Mission 16: Breakout

Intro and Discussion Points:

This mission starts where the previous Handball Mission left off. You'll need to use Save As... to save your Handball code to a new file for Breakout.
The game Breakout adds 8 rows of bricks as shown at right (original Atari Arcade screen). By the end of this mission the player will be able to score points by smashing bricks! Different color bricks are worth different points.

History

The concept for Breakout came from Atari founder Nolan Bushnell, who wanted a single-player game to follow up the 1972 smash-hit Pong - one of the first video games many people encountered. He gave the challenge to young Steve Jobs, who recruited his friend Steve Wozniak to implement the game. Do those names sound familiar? They went on to found Apple Computers!! Breakout hit the arcades in 1976, becoming one of the top earning arcade video games that year. That means a lot of players dropped quarters (25 cents per turn) into arcade cabinets like the one shown at right.

Your Task

...is to follow in the footsteps of Jobs and Wozniak. Imagine that you've been tasked by Atari's CEO to create the next hit game for the company. Ready to break some bricks?

CodeX Lesson Plans

UNIT 4: Games and Graphics	**MISSION 16: Breakout**	**# DAYS:** 5
UNIT GOALS: Students will create advanced graphics and design games with the CodeX.	**ADDITIONAL MATERIALS:** ● none	**VOCABULARY:** ● Prototype ● Matrix ● 2D Array

FOCUS CSTA STANDARDS: 2-AP-10, 2-AP-12, 2-AP-14, 3-AP-14

LEARNING TARGETS:

- I can create prototype functions.
- I can detect a collision on a brick using the previous position in the matrix.
- I can create a tuple to hold the official score value for each row of bricks.
- I can review all the code in the program and locate the “secret word.”
- I can add a “mute” feature to toggle the sound on/off.

SUCCESS CRITERIA:

- ❑ Define a function to draw bricks.
- ❑ Define and use a 2D Array to hold the boolean condition of each brick.
- ❑ Check against the ball’s previous position (i, j) & new position to create bounce.
- ❑ Use test code that prints the matrix.
- ❑ Add a button event trigger to control sound on/off.
- ❑ Add gamification features: a bonus +1 life for clearing a full screen of bricks.

KEY CONCEPTS:

- Use functions to organize your code into reusable blocks: draw bricks, check collision, check clear, etc.
- Create a matrix using a list of lists with 8 rows and 10 columns of True.
- Identify which side of the brick was hit to initiate rebound.
- Use variables to hold the previous position and check against the new position to make the ball rebound.

DISCUSS REAL WORLD APPLICATIONS:

- Developing the Breakout game requires students to break down complex problems into smaller, manageable tasks, design algorithms to solve those tasks efficiently, and debug their code to fix errors. These problem-solving and algorithmic thinking skills are applicable to various real-world scenarios, such as software engineering, scientific research, and business analysis.
- Coding the Breakout game provides students with hands-on experience in programming fundamentals such as variables, loops, conditionals, functions, and event handling. These skills form the building blocks of software development and can be applied to create a wide range of applications beyond games, including web development, mobile apps, and data analysis tools.

ASSESSMENT STRATEGIES:

Remix suggestions (set aside 0.5-1.5 periods to complete):

- Introduce power-ups that can have various effects such as multi-ball, larger paddle, sticky paddle, or even power-ups that affect the behavior of the balls.
- Design multiple levels with increasing difficulty. Each level could have a unique layout of bricks or obstacles, requiring different strategies to clear.
- Create a play mode where difficulty levels are randomly generated, providing endless replayability.
- Implement a multiplayer mode where players can compete against each other or cooperate to clear levels together.

TEACHER NOTES:

Always refer to **Appendix A:** All the instructions from CodeSpace and CodeTrek are there.