◆ Tech Systems ◆

Grade Level: 7th-9th

Length of Lesson: 2 days

Goals:
- Understand that core technologies are the basic systems integrated to create systems and products
- Introduction to quality control
- Identify at which points during the SeaPerch construction quality control will need to be performed

National Science Standards:
- PS3.A: Definitions of Energy
- PS4.B: Electromagnetic Radiation
- PS4.C: Information Technologies and Instrumentation
- ESS3.A: Natural Resources

Materials:
- Subsystems Cards (located below)
- Large poster-sized papers labeled with the 9 core technologies (Mechanical, Structural, Electrical, Electronic, Fluid, Optical, Thermal, Biotechnology, and Materials Technology)
- Glue or tape
- PowerPoint 4: Core Technologies
- Core Technologies Quiz (optional, located below)

Background:
Core technologies integrate to form systems and products. They can be combined and connected to form strong products with multiple uses.

Lesson: LAUNCH
Have the **Subsystems Cards** cut before students enter the room. Hang the **Posters of Core Technologies** around the room. As the students enter, give each of them a few cards and ask students to glue/tape their card(s) to the poster where they think it fits best.

Lesson: INVESTIGATE

Use **PowerPoint 4: Core Technologies** to introduce students to the nine core technologies. Ask students to come up with additional examples for the core technologies. Explain that all the subsystems must come together in order to make a successful product that fulfills its purpose.

Ask the students to pair up and discuss this question: "Have you ever bought an item, taken it home, and it did not work, so you had to return it?" Ask students how the problem might have been solved before the product got onto the shelf. How could the company have avoided an unhappy customer?

If you wish, you may give students the **Core Technologies Quiz** to assess their understanding of the lesson.

Lesson: PRACTICE

Define quality control (a process where all aspects of a product's quality are reviewed and tested). Explain that quality control must occur throughout all steps of a build process, such as the SeaPerch project. Make sure students understand that they will have to stop at several points during their SeaPerch build to check different parts. They must ensure that all parts work before they continue on to the next section of the build.

Ask students when they think it will be most helpful for them to perform quality control checks on their SeaPerch ROVs. Discuss the balance between enough quality control checks to ensure performance, and too many, which slows down the build excessively and may become unnecessarily costly.

Subsystems Cards (Page 1)
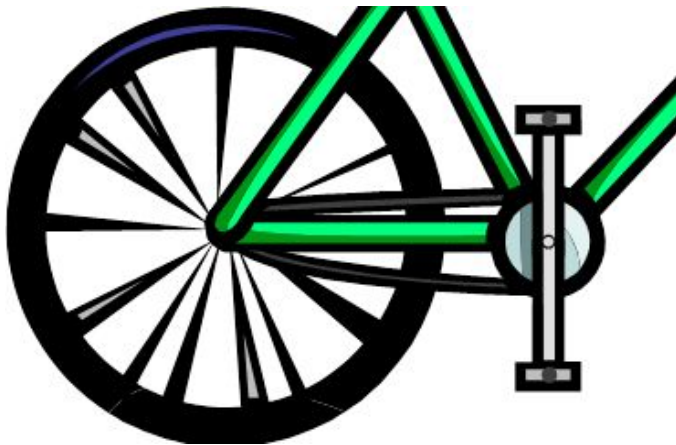
Subsystems Cards (Page 2)

Core Technologies Quiz

Name: _____   **Date:** _____

Directions: You may use your notes from the Core Technologies presentation to complete this quiz.

Match the terms in Column II with the statements in Column I.

		Column I		Column II
1.		The technology of putting together mechanical parts to produce, control, and transmit motion	A	biotechnology
2.		The technology of producing, storing, controlling, transmitting, and getting work from electrical energy	B	electrical technology
3.		The technology of using small amounts of electricity for controlling, detecting, and information collecting, storing, retrieving, processing, and communicating	C	electronic technology
4.		The technology of putting parts and materials together to create supports, containers, shelters, connectors, and functional shapes	D	fluid technology
5.		The technology of using fluid, either gaseous (pneumatics) or liquid (hydraulic), to apply force of transport	E	materials technology
6.		The technology of producing light; using light for information collecting, storing, retrieving, processing and communicating; and using light to do work	F	mechanical technology
7.		The technology of producing, storing, controlling, transmitting, and getting work from heat energy	G	optical technology
8.		The technology of using, adapting, and altering organisms and biological processes for a desired outcome	H	structural technology
9.		The technology of producing, altering, and combining materials	I	thermal technology

Directions: Circle the T or F in the column to the left of each true (T) or false (F) statement.

T   F   1.   A door latch is an example of mechanical technology.

T   F   2.   Laser surgical instruments are an example of fluid technology.

T   F   3.   A hot water heater is an example of biotechnology.

T   F   4.   Producing paper from wood is an example of materials technology.

T   F   5.   A swimming pool is an example of structural technology.

T   F   6.   Flashlights are examples of mechanical technology.

T   F   7.   A telescope is an example of optical technology.

T   F   8.   An artificial leg is an example of biotechnology.

T   F   9.   A bridge is an example of structural technology.

T   F   10.   Computers are examples of electronic technology.