Equation Expedition Challenge

Abstract:
The activity is an interactive, escape-room-based challenge that is designed to reinforce students' ability to solve algebraic equations. Students will work in teams to navigate through a series of checkpoints. At each checkpoint, they will draw an equation card and work together to solve it. If an incorrect solution is given, students will have to draw another equation to solve, promoting mastery through repeated practice. This activity is aimed at strengthening equation-solving skills and increasing confidence through active learning.

Keywords:

- Linear Equation
- Quadratic Equation
- Exponential Equation
- Games

Goal(s):

- The goal is to test students' ability to solve different equations.

Learning Objectives:

- Students will be able to recognize and solve linear equations.
- Students will be able to solve quadratic equations using various methods.
- Students will be able to solve exponential equations.
- Students will understand how to check the solutions.

Assessment:

- Students will check the solution during the activity. At the end of the activity, the teacher can check students' work.
- By the end of the activity, each student should have demonstrated the ability to solve linear, exponential, and quadratic equations.

Purpose/Rationale:

- This activity is used as a reinforcement for students to practice solving linear, exponential, and quadratic equations.
- This game can be fun to summarize different units (2, 4, 5, 6, 7) of Algebra I and allow students to see the difference between functions.

Prior Preparation:

- The teacher will need to set up checkpoints around the classroom and prepare printed instructions for how to navigate through the checkpoints.

- The teacher will need to prepare different equations and challenge cards for each checkpoint.

Materials/Resources:

- Cones (or anything else that can be used to mark the checkpoints) ($10-20)
- Sheets of paper or note cards ($5)
- Enough space for students to move around

Bibliography and Sources for Further Reading:

- Kendall Hunt, Illustrative Math, Algebra I https://im.kendallhunt.com/HS/students/1/6/1/index.html

#1 Introduction: "Set Up for Success" (5 mins)

The teacher will start off by reviewing how to solve the different types of functions: linear, exponential, and quadratic. If the students need it, the whole class can work through examples of how to solve equations together.

Once the review is done, the teacher can go over the instructions for the game. The activity can be done in groups or individually. Half the class will act as checkers and the other half will be players. The checkers are stationed at each checkpoint who will verify whether the players' answer are correct. The players are solving the equations and trying to get through all the checkpoints the fastest.

#2 Exploration: *"Do it"* (25 minutes)

Start:

- Checkers pick and station themselves at a checkpoint. The checkpoints will have instructions for the checkers, so they know where they will send the players next.
- The players will be given a designated checkpoint, and they will move to that checkpoint. Each team or player should ideally be starting from different checkpoints.
- At each checkpoint, there will be notecard with equations.

At checkpoint:

- Players will pick up an equation and solve the problem.
- Teacher can choose to have players write down their work and solution to be checked at the end of the activity.

Verifying Solution:

- After the players have solved equations, they will go to the checkers at their checkpoint.

- If the answer is correct, the checkers will give instructions on where to go next. (It is possible to add in more physical activity here. Examples include having students moving to next checkpoint by hopping or in a zigzap pattern.)
- If the answer is wrong, the player will be given a challenge card that contains a physical task, such as doing 10 jumping jacks.

Moving on:

- After the player have completed the physical challenge, they will pick up another equations to solve.
- Players can only move onto the next checkpoint once they have solved an equation correctly.

End:

- The players will have to go through all the checkpoints. The goal is to complete all the checkpoints with the fastest time.
- After round one, the students will switch roles.

 # 3 Sharing: *"What Happened"* (5 mins)

- After each round and at the end of the game, ask the students for their experience and how they felt during it. The teacher can ask the following questions:
    - What strategy did you use to solve the equations?
    - Were there any challenges?
    - What did you learn through this activity?
- As students practice more, solving the equations should become easier, helping reinforce their understanding and strengthening their skills.

#4 Processing: *"What's Important?"* (5 mins)

- Discuss what the differences were between solving the different functions:
    - Did the students use different strategies?
    - How can strategies used to solve the functions translate to solving real-life situations?
- Reiterate the strategies that can be used to solve different types of functions and how students can double-check their work.

#5 Generalizing: "*So What?"* (5 mins)

- Summarize the scenarios where each function type can occur. Ask the students to create real-life examples for each function type and to write an equation to model and solve each example.

#6 Application and Wrap-Up: *"Now What?"* (5 mins)

- Have a final discussion with the students to see what they learned today and what they feel like they still need to work on.
- Can also do a short, informal assessment by providing the students with equations that they have to solve independently as an exit ticket.

Problem Set:

1. The sales tax at the store is 6%. However, the food items are tax free. You spent $60 on food items and x dollars on other items.
    a. Write an equation for the total price of the purchase.
    b. What is the total if you spent $50 on other items?
    c. How much did you spend on other items if your total was $166?
2. Solving the following system of equations:
    a. $x + 2y = 8$ and $x = -5$
    b. $y = x - 3$ and $y = x + 4$
    c. $4x + 2y = 10$ and $y = 3$
3. A rabbit population starting with 2,000 rabbits grows at a rate of 5% per year. What would the population be after 5 years?
4. You put $1000 into a savings account that earns 3% interest compounded annually. If you did not add any more money into the account, how much would be in the account after 10 years?
5. Find the roots of the following quadratic equations:
    a. $y = (x - 4)(x - 5)$
    b. $y = 2x^2 - 16x + 24$
    c. $y = x^2 + 5x + 6$
6. Identify whether linear, exponential, or quadratic function best describes the situation. Then solve each problem.
    a. A car rental company charges $50 per day and a one time fee of $150. What is the total cost for renting the car for 5 days?
    b. You throw a ball into the air. The height of the ball in meters is given by $h(t) = -5t^2 + 10t + 15$. When would the ball hit the ground again?
    c. The value of a car decreases by 10% a year. What would be the price of the car be after 6 years if the price of the car now is $32,000?