Synopsis and Key Concepts

APPLES AND OCEANS (from Only One Ocean)

In this activity, students first brainstorm what they know and value about the ocean and discover where most of life is found in the ocean. Students then work in pairs, using an apple and a circle graph to represent the planet. They carefully section the apple and the graph into wedges representing various critical resources on the planet. These visuals give students an immediate sense of the small proportion of the Earth that provides resources from the land and the ocean. Students then design a mini-book or other creative writing to demonstrate what they've learned.

• *Most of our planet is covered in ocean, but only a small fraction of the ocean supports large concentrations of life.*

PLANET OCEAN (from Ocean Currents)

Students are introduced to the vastnes of our planet's one, interconnected ocean and the importance of the ocean to all life on Earth. Students participate in a wide-ranging brainstorm about what they already know, value, and enjoy about the ocean. They work in teams to explore a globe using a global exploration worksheet as a guide.

• *There is only one ocean! Our Earth is covered by one interconnected world ocean that circulates around all the continents.*

WASTE DISPOSAL (from Ocean Currents)

Students discuss their personal experiences with currents and then make predictions about the best and worst locations in the ocean to dispose of waste from imaginary countries. They test their ideas with a simple model of an ocean and continents. Food coloring models the waste, and ice cubes are used to model temperature differences between water masses in the ocean. The students record the movement of the "waste" and then interpret and present their findings. Finally, the teacher uses the model ocean set on an overhead projector to show how wind sets water in motion. These wind-driven currents are projected onto a map of the Pacific Ocean Rim , modeling the major circulating patterns in the ocean.

• *Things dumped into the ocean may be distributed by currents throughout the ocean.*

• *Wind and the temperature differences between masses of water are two factors that cause currents.*

• *Winds blowing across the surface of the ocean–combined with other factors–cause major circulating currents, or gyres.*

CURRENT TRENDS (from Ocean Currents)

This activity provides students with a range of experiences relating to salinity and temperature and model how these factors and their interactions affect density and the creation of real currents. Cooperative student groups examine the relationship between temperature, salinity, and density as rotate through three different activities and experiments set up as stations. The students create currents by combining water of different temperature and salinity, and discover how the force of the wind and differences in density affect motion at all levels. Students apply their knowledge as they make a poster describing how the station activities relate to actual currents.

• *Salinity and temperature differences create masses of water with different densities.*

• *Gravity causes more dense water to sink below less dense water. As a result, the less dense water rises.*

ICE CUBES (from Ocean Currents)

This demonstration synthesizes what students have learned about density-related currents. Temperature and salinity are combined to look at the interactions that create ocean currents. Students make predictions about whether ice cubes will melt faster in fresh water or salt water and explain their reasoning. They watch an experiment and hypothesize about the results.

(Students write their own key concepts for this activity.)

THE GREAT PLANKTON RACE (from Open Ocean Binder)

Students observe, sketch and categorize a diversity of plankton from video footage and transparency cutouts and focus on the adaptations to slow down how fast they sink. Students then construct plankton models from materials of various shapes and densities to simulate adaptations, which slow sinking. They then "race" their models and calculate and graph sinking rates. The students then make increasingly detailed observations of live plankton and relate what they have learned about plankton adaptations to the living organism.

• *Plankton have adaptations which help them avoid sinking below the sunlit photic zone.*

SQUIDS—OUTSIDE AND INSIDE (from Only One Ocean)

Students work in pairs to dissect a squid and investigate its adaptations: its structure and how all the parts function together to allow the squid to survive and thrive in its open-ocean environment. The squid is then honored as the students participate in a Calamari Festival. In the last session, the class explores the issues surrounding the squid fishery by role-playing and discussing the problem from different points of view.

• *Pelagic creatures are organisms living in the open ocean.*

• *Looking closely at an animal like the squid can tell us a lot about the adaptations needed to survive and thrive as a pelagic creature.*

• *Many people depend on squids for food or for their livelihood. More discussion among these people will help create solutions to the problem of diminishing squid populations.*

WHALE WITH CLASS (from Open Ocean Binder)

In this activity, students first discuss what they already know about mammals and then work with a partner to change a terrestrial mammal so that it is adapted to a completely aquatic environment. The general categories of changes the students suggest are then used to describe marine mammal adaptations to the ocean. Students then take on the role of a specific body part of a whale and put all the parts together in a choreographed production demonstrating several behaviors and adaptations in a "movable whale" with the entire class. Finally, students work with a partner and choose a terrestrial mammal for which they make several drawings with written descriptions, each one 10 million years apart, until their animal is a highly specialized marine mammal.

• *Evolution is change in an organism over time.*

• *Over the last 50 million years, whales have evolved from land mammals into ocean mammals.*

BUILD AN OPEN OCEAN (from Open Ocean Binder)

Students review what they have learned about open ocean organisms and take a virtual field trip while keeping "field notes" with a partner. Students then research an open ocean organ ism, complete a page for the class Field Guide, and participate in presentations to the class. Students then transform the classroom into an open ocean as they create 3-dimensional organisms.

• *The open ocean is home to many different organisms that interact with one another as predators, prey or competitors.*