PROFILES IBSE Teaching/Learning Materials – Overview

Compiled by the PROFILES Working Group of Valahia University of Targoviste – România

A Module for Science Instruction – Especially Physics – for 9th Grade

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1. Abstract:

This is a 9 grade Science (Physics) module on calculating work done by friction on sliding and solving simple problems in different situations by applying the theorem of kinetic energy variation and the law of conservation of mechanical energy.

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A student was easily hit by a car on a pedestrian crossing with traffic lights. The student was slightly injured. The analysis of traces of the scene will attempt a reconstruction of the accident a establishing the blame.

For this series of lesson the students must be familiar with the laws of motion and friction force (coefficient of friction). They can explore the possibility of introducing the idea of friction by an examination of skid marks related to an actual traffic accident. The students are thus introduced to the work done by friction through trying to solve an actual societal problem.

2. Subject: Science and/or Physics

3. Grade Level: 9th Grade

4. Curriculum content: Mechanical work. Theorem of kinetic energy variation for the material point. Mechanical energy conservation law. Work done against friction.

5. Kind of activity: Interpretation of data by drawing a reconstruction diagram; Calculations based on real life data covering laws of motion and work done against friction; group work on making a justified decision after calculations have been successful performed.

6. Anticipated Time: 4 lessons

7. Prior Learning: Laws of Motion, Laws of friction, Kinetic Energy

8. Overall objective/Competencies: The students are expected to:

- understand the connection between theoretical background and the described problem;
- draw a labelled, reconstruction diagram of the situation;
- undertake suitable calculations solve the traffic problem applying the laws of motion and the concept of work done by friction force;
- undertake experiments to determine the coefficient of friction;
- be willing to show perseverance to understand the issue and participate in determining whether the car driver is to blame for the accident;
- cooperate by participating as a member of a group in a discussion on the outcomes of the calculations to determine whether to apportion blame;

- understand the relationship between change in kinetic energy of motion and work done against friction and hence be able to apply to derive and apply the formula, $v = (2\mu gs)^{½}$;
- decide, with justification, whether the car driver was to blame for the accident.

Sections		
1.	Students Activities	Describes the scenario in more detail and the tasks the students should perform
2.	Teaching Guide	Suggests a teaching approach
3.	Assessment	Gives suggested formative assessment strategies
4.	Teacher Notes	States the theoretical physics and gives the expected calculations

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