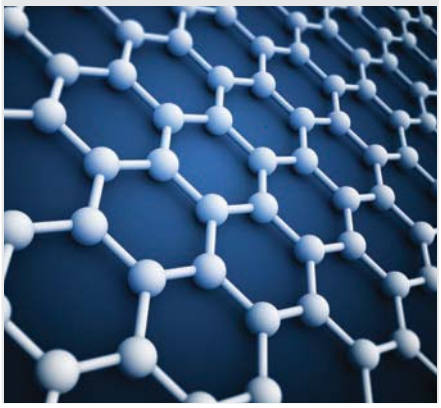
## Physical Science Connection

**Graphene** The unique chemistry of carbon molecules has many uses in nonliving systems. For example, graphene is a substance composed of a honeycomb lattice of carbon, just one atom thick. Graphene was first characterized in 2004 and is an excellent conductor, extremely flexible, and 100 times stronger than steel. Scientists and engineers are just beginning to tap into the many possible uses for graphene and products made with it.

Using library and Internet resources, research current and potential applications of graphene. Write a blog entry explaining the applications you think would have the greatest benefits. Use evidence from your research to support your claims.

**FIGURE 1:** Schematic View of Graphene



## Art Connection

**Chemistry of Pigments** Pigments are colored substances that can be used to color other materials. Pigments have been used for thousands of years to add color to artwork, clothing, skin, textiles, decorations, and other materials. Each pigment, whether organic or inorganic, natural or synthetic, has unique chemical properties that determine the pigment's color, durability, binding and other attributes. People using pigments and dyes carefully select those with the characteristics most appropriate and useful for the application at hand.

Using library and Internet resources, research the chemical properties and historical uses of pigments. Using your favorite pigments, produce your own work of art—a painting, a print, or another format. Prepare a report describing the chemistry and history of the pigments you chose to accompany your artistic work.

**FIGURE 2:** A Collection of Pigments

## Life Science Connection

**Silicon-Based Life** All known life forms on Earth depend on the chemistry of carbon biomolecules. Carbon may not be the only possible basis for life, however. The element silicon (Si) shares several important chemical properties with carbon, including the ability to form four bonds per atom. Some scientists have theorized that silicon-based life—perhaps on other planets, with conditions unlike those found on Earth—might be possible. For example, some scientists think other planetary bodies, like Titan, may be able to sustain silicon-based life.

Using library and Internet resources, research the case for silicon as a basis for the chemistry of living things. Construct an explanation using evidence stating whether you think silicon-based life could exist. In your argument, discuss the specific chemical properties of silicon compared to carbon that could make life possible or not. Cite specific text evidence to support your claims.

**FIGURE 3:** Titan, one of Saturn's moons, has conditions that some think may be able to support silicon-based life.