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# High-Altitude Ballooning & the Properties/Functions of Water

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**Subjects: Science, Geography**

**Grade Level(s): 9-12**

**Time Required: 4 days**

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## Goal

Students will be able to gather information about the Earth's surface by using pictures collected from a high-altitude balloon launch and Google Earth images.

## Objectives

- Students will learn the basics of high-altitude ballooning and the functions such balloons serve
- Students will compare & contrast pictures taken from a balloon launch to Google Earth images.
- Students will explain why certain river systems and landforms appear the way they do using what they learn about water properties, force, energy, etc.

## Materials

- PowerPoint presentation
- Projector, projector screen, computer
- Pictures and footage of a balloon launch
- Google Earth
- Pictures of the Skunk River (Ames, IA) taken from a high-altitude balloon launch.
- Textbooks



## Anticipatory Set

Begin with showing students pictures taken from a high-altitude balloon and have them guess how the pictures were taken.

Questions:

- "What do you see in these pictures?"
- "Who can tell me how these pictures were taken?"

## Instructional Sequence/Procedure

1. Introduce students to the basics of high-altitude ballooning and the functions such balloons serve with a short PowerPoint presentation. Explain the different kinds of information the balloons can gather, such as air temperature readings and photos of Earth's surface.

2. Show footage of a balloon launch to give students a visual of the process of a high-altitude balloon launch. Point out how not just a balloon is launched, but a capsule with equipment inside and how wind and weather impact the balloon's movement once it is launched.

3. Present students with pictures of the Earth's surface taken from a high-altitude balloon. Explain how the camera taking the pictures was inside the capsule attached to the balloon and was wired to be constantly taking pictures.

4. Have students observe the photos, and then discuss in small groups of 4-5 what they see.

5. Go into a class-wide discussion and have students share what they discussed in small groups.

- (See Example #1)
- What river systems, landforms, or other interesting things did they see?
  - In Example #1, students would see ponds, crop fields, housing developments, roads, and wooded areas.

6. Next, have students go onto Google Earth and view the area where the balloon launch occurred.

7. Have students compare and contrast the balloon's images with Google Earth images.

- Do they match up?
- Are the photos from the balloon launch of better or worse quality than Google Earth's?

8. Then, present students with pictures of the Skunk River (Ames, IA) taken from a high-altitude balloon launch, and have them discuss what they see.

- (See Example #2 and Example #3)
- What does the river look like?
- How does the river affect the land around it?

9. After discussion, have students go back onto Google Earth and type in the Colorado River in the Grand Canyon and the river delta in Louisiana. Have them compare and contrast those images with the balloon launch pictures of the Skunk River (Ames, IA).

- (See Example #4 and Example #5)
- What differences and/or similarities do they see?
- Why do they think any differences occurred?

10. Switch gears, and go into teacher-led lecture over the properties of water and its effects on the environment. Use the balloon launch pictures of the Skunk River (Ames, IA) and Google Earth images of the Colorado River and Louisiana river delta as references when necessary.

11. Have students go into their textbooks and read the unit about water and water energy/force to reiterate what they were taught during the lecture. Then, have them read the unit about river systems and landforms, including “flow and channel characteristics, stream gradient, and stream disposition”, to connect directly with physical geography.

12. Students will work on their assignment.

## **Formative Evaluation**

- Class discussion over what landforms, water masses, etc. they see in the balloon launch photos.
- (Step #5 Instructional Sequence/Procedure)

## **Assessment**

- Students will write a brief, three paragraph reflection to tie everything together. In the first paragraph, students will write about any differences and/or similarities they saw between the Skunk River (Ames, IA) balloon launch pictures and the Google Earth images of the Colorado River in the Grand Canyon and the river delta in Louisiana. In the second, students will explain why those differences/similarities exist using what they learned about water properties, water’s energy and force, flow and channel characteristics, stream gradient, and stream disposition. The third paragraph will be devoted to students predicting how the Skunk river, Colorado River in the Grand Canyon, and Louisiana river delta might look in the future, using their knowledge about water properties, energy, and force.

## Next Generation Science Standards:

Standard: H.S. Earth's Systems

- HS-ESS2-5
  - Plan and conduct an investigation of the properties of water and its effect on Earth materials and surface processes.

## NGS Standards:

Standard 1: How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information.

- 1A- The advantages of coordinating multiple geographic representations- such as maps, globes, graphs, diagrams, aerial and other photographs, remotely sensed images, and geographic visualizations to answer geographic questions.
  - (A): Explain the advantages and disadvantages of using multiple geographic representations to answer geographic questions.
- 2B- The technical properties and quality of geospatial data.
  - (B): Evaluate the quality and quantity of geospatial data appropriate for a given purpose.

Standard 7: The physical processes that shape the patterns of Earth's surface.

- 3A- Physical processes interact over time to shape particular places on Earth's surface.
  - (A): Analyze and explain the results of interactions of physical processes over time.



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## Reflection Rubric

**Student Name:**

**Points**

	<b>2</b> Attempted Demonstration	<b>3</b> Partial Demonstration	<b>4</b> Proficient Demonstration	<b>5</b> Sophisticated Demonstration
<b>1<sup>st</sup> Paragraph</b>	Student describes very little differences and similarities between the balloon launch pictures and Google Earth images and shows no higher-level thinking.	Student describes vague differences and similarities between the balloon launch pictures and Google Earth images and shows little higher-level thinking.	Student gives average explanations for differences and similarities between the balloon launch pictures and Google Earth images and shows some higher-level thinking.	Student thoroughly explains differences and similarities between the balloon launch pictures and Google Earth images and shows higher-level thinking.
<b>2<sup>nd</sup> Paragraph</b>	Student explains differences and similarities between the two types of images using no content knowledge of water properties, water's energy and force, flow and channel characteristics, stream gradient, and stream disposition.	Student explains differences and similarities between the two types of images using a poor content knowledge of water properties, water's energy and force, flow and channel characteristics, stream gradient, and stream disposition and does not include each in their explanation.	Student explains differences and similarities between the two types of images using average content knowledge of water properties, water's energy and force, flow and channel characteristics, stream gradient, and stream disposition.	Student explains differences and similarities between the two types of images using a wide variety of content knowledge of water properties, water's energy and force, flow and channel characteristics, stream gradient, and stream disposition.

<p><b>3<sup>rd</sup> Paragraph</b></p>	<p>Student predicts how each landform and/or water mass will look in the future based solely upon their own opinion and does not refer to any content knowledge.</p>	<p>Student predicts how each landform and/or water mass will look in the future using their own opinions and refers little to content knowledge about water properties, water's energy and force, flow and channel characteristics, etc.</p>	<p>Student predicts how each landform and/or water mass will probably look in the future by using some of what they know about water properties, water's energy and force, flow and channel characteristics, etc.</p>	<p>Student predicts how each landform and/or water mass will realistically look in the future by accurately using their knowledge about water properties, water's energy and force, flow and channel characteristics, etc.</p>
<p><b>Spelling and Grammar</b></p>	<p>Student uses poor spelling and grammar throughout the entire reflection.</p>	<p>Student uses proper spelling and grammar only sometimes in the reflection.</p>	<p>Student uses proper spelling and grammar throughout most of the reflection.</p>	<p>Student uses proper spelling and grammar throughout the entire reflection.</p>

**Total Points out of 20:**