ozobot

SPACE EXPLORATION OZOBOT BIT GAME

PREPARED FOR OZOBOT
BY LINDA MCCLURE

Essential Questions

How can we use programming to learn science? How can programming be used to create a gaming experience?

Topics

- Science: space exploration
- Computer science: programming

Overview

Students create a game for Ozobot Bit. Students design a game board with events in the history of exploration of space. The events will not be in order on the game board. Using student created game play rules, Ozobot Bit is programmed to correctly travel the timeline.

Suggested Prerequisites

Knowledge of how to program Ozobot Bit using OzoBlockly with blocks from the Movement category. To practice, please complete the Shape Tracer games on games. ozoblockly.com.

Grouping

Groups of 3 or 4 students

Materials

- Tablet or computer with the OzoBlockly editor, http://ozoblockly.com/editor
- Ozobot Bit, 1 per group of 3-4 students
- Printouts of the "Group Collaborative Conversation" worksheet, one per student
- Printouts of the "Event Summary Template", 2 per group

- Printouts of the "Game Play Instructions Template", one per group
- Materials to construct the game board:
    - Construction paper, poster boards or butcher paper
    - Scissors, glue, crayons or markers
    - Decorative art using crayons, markers or digital graphics

Age Level

3rd Grade – 9th Grade

OzoBlockly Programming Topics

Free Movement, Light Effects

OzoBlockly Mode

Use mode 2 or higher

Lesson Duration

3 One Hour Sessions

    1 Hour: Introduction and Research
    1 Hour: Game Creation
    1 Hour: Programming and Game Play

Vocabulary

- Ozobot Bit - Little robot that can follow drawn lines or can be programmed using visual codes or through the OzoBlocky programming language
- OzoBlocky - A visual editor which allows to create programs by plugging blocks together. The blocks can be used to control Ozobot Bit's behavior like movement, LED lights, etc.
- Rotate Right or Left – Approximate 90° turn
- Rotate Slightly Right or Left – Approximate 45° turn
- Steps – a unit of movement forward
- Line Following – Ozobot's capability of sensing and following lines on paper or digital screens

LESSON PLANS

1. Session: Introduction and Research

Activity: Collaborative Conversation on a space timeline event

Choose one or both of the videos on the Group Collaborative Conversation worksheet to show to the class. In groups of 3 or 4 have students participate in a short collaborative conversation about the video.

1. Hand out the Group Collaborative Conversation worksheet.
2. Review the questions about the movies with the class.
3. Divide the students into groups of 3 or 4.
4. Students begin by taking 3-4 minutes to record their own thoughts about the question(s) in the first column on the worksheet "Individual Thoughts".
5. Next, they take turns sharing with the group. Each student notates any interesting opinions from group members in the last column "Group Thoughts".
6. Finally the group agrees on a short (1-2 sentence) summary in the "Final Answer" box.

Research

This is a group activity.

1. Pass out two copies of the Event Summary Template to each group.
2. In groups, students choose six space exploration events from this website: http://www.archives.gov/research/alic/reference/space-timeline.html
3. Using the Internet, students research and write a summary of the events in the Space Event Card on the Event Summary Template. Each event should include the title, date or year, and a research citation. Instruct the students to write the title of each event twice, once on the summary side and once on the date side. When creating the game board, students will need to separate the date from the event to make the game interesting (later in the lesson, students will paste the date of each event to a separate paper to create an answer key).
4. Students find pictures on NASA's website to illustrate the summaries. Pictures can be printed from the internet.

   Note: students can copy and paste several pictures into a Word document to simplify the printing process. They can also draw the pictures onto the game board if printing is unavailable. Be sure to have them include the name of the event on the pictures.

2. Session: Game Creation

The entire session is a group activity.

Game Board Creation

After the research has been done, each group creates a game board with the Space Event Cards and pictures of the events. When creating the game board, students should put the events in random order so the Ozobot Bit programmers (players) have to figure out the correct order of events.

1. Each group gets a large piece of construction paper, poster board or butcher paper.
2. There are several creative ways students can create the game board. Some ideas include…
   a. Students paste the summary side of the Event Cards with picture to the paper in random order (do not include dates).
   b. Students type up the summaries in a word document, digitally add the picture, and format creatively in Word. These can be printed and pasted onto the game board in random order (do not include dates).
   c. Students can brainstorm as a group different and creative ways to put the events and summaries on the game board.
   d. Using crayons, markers or digital graphics, students decorate game board with a theme.

   Differentiation: For younger students, demonstrate one way to create the game board and have all groups create the same type of board. Older students can be given the option of inventing their own type of board.
3. Students should create an answer key with Date section of the Event Cards.
   a. Have the students paste the date sections onto a piece of paper in the correct order.
   b. Have the students sketch the correct timeline path on the answer key.
   c. Leave space on the answer key to insert the correct Ozobot Bit programming commands (more details below in "Testing").
   d. Decorate the answer key to match the game board.

Game Rules Creation

Hand out a copy of the Game Play Instructions Template to each group. Students create game play instructions and rules for their game on the template. Rules should include a behavior for the Ozobot Bit to execute at each event station on the game board.

Rules can include different activities for each timeline event. For example, at the first event, Ozobot Bit flashes green; at the second event, Ozobot Bit flashes green and red, etc. At the last event, Ozobot Bit can spin. To make the programming harder, Ozobot Bit can circle the event on the game board before going on to the next event. Challenge the groups to come up with unique rules and instructions.

Groups can type rules and instructions in a document and format to match game board.

Testing (Troubleshooting)

Have each group program an Ozobot Bit to complete the game on their own game board following the directions they have written. They should save, write down or screen shot a correct solution to their game and include it on the answer key. This is a good troubleshooting step as they may find their instructions to easy or too difficult.

3. Session: Programming and Game Play

Classroom Activity

Once groups have completed their games and instructions, they can challenge other groups to play the game by programming an Ozobot Bit. As the students are playing each other's games, have them take notes on the events from the different game boards in a notebook.

In a final activity, the class can put all events from all the game boards together into one timeline.

Extensions

- Have the students decorate a box for the game board, instructions and answer key. Students can use cereal boxes or shoe boxes. Display the games and solutions with the Ozobot Bit at Open House.
- Have the students create a website or blog with photos and instructions from game. Include Ozobot Bit programming and videos of game play. Provide a QR code to link to the websites for parents at Open House.
- Create a class fundraiser where other students in the school can come use the Ozobot Bits to play the student designed games for a fee.
- Put the class timeline on a large piece of butcher paper surrounded by the student game boards. Have the class compete with each other to program the Ozobot Bit to complete a class timeline.

Share

We would love to see your student's creations! Please share your documents, photos and videos with us for a chance to win cool prizes and be featured on our website. Contact us at ozoedu@ozobot.com.

Links

Interactive Solar System from NASA

http://solarsystem.nasa.gov/kids/index.cfm#

Overview of Timeline of Space Exploration

http://www.archives.gov/research/alic/reference/space-timeline.html

# SPACE EXPLORATION GAME GROUP COLLABORATIVE CONVERSATION

BY _____

Instructions

1. Watch one or both of the videos about an exciting event in space exploration
2. Record your own thoughts in the column labeled "Individual Thoughts"
3. Take turns sharing your thoughts and answers with your group. In the last column, write down some interesting thoughts from other group members
4. As a group decide on a 1-2 sentence summary of your group members answers to share with the class

Videos

1
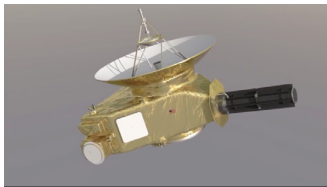
Space Timeline Event: New Horizons Photos of Pluto 7/14/2015
Video: NASA | Four Questions About New Horizons
Online Link: http://www.nasa.gov/multimedia/videogallery/index.html
Download HD Link: http://svs.gsfc.nasa.gov/goto?11950
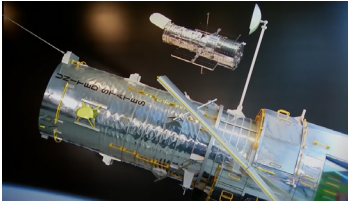
Overview: New Horizons is a spacecraft that has recently sent back information and imagery from the farthest body, Pluto. The video answers some common questions about the spacecraft and Pluto.

Discussion Question	Individual Thoughts	Group Thoughts
What does the New Horizons' information from Pluto mean for space exploration?		

Final Answer

2

Space Timeline Event: Hubble Telescope Deployed in 1990
NASA | Hubble Memorable Moments: Brute Force (5:45 minutes)
Online Link: http://www.nasa.gov/multimedia/videogallery/index.html
Download HD Link: http://svs.gsfc.nasa.gov/goto?11822

Overview: The Hubble Telescope needs repair. The video explains how the team practiced and finally solved the problem.

Discussion Question	Individual Thoughts	Group Thoughts
Describe the steps the engineers and astronauts went through before performing the repair on the Hubble Telescope. Why did they take these steps?		
Why was their final solution unique?		
Final Answers		

EVENT SUMMARY TEMPLATE

BY _____

Instructions:

1. Choose a total of six important events in the history of space exploration at
   http://www.archives.gov/research/alic/reference/space-timeline.html.
2. Write the name of the event (in both sections of card), summary, date and citation. Cut out the
   cards. Separate the date to create an answer key to your game board.
3. Find a picture related to the event.

Space Event Card

Event Title _____

Summary of Event _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Repeat Event Title_____

_____

_____

Date of Event _____

_____

Citation

Space Event Card

Event Title _____

Summary of Event _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Repeat Event Title_____

_____

_____

_____

Date of Event _____

_____

Citation

Space Event Card

Event Title _____

Summary of Event _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Repeat Event Title_____

_____

_____

_____

Date of Event _____

_____

Citation

OZOBOT BIT SPACE EXPLORATION GAME
GAME PLAY INSTRUCTIONS

Name of your game: _____

How many players can play your game? _____

What are the ages of your players? _____

How to Play

Explain to the users how to play your game.

_____

_____

_____

_____

_____

_____

_____

Rules

What behavior should the Ozobot Bit demonstrate? Create rules that your players have to follow to complete the game.

_____

_____

_____

_____

_____

_____

_____

Ozobot Bit Behaviors
- Flash colors
- Flash a sequence of colors
- Turn or spin
- Dance
- Move backward or forward
- Move in a "shape" such as a square or triangle