

## **A short Teacher's Guide**

### **My Country's g-Map**

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Dear physics and science teachers, as we all realize, physics and its concepts are very elusive for students. In this module, we will try to make gravity a step closer to our students, and this all starts from within each one of us.

\*The first thing that we need to do is to attract our students' attention to gravity and its effects on our lives on earth. This can be done by simply dropping something from your hand while you are walking in class. This can be your ignition factor!

\*Discuss gravity at least one class before you introduce the module to your students. This is necessary to give them a head start before doing any experiments. It will also be good to ask them, at this stage, on how they can measure gravitational effects.

\*During the video pauses, we need to engage our students in the activities of the module. During the first pause, students talk briefly about gravity effects on our lives. During the second pause, Newton's second law and relation between force of gravitation and the acceleration due to gravity is discussed. Now, as the third pause starts, the simple pendulum idea is introduced. The students are then taught how to count and time oscillations through a simple and attractive graph on the board.

\*The crucial part is to involve your students in the experiments. First we need to show them how to make a pendulum and how to measure its length, and then we will divide the students into groups and we will ask them to build their own pendulums with each group assigned a different pendulum length.

\*Now we come to introducing the pendulum's formula and we need to tell the students about this equation. The most important thing here is to indicate two facts. First, the longer your pendulum the better is your results; this makes it easier to time the pendulum. The second point is to make the angle, shown in the graph, as small as possible. This is important since this formula is assuming a small angle.

\*Now, teach your students how to count oscillations and how to time them. Tell your students that we are counting 15 oscillations and how this helps in reducing errors. It is important to tell students that our experimental work will contain some errors and tell them about the possible sources of errors.

\*At this point the students will be ready to see a demonstration. Ask them to time and count oscillation with you. Let them feel that they are part of the module. Take the timing from each group and get its average. This is part of error reduction process< just take as many measurements as you can.

\*Now, ask each group to come out, one at a time, and repeat the above experiment. Involve all students in the experiment.

\*Calculate the value of  $g$  from the demonstration, and let each group calculate its value too. Take the average of  $g$  for all the groups. Again, this reduces errors in the final  $g$ -value.

\*Ask your students to try this experiment with their families at home and ask them to bring their measurements to the next class.

\*With all the values in, find the grand average of the  $g$ -value and ask your students to start using this  $g$ -value as their location's  $g$ -value. Always remind them that they measured this value, this will make them more excited.

\*Try to contact other schools at different parts of the country and get their values. Write the values on the countries map, each at its relevant location. Try to relate this to the geographical location. Show the map to your students, and discuss the results briefly with them.

\*Always remember that physics is fun only if you want it that way, otherwise, physics will always BE ABSTRACT!

\*Finally, I do welcome all your questions and suggestions. You can always reach me at

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Have fun.