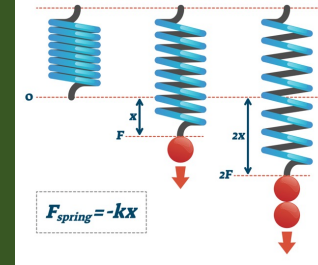


Energy and Momentum

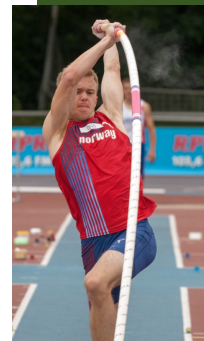
Senior Physics Unit

- 5-7 weeks of teaching material
- 6 Lessons in Office and Google Format and Daily Teaching Schedule
- 4 Activities
- 1 Unit Test with Answer Key
- 1 Quiz with Answer Key

1. Work and Force
2. Kinetic and Gravitational Potential Energy
3. How Energy is Conserved
4. Elastic Potential Energy and Simple Harmonic Motion
5. Impulse and Momentum
6. Conservation of Momentum

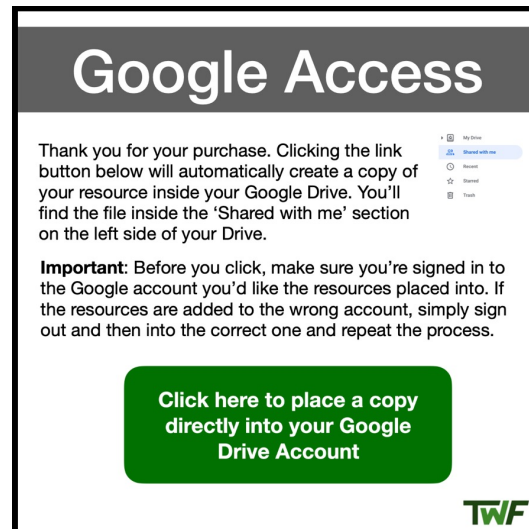


$$\begin{aligned} W_{total} &= \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2 \\ &= E_{kf} - E_{ki} \\ &= \Delta E_K \end{aligned}$$



Office and Google Versions

- The lessons inside this unit come in both PowerPoint and Google Slides format
- Each lesson also contains an Exit Ticket that you can use to check for student understanding
- Your resource is perfect for distance learning and integrates seamlessly with Google Classroom as I've included a link that will automatically create a copy of the resources and put them directly into your Google Drive with one click



Thank You For Your Interest

Inside the Unit

- 5 - 7 weeks of teaching material
- 6 lessons
- Office and Google versions of EACH lesson
- Teacher and student versions for each lesson
- Many videos and simulations embedded into the slides
- Student notes in Word and Google Doc

Check Your Understanding

What total work, in megajoules (MJ), is required to cause a cargo plane of mass 4.5×10^4 kg to increase its speed in level flight from 105 m/s to 185 m/s?

Check Your Understanding

A fire truck of mass 1.8×10^4 kg, travelling at some initial speed, has 2.9 MJ of work done on it, causing it to speed to become 11 m/s. Determine the initial speed of the fire truck.

Check Your Understanding

What total work, in megajoules (MJ), is required to cause a cargo plane of mass 5.5×10^4 kg to increase its speed in level flight from 105 m/s to 185 m/s?

Check Your Understanding

A fire truck of mass 1.6×10^4 kg, travelling at some initial speed, has 2.9 MJ of work done on it, causing it to speed to become 11 m/s. Determine the initial speed of the fire truck.

Answer: 5.28×10^3 MJ

$$W_{\text{total}} = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$$

= ΔK

Answer: 22 m/s

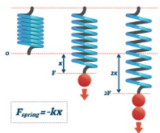
$$W_{\text{total}} = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$$

= ΔK

Opportunities for students to check their understanding with answer key

Hooke's Law

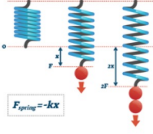
- The constant k is called the spring constant and is the absolute magnitude (positive)
- _____
- The negative is because the displacement is in the opposite direction of the restoring force



The diagram shows three vertical springs hanging from a horizontal red line. The first spring on the left is at its natural length. The middle spring is stretched downwards by a distance x , indicated by a double-headed arrow and a downward arrow labeled x . An upward arrow next to it is labeled $F_{\text{spring}} = -kx$. The rightmost spring is stretched downwards by a distance $3x$, indicated by a double-headed arrow and a downward arrow labeled $3x$. An upward arrow next to it is labeled $F_{\text{spring}} = -k(3x)$.

Hooke's Law

- The constant k is called the spring constant and is the absolute magnitude (positive)
- **x is the displacement of the spring from its unstrained length**
- The negative is because the displacement is in the opposite direction of the restoring force
- SI unit of $k = \text{N/m}$



The diagram illustrates Hooke's Law with three vertical springs and a graph. The first spring is unstrained. The second spring is stretched by a distance x by a downward force F . The third spring is stretched by a distance Δx by a downward force ΔF . To the right, a graph shows a linear relationship between the restoring force F_{spring} (y-axis) and the displacement x (x-axis), with the equation $F_{\text{spring}} = -kx$.

$k = N/m$

Conservation of Energy

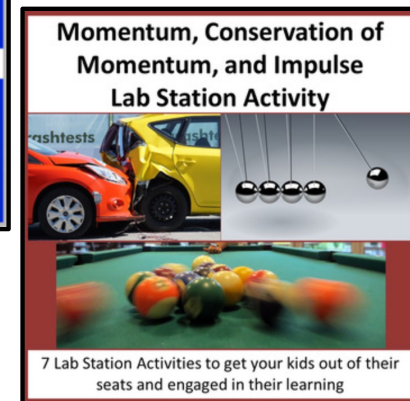
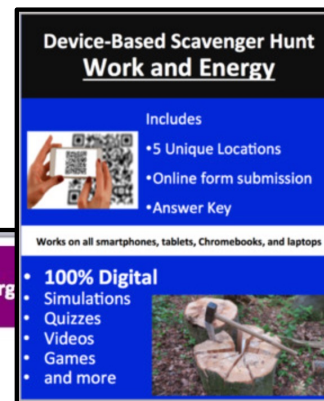
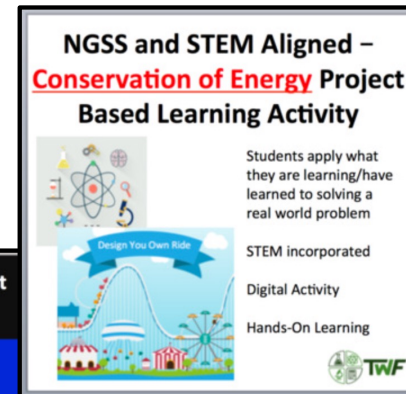
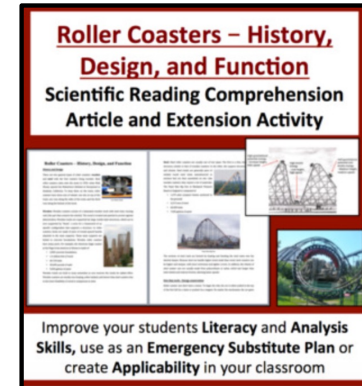


The diagram illustrates the concept of conservation of energy using a visual metaphor. It features two identical video player icons, each with a blue screen and a white play button. Above each screen is a clapperboard with black and white diagonal stripes. A red arrow points from the first icon to the second, suggesting a transition or flow of energy between the two states.

Thank You For Your Interest

Inside the Unit

- 1 Unit Test with Answer Key
- 1 Quiz with Answer Key
- 2 Lab Station Activities
- 1 Digital Scavenger Hunt Activity
- 1 Unit Project
- 1 Reading



Thank you for your interest

The following lessons are included.

1. Work and Force
2. Kinetic and Gravitational Potential Energy
3. The Law of Conservation of Energy
4. Elastic Potential Energy and Simple Harmonic Motion
5. Momentum and Impulse
6. Conservation of Momentum