

## RAMP UP - HAB Lesson Plan

<b>Title of Lesson:</b>	Balloons, Balloons! Comparing Hot Air and High-Altitude Balloons
<b>Grade Level:</b>	2
<b>AL COS Standard:</b>	<p>SC15.2.4 - Provide evidence that some changes in matter caused by heating or cooling can be reversed (e.g., heating or freezing of water) and some changes are irreversible (e.g., baking a cake, boiling an egg).</p> <p>ELA21.2.26 - Compare and contrast important details presented by two texts on the same topic or theme.</p>
<b>NGSS:</b>	2-PS1-4 – Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.
<b>Learning Targets/Objectives:</b>	<ul style="list-style-type: none"> <li>● I can explain how different temperatures and pressure change the air on earth.</li> <li>● I can compare and contrast different types of balloons</li> </ul>
<b>Materials Needed:</b>	<ul style="list-style-type: none"> <li>● <b>Book</b> <ul style="list-style-type: none"> <li>○ <i>Please Bring Balloons</i> by Lindsay Ward           <ul style="list-style-type: none"> <li>▪ Link to purchase on Amazon: <a href="https://www.amazon.com/Please-Bring-Balloons-Lindsay-Ward/dp/0803738781">https://www.amazon.com/Please-Bring-Balloons-Lindsay-Ward/dp/0803738781</a></li> <li>▪ Link to Read Aloud: <a href="https://www.youtube.com/watch?v=C5WKMirwfj8">https://www.youtube.com/watch?v=C5WKMirwfj8</a></li> </ul> </li> </ul> </li> <li>● <b>Videos</b> <ul style="list-style-type: none"> <li>○ Colorful Time-Lapse of Hot Air Balloons in New Mexico - <a href="https://www.youtube.com/watch?v=QGAMTII6XxY">https://www.youtube.com/watch?v=QGAMTII6XxY</a></li> <li>○ CAP High-Altitude Balloon Challenge 2021 (Highlights) - <a href="https://www.youtube.com/watch?v=qWjzHME20UE">https://www.youtube.com/watch?v=qWjzHME20UE</a></li> <li>○ What is a High-Altitude Balloon? - <a href="https://www.youtube.com/watch?v=ckzpSbEKU3c">https://www.youtube.com/watch?v=ckzpSbEKU3c</a></li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ How Do Hot Air Balloons Work? - <a href="https://www.youtube.com/watch?v=ABsVP41-EeY">https://www.youtube.com/watch?v=ABsVP41-EeY</a></li> <li>● <b>Venn diagram</b> <ul style="list-style-type: none"> <li>○ Can make or source one</li> </ul> </li> <li>● <b>HAB RAMP UP Kit</b> <ul style="list-style-type: none"> <li>○ All materials needed for the HAB experiment are included in the kit.</li> </ul> </li> </ul> <p>All links to videos and books can also be found on the HAB Kit Resources page <a href="https://uahrampup.org/hab/">https://uahrampup.org/hab/</a></p>
<b>Preparation:</b>	<ul style="list-style-type: none"> <li>● Review steps for launching the balloon. You will need more than one person.</li> <li>● Determine if your students are mature enough to help with balloon inflation or if you need to as an adult.</li> <li>● Determine day and time of launch</li> <li>● Fill out the Pre-Flight Checklist on the uahrampup.org website</li> </ul>
<b>Lesson Logistics:</b>	<ul style="list-style-type: none"> <li>● This is a whole group lesson and it is encouraged to include more than one class.</li> <li>● Needs to be conducted outside in an open area on a clear day.</li> <li>● 3-day lesson. All of the days may not be consecutive.</li> </ul>
<b>Vocabulary Words:</b>	<ul style="list-style-type: none"> <li>● remote sensing</li> <li>● air pressure</li> <li>● temperature</li> <li>● altitude</li> <li>● wind speed</li> </ul>
<b>Safety Considerations:</b>	<ul style="list-style-type: none"> <li>● The balloon is made of latex. Check for latex allergies when deciding who will help with launch and make sure anyone with an allergy stays away from the balloon.</li> <li>● Check the weather and notify UAH of when you will be doing the experiment. They will need to approve the day and time (instructions included in HAB kit)</li> </ul>
<b>Engage:</b>	<ol style="list-style-type: none"> <li>1. Watch or read <i>Please Bring Balloons</i> to the class. Then ask the following questions: Do you know about birthday balloons? What are they filled with? What do they do? What happens to them if you let them go outside? What other kinds of balloons are there? (mention hot air balloons) What are they filled with?</li> </ol>

	<p>Show the students the video <i>Colorful Time-Lapse of Hot Air Balloons in New Mexico</i>.</p> <p>2. Talk about the high-altitude balloons. What it is filled with and how they are used? Show the students the video <i>CAP High-Altitude Balloon Challenge 2021 (Highlights)</i>.</p> <p>Questions following the video:</p> <ul style="list-style-type: none"> <li>● What do you think we can learn from the balloon?</li> <li>● How high do you think it will go?</li> <li>● How far do you think it will go?</li> </ul>
<p><b>Explore:</b> Day 1 and 2.</p>	<p>1. <b>Day 1:</b> Follow the steps to launch the balloon. Multiple classes can be involved.</p> <p>2. While the balloon is inflating, read a book of your choice.</p> <p>3. Once it is launched and everyone has watched it go out of sight, go inside and begin tracking the balloon.</p> <p>4. <b>Day 2:</b> (when data comes back) Look at the data and discuss it.</p> <p>Questions:</p> <ul style="list-style-type: none"> <li>● When do you think the balloon popped?</li> <li>● How do you know?</li> <li>● Why do you think it popped?</li> <li>● What happens to the air as the balloon gets higher?</li> <li>● Do you notice anything about temperatures?</li> </ul>
<p><b>Explain:</b> Day 2</p>	<p>1. Discuss helium: Helium is lighter than air, but what does that mean? It means that helium is less dense than air. For a given volume of helium, there's less matter in that space than if the same volume was filled with regular air here on the ground.</p> <p>When we fill a balloon with helium, it wants to float above all this air, just like how an air bubbles underwater or a ship filled with air want to float above the water – because air is less dense than water.</p> <p>What makes the balloon actually rise is called buoyancy force.</p>

	<p>The denser air has a higher pressure than the balloon.</p> <p>The air wants to fill in the space that the balloon is taking up, and because the balloon is lighter than air, the force from the air is strong enough to push the balloon upward with buoyancy force.</p> <p>Show the students the video <i>What is a High-Altitude Balloon?</i></p> <ol style="list-style-type: none"> <li>2. How is this different from a hot air balloon? Show the video <i>How Do Hot Air Balloons Work?</i></li> <li>3. Use a Venn diagram to compare and contrast the hot air and high-altitude balloons.</li> </ol>
<b>Extend: Day 3</b>	<p>Have students write an expository text about the two balloons discussed.</p> <ul style="list-style-type: none"> <li>● Review the Venn diagram graphic organizer previously filled out.</li> <li>● Give students a prompt for topic sentences if needed. Ex: Hot air balloons are special because... High altitude balloons are different because.... Both balloons are the same because...</li> <li>● Edit drafts of students' work.</li> <li>● Have students type their papers to turn in.</li> </ul>
<b>Evaluation:</b>	Evaluate with the student papers.