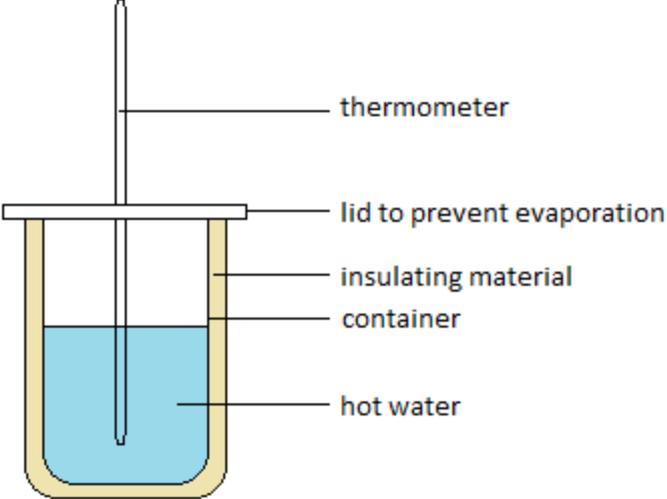


Lesson plan 16 – designing an activity on insulation

Subject and Grade Level: Physics		Date: 22 nd May 2018
Competences: Collaboration - students to work in teams of 4 for the activity Communication – reporting back on results Understanding – thermal insulators Synthesis – designing an experiment to test different insulating materials		Topic: Heat transfer
Learning Objectives of the Lesson: Students will identify the independent variable, the dependent variable and the control variables in designing an activity		
Previous Knowledge of Students: Students should be aware that thermal insulators are poor conductors		
Educational Tools, Aids, and Materials: Nothing will be needed for this lesson		
Flow of the Lesson: Reminder of methods heat transfer – insulators as poor conductors – discussion of task - Activity 1 to design a suitable experiment – plenary to identify and discuss important features		
<i>Starter</i>	Teaching and learning tasks: Remind student that conduction is one of the three mechanisms by which heat may be transferred and is the method of heat transfer in solids. A thermal insulator is a substance which is a poor thermal conductor.	
<i>Main Body</i>	Teaching and learning tasks: Point out that there are a number of different materials which are commonly used as thermal insulators. These include cardboard, expanded polystyrene, fibreglass, rock wool, cotton wool etc. The task is for each team is to assess how effective these materials are compared to each other. A simple way to do this is to investigate how long a container of hot water takes to cool when insulated with different materials. Activity 1 Students should work in teams of 4 to design a suitable activity for comparing the efficiency of thermal insulators. For the purposes of the task they should assume they have been given the following to test: corrugated cardboard, sheets of expanded polystyrene, fibreglass and rock wool. They can also assume suitable containers, thermometers, and any other equipment they need is available. Point out that in order to produce meaningful results teams will need to identify the independent variable, the dependent variable and all control variables. Practical details should be kept as simple as possible. A suitable diagram might be appropriate as part of an explanation. The following might be a possible design for testing each insulating material.	

	
<p>Plenary</p>	<p>As a spokesperson from each team to give a brief outline of their method. The basic format will be:</p> <p>Indirect variable – insulating material Direct variable – rate at which hot water cools Control variables – nature and size of containers, thickness of insulation, volume of hot water, initial temperature of hot water, cover surface to prevent evaporation</p> <p>It is likely that all teams will suggest similar methods. Any interesting innovations, such as the use of temperature probes and automatic data logging should be highlighted.</p>
<p>Notes <i>(teacher's self-evaluation of the lesson)</i></p>	<p>What went well and what went badly?</p> <p>Are any changes needed to the lesson before I teach it again?</p>