The scenario

Subject (field/title)	**Mechanics/ The center of mass of an irregularly shaped body**
Length of movie	3:11
Main Goals	Rigid body statics. Determination of the center of mass/center of gravity of solids.
Detailed Goals	Determination of the center of mass/gravity of an irregularly shaped solid. Behavior of a solid supported (suspended) at the center of mass/gravity.
Structure and description of the experiments:	
Introduction	Description Observation of subsequent steps to determine the center of mass/gravity of an irregular body. An illustration of neutral equilibrium.
Main topic	Description The aim of the experiment is to familiarize students with the method of determining the center of mass/gravity of irregular solids. Indication of the role of the plumb line in determining the center of mass/gravity of bodies. Rigid body equilibrium demonstration.
Part 1	
	Tools : • *Flat, irregular shape body* • *tripod,* • *tripod adapter to attach the handle* • *handle* • *string* • *weight or other weight* **Description** : We place a handle on the tripod, on which we hang a weight fixed at the end of the string, creating a plumb line. A weight suspended on a string creates a so-called plumb line. The plumb line is a line that coincides with the direction of gravity on the Earth's surface. We hang the body on the tripod, on the same handle as the plumb line. We choose any suspension point. We pay attention to the direction of the plumb line. If possible, we can draw a straight line on the body that runs along the vertical. We hang the body at any other point and set the direction of the plumb line again. Once again, we change the suspension point of the body and mark the direction of the vertical with such a suspension.

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	The center of mass of the solid lies at the point where all 3 lines determined by the perpendicular intersect for each suspension point of the body. We suspend the body at its center of mass/gravity. We show that no matter which way we turn the body, how we tilt it, it will always remain in balance. **Questions** : How can you find the center of mass of an irregular body? What is the difference between center of mass and center of gravity? Can the location of the center of mass coincide with the location of the center of gravity? If so, under what conditions is it possible? What is a plumb line (masonry plumb)? What is the vertical? How does a body supported (suspended) at its center of mass/gravity behave? **Conclusions:** The center of mass lies at the point where the lines drawn by the plumb line for each point of suspension of the solid intersect. To determine the location of the center of mass of an irregular body, we can use a plumb line (masonry plumb). The center of mass is a point in an object that often behaves to a good approximation as if the mass of the entire object was concentrated there. This concept is very useful in mechanics because it allows you to describe the motion and behavior of a body, even of a complex shape, in a simple way. The force of gravity (gravity) is in a homogeneous gravitational field applied to the center of mass - that's why we talk about the center of gravity. Only in a heterogeneous gravitational field the center of mass and the center of gravity do not coincide. In a gravitational field, which is approximately homogeneous, like the gravitational field at the surface of the Earth, we assume that the center of gravity coincides with the center of mass. For this reason, the terms "center of gravity" and "center of mass" are often used interchangeably as synonyms.
1. Summary, evaluation and comments	**Application:** The video can be used at the beginning of the lesson as an introduction to the center of mass/gravity lesson. Question: What is the center of mass? What is the center of gravity? How to determine the center of mass of irregular solids? The film can be used in the implementation phase of the lesson as an illustration of the discussed issue.

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	The film can be used as a repetition of the topic related to the center of mass and the way it is determined. Discussion about methods of determining the center of mass of regular and irregular bodies. You can support a solid in the center of mass on a finger and demonstrate that it remains at rest. Previously, in the same way, we can determine the location of the center of mass of regular bodies, for example, for a square, any triangle, an equilateral triangle, a trapezoid. We can discuss what straight lines the plumb determines in solids, when the suspension point will be in the successive vertices of a given solid. **Level of education:** secondary school

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