

HOOKE'S LAW PROBLEMS – Ideal Springs

For all questions assume that the **positive x** direction is to the **right**. $F_s = -k\Delta x$

1. Research (briefly) online the difference between an Ideal Spring and a Non-Ideal Spring. Which type of spring obeys Hooke's law? What happens if you stretch or compress a spring too much?
2. Calculate the spring force when the following ideal springs are stretched to 0.3 m from the equilibrium position.
a) $k = 5\text{ N/m}$ b) $k = 15\text{ N/m}$ c) $k = 1000\text{ N/m}$
3. Calculate the spring force when an ideal spring with a spring constant of 500 N/m is compressed by 60 cm . Calculate the spring force when the spring is stretched by 60 cm .
4. The equilibrium position for an ideal spring, with a spring constant of 400 N/m , that is attached to a wall is 1.3 m . A force of 2000 N is applied to the spring. What is the new position of the end of the spring?
5. An ideal spring with a spring constant of 600 N/m has a force of 120 N acting upon it. By how much is the spring compressed/stretched?
6. An ideal spring is stretched by 23 cm . The person that was stretching the spring exerts a force of 280 N . What is the spring constant?
7. A 65 kg box of bananas is resting on a spring loaded scale. The scale is calibrated such that a compression of 0.5 cm occurs when a 10 N force is placed on it. What is the compression of the scale when the box of bananas is on it?
8. A 1000 kg car is parked in an underground parking garage. Four people (masses of 73 kg , 65 kg , 71 kg and 92 kg) get into the car. The car lowers due to the weight by 2.5 cm . Determine the k values of the shocks in the car. Assume the shocks are ideal springs and that they all compress by the same amount (i.e. the force is evenly distributed).
9. What is meant by the term: Ideal Spring? Sketch the graph of Force vs. Stretch (Δx) for an ideal spring. Sketch the graph of Force vs. Stretch for a non-ideal spring.