Lesson Plan

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| Subject: Physics | Grade: 11 | Course Code: SPH3U0 |
| Lesson Topic: Kinetic Energy | Duration: 60 min | Date: Oct 2, 2012 |

Pre-requisite Knowledge/Skills:

Students should:

* Be familiar with the famous five equations
* Be able to draw FBDs
* Be familiar with the work equation

Overall Expectations:

D2: investigate energy transformations and the law of conservation of energy, and solve related problems;

D3: demonstrate an understanding of work, efficiency, power, gravitational potential energy, kinetic energy, nuclear energy, and thermal energy and its transfer (heat).

Specific Expectations:

D2.1: use appropriate terminology related to energy transformations, including, but not limited to: *mechanical energy, gravitational potential energy,* *kinetic energy, work, power, fission, fusion, heat, heat capacity, temperature,* and *latent heat*

D3.2: explain the concepts of and interrelationships between energy, work, and power, and identify and describe their related units

D3.3: explain the following concepts, giving examples of each, and identify their related units: *thermal energy, kinetic energy, gravitational* *potential energy, heat, specific heat capacity, specific latent heat, power,* and *efficiency*

Agenda:

1. Recall: What is energy? What is work?
2. Derivation of kinetic energy (as a group)
3. Units of Kinetic energy
4. Sample problems 1-4
5. Consolidation

Lesson Learning Goals:

Students will be able to:

* Define kinetic energy to the extent that it is energy associated with motion and justify to themselves why the equation is valid
* Perform calculations with kinetic energy (ranging from plug and go to more tricky problems where “work” – f\*Δd - is also involved)

Assessment – Indicators of Learning:

1. Socratic Questioning – recap of material from last class
2. Summary recap – one group writes on the board everything they learned today

Accommodations and/or Modifications:

No IEPs

Resources and Materials Required/Safety Considerations:

* Whiteboard
* Homework questions

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| Time | Lesson Sequence/Instructional Strategies | Assessment Opportunities |
| 5 min | Recap:  What is energy?  (capacity to do work)  What is necessary for work to happen?  (force must displace object in same direction)  **What is work?**  **(Change in energy)**  What are the units of Work?  (J = n\*m)  Lead in to this class:  Can a moving object do work? Could It apply a force and displace an object?  What might affect how much energy a moving object would have?  If an object was heavier would it have more or less energy?  If an object was moving more quickly would it have more or less energy? | Diagnostic assessment – Socratic questioning |
| 20 min | Group Derivation of Kinetic Energy Formula  Consider a curling stone moving across the ice. You increase the speed of the stone from v1 to v2 over a distance Δd   * Start with work equation (work is change in energy) * Show how the net force is Fapp = ma * Substitute into work equation W= fΔd =maΔd * Use famous five equation to substitute in acceleration * **Show how work done is change in kinetic energy** * Ek = Ek2 – Ek1 * So Ek = ½mv2 | Have students supply the steps in each question.  How do we start? (with FBD)  What did we say work equaled? (change in energy)  What force is doing the work?  (app force)  What is the famous five equation we could use?  THIS IS an important step(work done is change in kinetic energy) Make sure everyone follows |
| 5 min | Units of Kinetic Energy   * Use the units we have previously to find the units of kinetic energy and solve for them | What are the units of mass, what are the units of velocity. Show how this leads to N\*m and then J |
| 20 min | Sample Problems 1-4   * Sample problem 1 finding speed and units given kinetic energy * Sample problem 2 finding mass given kinetic energy and speed * Sample problem 3 connecting work and change in kinetic energy * Sample problem 4 further connecting work and kinetic energy to friction and kinematics (tricky!) | Check in with students frequently to make sure everyone is following along with each of the steps |
| 10 min | Consolidation/Summary  What have you learned today   * W = ΔEk = 1/2mv22 – 1/2mv12 * Ek = 1/2mv2 * Units of kinetic energy * How to use kinetic energy to solve problems in finding speed etc...   Homework | Students will pair up. One pair will be selected to write on the white board a summary for the lesson for the day and explain their summary to the class |
| Applying Learning in Class/At Home  Homework on kinetic energy | | |