**Guided Notes: Design Technology**

**Big Idea**:

Materials used in technological design are chosen based on their \_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_ and electrical energy.

**Key Concepts**:

• \_\_\_\_\_\_\_\_\_\_ energy is the energy that a substance has due to the motion of its particles.

• Materials with high \_\_\_\_\_\_\_\_\_\_ may expand or contract due to temperature changes.

• \_\_\_\_\_\_\_\_\_\_ materials are natural resources from the Earth, like gold or copper.

• \_\_\_\_\_\_\_\_\_\_ materials are created when a raw material is combined with another element.

• A \_\_\_\_\_\_\_\_\_\_ is a loop or closed pathway that allows electric energy to pass through.

• \_\_\_\_\_\_\_\_\_\_ are materials that are able to conduct an electric current.

• \_\_\_\_\_\_\_\_\_\_ are protective coverings that prevent transfer of electric energy.

• \_\_\_\_\_\_\_\_\_\_ limit the flow of electric current that passes through them.

• Resistance is measured in \_\_\_\_\_\_\_\_\_\_.

**Real World Examples**:

1. Smart watches: The internal components of smart watches use materials that can efficiently \_\_\_\_\_\_\_\_\_\_ electrical signals, while the outer casing and watch band are made of \_\_\_\_\_\_\_\_\_\_ materials to protect the wearer from heat and electrical components.

2. Solar panels: The cells in solar panels are made of materials that can efficiently \_\_\_\_\_\_\_\_\_\_ light energy into electrical energy, while the protective covering is made of materials that can withstand \_\_\_\_\_\_\_\_\_\_ and environmental factors without degrading.

**Guided Notes: Physics and Chemistry in Design**

**Big Idea**:

Physics and chemistry principles are crucial in the design and construction of \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_.

**Key Concepts**:

• Physics in construction:

 - \_\_\_\_\_\_\_\_\_\_ is balanced with other forces to keep structures upright

 - \_\_\_\_\_\_\_\_\_\_ determines the strength needed in materials to support weight

 - \_\_\_\_\_\_\_\_\_\_ air currents help distribute heat in buildings

 - \_\_\_\_\_\_\_\_\_\_ energy transfer is managed through insulation and material choices

 - \_\_\_\_\_\_\_\_\_\_ must be safely conducted and insulated in buildings

• Chemistry in design:

 - The \_\_\_\_\_\_\_\_\_\_ structure of materials determines their electrical conductivity

 - \_\_\_\_\_\_\_\_\_\_ reactions involve the transfer of electrons between atoms

 - \_\_\_\_\_\_\_\_\_\_ are formed when atoms gain or lose electrons

 - Batteries convert stored \_\_\_\_\_\_\_\_\_\_ energy into electrical energy

**Real World Examples**:

1. Electric skateboards: These use physics principles to \_\_\_\_\_\_\_\_\_\_ electrical energy into motion. The materials used in the motor and wheels must be able to withstand \_\_\_\_\_\_\_\_\_\_ forces while providing smooth acceleration and braking.

2. Water-resistant smartphones: These rely on chemistry to create \_\_\_\_\_\_\_\_\_\_ coatings that repel water. The materials used must form a tight \_\_\_\_\_\_\_\_\_\_ around the phone's components without interfering with its functionality.

**Guided Notes: Transportation Design**

**Big Idea**:

Transportation systems use various vehicles and devices to move \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_ efficiently.

**Key Concepts**:

• A \_\_\_\_\_\_\_\_\_\_ system is designed to use a variety of vehicles and devices to move people and goods.

• The four main categories of transportation systems are:

 1. \_\_\_\_\_\_\_\_\_\_

 2. \_\_\_\_\_\_\_\_\_\_

 3. \_\_\_\_\_\_\_\_\_\_

 4. \_\_\_\_\_\_\_\_\_\_

• A vehicle can be thought of as a \_\_\_\_\_\_\_\_\_\_ with many interacting parts.

• The individual parts that work together in a system are called \_\_\_\_\_\_\_\_\_\_.

• Key subsystems in vehicles include:

 - \_\_\_\_\_\_\_\_\_\_ subsystem: includes the frame and body

 - \_\_\_\_\_\_\_\_\_\_ subsystem: provides energy through the engine

 - \_\_\_\_\_\_\_\_\_\_ subsystem: helps with navigation

 - \_\_\_\_\_\_\_\_\_\_ subsystem: absorbs vibrations and impacts

 - \_\_\_\_\_\_\_\_\_\_ subsystem: includes parts for driving and parking

**Real World Examples:**

1. Ride-sharing apps: These use GPS technology from the \_\_\_\_\_\_\_\_\_\_ subsystem to connect drivers with passengers and provide efficient routes.

2. Electric scooters: These personal transportation devices rely on a battery-powered \_\_\_\_\_\_\_\_\_\_ subsystem for movement and a sturdy \_\_\_\_\_\_\_\_\_\_ subsystem to support the rider's weight.