Acceleration Due to Gravity in my Country

http://blossoms.mit.edu/video/lahlouh.html
Hello my friends! I believe that you have discussed with your teacher the influences of gravity on our lives, and we all know that the scientist, Newton, studied the relation between force and mass, and we realize that when a force acts on a mass that is free to move, then this mass will accelerate.
Hence, gravity is no different than other forces: if gravity acts on a free-to-move mass, then this mass will accelerate. This acceleration is represented as ($g = 9.\ 8\ m/s^2$).
However, you must be wondering if this value is fixed, and how we got it originally, and if we can find it easily.
The answer is "YES". There is a simple experiment, called "the experiment of the simple pendulum", by which we can find this value easily. So, I will leave you with your teacher again, so that you may discuss how the "simple pendulum" works, by which we will get the value of "g". Bye for now.
Hello my friends. I assume that you have figured out that we will use the simple pendulum to measure the acceleration of gravity. The simple pendulum is a very simple tool, consisting of string from which a regular block is hanging. This pendulum moves under the influence of gravity, and has a very regular movement. Let's try to make this simple pendulum.
The pendulum already consists of a string and a regular mass. This pendulum will move under the influence of gravity back and forth, between two main points: (A) and (B(.

As you can see, the movement from point (A) to point (B), and then back from point (B) to point (A), is called a "complete pulse". The time of this pulse is called the "period of oscillation of the pendulum", so we will define this time and give it the name (T). It is, once again, the movement from (A) to (B), and then the return trip from (B) to (A).
The time required for this movement is called "the period of oscillation ". Another factor that we should measure for the pendulum is the length of the pendulum, i.e. the distance extended from the point of installation to the center of the shape or the regular mass. We will call this distance (L), so the length of the pendulum will be given the symbol (L). Therefore, my friends, I want you to pay attention to this angle: (theta). We must keep it as small as possible, because the final equation that we will use states that (theta) should be as small as possible.
So, for now, I will leave you again until you discuss with your teacher how to build the pendulum and how we can use it to measure (g). Good bye.
Welcome again, my good friends. We are now able to build the pendulum, and we also know the variables for the pendulum, which are the length of the pendulum and the period of oscillation of the movement of the pendulum. I have brought my own personal pendulum with me today. Here it is.
As you can see, it consists of a string, and a cylindrical weight. This weight will oscillate as we expect. We will measure the length of the pendulum, and measure the period of oscillation of the pendulum, so that we can measure the value of (g) in our lab here at the University of Jordan.
So my friends, to make the experiment more enjoyable for you, I would

like you all, with your teacher, to divide the class into four groups, and have the teacher build the main pendulum, while each group of you builds your own. These pendulums will only be different from each other in length.
This length will directly affect the period of oscillation, but the link between the length of the pendulum and the period of oscillation is the acceleration of gravity that we are looking for. So now I will leave you again so that you can form four groups, and each group can build its own pendulum. Good bye.
Hello again. I believe that each group has its own pendulum. So what I will do now is to try to conduct the experiment in front of you. I am more fortunate than you, as I have a special tool to install the pendulum here in the laboratory. You in your classrooms, and homes, can install the pendulum using a small nail and a door frame, for instance. In my case here, I have a special tool to install the pendulum.
The pendulum, which I made here, is 1.2 m. What remains is to measure the period of oscillation of this pendulum. But what I will do exactly is to measure the period of oscillation for 15 oscillations, not for one. The reason for this is that in this way, we can divide the result by 15, and thus we get the time rate of one pulse of the pendulum.
This process requires your participation, as well, so you will perform the experiment in class. What I want you to do during the experiment with your teacher is to have each group count the pulses together, and stop them together as well. In this way, we can get more values to measure the period

of oscillation.
Now, I will perform the experiment first to get the period of oscillation of my pendulum. To measure the period of oscillation, we will use this stopwatch, a normal one, but in fact you can use any watch, even your wristwatch to measure the period of oscillation of the pendulum.
So what I will do now is count 15 pulses, and also time these pulses using this watch. Try to count with me. Let's start now. What I will do is the following:
I will hold the pendulum, and hold the stopwatch in my other hand. I'll let go of the pendulum and begin timing at the same moment. So we will start counting together: one, two, three.
1, 2, 3, 4, 5 pulses, 6, 7, 8, 9 pulses, 10, 11, 12, 13, 14 and 15 pulses. We've got the time for 15 periodic pulses. So for now, I will leave you so that you can perform the experiment with your teacher, and measure its period of oscilation, and be sure that all of you participate in this experiment. See you soon, bye.
Hello friends! So, we have been able to measure the period of oscillation of 15 oscillations. What we will do now is make a table, in order to arrange all the information we have obtained. This table will be as follows.
Here is how to draw the table, which contains the data of our experiment. We will begin by drawing a place for the length of the pendulum. In this case it was 1.2 m. We will then draw a place for 15 pulses, we will call it T15 or 15T, for 15 pulses, it was 32.97 s., and then we will divide this figure by 15 to get the time rate. After that, we will find the square of this

period of oscillation. Finally, in our table, there will be the value of (g), which is m/s2.
The equation needed to do this is the following: (g) = 4 multiplied by the approximate squared ratio "$Pi^{2"}$, multiplied by the length of the pendulum L, divided by the square of the period of oscillation. Now, we are ready to calculate the value of (g). I will use my calculator to find the value of T. First, divide this figure by the 15 pulses, and we will get 2.198 s.; this is the period of oscillation of one pulse. Then we will square this figure to get 4.831 s2.
Now what remains is to apply this figure, and that figure in our equation to find (g). Once we do, we find that (g) in this case is 9.806 m/s2. Isn't that amazing? Isn't this the value of (g) that we figured out long ago? We are now able to calculate it. You should now go with your teacher and try to understand this equation, and then use it to find the values of (g) in your experiment which you have conducted with your teacher. So I'll leave you again so that you can do that. See you shortly, good bye.
Hello my friends. I guess you have been able to calculate the value of (g) easily. I hope that you have enjoyed the experiment with your teacher. You should do only one experiment at your homes. You also should inform your parents how they can measure the value of (g), and in the coming lesson, you should bring these values to your teacher.
This way, my friends, when we find the overall rate for these values, we get the best value for (g) in a city. Therefore, in honor and recognition of your efforts, what we will do is use the value of (g), which you got, in all measurements, experiments and questions in which we need the value (g).
Also, I request you to ask the teacher to try to get the values of (g) in other

schools and other cities of our beloved country. In this way, we can see and know if (g) changes from one place to another on the surface of the earth.
Always remember, my friends, that you are the scientists of the future, you are our hope in the future. Always be curious, always love science. I hope you always enjoy science and the study of science. Good bye and see you soon.
My fellow teachers, as you are aware, the subject of physics is one of the most difficult for students. But I think that the solution for this lies in our own hands, us, the teachers. If we present the subject in an interesting and relevant way, I think we will help our students to love and adore it.
Therefore, my fellow teachers, the principal objective of this experiment is, at first, to make the subject of physics interesting for our students. And then comes the basic concept -- the concept of the acceleration of gravity. This concept is essential for all stages of physics that the students will learn later.
So, the key function in the first pause for the teacher is to try to provide spiritual support and the motivation for the student to think of gravity and acceleration. Give them relevant and easy-to-see examples of gravity, such as the movement of the earth, a person climbing up and down, its effect on the movement of cars, aircraft, and rivers, and athletes.
It is through these simple examples that we can provide the student an introduction, to open the door to the study of gravity. During the second pause, you, my colleague, will introduce the concept of force and acceleration, in this case by providing the students with Newton's Second Law, and remind the student that through forces, we can make masses

accelerate. One of these forces is the force of gravity. As we all know, the force of gravity gives a constant acceleration of objects, at least 9.8 m/s2.
You should also try at this time to provide the student with the concept of the simple pendulum, which is (in this situation) only a string from which a weight is hanging. We believe that the students, through this very simple experiment, can learn how to measure the value of (g) used almost everywhere during their study of physics.
Then, during the presentation of pendulum section, you, my fellow teacher, should draw the pendulum on the blackboard. It may help to use some colors in the drawing, so that the shape becomes more pronounced for the student, which will help the students understand the things that we want to measure.
For example, we want to measure the length of the pendulum; it can be colored red, for instance. Or we want to measure the period of oscillation of the pendulum; we can use green to indicate the periodical motion of the pendulum. In this way we produce a very interesting drawing and an easy, informative way for the student to understand the meanings of the length of the pendulum and the period of oscillation of the pendulum.
After that, the teacher explains to the students the concept of the periodical motion of the pendulum, which is defined as the movement of the pendulum from point (A) to point (B), and then returning from (B) to (A) on the drawing.
In the next phase, after the video presents the pendulum and the experiment, through the work of the simple pendulum, you, my fellow teacher, should encourage the students to interact more, by dividing the class into four groups. First build your own pendulum, and then give each

group the necessary tools to make their own, as well.
In this way, we allow the students to participate in the experiment. The lesson, and the experiment as well, becomes less tedious, because the students are involved in the experiment personally. You should also try to show the students your excitement with the experiment with the counting process, with the calculation of time, and with the period of oscillation of the pendulum.
Therefore, you must always be aware that you are the model for the student; you should always try to be the ideal for students. And the student, too, always tries to emulate the teacher in terms of excitement in experiments. I hope you always remain focused on the students during the course of the experiment.
Therefore, my fellow teacher, after it has become clear to the student how to measure the period of oscillation, and after each group knows how to operate their own pendulum, use the period during which the video is showing the experiment to draw the accompanying table so you can input the information of the students' pendulums.
In the next phase comes the most crucial role of the teacher. In this stage you will involve the student personally in these experiments, so as to interact more and more with them. You will conduct the experiment in front of the students first, and then ask each group to help you by counting the pulses and timing them.
Then repeat the same process with each group to complete our table. After that, my friend, you must provide the equation needed to calculate (g). This equation requires the angle of (theta) accompanying the drawing to be small, not large, because this is the principle at work in this equation.

As you can see, my colleague, this equation links the key variables, the length and the period of oscillation of the pendulum, with the desired value, i.e. the value of the acceleration of gravity (g).
In the next phase you, my friend, explain to the students how to rearrange this equation to get (g). You should assist the students to calculate (g) for each group. That way, you get 5 values for the measurements of the period of oscillation for 15 pulses.
Next, find the average value for this time, and then find the average value of the period of oscillation by dividing by 15. Thus, we can get rid of the effects of errors within the calculations of the experiment. So, the value of (g) becomes as close as possible to its real value in terms of the place where we are.
Then, my friend, ask your students to try to measure the value of (g) at their homes, with the participation of their parents, as if this were their homework. In this way you can allow the students to show off their skill and feel proud in front of their families, as they measure a constant law of nature.
In the next class, ask each student to bring you the value that has been measured. In this way, we have large numbers of measurements of the values of the acceleration of gravity, from which we can take a general average. This way, we get the best value for (g), or the acceleration of gravity, in our city.
It would also be very useful for you, my colleague, to try to obtain the values of (g) from other schools in other cities in your country. This way, you can help the student to consider the following idea: is the value of (g) a

constant value in all geographical locations? Or does it change from one place to another?
Now comes another crucial role for you, my good friend, and that is to show students that through a simple experiment, we have reached an important conclusion which affects our lives dramatically. Furthermore, you can encourage the students to understand that such simple experiments sometimes lead to great results, for example finding the acceleration of gravity. Always try to use the value of (g) that you have learned through such experiments.
This way you will always remind the student that this is the (g) that you measured yourself in one day. Always encourage the students by telling them that they are scientists, one way or another, that their curiosity makes them scientists, brings them closer to science. Dear teacher, always remember that the students look at you as their model, so you must always be passionate about and loving to science.
Dear teachers, you can find my e-mail at the end of the text accompanying this video, so I hope that all of you try to provide me with any questions or any suggestions about this experiment or any other experiments. I wish you all success. Thank you and good bye.