

Technical Drawings  
Motion, Design, Forces  
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South Carolina State Standards

**Process skills and inquiries are not an isolated unit of instruction and should be embedded throughout the content areas. Safety issues should be addressed as developmentally appropriate.**

**A. Process Skills**

**1. Observe**

- a. Use the senses and simple tools to gather information about objects or events such as size, shape, color, texture, sound, position, and change (qualitative observations).

**4. Communicate**

- a. Use drawings, tables, graphs, written and oral language to describe objects and explain ideas and actions.

**5. Infer**

- a. Explain or interpret an observation based on data and prior knowledge.
- b. Discriminate between observations and inferences.

**6. Predict**

- a. Use prior knowledge and observations to identify and explain in advance what will happen.
- b. Discriminate between inferences and predictions.

**B. Inquiry**

**1. Plan and conduct a simple investigation.**

- a. Identify questions that can be answered through scientific investigations.
- b. Design and conduct a scientific investigation.
- c. Use appropriate tools and techniques to gather, analyze, and interpret data.
- d. Develop descriptions, explanations, predictions, and models using evidence.
- e. Use mathematical thinking in all aspects of scientific inquiry.
- f. Communicate outcomes and explanations.

### C. Abilities Necessary to Do Technological Design

#### 2. Design a solution or product.

b. Communicate ideas with drawings and simple models.

## IV. Physical Science

Units of Study: Mixtures and Solutions  
Forces, Motion, and Design

### B. Motions and Forces

#### 2. If more than one force acts on an object along a straight line, then the forces will reinforce or cancel one another.

c. Analyze a device with parts that move and determine the purpose of each moving part and the overall purpose of the device.

d. Design and construct a device that moves. (T)

### Background Knowledge:

Engineers sketch their ideas before they build a product. Engineers make detailed records of products after building them. Engineers may draw them or use computer records so that products can be studied and reviewed.

Technical drawings should be labeled, color-coded, neat, and have multiple views.

### Materials:

Graph Paper

STC Motion and Design Kit

Colored Pencils

Circle Templates

Rulers

### Engage:

Explain to the students that we will be doing a unit on motion and design. Ask the students what they know about the motion and design of vehicles and what they want to know. Write down student responses on chart paper. Allow students time to explore with materials used to build vehicles.

### Exploration:

Have the students work in groups of 3-4. After students have had ample time to explore with the materials used to build vehicles assign the students their first challenge. Their first challenge is in twenty minutes or less, design and build a vehicle that will move at least 100cm. Before the students begin building ask them how they will test their

vehicles to meet the requirements and discuss as a class. Give students time to build and test vehicle.

**Explication:**

Discuss student's vehicles. Have students explain how they built their vehicles and any problems they may have experienced while trying to meet the requirements of their first challenge.

As a class discuss technical drawings. Talk about what engineers use to plan, design, and construct products. Record student answers on chart paper.

Have students get their vehicles, colored pencils, rulers, circle templates, and graph paper. Have students draw their vehicle from lesson 1 on graph paper. Also have students write a description of what the vehicle looks like. Discuss first as a group and then as a class what they would do differently and what they would do the same if they had to draw their vehicles again that would make it easier for other to use a guideline to build.

**Elaboration:**

Students will build a vehicle based on a technical drawing. Discuss what techniques students can use to examine technical drawings to determine what pieces are needed to build vehicle. Allow students time to build vehicles. After groups have had enough time to build vehicles discuss the completed product.

- Why are all of the vehicles the same?
- Compare their technical drawing to the one in the book. How are they the same? How are they different?
- Discuss the different views and why they are necessary.
- Which drawing would be easier to make a model from, the one in the book or the one they created?
- Discuss what makes a good technical drawing.

**Evaluation:**

Throughout the unit on motion and design students will build vehicles and record their designs in a technical drawing. Rubrics will be used to assess the technical

drawings. Rubric is attached. The final assessment on technical drawings is that each group will have to build a vehicle and record their design through a technical drawing. Each group will then give their technical drawing to another group to see if they can build their vehicle based on the technical drawing they were given.