally from one conveyor to the next using a ramp for which $\mu_k = 0.15$. The top conveyor is moving at 1.8 m/s and the packages are spaced 0.9 m apart. Determine the required speed of the bottom conveyor so no sliding occurs when the packages come horizontally in contact with it. What is the spacing $s$ between the packages on the bottom conveyor?
6. The material hoist and the load have a total mass of 800 kg and the counterweight $C$ has a mass of 150 kg. At a given instant, the hoist has an upward velocity of 2 m/s and an acceleration of $1.5 \text{ m/s}^2$. Determine the power generated by the motor $M$ at this instant if it operates with an efficiency of $\varepsilon = 0.8$.

7. The 2-Mg car increases its speed uniformly from rest to 25 m/s in 30 seconds up the inclined road. Determine the maximum power that must be supplied by the engine, which operates with an efficiency of $\varepsilon = 0.8$. Also, find the average power supplied by the engine.

8. A constant power of 1kW is supplied to the motor while it operates with an efficiency of $\varepsilon = 0.8$. Determine the velocity of the 100-kg crate in 15 seconds, starting from rest. Neglect friction.
9. The cylinder has a mass of 20 kg and is released from rest when $h = 0$. Determine its speed when $h = 3$ m. The springs each have an unstretched length of 2 m.

\[ \text{Diagram: Cylinder and springs with unstretched length of 2 m.} \]


\[ \text{Diagram: Skier on a ramp.} \]

11. The 10-kg block $A$ is released from rest and slides down the smooth plane. Determine the compression $x$ of the spring when the block momentarily stops.

\[ \text{Diagram: Block sliding down a plane with a spring.} \]