Principle 5: Grades 3-5

Principle 5:
The ocean supports a great diversity of life and ecosystems.

Diversity of Ecosystem

A.
The ocean supports a great diversity of interconnected and interdependent ecosystems, each defined by the interaction of the physical environment and the community of organisms living there.

A.1.
Coastal ocean ecosystems, (e.g., rocky seashores, kelp forests, and surface waters around the Arctic and Antarctic) that support the most life are mainly located in sunlit areas where the water is cold and nutrient-rich.

A.2.
Phytoplankton, the base of most ocean food webs, flourish in coastal surface waters where there are plenty of nutrients and sunlight.

A.3.
Estuaries—shallow coastal ecosystems where fresh water from rivers mixes with salt water from the ocean—are important nursery grounds for many different ocean organisms.

A.4.
Coral reefs are productive ecosystems found in clear, warm, nutrient-poor, tropical water. Algae living inside the coral provide them with some of the nutrients they need to survive.

A.5.
The open ocean ecosystem consists of the surface, mid-water and deep parts of the ocean away from the coast and sea floor bottom. Each of these areas is made up of entirely different physical characteristics and diverse communities of organisms.

A.6.
The sunlit surface layers of the ocean are where the sun's energy is captured by photosynthetic phytoplankton (algae and bacteria). This layer only extends down about 200 meters.

A.7.
The middle ocean layers are important living spaces for for many organisms, such as large fish and jellyfish. There is not enough light to support photosynthesis here. This zone extends from 200 meters down to 1,000 meters.

A.8.
Deep water ecosystems below 1,000 meters are in complete darkness and under extreme pressure.

A.9.
There are deep ocean ecosystems that are independent of energy from sunlight and photosynthetic organisms.

Diversity of Life

B.
The ocean provides most of Earth's living space and supports a great diversity of life from the surface, through the water column, and down to the sea floor.

B.1.
The great diversity of ecosystems in the ocean provides opportunities for organisms to develop a great diversity of adaptations, many of which are unique to organisms living in the ocean.

B.2.
There are adaptations and life histories that exist only in the ocean, due to unique environmental and physical properties, such as salinity, pressure, temperature, light and density, that are associated with living in a liquid environment.

B.3.
Adaptations that help some organisms survive in the ocean include: blubber to retain heat, fins for swimming, gills for removing oxygen from water, collapsible lungs for deep diving and acute hearing under water.

B.4.
Migration (both horizontal and vertical) is a strategy used by marine organisms to help them respond to daily and seasonal changes in ecosystems, such as the seasonal availability of food, high and low tides and escape from predators.

B.5.
Organisms in the ocean exhibit an amazing variety of life cycles. Some undergo metamorphosis and have planktonic phases, some lay eggs and others nurse their young.

B.6.
There are many groups of organisms that occur in the ocean that do not occur on land or in fresh water, such as sea stars, squid, jellyfish, corals, many types of worms and seaweeds.

B.7.
The ocean supports a tremendous variety of sizes of organisms, from extremely small to the largest animal ever to live on Earth.

B.8.
Most of the organisms in the ocean are microscopic. Photosynthetic microbes are the most abundant forms of life in the ocean.

See Principle 1: B4

See Principle 4: B1

See Principle 1: B8