



Lesson 8 – Ballooning Mechanics

Subject Area: Science

Learner Outcomes:

1. The students will explore occupational opportunities in science and technology.
2. They will become familiar with basic weather related concepts as they affect issues dealing with ballooning and weather occupations.
3. The students will discuss how weather ties into their everyday lives.

Materials: Information, below, duplicated on hand-outs or on Overhead Transparencies

Lesson time: approximately 45–50 minutes with discussion

WV Third Grade CSO's: SC.3.1.3, SC.3.2.1, SC.3.2.2, SC.3.2.7, SC.3.3.1, SC.3.3.2, SC.3.4.22, SC.3.5.2.

Procedure:

1. Have following information handy to read and discuss. The following information can be printed from the website in greater depth.
<http://www.howstuffworks.com/hot-air-balloon.htm?printable=1>
 - A cubic foot of air weighs roughly 28 grams (about an ounce). If you heat that air by 100 degrees F, it weighs about 7 grams less. Therefore, each cubic foot of air contained in a hot air balloon can lift about 7 grams. That's not much so that's why hot air balloons are so big.
 - To lift 1,000 pounds, you need about 65,000 cubic feet of hot air
 - Modern hot air balloons heat the air by burning propane, which is the same gas used in most outdoor grills.
 - In most modern hot air balloons, the envelope (the balloon part of the hot-air-balloon) is constructed from long nylon gores. The gores go all the way from the base of the balloon to the top which is called the crown. Each gore is made up of several smaller panels.
 - Nylon works very well in balloons because it is lightweight, but it is also fairly sturdy and can tolerate fairly high temperatures.
 - Most hot air balloons use a wicker basket for the passenger compartment. Wicker works very well because it is sturdy, flexible and relatively lightweight. The flexibility helps with balloon landings. In a basket made of more rigid material, passengers would feel the landing much more.
 - Hot air balloons have a control that opens a second propane valve. This valve sends propane through a hose that bypasses the heating coils. This lets the pilot burn liquid propane, instead of propane in gas form. Burning liquid propane produces a less efficient, weaker flame, but it is much quieter than burning gas. Pilots often use this second valve over livestock farms, to keep from scaring the animals.



- Makes to it go up and venting the hot air makes the balloon come down.
- By changing your vertical position, a pilot can catch different winds to take him in the direction he prefers to go.
- Before a flight, a pilot will check the weather conditions to make sure there isn't too much wind or rainy weather. Storms are very dangerous because of lightning strikes and the rain will damage the balloon material.
- Pilots also send up a "pie-ball" which is short for "pilot's balloon." A pie-ball is a plain old balloon that is usually black so that pilots can see it in the sky. It is filled with helium and then released. The pilot and crew will watch the pie-ball to see which direction it goes so they have an idea which direction they will be flying.

Assessment: Class participation in discussion format

