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Wave Math

Guide for Curriculum Unit 08.05.06
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This unit introduces and integrates surface waves and the sport of surfing as a study subject relative to the math curriculum for high-school grade levels within the New Haven Public School system. Specific goals and objectives are cited that will enable students to respond to a series of sequential assignments, culminating and terminating in one or more definitions of surface waves and the mathematical dynamics implicit to those forces of nature. The Algebra, Calculus, Geometry, and Trigonometry processes of ocean waves are the subject of this presentation of math curriculum.

The curriculum unit assists in teaching about ocean surface waves: mechanical waves that propagate along the interface between water and air; the restoring force is provided by gravity, and so they are often referred to as surface gravity waves. As the wind blows, pressure and friction forces perturb the equilibrium of the ocean surface. These forces transfer energy from the air to the water, forming waves. In the case of monochromatic linear plane waves in deep water, particles near the surface move in circular paths, making ocean surface waves a combination of longitudinal, or back and forth, and transverse, or up and down, wave motions. The force of waves and the math that defines those forces will assist in teaching about this seminar subject in my classroom. Lesson plans assist teaching wave mathematics in the classroom, referencing common equations consistent with math curriculum: the circle equation; the ellipse equation; conic sections; etc. The unit identifies goals, objectives, vocabulary, and assessments.

(Developed for Mathematics and Physics, grades 9-12; recommended for Mathematics, grades 9-12)