

The scenario

Subject	Mechanics / Equilibrist's balance
Length	1:37
Main goals	Statics of a rigid body, center of gravity
Detailed goals	Types of equilibrium in which the body can be: indifferent, unstable, stable,
Structure and description of experiments:	
1. Introduction	<p>Description: Observation of the behavior of a motorcyclist balancing on a rope. Learn the rules to keep bodies in balance.</p>
2. Main subject	<p>Description: The aim of the experiment is to introduce students to topics related to the concept of the center of gravity and its role. Discussion of the types of equilibrium of a body (rigid body) depending on the location of the center of gravity of this body relative to its support point.</p>
Part 1	
Experiment 1	<p>Materials:</p> <ul style="list-style-type: none"> • Motorcyclist - a figure made of LEGO bricks on a motorcycle without tires, • wire or rod properly bent into an arc, • plasticine to load the rod, • string/rope or flat bar, • 2 tripods, • connectors for attaching the rope/flat to the tripod <p>Description: We assemble the connectors on the tripods, place them at different heights (slight difference in height). We attach the rope/twine between the tripods to the connectors, we tighten it. The rope forms an inclined plane with a small angle of inclination between the tripods. We place the motorcyclist on the rope and observe his behavior - he does not keep his balance and falls down with the motorcycle. We put a bent rod loaded with plasticine at the ends into the motorcyclist's hands. We put the motorcyclist back on the rope. The motorcyclist maintains balance, slides down the rope, stops at the end of the rope and continues to balance. Instead of a rope/string, you can use a flat bar fixed vertically (with a thin edge vertically).</p> <p>Questions: Why is a motorcyclist on a motorcycle set on a rope unable to keep his balance?</p>

	<p>Where is the motorcyclist's center of gravity relative to the fulcrum (where the motorcycle wheels meet the rope)? What could help him keep his balance? What role does the bent rod play in the hands of a motorcyclist? What is the role of an umbrella or a balance in the hands of a tightrope walker? In what position relative to the fulcrum is the motorcyclist's center of gravity when we place a long rod/wire loaded at the ends in his hands.</p> <p>Conclusions: If the center of gravity of the body (motorcyclist) is below the rope, the figure will keep balance, it will balance, but it will not fall. A bent long rod, a pole, an umbrella held in the hands of a tightrope walker change the position of the center of gravity of the body/system, lowering it. The role of the long rod is to lower the center of gravity of the body/system. When the center of gravity is under the point of support of the body - the body will be in permanent equilibrium.</p>
<p>3. Summary, evaluation and remarks</p>	<p>The video can be used at the beginning of the lesson as an introduction to the lesson on the center of gravity, the question: why without a long pole the motorcyclist loses balance and with a long pole in his hands he easily moves along the rope The film can illustrate how the behavior of bodies changes under the influence of changing the position of the center of gravity. The video can be used as a control question: What happened to the position of the biker's center of gravity when a long pole was added to the system? Discussion about</p> <ul style="list-style-type: none"> • circus equilibrists, • Philippe Petit - French highwire-walker and the movie "The walk" • physics in sport - change in the position of the center of gravity during high jump, race walking ect, • A tightrope walker balancing over the Brda River in Bydgoszcz in Poland. <p>Level of education: secondary school</p>