

### The scenario

<b>Subject (field/title)</b>	<b>Mechanics / Determination of the center of mass of a hanger</b>
<b>Length of movie</b>	1:37
<b>Main Goals</b>	Statics of a rigid body, center of gravity
<b>Detailed Goals</b>	Rigid body statics. Determination of the center of mass/gravity of the hanger
<b>Structure and description of experiments:</b>	
<b>1. Introduction</b>	Description: Observation of the method of determining the center of mass/gravity of an irregular body - hanger
<b>2. Main topic</b>	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 (bricklaying plumb) in determining the center of mass/gravity of bodies. Making students aware that the center of mass/gravity does not have to be a material point and can be outside the solid. Center of mass and center of gravity.
<b>Part 1</b>	
<b>Experiment 1</b>	<p><b>Tools:</b></p> <ul style="list-style-type: none"> <li>• <i>hanger made of wire (plastic or wood),</i></li> <li>• <i>tripod,</i></li> <li>• <i>tripod connector for attaching the handle</i></li> <li>• <i>handle</i></li> <li>• <i>twine</i></li> <li>• <i>a weight</i></li> </ul> <p><b>Description:</b> We place a handle on the tripod. We hang a weight fixed at the end of the twine on the handle, creating a plumb line. A weight suspended on a twine creates a so-called plumb line, i.e. a device for determining the vertical direction. The plumb line determines the direction to the center of the Earth, the direction of gravity. We hang the hanger on the hook on the same handle as plumb line on the tripod. We pay attention to the direction of the plumb line inside the contours of the hanger. We hang the hanger at a different point and pay attention to the direction of the plumb line again. Once again, we change the suspension point of the hanger and look at the direction of the plumb line in such situation.</p>

	<p>We choose a total of three arbitrary points on which we hang the hanger and observe the direction of the plumb line in each case. The center of mass lies at the point where all lines drawn by the plumb line for each suspension point of the body (hanger) intersect.</p> <p><b>Questions:</b></p> <p>How can we 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?          Can the center of mass of a body be immaterial and be located outside the solid?</p> <p><b>Conclusions:</b></p> <p>The center of mass lies at the point where the lines drawn by the plumb line for each suspension point intersect.          The center of mass may be outside the solid.          We can use the plumb line to determine the location of the center of mass of an irregular body.          The center of mass is a point of an object that often behaves as if all the mass of the rigid body 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 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.</p>
<p><b>3. Summary, evaluation and remarks</b></p>	<p>The video can be used at the beginning of the lesson as an introduction to the center of mass/gravity lesson.</p> <p><b>Question:</b> What is the center of mass? What is the center of gravity?          How to determine the center of mass of irregular solids?</p> <p>The film can be used in the implementation phase of the lesson as an illustration of the discussed issue.          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 solids</p> <p><b>Level of education:</b> secondary school</p>