

Operations on Polynomials: Spring Breakout Game

Lesson Overview

In this lesson, students will review basic polynomial terms, put polynomials into standard form as well as add, subtract, and multiply polynomials. Students will also factor the GCF from trinomials.

SC Standards Addressed

AIG 1.ASE.2 Analyze the structure of binomials, trinomials, and other polynomials to rewrite equivalent expressions.

Disciplinary Literacy Strategy

Collaborative groups - critical friend

Computational Thinking

Tools:

Breakouts (Digital)

Cornerstone(s) Addressed:

- **Decomposition:** Students will need to break down the game into different sections to solve for the codes needed for each group. This will encourage critical thinking of how to start the game.
- **Pattern Recognition:** After performing the indicated operation, students will need to use the given clues to determine the correct number to use for the code. Not only must the students solve the problems correctly, they will also need to look for the number of digits needed for each code.
- **Abstraction:** There are many numbers and terms within the problems that are not used for the codes. Students will need to disregard the numbers and terms not needed.
- **Algorithmic Thinking:** Students will need to come up with a strategy, to figure out the codes which ones go with each lock.

Lesson Plan

Time required: 55 minutes

Focus Question(s): How do you add, subtract and multiply polynomials? How do you factor a GCF from a polynomial?

Disciplinary Vocabulary: Monomial, Binomial, Trinomial, Polynomial, Leading Coefficient, Degree, Constant, Term, GCF.

Materials needed:

- *Students will need a computer or electronic device with internet access*
- *Attachments: Digital Breakout Instructions, Digital Breakout Grading, Exit Ticket and Collaboration Rubric*

Engage

Students are paired up with a critical friend. This should be student driven, i.e. students will need to choose someone they trust as this person will not only be collaborating with them but also evaluating them. Each pair is provided the instruction sheet with the breakout link, the collaboration rubric and prompted with the scenario (see the attached instruction sheet). It is a good idea to either read the scenario aloud or have an engaging student read it. Be sure to post the weights (see attached green table) for each lock so that all students can see them. *NOTE: Adjust these to suit your needs.*

Explore

Students are instructed, if needed, to click on pictures or links on the webpage (Google Site) and to complete the tasks presented. Each task provides a code that is aligned to a specific lock in the embedded form (Google Forms). It is advised that students open the form in a new tab or window so that if the picture or link takes them to another page, they don't lose the locks they have broken.

Explain

Students complete the tasks (factor, find GCF, etc.) to logically arrange terms, coefficients and/or constants in the correct order to break the lock, as well as determining which codes go with which locks. Students are encouraged to assist each other BUT are also required to individually show and explain their work to their critical friend, in addition to remembering the information already learned during class instruction.

Evaluate

Students will evaluate their progress by communicating and troubleshooting with peers as well as the amount of time spent breaking out. An exit ticket is provided for reflection (as well as formative assessment). Students are paired (with someone outside the group they worked with on the breakout) to reflect further on the strategies they used to complete the tasks.

Assessment Notes:

Locks are weighted by difficulty (length and rigor). Points are awarded not only for breaking out but also by peer evaluation for collaboration. An exit ticket containing feedback from the students will be collected and used to inform the implementation of future breakouts.

Resources:

Digital Breakouts Link: <https://sites.google.com/view/algebraspringbreakout/home>

Teacher Biographical Information

Lesson Author: *Mrs. Deborah Waters, 8 years teaching high school math, BS: Mathematics – Minor: Education, ACSI certification.*

SPRING BREAK-OUT

Polynomials

Remember all your rules for polynomials. You will need to perform all your operations with polynomials, (add, subtract, multiply and factor)

First step....

Refer to all your terms for polynomials. You may use any of your prior handouts.



All about the game...

Read everything you can within the website. There are clues everywhere even when you put in the wrong answer. Don't be afraid to click on pictures and follow the links. The more you try on your own, the better you will do. You may ask me questions but only after you have tried first!

HAVE FUN!!

We are reviewing our knowledge of polynomials, but you should have fun. There are some hidden clues if you get stuck so keep going. Work with your partner and get through each code.

Here we go...

<https://sites.google.com/cathedralemail.com/algebra-i-springbreak-out/home>

Exit Ticket:

Name: _____

What did you like about the game?

What did you dislike?

What did you find challenging?

What was easy?

Would you want to do something like this again?

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Name: _____

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Peer Collaboration Rubric

Name: _____

With your critical friend, rate yourself in each of the following categories. IF you score a 2 or below be sure to cite what you might do to improve. If you score a 3 or above be sure to cite evidence for this score.

	4	√	3	√	2	√	1	√
Participation	Full Participation and always on task.		Full participation and almost always on tasks.		Participation was good but wasted time.		No participation	
Leadership	Helped and encouraged others, posed solutions to problems, and had a positive and inclusive attitude.		Sometimes assumed leadership in an appropriate way.		Usually allowed others to assume leadership or often dominated the group.		Was disengaged from the group.	
Listening	Carefully listened carefully to others' ideas.		Usually listened to others' ideas.		Sometimes listen to others' ideas.		Did not listen to others and often interrupted them.	
Feedback	Offered detailed, constructive feedback when appropriate.		Offered constructive feedback when appropriate.		Occasionally offered constructive feedback, but sometimes the comments were inappropriate or not supported.		Did not offer constructive or useful feedback.	
Cooperation	Treated others respectfully and shared the work fairly.		Usually treated others respectfully and shared the work fairly.		Sometimes treated others disrespectfully and/or did not share the work fairly.		Often treated others disrespectfully and/or did not do work with others.	
Time Management	Completed assigned tasks on time and assisted other with time management.		Completed assigned tasks on time and did not hold up the progress of others.		Often did not complete assigned tasks on time, and rarely held up the progress of others.		Did not complete assigned tasks on time and interfered with the ability of others to complete their work as a result.	

Check the box next to the number of the description that fits each group members' participation in the box under the collaboration skill. Include your own name in the list.

- 4—High functioning improvement is on advancing the capability in others
- 3—Working well with others but has a few areas which could be improved;
- 2—Making an effort to work well but needs more support and practice;
- 1—Student does not seem to be trying and may need individual support and practice.

Use the back of this document to cite ideas for improvement and evidence of achievement