



## Lesson Plan 4: Physical Science

**Subject:** Science

**Course/Grade:** 4 – 6, 6 - 8

**Objectives/Outcomes:**

- To increase students' knowledge of the effects of temperature on an object using the Scientific Method.

**Curriculum Framework Standard(s):**

- Science/Technology
  - Physical Science Grades 6 – 8
    - Properties of Matter
      - Differentiate between weight and mass, recognizing that weight is the amount of gravitational pull on an object.
      - Differentiate between volume and mass. Define density.
      - Recognize that the measurement of volume and mass requires understanding of the sensitivity of measurement tools (e.g., rulers, graduated cylinders, balances) and knowledge and appropriate use of significant digits.
    - Heat Energy
      - Recognize that heat is a form of energy and that temperature change results from adding or taking away heat from a system.
  - Physical Science Grades 3 – 5
    - Properties of Objects and Materials
      - Differentiate between properties of objects (e.g., size, shape, weight) and properties of materials (e.g., color, texture, hardness).

**Materials:** See if any of your students have any of the following materials

- Football(s)
- Tape measures
- Scales or balances
- Access to a refrigerator
- Note taking equipment (either pen/paper or excel)

**Procedure:**

1. “Frontloading” (Before)-
  - a. Preparation & Planning
    - i. Before you begin- see how many students have footballs and football gloves they can use during your virtual class time.
    - ii. Visit websites below and watch short Patriots Snow Bowl highlights:
      1. <https://www.patriots.com/video/memorable-divisional-game-moments-320401> OR
      2. <https://www.patriots.com/video/2001-afc-divisional-playoff-snow-bowl-kick>





- iii. Make sure students have basic knowledge of the physical science related terms and relationships (temperature vs air density etc)
- iv. Review the Scientific Method/Process

**2. Assistance and Associations (During)**

- a. Question: Is kicking a warm football (think preseason) any different from kicking a cold football (think playoffs in New England)?
- b. Have students make hypothesis
  - i. Make sure students not only think about the snow, but about the playing surface, the temperature, the temp of the players, and most importantly the ball
- c. Collect Data
  - i. Have students make chart or table to input football data

“Superdome” (room temp)	“Seattle” (wet)	“Playoffs” (cold)

- ii. Start w/ brainstorming and observations about the physical characteristics of the ball – use the chart above to record these observations in the Superdome column:
  - 1. Shape
  - 2. Size
    - a. Diameter around laces
    - b. Diameter tip to tip
    - c. Volume – water distilling
    - d. Mass
  - 3. Color
  - 4. Texture
- iii. Have the students with footballs describe them. Have them be very detailed about what it feels like, how heavy it is and how it changes when they, squeeze it, bounce it, throw it, catch it, kick it – have all students use the chart to record observations while “playing” with the ball (once each at a regular dry room temp, wet, and cold and record in chart). Have the students without footballs ask questions about how the footballs feel under certain situations. Students can run the football under cold water for “Seattle” testing and either place the ball in the refrigerator or freezer for 30 minutes for “Super Bowl” testing.
- iv. Do it all again but w/ gloves

**3. Reflection & Readiness for Application (After)**

- a. Analyze and Interpret Data
- b. Draw a Conclusion (Final Statement)
- c. Any questions or suggestions?
  - i. Better ways to construct the football to minimize these differences?
    - 1. Different material?
    - 2. Different filler (hydrogen vs. air?)
  - ii. Dome games?
  - iii. Football heaters?

