

Work and Energy

5E Lesson

The 5E model is a scientifically proven method to improve student engagement and learning in your classroom

- ✓ Engagement
- ✓ Exploration
- ✓ Explanation
- ✓ Elaborate
- ✓ Evaluate



Complete Teacher Instructions

Work and Energy

5E Lesson

Grades 7-10	Work and Energy	Ongoing Less
Lesson Objective: Students will learn about: • Work done • Work equation • Units and direction • Positive and negative work • When work is 0 • Simple machines • Friction's effect on work • Roller coaster lift and launch mechanisms • Gustave-Gaspard Coriols		
Possible Student Misconceptions: • The terms "energy" and "force" are interchangeable. • Only animate objects can exert a force. • Motion of an object is always in the direction of the net force acting on • Machines put out more work than we put in.		
Materials: • 1 device (smartphone, Chromebook, laptop, tablet, or computer) per 3 • A means of projecting a PowerPoint presentation • Internet access • General classroom objects		
Teacher Notes: ➢ All videos can be accessed directly from the PowerPoint. To retrieve th icon while in slideshow mode and it will automatically open for you. If it reason, right-click on the image and click Edit Hyperlink or something ➢ I've created a video walkthrough if needed. It can be accessed here - https://youtu.be/cKlIP9SaDQ ➢ I don't believe in long lessons. If you feel your students are losing their Stop the PowerPoint and give them a 5-minute break. If you'd like to st recommend my video collection here - http://www.teachwiththefergy.com/, are tons of brain-break videos to choose from all grouped by category.		

Work and Energy – 5E Lesson

Engagement Phase Your students will watch the video <i>'Work, Energy, and Power'</i> and complete the questions found in the file – <i>Engagement – Work, Energy, and Power</i>. The video can be found here - https://www.youtube.com/watch?v=w4QFIb9a8vo Teacher Notes: - The video is about 10 minutes long, but students will stop at 2:40 - You may need to show the video more than once or pause when an answer is given to one of the questions.	Te lea un ☐ ☐ ☐
Explanation Phase Exploration – Lab Station Activity • In groups of 2-3, have your students complete <i>Exploration – Lab Station Activity</i>. Once they're done, they will submit their passport to you.	Du Te lea un ☐ ☐
Teacher Notes: • The complete instructions for my Lab Station activity can be found in the <i>START HERE – Instructions</i> file.	☐ ☐
Explanation Phase PowerPoint Lessons • The lesson is found in the folder – <i>Explanation – Work and Energy Lesson</i> • This lesson is designed to be completed over one day • There is one embedded video, and plenty of opportunity to engage, interact and check for your students' understanding throughout the lesson • The lesson covers the following topics: ➢ Work Done ➢ $W = Fd$ ➢ Units and Direction ➢ Positive and Negative Work ➢ When Work = 0	Du Te co ma pre ☐ ☐ ☐ ☐
Teacher Notes: • All videos can be accessed directly from the PowerPoint. To retrieve them, click on the video icon while in slideshow mode and it will automatically open for you. If they don't open, right-click the image and select Edit Hyperlink or something similar. • I've created a video walkthrough if needed. It can be accessed here - https://youtu.be/oCtKIP9SaDQ • I have also enclosed a .PDF version of both the teacher and student versions.	☐ ☐ ☐ ☐

<u>Elaborate Phase</u> Elaborate – Scavenger Hunt Your students will complete – <i><u>Elaborate – Scavenger Hunt</u></i>. This activity will require your students to move beyond what was covered directly in the lesson and allow them to further develop their understanding. Teacher Notes: - Students will work individually or in small groups - Students will need one device per group.	Duration: 1 hour Teacher Role – Facilitate learning and keep students focused Goal ☐ Students use their newly obtained knowledge to propose solutions and extend their learning to new situations
<u>Evaluate Phase</u> Quiz Have your students complete - <i><u>Evaluate – Work and Energy Quiz</u></i> Teacher Notes: ➢ It's sometimes best to have the students peer evaluate ➢ Placing students in small groups and having them exchange papers to mark will accomplish two things 1) Provide immediate feedback on the questions they just completed 2) Significantly reduce your marking time ➢ Peer evaluation is not needed, only suggested when appropriate	Duration: 30 min Teacher Role – Distribute and collect evaluation Goal ☐ Students are given the opportunity to demonstrate their understanding and evaluate their own process

Each phase is clearly described

A Complete Lesson

Work

- Work (W) is the energy transferred to an object when a force acting on the object moves it through a distance
- $W = F \times d$
 - F = the magnitude of force acting on the object parallel to d
 - d = the displacement

← Make sure your students are on track

Student copies with blanks
Videos embedded right into your slideshow

Work Done

- Work is done when you lift an object



- Work is done to make a car accelerate

Units and Direction

- Work is scalar and has no direction
- Its units are $\text{N} \cdot \text{m} = \text{J}$
- $1 \text{ J} = 1 \text{ kg} \cdot \text{m}^2/\text{s}^2$

Stop at 3:42



Interactive and Engaging Activities

Device-Based Scavenger Hunt Work and Energy

Includes



- 5 Unique Locations
- Online form submission
- Answer Key

Works on all smartphones, tablets, Chromebooks, and laptops

- **100% Digital**
- Simulations
- Quizzes
- Videos
- Games
- and more



Work and Energy Lab Station Activity



7 Lab Station Activities to get your kids out of their seats and engaged in their learning

Get away from tired practices and unengaged students



Provide a Scientifically-Proven means of instruction



Incorporate Technology and Increase Collaboration

