

Teacher's Guide for BLOSSOMS Video Lesson on Equilibrium

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First of all, I would like to thank you, the high school teachers, for your effort and time spent guiding the class during this blended learning module on equilibrium. When I was preparing this module, all what I was thinking about is how I can create a clear understanding of the concept behind this module which is the concept of static equilibrium. So I tried to direct the students step by step to the final conclusion.

This module is built in a way that you have the option whether to push for the entire module to be covered in one session, which I prefer personally, or to divide it into two different shorter sessions. Even though I'm leaving it for you, the high school teacher, to decide how much extra work you want to ask from your students during the breaks, you have the choice to deal with the entire class as one big group and then do the suggested experiments one time in front of every one, or to form groups of students in the class, ask each group to do the experiments, and then let them write their own conclusions using their own words. Even though both options are available for you, I would go for the second choice and divide the class into smaller groups because of the benefits and skills they will acquire in doing the experiments by themselves.

Now during the first break, you may want to spend the time listening to the students talking about huge structures that demonstrate static equilibrium, may be asking them about buildings or bridges they have seen or know about. Where are these structures, what are their names, when they were built, are they considered to be stable or unstable, and under what situations these structures become unsafe.

When I come back, I will demonstrate what it is meant by each of the equilibrium terms (stable, unstable, and neutral). This demonstration is very illustrative and easy to be conducted in class. You may elect during the pause after the second segment to ask your students to prepare track just like the one I used. You may ask each group after that to push their object on the track with different forces and check each time after the object comes to rest whether it is in stable, unstable, or neutral equilibrium. After that, you may want to talk to your students about the importance of size and shape of various objects and if the distribution of matter within the object will affect whether the object will stand still or flip on its side. Let them think what will happen if the objects are composed of more than one part, like cranes. This is very important as I want to work on the concept of the center of gravity in the third segment.

During the pause and after the third segment, I want the students to determine experimentally the center of gravity of a system composed of non-uniform rod (may be a trunk or even a baseball bat) and two different weights of different shapes.

Now during the break after the fourth segment, you may ask the groups to do the same experiment and see which group will reach to equilibrium first. Then go to each group and try to push or rotate their system to check which experiment can tolerate more force or withstand more punishment before collapsing. Then you might ask each group to challenge itself by reconstructing and locating another equilibrium point for their system, and then see whether the new equilibrium point is more stable than the previous one!

You may also want to discuss with your students real situations or examples where equilibrium is crucial. Also, it is important to explain to them the significance of checking the soil in any intended construction site of any huge structure such as a skyscraper before the construction starts.

After the fifth segment, I expect you to summarize for your class the concepts and keywords introduced during this lesson and then open the floor for any comments or questions. At this point, all what I can say is that I hope the students have received and gained all the intended benefits from this lesson. Therefore I can gladly extend to you my deep thanks and appreciations for your attention, help, and patience. I hope this lesson was fruitful and enjoyable as I enjoyed teaching it. Thanks again.