Homework Problems

1. A 100.0 g mass is suspended from a spring whose constant is $50.0 \, \text{N/m}$. The mass is then pulled down 1.0 cm and then released.
   a. How much force was applied in order to pull the spring down the 1.0 cm?

   Answer: 0.5 N

   b. What is the frequency of the resulting oscillation?

   Answer: 3.56 Hz

2. A 1000. kg car bounces up and down on its springs once every 2.0 s. What is the spring constant of its springs?

   Answer: $9870 \, \text{N/m}$
3. A 4.0 kg block is released from a height of 5.0 m on a frictionless ramp. When the block reaches the bottom of the ramp, it slides along a frictionless surface and hits a spring with a spring constant of $4.0 \times 10^4 \ \text{N/m}$ as shown in the diagram below:

![Diagram of a block on a ramp colliding with a spring](image)

What is the maximum distance that the spring is compressed after the impact?

Answer: 0.10 m

4. A 1.6 kg block is attached to a spring that has a spring constant of $1.0 \times 10^3 \ \text{N/m}$. The spring is compressed a distance of 2.0 cm and the block is released from rest onto a frictionless surface. What is the speed of the block as it passes through the equilibrium position?

Answer: $0.5 \ \text{m/s}$

Use this space for summary and/or additional notes: