12th GRADE

INQUIRY BASED LESSON PLAN

ADAPTATIONS

195 MINUTES

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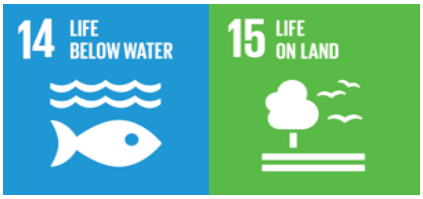
Google Earth Education

ADAPTATIONS

195 mins

OVERVIEW
Students will explore the various adaptations in plants and animals that enable them to survive and reproduce in their habitat using the Google Earth Creation tool.

SUBJECT/TOPIC **Biology/ Organism and its Environment**	**AGE LEVEL** **12th Grade**
Learning Objectives • Students will identify the various alternatives available to organisms for coping with extremes in their environment. • Students will research and identify the adaptations of plants and animals in different habitats • Students will participate in collaborative discussions and identify the species of animals and plants that have inhabited different habitats (deserts, Arctic ocean, Himalayas) • Students will apply their learnings in the form of a presentation on adaptations of organisms that have evolved over a long evolutionary time and are genetically fixed as well as the impact of climate change on the organisms in different habitats.	**Inquiry** What are the various adaptations of plants and animals and how do they enable the organisms to cope with extremes in their environment?
Materials Needed • Access to Google Earth. • Student internet access.	**Lesson Summary** **Engage**: Locate Mojave Desert, Thar Desert, Arctic Ocean, Himalayas, Emerald Spring and Himalayas on the Google Earth and study the environmental conditions of these places. **Explore**: Gather information from multiple sources about the species of animals and plants that inhabit these habitats **Explain**: Identify the adaptations of plants and animals in these habitats, hypothesize various alternatives available to organisms for coping with extremes in their environment **Revise**: Adjust hypotheses based on additional evidence from class discussion. **Apply**: Make an impact by creating a presentation on the

	adaptations that have evolved over a long evolutionary time and are genetically fixed as well as the impact of climate change on the organisms in different habitats.
Sustainable Development Goals 	**Culminating Task/Assessment** • Students will work collaboratively to create a presentation about the species of animals and plants that have inhabited different habitats, their adaptations for coping with extremes in their environment as well as the impact of climate change on the organisms in these habitats.

Textbook Chapter

'Organism and its Environment' is a topic from the chapter "Organisms and Populations" from Biology NCERT Textbook for Class 12

Engage (5 minutes)

1. Share the imagery of Mojave Desert, Thar Desert, Arctic Ocean, Himalayas, Emerald Spring and Himalayas using Google Earth.
2. Ask the students to share their ideas about the environmental conditions of these places. Document student responses.
3. Introduce the essential questions that will guide the inquiry investigation: What are the various adaptations of plants and animals and how do they enable the organisms to cope with extremes in their environment?

Explore (25 minutes)

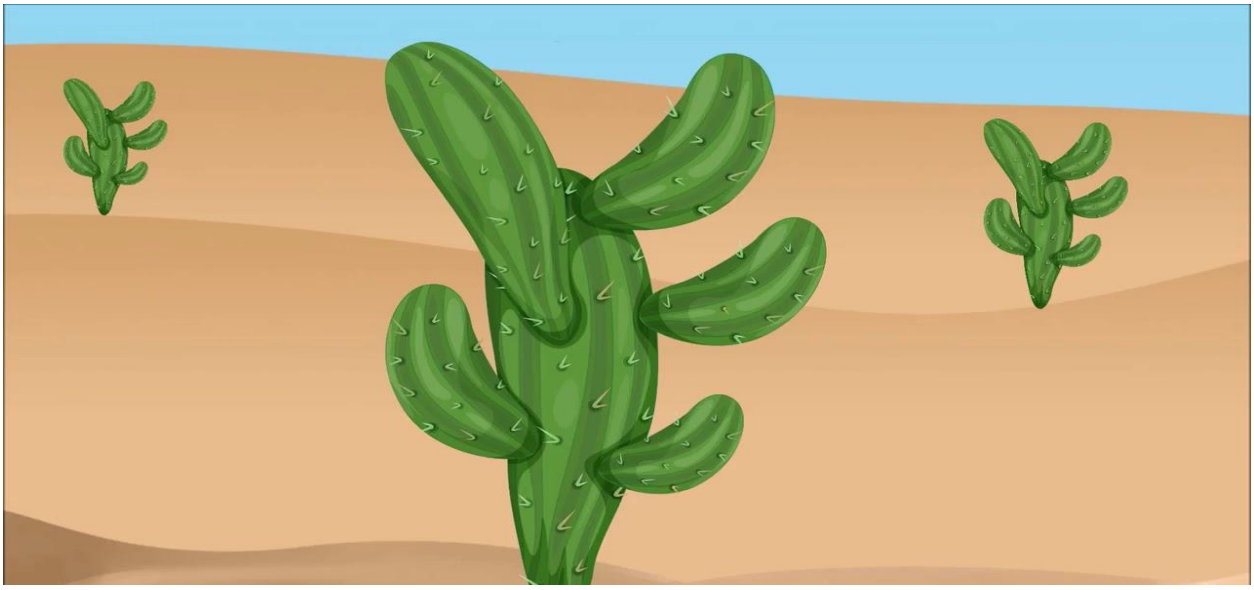
1. Present the first source of information on 'Adaptations' using a Google Earth story. Introduce the story, read the information on each slide and share the images and videos of the places shown on the Google Earth
2. Prompt the students to record their observations of the places shown on the Google Earth.
3. Students identify relationships in the places shown and form a hypothesis based on information gained.

Explain (20 minutes)

1. Organize students into partners. Ask each pair to share their observations from the images and videos featured in the Google Earth Story.
2. Ask partners to share their thoughts on the common thing they noticed about the places shown on the Google Earth (Possible student response: Adaptations of plants and animals to cope with the extremes of their environment)
3. Facilitate whole group discussion in which students share their ideas about the adaptations of plants and animals in their specific habitats with their classmates and ask questions about the ideas of others.
4. Students test hypotheses and record their findings.

Revise (10 minutes)

1. Students add new ideas to their hypotheses based on information gained in discussion.
2. Students to record any questions they have about the adaptations of plants and animals.



Next, repeat the process with a second source of information.

Explore (25 minutes)

1. Present the second source of information, the Google Earth Voyager Story, The Arctic Live. Introduce the story, read the information on each slide and share the LIVECAM Highlights of the polar bears in the various locations provided.
2. Explore the imagery using Street View and 2D perspectives.
3. Prompt students to record their observations.

Explain (20 minutes)

1. Organize students in partners. Ask each pair to share their observations from the Google Earth Voyager Story, The Arctic Live.
2. Ask students about the adaptations of polar bears that help them to survive in the extreme environmental conditions of the Arctic as well as the effects of climate change on the polar bears. Prompt them to record their thoughts.
3. Ask partners to share their thoughts. (Possible student response: White fur blends them with snow and ice and layer of fat under their skin helps them stay warm)
4. Allow time for students to share their ideas with the class and ask questions about the ideas of others.
5. Students test hypotheses and record findings.

Revise (10 minutes)

1. Following the discussion, prompt students to note down their hypotheses on a sheet of paper.
2. Ask students to record any questions they have about alternatives available to polar bears for coping with extremes in their environment.

(Option to repeat this process with additional sources of information, each time resulting in an updated hypothesis.)

Apply (80 minutes)

1. Organize students into small groups. Each group will work collaboratively to create a presentation
2. Provide students access to the internet to research questions generated during the investigation and gather additional information about adaptations of plants and animals in different habitats.
3. Presentation should include the following:
   - The species of animals and plants that have inhabited different habitats
   - The adaptations of plants and animals in different habitats
   - Adaptations that have evolved over a long evolutionary time and are genetically fixed.
   - The impact of climate change on the organisms in different habitats.
4. Allow time for each group to present their presentation to the class.

Evaluate: Rubric

	Exceeding	Meeting	Approaching	Beginning
Content knowledge	Student demonstrates mastery of key concepts such as the species of animals and plants that have inhabited different habitats, the adaptations of plants and animals in these habitats to cope with the extremes in their environment.	Student demonstrates adequate understanding of key concepts such as the species of animals and plants that have inhabited different habitats, the adaptations of plants and animals in these habitats to cope with the extremes in their environment.	Student demonstrates partial understanding of key concepts such as the species of animals and plants that have inhabited different habitats, the adaptations of plants and animals in these habitats to cope with the extremes in their environment.	Student lacks understanding of key concepts such as the species of animals and plants that have inhabited different habitats, the adaptations of plants and animals in these habitats to cope with the extremes in their environment.
Presentation	Presentation clearly and creatively communicates the adaptations of plants and animals in different habitats to cope with the extremes in their environment as well as the impact of climate change on the organisms in these habitats. Presentation draws on multiple sources of evidence from student research.	Presentation clearly the adaptations of plants and animals in different habitats to cope with the extremes in their environment as well as the impact of climate change on the organisms in these habitats. Presentation draws on 1-2 sources of evidence from student research.	Presentation clearly the adaptations of plants and animals in different habitats to cope with the extremes in their environment BUT does not throw light on the impact of climate change on the organisms in these habitats. Presentation is not supported by evidence from student research.	Presentation is lacking information about the adaptations of plants and animals in different habitats to cope with the extremes in their environment AND does not throw light on the the impact of climate change on the organisms in these habitats. Presentation is not supported by evidence from student research.
Participation	Student did an equal share of the work; shared with, listened to, and showed respect for group members; stayed on task.	Student did a fair share of the work, was respectful to group members most of the time, and/or used most of the class time wisely	Student did less than a fair share of the work, was sometimes disrespectful to group members, and/or wasted a lot of work time.	Student let others do most of the work, was rude or disrespectful, and wasted most of the work time.

Additional Resources

- Related Google Earth Voyager Stories: Hope Spot: Spitsbergen Island; Treks: Churchill, Manitoba, What's Missing: Polar Bears, See Climate Change's Impact
- National Geographic Society-Adaptation - https://www.nationalgeographic.org/encyclopedia/adaptation/-
- National Geographic Society,-Adaptation and survival- https://www.nationalgeographic.org/article/adaptation-and survival/?utm_source=BibblioRCM_Row
- Biology NCERT Class 12 - https://ncert.nic.in/ncerts/l/lebo113.pdf
- BBC- https://www.bbc.co.uk/bitesize/topics/zvhhvcw/articles/zxg7y4j
- YouTube.com video- NASA Goddard: Older Arctic Sea Ice Disappearing- https://www.youtube.com/watch?v=Vj1G9gqhkYA
- YouTube video- Polar Bears 101 | Nat Geo Wild-https://www.youtube.com/watch?v=1zRGzlWqce4
- Polar Bears International Article: Hunting and Ecosystem
- BBC News Article: Six Graphics that Explain Climate Change
- Expeditions: AR (Plant adaptations) VR (Living in Extreme Places)

Options for Differentiation

- Extension: Explore other examples of adaptations of plants and animals in different habitats to cope with the extremes in their environment and the impact of climate change on the organisms in these habitats.
- Introduce additional sources of information for students to gather evidence.

Credits

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