GMOs: What do you know? Breakout

Teacher preparation

You may purchase a breakout box (kit) from https://www.breakoutedu.com/. It is possible to build your own kit or kits by visiting other websites and piecing together the contents.

Materials
Large locking box
Small locking box that fits inside larger box
Hasp
Alphabet Multi-lock
3-digit lock
4-digit lock
Key lock
UV light
UV ink marker
Hint cards (2) (or blank index cards)
A "prize" inside the small box to present to the team (candy, stickers, badges, etc)

Printed materials
GMO card sort cards
GMO instruction sheets
GMO Myths and Facts

1. Print out materials: GMO card sort cards and the instruction sheets are smaller format and will only need to be printed once for the number of student groups you have in your class. GMO Myths vs Facts should be printed on full sheets of paper so students may write on them. These will need to be printed 1 per group.
2. Copy information with UV marker on the GMO card sort instruction sheet and card sort cards as indicated on *UV code instructions.* These instructions along with the answers to the card sort, are also included in the Card Sort Presentation.

*Note: It is recommended that only a few of the cards be used for the card sort. We have included 19 cards total, but it takes a long time to sort out which are genetically modified, which are not and which may be, but can't be determined by their phenotype. In pilot testing this activity 9-12 cards are plenty to get the point.

3. Laminate instruction sheets and card sort cards after UV codes have been added.
4. Create enough sets of materials for the number of groups in your class. It is recommended that no more than five-six students work together; three-four students is ideal.
5. Set the combinations to the locks if from breakoutedu.com. Otherwise, follow the lock instructions to set.
   - See https://www.breakoutedu.com/4-digit to set the combination for the four-digit lock
   - See https://www.breakoutedu.com/3digit to set the combination for the three-digit lock
   - See https://www.breakoutedu.com/hint-cards to set the combInation for the ABC multi-lock
6. *Puzzle #1* goes with the ABC multi-lock. The answer to this is **TEAM_ (set the lock to the blank for the fifth letter)**
   Answers for blanks: gene**T**ically; bact**E**rium; tr**A**nsgenic; reco**M**binant
7. The *Card Sort* goes with the three-digit lock (this combination will be determined by the cards you choose for them to sort)
8. *Myths and Facts* goes with the four-digit lock (the combination for this is **2-5-7-8**)
   Answers for 2, 5, 7, and 8 are Facts; 1, 3, 4, 6, 9, and 10 are Myths
9. *Misleading Label* goes with the keyed lock
   Answer: there is no DNA in salt, so although it is Non-GMO, there is no GMO salt.
10. If there are not enough lock boxes for each group to have their own, student groups can be set up with

folders and envelopes containing the materials, with each group working to solve the combination locks on one hasp. This requires re-locking the lock after solving and keeping track of each group's progress. The final key could be obtained from the teacher and each group would open the same box as they solve the final puzzle.

11. Set up of boxes: The Scenario and Puzzle #1 will be handed to each group.
    - ✔ The instructions for the *GMO Card Sort* and the card sort cards, should be in a 5 x 8 envelope, so it is clear they go together.
    - ✔ Enclose the prize for the group in the small box (a badge, candy, fake money, etc.)
    - ✔ Lock the small box using the hasp and attach the three additional locks
    - ✔ Set the small box inside the large box
    - ✔ Enclose the envelope with the *GMO Card Sort* materials, a *GMO Myths vs Facts* sheet and the *Misleading Label* instruction sheet in the large box.
    - ✔ Lock the large box with the Alphabet lock.

Student Preparation

Students will need an introduction to the game itself to include answers to these questions:

What is the objective?

To unlock all of the locks by correctly solving the clues that will show them the combination.

What do successful teams do?

Cooperate with one another, listen to one another, use critical thinking, show grit in continuing to work on the puzzles even frustrated

Note: This may also be a good time to talk about whether groups can share information and or cooperate – the scenario is set as a job interview so the teacher may want to make it more competitive; however, there is a value placed on teamwork, so it is up to the individual teacher to set the parameters.

How do the locks work?

Show the Mechanics of the lock graphic

There is a presentation included in the unit that may help you to introduce these objectives.
Depending on how much time you want to spend on this introduction, here are two additional resources that may be shown in class or assigned as homework the night before to help students prepare.

Duckworth, Angela. (2013, May 9.) *Grit: The power of passion and perseverance*. [Video file]

TED. https://www.youtube.com/watch?v=H14bBuluwB8

Jimmy Kimmel Live. (2014, October 9). What is a GMO? [Video file]

https://www.youtube.com/watch?v=EzEr23XJwFY

Breakout Game Procedure

12. Scenario: This represents the first piece students receive. Allow for each group to read the Scenario
13. Puzzle #1: This first puzzle is required to open the large box.
14. Additional puzzles may be solved in any order if there are enough boxes. If only one box is used, the final puzzle should be *Misleading Label*, which requires all teammates to agree with the **explanation by signing the sheet with a dry erase marker,** a student representative must approach the teacher, state the explanation to get the key as it is required to open the final lock.

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