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Unit 4G
Spring Potential Energy
Note-Taking Guide TEACHER

Main Ideas, Key Points, Questions:

After watching the video segment, write down key points, main ideas, and big questions.

Objective(s):

- *Understand how Hooke's law represents the non-constant force exerted by springs as they are stretched or compressed, and use it to calculate the force exerted by a stretched spring.*
- *Apply the spring potential energy equation to situations in which an object stretches or compresses a spring or in which a spring does work on an object.*

Notes:

During the video segment, use words, phrases, or drawings to take notes.

Summary:

After watching the video segment, write at least three sentences explaining what you learned.
You may ask yourself: "If I was going to explain this to someone else, what would I say?"

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Questions to Consider TEACHER

Answer the following.

1. **According to Hooke's law, the force necessary to stretch or compress a spring is proportional to what value?**

The force necessary to stretch or compress a spring is proportional to the distance that the spring is stretched or compressed beyond its equilibrium position.

2. **What is the rest position of a spring called?**

The rest position of a spring is called the equilibrium position.

3. **What is the equation for Hooke's law?**

F_s = -kx, where k is the spring constant and x is the displacement of stretch or compression from the equilibrium position.

4. **In what direction is the force of a compressed spring?**

A compressed spring exerts a force (pushes back) on that which is compressing it.

5. **Explain what it means for a spring to apply a "restoring" force?**

A spring will always apply a force back to its equilibrium position. If it is stretched, it will pull back, and if it is compressed, it will push back.

6. **Do rubber bands follow Hooke's law? Explain.**

No, rubber bands do not follow Hooke's law. Over time, the bonds in a rubber band break apart, and the force necessary to stretch the rubber band is no longer proportional to the distance that the rubber band is stretched.

7. **What is the equation for spring potential energy?**

$$PE_s = \frac{1}{2} kx^2$$

questions continued on next page

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Answer the following.

8. **If a spring is stretched to twice the length of its equilibrium position, by what factor does the energy stored in the spring change?**

If a spring is stretched to twice the length of its equilibrium position, its potential energy will increase four times because stretch displacement is squared in the equation for spring potential energy.

9. **How is spring potential energy determined from a force versus position graph?**

In a force versus position graph, the area under the curve is equal to the spring potential energy.