

## INSPIRE GK12 Lesson Plan



<b>Lesson Title</b>	Air Pressure
<b>Length of Lesson</b>	1 Day
<b>Created By</b>	Hannah Box
<b>Subject</b>	Earth Science
<b>Grade Level</b>	8th
<b>State Standards</b>	Eighth Grade: 4c
<b>DOK Level</b>	DOK 2
<b>DOK Application</b>	Construct, modify, relate
<b>National Standards</b>	5-8: D: Earth Science
<b>Graduate Research Element</b>	Chemistry gas laws (Ideal, Boyle's, Charles). Understanding the relationship between temperature and pressure.

### **Student Learning Goal:**

#### State Standards Eighth Grade:

4(c): Examine weather forecasting and describe how meteorologists use atmospheric features and technology to predict the weather. (DOK 2)

#### National Standards 5-8: D: Earth Science:

The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.

### **Materials Needed (supplies, hand-outs, resources):**

For each group: Tissue Paper, Spray glue, glue sticks, regular Elmer's glue, wire, string, hair dryer, plastic cup, tea light candle, scissors, ruler, and a felt tip marker.

### **Lesson Performance Task/Assessment:**

During the short lecture at the start of class the students will have to complete a worksheet filling in the blanks to act as their notes. At the end of these notes there will be several questions that they will have to answer.

The students will be given a grade based on the final hot air balloon product. It will have to fly.

### **Lesson Relevance to Performance Task and Students:**

The students will be taught about air pressure and the properties that are associated with it. They will then use what was discussed to construct their own hot air balloon.

### **Anticipatory Set/Capture Interest:**



Video of a hot air balloon ride many found on youtube

**Guided Practice:**

The teacher will give a brief lecture on air pressure (see power point attached). Then make sure to define volume, mass, density, and buoyancy

When flying a hot air balloon, energy is transferred from the stove to the air in the balloon through heat. The energy of the heat accelerates the motion of the air molecules causing fewer molecules to occupy the same space as do at a lower temperature. With fewer molecules, the hot air has less mass than an equal volume of cold air. Therefore, hot air is less dense than cold air. The greater the difference in the temperature between the air inside the balloon and the surrounding air, the greater the buoyancy. If this buoyant force is greater than the total weight of the balloon and its cargo, the balloon will rise. That's why hot air balloons work best on cool, still days.

Next the students will be split into groups of three or four. They will be given the materials to make one balloon. Using the information given to construct one gore of the balloon, they will construct a hot air balloon out of eight gores using the materials available. The balloons will then be taken outside and tested using either the hair dryer or the cup and candle.

**Independent Practice:**

The students will be given a sheet with instructions on it and will have to work in their groups without help from the teacher to assemble their own hot air balloon.

**Remediation and/or Enrichment:**

Remediation: Individual IEP. Instead of working in small groups, the students could work as a whole class. Kits that require minimum setup can also be purchased.

Enrichment: The students could be given different materials (Varying glue and tissue) and have to design their balloon by trial and error.

**Check(s) for Understanding:**

Why does a hot air balloon fly?

Why does hot air rise?

Why is hot air lighter than cold air?

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### **Closure:**

The students will fly their hot air balloons and then answer the questions at the bottom of their notes. Then the class will discuss what was seen and learned.

### **Possible Alternate Subject Integrations:**

Chemistry: Tie in this lesson with gas laws

### **Teacher Notes:**

Hot air balloon construction instructions found and adapted from <http://juniorballoonist.com/lessonplan.pdf>