



Digital Breakout Review Game

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Target Grade: 6th Grade Science

Time Required: 60 minute

Standards

Next Generation Science Standards (NGSS):

- MS-PS3-5: Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.
- MS-PS3-1 Energy: Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

**Exact standard matches activities provided in the teacher guide to breakout*

Lesson Objective

- Students will be able to solve science related problems in order to solve a problem to review for a final exam.

Central Focus

You've been locked in the science lab! In this digital breakout review game, students will use their science knowledge to escape the digital science lab. Students will get together and work in small groups to answer science related puzzles in order to open digital locks and "escape" from a virtual locked room. This lesson has been designed to cover the 6th grade standards of kinetic, potential, chemical, and thermal energy; energy transfer through an ecosystem; the law of conservation of energy; radiation, conduction, and convection; and the hydrologic cycle. While your students may escape their virtual locked room, they won't escape the phenomenal review this activity provides!

Key terms: test, competition, prepare, engaging, games, teams, end of year, exam

Background Information

Prior to the lesson students should be aware of the following concepts:

- Properties and comparing the source of kinetic, elastic potential, gravitational potential, electric potential, chemical, and thermal energy



- Identifying the different energy types in a graph format and know the definitions of the different types of energy
- Thermal energy (heat) transfer
 - Radiation, conduction, convection
- Energy transformation between potential and kinetic energy
- Energy transfer in an ecosystem
 - Food webs and energy pyramids
- The hydrologic system
 - Steps in the cycle, their definitions, and their functions that they serve within the system
- Impact humans and other organisms have on the hydrologic cycle
- The 10% rule to determine the energy at each trophic level
 - Only 10% of energy will pass on in an ecosystem from one trophic level to the next.

The breakout room

- This breakout room is found on the following website: <https://bit.ly/2Xna9cN>
- Students will continue to click on pictures and solve puzzles as they scroll down the page.

Locked!

You arrive at science class today to a note taped to the door. "GO TO THE SCIENCE LAB"

Yes! Lab day is always the best day. The class piles into the lab room, full of microscopes and an array of half-cleaned-up experiments. As the class looks around the room, the teacher is nowhere to be found. Suddenly, you hear a click and the door to the hallways closes and locks. No matter how hard anyone pulls, no one is able to get the door to the science lab open.

On one of the nearby lab tables you see a glowing screen with a list of 4 different locks. Next to the device is a simple note that reads: "The keys to your release lie in the lab"

The class begins to search the room for hints to help open the locks.

The locks

- The Google form contains all of the locks. Students will be unable to submit unless all answers are correct.
 - Correct answers are provided here:

Word Lock *

Enter the correct word to proceed. Use all CAPITAL LETTERS. 10 letters

CONVECTION

Number Lock *

Enter the correct number to proceed.

2400

Color Lock *

Enter the correct colors to proceed. Use all capital letters to answer. R = Red, Y = Yellow, G = Green, B = Blue, P = Purple

GPYB

Word Lock 2 *

Enter the correct word to proceed. Use all CAPITAL LETTERS. 13 letters

TRANSPIRATION



Materials

- Internet connected devices (one per group)
- Access to a Google Account (one per group)

If students do not have their own access, the teacher can set up classroom Gmail accounts so that students are able to access the Google sheets and forms that are in the breakout.

- Paper
- Pencils
- Clipboard (optional)
- Reward (ex. candy)

Instruction

This lesson is intended to review for an end of year assessment and time can be adjusted as needed.

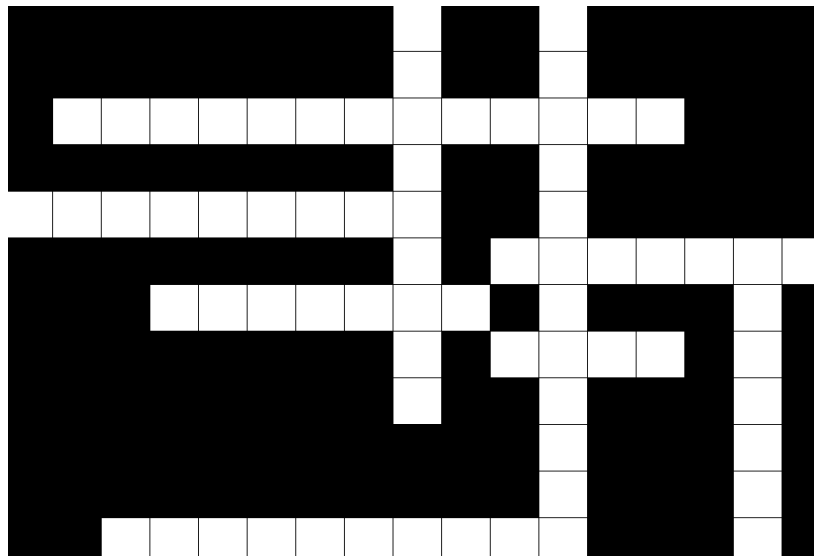
- Assign students to groups of 4-5.
- Devices should each be logged into a classroom Google account, or students should have their own accounts that they can use when prompted.
- Provide each group with 1-2 devices. The devices should be logged into this website: <https://bit.ly/2Xna9cN>(QR Code attached).
- Instruct students that to read the story on the webpage and use the clues and puzzles to help them find the 4 keys to the locks.
- Provide each group with two hint cards. These can be used to get a hint from the teacher. You can choose to be more or less helpful when giving hints, this often depends on the groups playing.
 - Hints for the teacher to give can be found on a separate sheet of paper along with the printable hint cards that are intended to be handed out to the students.
- Set a timer for the remainder of the class time, or the remainder of time allotted to complete the activity.
- Have students bring their device to the teacher when they have finished.
- If any of the groups are able to breakout, provide a small prize to the first group to break out.
 - Alternatively, provide a small prize to each of the groups that is able to break out if there is more than one.
- Celebrate with students who have completed the task. If no one is able to breakout, allow students to share challenges and successes.



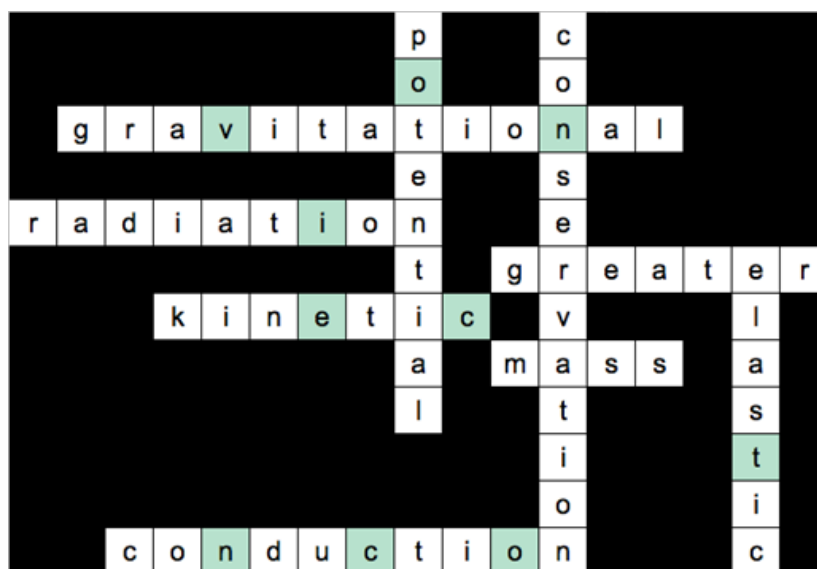
Challenges

First Puzzle

- When students click the microscope, it will prompt them to make a copy of a Google Sheet. This copy will bring them to a blank crossword puzzle.



- Once the correct answers are entered, specific letters will become shaded green.
- These shaded letters must be unscrambled to form the word "CONVECTION" which is the answer to the first word lock.





Second Puzzle

- Students click on the file cabinets and will be prompted to make a copy of a Google sheet.
- On this sheet, students will be required to use the 10% rule to determine the energy at each trophic level.

The picture to the right shows the food chain of an owl in the deciduous forest. It is known that the frog contains 240 J of energy. Based on this information and your knowledge of scientific processes, fill in the chart with the correct energy in Joules for each organism in the food chain. Only type the number in the box, not the unit of measure.

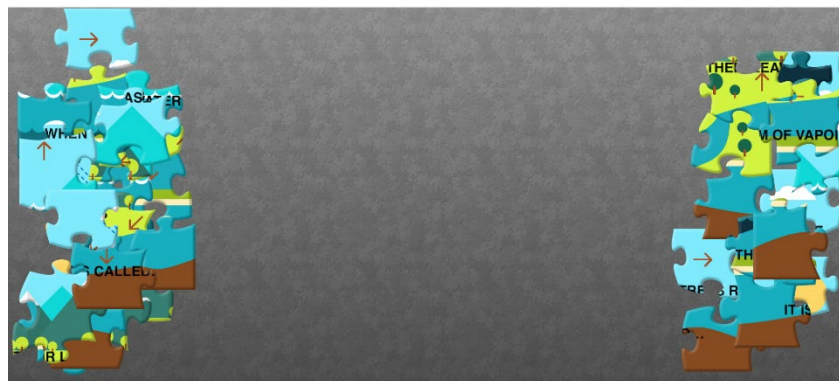
Organism	Energy (J)
Flower	
Caterpillar	
Frog	240
Snake	
Owl	

- When students enter the correct values, the cells will change color. The colors, in order, are the answer to the color lock

Organism	Energy (J)
Flower	24000
Caterpillar	2400
Frog	240
Snake	24
Owl	2.4

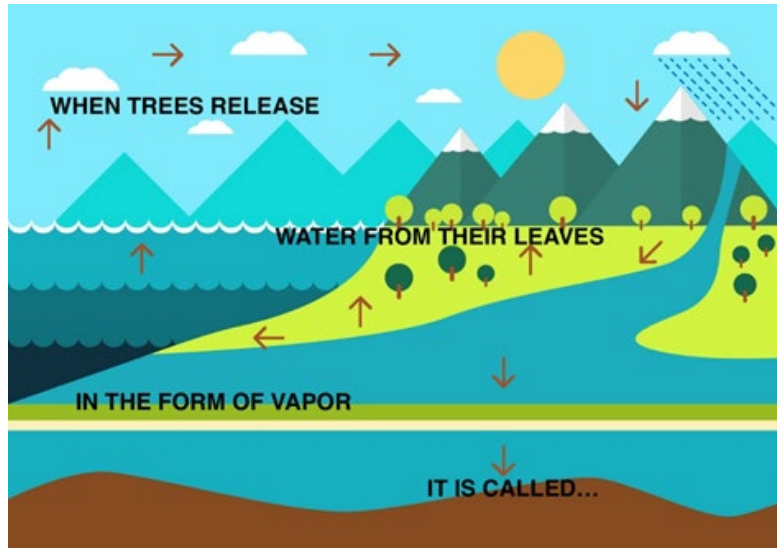
Third Puzzle

- Students click on the petri dishes and will be brought to a page where they need to complete a jigsaw puzzle.





- When the puzzle is completed, there is a clue written on it.
- The answer to this question, TRANSPIRATION, is the answer to the second word lock.



Fourth Puzzle

- Students click on the stack of paper and will be brought to a Google form.
- This form will prompt them to answer questions about kinetic and potential energy on a rollercoaster.
- If they get an answer wrong, it will bring them back to the beginning of the form. Once they get all 3 questions correct, they will be able to submit and their final clue will be revealed.
- Answers: 1. D 2. C 3. A

Final Clue

- Once submitted, the students will see the final clue.

Rollercoaster Clue

Still stuck? Ask the caterpillar!

[Submit another response](#)

- The final lock is a number lock. The answer lies in the trophic level energy for the caterpillar from Puzzle 2. The answer is **2400**.



Closure

- The teacher would lead a discussion on which puzzles were a little harder and ask students what they can do to better help them prepare to know this knowledge.
- Optional closure would be to have students create their own puzzle with a solution and tell them that it could be a bonus question on the exam.

Differentiation

- Students should be placed in heterogeneous groups based on ability level to provide support on thinking through the challenges.
- For ELL, student could be provided a vocab sheet with key vocabulary defined and translated to their native language.
- The teacher could provide more hint cards for groups that may need more support during the breakout game.
- Struggling students can use classroom notes for definitions of terms throughout the exercise.

Assessment

Formative assessment

- The hint cards will help the teacher determine when students are struggling and need more support.

Summative assessment

- This activity is used to act as an end of year review for either state or other comprehensive tests. These skills will be assessed on the test.

Teacher Guide to Science Lab Breakout

Introduction: This storyline gets the students engaged in the activity. Students will continue to Click on pictures and solve puzzles as they scroll down the page.

Locked!

You arrive at science class today to a note taped to the door. "GO TO THE SCIENCE LAB"

Yes! Lab day is always the best day. The class piles into the lab room, full of microscopes and an array of half-cleaned-up experiments. As the class looks around the room, the teacher is nowhere to be found. Suddenly, you hear a click and the door to the hallways closes and locks. No matter how hard anyone pulls, no one is able to get the door to the science lab open.

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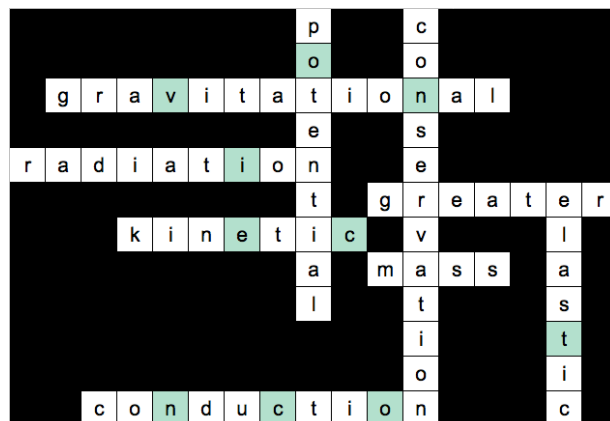
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Standards: PS3.1, PS3.2, PS3.4



Second Puzzle: Students click on the file cabinets and will be prompted to make a copy of a Google sheet. On this sheet, students will be required to use the 10% rule to determine the energy at each trophic level.

Standard: LS2.3

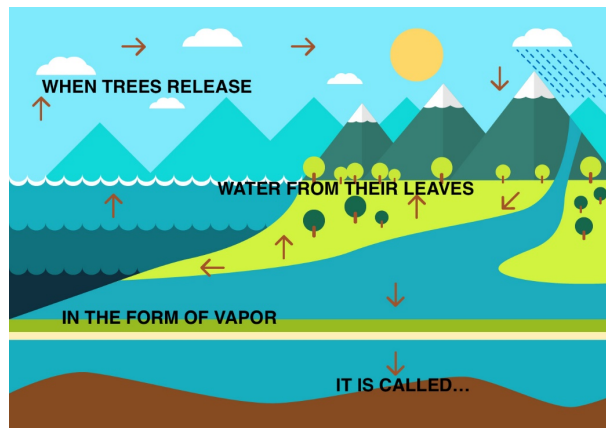
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Organism	Energy (J)
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Owl	2.4

Third Puzzle: Students click on the petri dishes and will be brought to a page where they need to complete a jigsaw puzzle. When the puzzle is completed, there is a clue written on it.



The answer to this question, **TRANSPIRATION**, is the answer to the second word lock.

Standard: ESS2.4

Fourth Puzzle: Students click on the stack of paper and will be brought to a Google form. This form will prompt them to answer questions about kinetic and potential energy on a rollercoaster. If they get an answer wrong, it will bring them back to the beginning of the form. Once they get all 3 questions correct, they will be able to submit and their final clue will be revealed.

Answers: 1. D 2. C 3. A

Once submitted, the students will see the final clue.

Rollercoaster Clue

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The final lock is a number lock. The answer lies in the trophic level energy for the caterpillar from Puzzle 2. The answer is **2400**.

Breakout!

Now that the students have all of the correct answers in the locks, they will be able to hit submit. When they submit, they will receive this message.

Locked in the Lab

You've entered the correct codes. Grab the door handle.
Push the letter A in ESCAPE to see what happens next.

Below this message, is the word "ESCAPE". Pressing the A button will bring them to the final screen and their congratulations message.



Hint Cards

Provide each group with 2 hint cards. They can use these at any times to get a clue from the teacher. I laminate these for multiple uses.





Hints to Give Students

- For puzzle 1
 - For 3 across, it also might be similar to a WEIGHTY ATTRACTION
 - Once you have all your checkered green letters, an example of this final word is Boiling Water
- For puzzle 2
 - To try and solve this puzzle you must use the rule of _____ percent.
- For puzzle 3
 - To answer this find and rhyme with inspiration
- For Puzzle 4
 - Still stuck after this puzzle? Might be helpful to retrace your steps and see if there's anything you missed