

BUILDING UP & BREAKING DOWN

LESSON PLAN



Breaking Down and Building Up (Breakout EDU)
An educational Break Out box by BreakoutEDU & Wolf Ridge ELC



WOLF RIDGESM
ENVIRONMENTAL LEARNING CENTER

BREAKING UP & BREAKING DOWN



CLASS DESCRIPTION: A Group Building Class

Breakout EDU Games require critical thinking, collaboration, creativity, and communication. Each kit is a unique collection of locks, boxes, and items that can be used to play immersive learning games. Breakout EDU includes many topics. Wolf Ridge ELC focuses on the environmentally geared platforms.

Total time: 1.5 hours (indoors)

Audience: 4-20 students, 6th grade through adult

Activity level: low

Travel: none

Total uphill travel: none

PURPOSE

Collaborate as a team to decode various puzzles based on geology knowledge in order to unlock the final box with the town's dam plans.

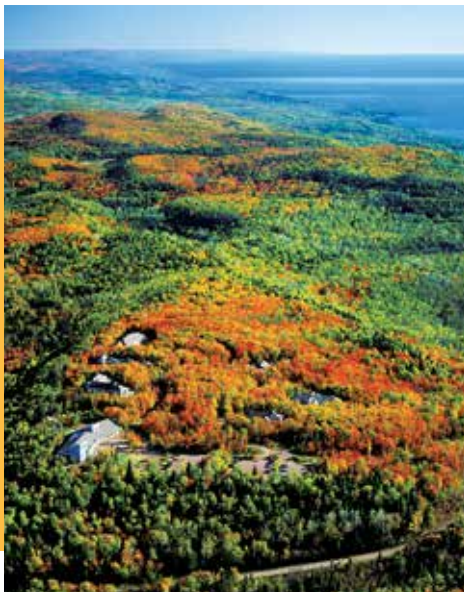
CONCEPTS

1. Erosion is the process that breaks down continents and landforms.
2. Deposition is the agent of erosion that lays down sediment.
3. There are various needs and impacts of dams.
4. Effective teams communicate well, make plans, cooperate, and include everyone.

OUTCOMES

Upon completion of Breakout Box, students will be able to:

- Construct an explanation based on evidence of how landscapes change due to erosion.
- Work as a team in order to problem solve.
- Practice self evaluation of their performances.



Our mission is to develop a citizenry that has the knowledge, skills, motivation and commitment to act together for a quality environment.

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Wolf Ridge Environmental Learning Center and the USDA are equal opportunity providers and employers.



Equipment

- 4-digit lock (code: 2332)
- 3-digit lock (code: 926)
- directional multilock (code: DUUDU)
- ABC multilock (ROUND)
- key
- red and blue arrows
- red and blue erosion and deposition sort cards
- 4 agents of erosion posters (wind, river, glacier, gravity)
- 10 agents of erosion sorting cards (V-shaped valley, kettle lake, landslide, scratched bedrock, avalanche, pitting or frosting, sand dunes, U-shaped valley, meanders, & delta)
- "Like A Rolling Stone" label
- sediments to sort (small, medium, large)
- sorting beaker
- "How Did These Features Form?" poster
- "Congratulations!" poster
- dam plans
- answer key to 4-digit lock
- brainstorm worksheet
- 2 hint cards

Appendices

- Glossary
- References
- Sources

Set-up (10 min.)

- Classroom/class prep description
- Safety Management

I. Introduction (10 min.)

- A. Greet
- B. Class Overview
- C. Assess Learner Level

II. Break Out Box Activity (50-75 min.)

- A. Background Story
- B. Break Out
- C. Congratulations!

III. Conclusion (10 min.)

- A. Reflect on the environmental topics covered in this activity.
- B. Reflect on the process of finishing the break out box.

Clean-up (15 min.)

Set-up (10 min.)

Classroom/class prep description

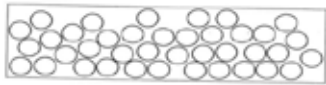






Arrange three tables pushed together in the middle of the room and circle chairs around them so that everyone can see the boxes in the middle and is a part of the process.

Set-Up/Reassemble the Breakout EDU Boxes

1. Put the key and the sediments to sort inside the small box. Lock the small box with the word lock and tape the rolling stone clue to the top of the small box.
2. Put the "Congratulations" and Dam Plans document into the large box and lock it with the hasp, 3 digit lock, 4 digit lock, directional lock, and key lock.
3. Leave the UV flashlight, "Agents of Erosion" sorting cards, "How did these features form" sheet, "erosion and deposition cards", and "Sorting Beaker" on the desk.
4. Hang Blue and Red Arrows with Blue facing up and Red facing down
5. Hang "Agents of Erosion Posters" on the wall in the following order – wind, river, glacier, and gravity.

Equipment Lock Combinations

- 4-digit lock - 2332
- 3-digit lock - 926
- directional multilock - down-up-up-down-up
- ABC multilock - ROUND

sediments to sort	
like a rolling stone	
agents of erosion sorting cards (2" x 3" cards)	
agents of erosion posters (5" x 7" cards)	
"How did these features form?"	
erosion & deposition cards	
sorting beaker	

Safety Management

Adhere to and be familiar with all general safety practices designated by Wolf Ridge. Be aware of any student's special needs (medical, etc.) and adjust the activities as needed to maintain safety. First aid kit is located in the kit room.

I. Introduction (10 min.)

A. Grabber

The readied equipment should interest the students and serve as the grabber.

Greet the students as they enter and take a minute to learn their names. Discuss clearly and specifically which behaviors you expect from your students during the next 1.5 hours. Explain the need for respect; for you, for each other, for the equipment. Give them a brief class overview.

B. Overview of the Class

Breakout EDU Games require critical thinking, collaboration, creativity, and communication. Each kit is a unique collection of locks, boxes, and items that can be used to play immersive learning games. Breakout EDU includes many topics. Wolf Ridge ELC focuses on the environmentally geared platforms.

C. Assess Learner Level

Assess Learner Level

Ask students about their experiences with Breakout Boxes or Escape Rooms. Find out what the students already know about weathering and erosion. Ask questions to determine what students know about key concepts and give examples of what they have seen in their own environments.

II. Break Out Box Activity (50-75 min.)

A. Background Story (5-10 min.)

New Houses, New Jobs... And a New Dam: Dramatic Plan for Town

20-Year Town Regeneration Plan Was Unveiled Today

The Mayor of your town said, "We're losing our young people as they move away for a better future. These plans will bring new hope. We will create a new science park and industrial zone and up to 30,000 new homes. These new jobs will bring families back to our town and rebuild our community." The City Council hopes that leading research companies will locate to the science park, and that the industrial zone will grow as new innovations are made. A ring road extension and new railway line will connect the town to Minnesota's major transport networks. But new jobs and homes may come at a cost; the plans require a new dam and reservoir to ensure a safe, secure water supply for the town. An architect has come up with four options but unfortunately, the plans are locked up in the box. You must use your knowledge of erosion and deposition to unlock the box, get the plans, and finally decide which plan would work best for your town!

B. Break Out (30-45 minutes)

Allow students 45 minutes to solve the puzzles in the activity in order to Breakout! Allow space for students to wonder, question, and grapple with the puzzles. Provide the two Hint cards if the students need assistance. Use the facilitator guide in order to help guide them in solving the individual puzzles.


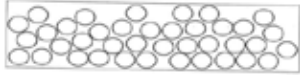


Assessment Concepts 1 & 2

1. Erosion is the process that breaks down continents and landforms.
2. Deposition is the agent of erosion that lays down sediment.

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For facilitator ONLY
(answer key):

If your group needs
a hint, feel free to
reference the follow-
ing information.

Equipment	Lock Combination	How Will They Know the Combo?	Where Will It Lead?
4-digit lock	2332	<p>When the students sort the "Agents of Erosion" sorting cards according to the posters on the wall there will be 2 cards under wind, 3 cards under rivers, 3 cards under glaciers, and 2 cards under gravity.</p> 	<p>Unlocks the large box</p> <p>Wind (2)</p> <ul style="list-style-type: none"> • pitting/frosting • sand dunes <p>River (3)</p> <ul style="list-style-type: none"> • V-shaped valley • deltas • meanders <p>Glaciers (3)</p> <ul style="list-style-type: none"> • U-shaped valley • kettle lake • scratched bedrock <p>Gravity (2)</p> <ul style="list-style-type: none"> • landslide • avalanche
3-digit lock	926	<p>When the students sort the sediments correctly in the beaker with the largest on the bottom and the smallest on the top, the number written in UV will reveal the combination.</p> 	<p>Unlocks the large box</p>
directional multilock	down-up-up-down-up	<p>When the students match the correct erosion or deposition card to the "How Did These Features Form?" and use the color of the arrows.</p> <p>How did these features form?</p> 	<p>Unlocks the large box</p> <p>How did these features form?</p> <ol style="list-style-type: none"> 1. river delta (deposition) 2. V-shaped river valley (erosion) 3. arch (erosion) 4. sand dune (deposition) 5. U-shaped glacial valley (erosion)
ABC multilock	ROUND	<p>Given by the "Like a rolling stone" clue on the top of the small box - the shape of a stone rolling down a hill.</p> 	<p>Unlocks the small box</p>
key lock	key	key found in the small box	unlocks large box

C. Congratulations! (15-20 minutes)

Once the group has “broken out” they will find the four options the architect came up with for the town dam. Have the class break in to four groups. Give each group a different dam plan. Have the small groups discuss the pros and cons for their dam. Guide groups to consider human factors (aesthetic, relocating homes, etc.), environmental factors (fish populations, wildlife, development, etc.), and economics (jobs gained, electricity produced? etc.).

After groups have considered all the pros and cons of their respective dam plans, have each group present to the class. The class must decide as a whole which dam they will choose for their town and why.

Assessment Concept 3 - There are various needs and impacts of dams.

III. Conclusion (10 Minutes)

Here you can lead a two part reflection after getting a feel of what your group needs.

A. Reflect on the environmental topics covered in this activity.

Some guiding questions:

- Where in a meander is erosion happening?
- What is the difference between weathering, erosion, and deposition?
- Which agent(s) of erosion/deposition leaves behind a pile of sorted sediments?
- Does erosion or deposition occur where the velocity of the sediments is increasing?
- Which agent of erosion/deposition is the most dominant today?

B. Reflect on the process of finishing the break out box.

Reflections can be done as a full group, in small groups or in partners. Have students draw 5-6 cards from the “reflection deck” and answer the prompts on the cards. Some other example reflection questions could be:

- Describe a moment in the game when your team worked well together.
- How did you make sure your ideas were heard?
- Describe how this game relates to what you are learning about.
- How did your group work well together?
- How could your group have been more effective?

Assessment Concept 4 - Effective teams communicate well, make plans, cooperate, and include everyone.

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Clean Up

- Put all clues and resources back in the kit box- no need to reassemble the box, your liaison will help with that.
- Stack any tables and chairs
- Return kit box to "kit room" down the hallway.
- Thank you!

Glossary

avalanche - A mass of snow, ice, and rocks falling rapidly down a mountainside.

dam - A structure built to form a reservoir to collect, retain, and store water.

delta - A landform created by deposition of sediment that is carried by a river as the flow leaves its mouth and enters slower-moving or stagnant water. This occurs where a river enters an ocean, sea, estuary, lake, reservoir, or another river that cannot carry away the supplied sediment.

deposition - The action of depositing something.

erosion - The process of eroding or being eroded by wind, water, or other natural agents.

glacier - A slowly moving mass or river of ice formed by the accumulation and compaction of snow on mountains or near the poles.

gravity - The force that attracts a body toward the center of the earth, or toward any other physical body having mass.

kettle lake - Kettles are depressions left behind after partially-buried ice blocks melt. Many are filled with water, and are then called "kettle lakes".

landslide - the sliding down of a mass of earth or rock from a mountain or cliff.

meanders - (of a river or road) follow a winding course.

pitting (frosting) - make a hollow or indentation in the surface of.

river - a large natural stream of water flowing in a channel to the sea, a lake, or another such stream.

sand dunes- a mount, hill or ridge of sand that lies behind the part of the beach affected by tides. They are formed over many years when windblown sand is trapped by beach grass or other stationary objects.

scratched bedrock - a deposit of solid rock that is typically buried beneath soil and other broken or unconsolidated material... bedrock deposits may be strong enough to resist the passage of glaciers and ice sheets over their exposed

surfaces, others may be scratched or deeply striated.

U-shaped valley - formed by the process of glaciation.

V-shaped valley - formed by flowing water, such as rivers.

wind - natural air movement.

References

British Dam Society (n.d.) Dam Planning and Construction. Retrieved from <https://www.geography.org.uk/teaching-resources/dam-planning-and-construction>.

Sources

Breaking Down and Building Up (Breakout EDU).