

A Boomerang Project

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Topic	The Boomerang – building, throwing, and designing	
Age of students	10 to 19 years	
Class	Class 5 to 13	
Presentation possibilities, Public relations	<ul style="list-style-type: none"> • Organisation of a Boomerang contest with different disciplines according to international rules • Exhibition of designed Boomerangs 	
Subjects	<p>This topic can be taught inter disciplinary, or as a single subject in a physics course and is especially well-suited for a project week.</p> <p><u>Physics:</u> Mechanics, special forces, buoyant force (class 8 to 13) <u>Geography:</u> Australia (class 9) <u>English:</u> Australia (class 9) <u>Art:</u> Art of the Australian aborigines</p>	
Building of Boomerangs	Wood:	best suited is peywood wood of Finnish birch-trees (thickness 3 – 5 mm)
	Tools:	for every student a fretsaw, coarse and fine grinding sand paper
	Design:	colours and light varnish
Scientific aspects	<p>Physics: While analysing the physics of the boomerangs students can deal with different disciplines of physics. Teacher and students can determine the depth of physical background theory that they want to understand. The students can learn about forms of the classical boomerangs, the efficient forces, the moments of rotation, and the corresponding distribution of the aerodynamical flow. The sub-topics of mechanics and thermodynamics will be mainly covered.</p> <p>Geography and English: In these two subjects the students will focus on the historical, economical, and cultural background of the life of the Australian aborigines. The students can study the history, race, language, and music of Aborigines.</p> <p>Art: Culture and art of the Aborigines are very mystic and interesting. Stories and rituals are often reflected through motives in paintings, on musical instruments and boomerangs.</p>	

<p>Didactical aspects:</p>	<p>A group of about 20 students can work on this project. During the manufacturing of their boomerangs the students have to work very carefully to sand the wooden surfaces, since the flight of the boomerang heavily depends on the smoothness of the boomerang areas.</p> <p>Firstly, the students should built a very simple boomerang and try to throw it properly.</p> <p>Simple boomerang models are [5]:</p> <ol style="list-style-type: none"> 1. „Standard“: boomerang for beginners flight distance: ca. 20 m weight: 80 g wood: 4 – 5 mm 2. „Outback II“: boomerang for beginners, trick catching, flight distance: approx. 20 m weight: 75 g wood: 4 – 5 mm 3. „Bellen“: boomerang for beginners, trick catching, accuracy throwing flight distance: ca. 20 m weight: 75 g wood: 4 – 5 mm <p>Naturally, students like to catch their boomerangs, but obviously here the teacher should decide if this is too dangerous (especially for very young children).</p> <p>A lot of fun is guaranteed when students use exotic boomerang forms (anchor, hammer and sickle, wheel, frog, cat, ...) and colourful designs (traditional patterns of Aborigines, Pop Art, phantastic patterns, ...).</p> <p>To prepare and to carry through a boomerang contest between students ensures a lot of fun. The students have to train a lot and are very proud of their results.</p> <p>An exhibition of nicely designed boomerangs is a must for all students, parents and teachers. Very often the best boomerangs are never thrown, but real nice exhibition objects.</p>
<p>Project time planning</p>	<p>A detailed description of a purely physical project for students of the classes 10 – 13 is given in [3].</p> <p>Students should be given enough time to study and select possible motives of boomerangs. The design of boomerangs takes about 5 hours. The thin varnish layers of the boomerangs should be carefully prepared.</p>
<p>Address to order special wood</p>	<p>Firma Fette Adolf GmbH & Co Porgesring 15 D – 22113 Hamburg Germany tel.: +49 – 40 – 731537, fax: +49 – 40 – 7328174</p>

Bibliography	<p>[1] Hess, F.: <i>The Aerodynamics of Boomerangs</i>, Scientific American <u>11</u> (1968) 124</p> <p>[2] Liebers, K.: <i>Naturwissenschaften „Vom Fliegen“</i>, Volk und Wissen, Berlin 1998</p> <p>[3] Mie, K.; Frey, K.: <i>Physik in Projekten</i>, Aulis Verlag Deubner, 1996</p> <p>[4] Siems, M.: <i>Die neue Bumerang Mappe</i>, Selbstverlag, 1994</p> <p>[5] Siems, M.: <i>Achtung ... Bumerang</i>, Mach+Sach-Buch Ravensburg, 1985</p>
Internet links	<p>Very informative web site on boomerangs, designs, contest and international links: www.bumerang-sport.de</p> <p>valuable information on the art of Australian aborigines, many pictures and motives: www.aboriginalartonline.com</p>