HOWARD B. OWENS SCIENCE CENTER

3rd Grade

"Ozobot Bit"

Computer Science Engineering Program

Pre-Visit Resources

2020

Winter/Spring 2020

Dear Visiting 3rd Grade Teacher:

Soon you and your students will visit the Howard B. Owens Science Center to participate in our *new* 3rd Grade, "Ozobot Bit Computer Science Robotics Engineering Program" designed to introduce students to the basics of computer science programming in a fun way.

The activities included in this Pre-Visit Resource Packet are designed to: 1) have students begin to think about the detailed sequenced information needed to program robots to perform simple tasks, 2) familiarize students with the procedure for calibrating Ozobot Bits optical sensors which read visual color coded commands and 3) have students practice using an Ozo-Blockly coding language editor to command a virtual Ozobot through online computer tracing challenges.

I look forward to your schools upcoming visit to the Science Center. Please do not hesitate to contact me with any questions or concerns at: (301) 918-8750.

Sincerely,

Sallie M. Smith

Sallie M. Smith, Ozobot Computer Science Robotics Instructor
Howard B. Owens Science Center

Name: _____ **Date:** _____

Pre-Visit Activity #1: "My Robot"

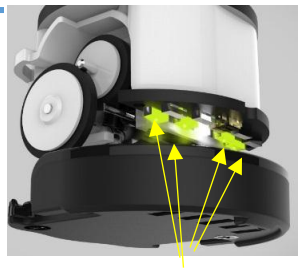
1. **If you had your own robot, what would you want it to do?**

2. **What information would the robot need to know to perform your desired task(s)?**

3. **How would you communicate this information to your robot so it would know how to perform the task(s)?**

Pre-Visit Activity # 2: Reading to Perform a Task

Learning to Calibrate Ozobot Bit's Optical Sensors



Ozobot Bit's **Optical Sensors**

The Ozobot Bit Robot does not respond to voice or written word commands. Ozobot has five **optical sensors** which **detect colors of light**.

During your visit to the Science Center it will be necessary for each student to be able to **"calibrate"** or fine tune Ozobot's optical light sensors to detect light accurately in its current environment.

Directions: Please carefully read the instructions below for calibrating Ozobot Bit's optical sensors and be ready to explain to the person sitting next to you what has to be done to calibrate Ozobot's optical sensors and what happens to indicate Ozobot's Sensors have been calibrated correctly.

ozobot

HOW TO CALIBRATE YOUR OZOBOT

STEP 1

Hold down the power button on Ozobot for 2 sec. until the LED light flashes white.

STEP 2

Draw a black circle and release the power button then place your Ozobot in the middle of the black circle while the LED light is flashing white.

STEP 3

Ozobot will then flash blue, move forward, and flash a green light, then stop and turn off. If Ozobot flashes red, start over from step 1.

Pre-Visit Activity # 3

Level 1

http://games.ozoblockly.com/shapetracer-basic?lang=en&level=1

During your visit at the Howard B. Owens Science Center, students will program Ozobot Bit robots through a series of challenge tasks. Using the Ozobot Blockly Level-One ***Shape Tracer*** computer program prior to your visit will help the students learn how to plan Ozobot movements based on the perspective of Ozobot's position and not their own. Students will also become familiar with the tasks of selecting, dragging, dropping and connecting category coding block commands for Ozobot's movement and lighting.

Overview: *The Shape Tracer* program includes ten Levels of programming challenges with each level progressing in difficulty challenging students to program their computer Ozobot to trace a shape displayed in a preview window and program Ozobot's dome light to match the color of the line it is tracing using drag and drop movement and lighting codes.

At levels 1-9 there is a "Preview Simulator" that when students click "run" moving the computer Ozobot to display student programming results as accurate or needing revisions.

Materials:

- **Instructor Computer with Internet and Projector Displaying Opened to the Ozobot Blockly Shape Tracer Level One Homepage Address:**
  http://games.ozoblockly.com/shapetracer-basic?lang=en&level=1

- **Student Computers with internet opened to the Ozobot Blockly "Shape Tracer" Level One Homepage Address:**
  http://games.ozoblockly.com/shapetracer-basic?lang=en&level=1

Optional: Sequence Graphic Organizers for students to plan Trace Steps before dragging and dropping movement and lighting codes.

Name(s): _____ _____

Ozobot "Shape Tracer" Sequence Chain

Directions:

1. Discuss each step necessary to have the Ozobot Computer Robot trace the path shown in the "Shape Tracer" preview window with your partner.
2. Record each step Ozobot must be programmed to take in order using the Sequence Chain Graphic Organizer.
3. On "*Shape Tracer*" Drag, Drop and Connect your block code commands to match the programming steps listed in your graphic organizer.
4. Click "run" to preview the results of your programming and make any necessary revisions to your sequence chain program script.

OZOBOT "SHAPE TRACER" SEQUENCE CHAIN

Step 1

Step 2

Step 3

Step 4

Step 5

Step 6

Step 7

On-Site Field Trip
5 E's Lesson Plan

Performance Expectation (don't include clarification statements)

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects that can be improved.

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts
Asking Questions and Defining Problems **Planning and Carrying Out Investigations**	**3-5 ETS1 Science & Engineering**	**Cause and Effect**

Maryland College and Career-Ready Standards (MD-CCRS)

Computer Science Practices: https://k12cs.org/wp-content/uploads/2016/09/K%E2%80%9312-Computer-Science-Framework.pdf

- **Recognizing and Defining Computational Problems**
- **Creating Computational Artifacts**
- **Testing and Refining Computational Artifacts**
- **Communicating About Computing**

ELA/Literacy	**RF4 Read with sufficient accuracy and fluency to support comprehension. RF4.a Read on-level text with purpose and understanding. (SC, 3) Demonstrate fluent reading in order to fully comprehend text by responding accurately (e.g., discussion, written response).**
Mathematics	**MP.2 Reason abstractly and quantitatively. (5-ESS2-1)**

Program Title:	**" 3rd Grade :Ozobot Bit Computer Science Robotics Program"**
Lesson Objective(s)	- Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. - Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects that can be improved.

Engagement (5 min): Activities capture the students' attention, connect their thinking to the situation, and help them access prior and current knowledge. Students may experience a new phenomenon or reflect on an anchor phenomenon.

Have students read the title of the power-point slide welcoming them to the Howard B. Owens Science Center's new **"Ozobot Bit Computer Science Robotics Program"**. Assess students prior knowledge of Robotics and Computer Science by following up on the Pre-Visit **"My Robot"** activity by having students share what tasks they wanted their created robot to perform and how the robot would know what to do?
Share with the visiting students that you will be bringing a "Space UFO Alien" Wind-Up toy to their table and that each student at the table should wind the toy three times and then place the Alien on the table facing them to observe what happens but not share. After each person has completed the task the student table team should determine together and be able to describe what Computer Scientists have programmed the "Alien" Wind-Up Toy to do when coming to the edge of the table.
Have student table teams report observations in a whole class discussion accurately concluding that computer scientists have programmed the "NEVER FALL" UFO SPACE ALIEN Wind-up Toy to turn away when its bottom sensor detects no surface beneath it.
Share with students today's Ozobot Objectives on the next powerpoint slide.

Exploration (20 min): Activities allow students to investigate initial ideas and solutions in meaningful contexts.

Each student table team will be provided an Ozobot Bit Smart Robot to engage in the following hands-on exploration activities to learn about Ozobot Bit's optical sensor calibration, ability to follow lines and implement visual color coding pattern programming language commands:
- **Ozobot Calibration Movie** – Using a "Focus for Viewing" strategy, visiting third grade students are directed to watch a very short "Ozobot Bit Calibration Video" with the request of being ready to explain how to calibrate Ozobot Bit's optical sensors after viewing the video.
- **Table Leader Calibration of Ozobot Bit** – the table leader will be the first person directed to calibrate Ozobot Bit using the calibration dot sheet in front of them.
-**Student Table Team Rectangle** – student table teams will be directed to take a marker and create one rectangle for their team with each person making part of the rectangle with their colored marker. Then the table leader will turn Ozobot on by pushing the left side button one time and place it anywhere on the team's rectangle for students to observe and be ready to describe Ozobot Bit's robotic response when detecting and implementing line – color code commands.
- **Student Coding Rectangle**– the student table team leader will remove the Team's rectangle from the center table clip board and replace it with their rectangle calibration sheet. Student table partners will place an Ozobot Reference Code Command Sheet located under each white table basket between table partners. Each student will select and color in a code command on the center table rectangle. Table student number "2" will calibrate Ozobot and then place it anywhere on the rectangle for table team students to observe Ozobot's response when implementing table codes with instruction to be ready to report out Ozobot code implementation observations.

Explanation (20 min): Students develop an explanation for the concept and practices. Teacher's descriptions and definitions help clarify and modify students' understanding of the lesson.

The Owens instructor will challenge and guide students through three applications of using both visual line and colored Ozocode commands to program an Ozobot Bit Robot to: 1) knock down as many of the opponents placed bowling pins as possible and to 2) move construction site cargo to correct yard site storage areas.

Elaboration (30 min): Activities provide students with opportunities to expand and apply their understanding of the concepts within new context and situations.

Student teams will extend and refine their newly acquired computer science skills by programming their Ozobot Bit to move around a student created track which includes given rolled codes and time with the ability to add line and additional Ozo codes to meet the challenge time.
The Owens instructor will also introduce and model how to use visiting teachers and students to free "Scratch" programming projects and real-world Science Robot explorers from NASA, NOAA and BOEING included in the Post Visit Activity Packet.
The Owens Instructor will summarize what was done in class today and highlight some of the activities found in the Teacher Post Visit Resource packet for continued study back at school. Students will also be invited to the next Howard B. Owens Family Science Night.

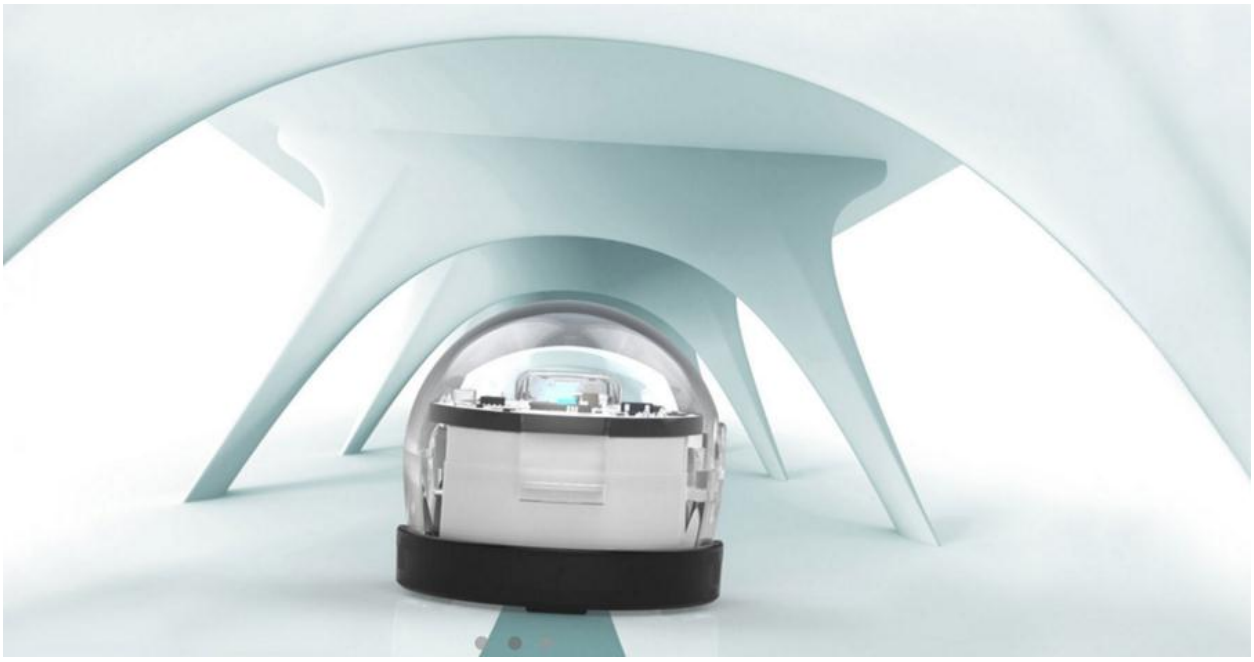
Evaluation (5 min): Students analyze their understanding of the concepts, and teachers have the opportunity to assess student learning.

Assessment will be on-going throughout the lesson monitoring student responses and ability to program Ozobot Bit to complete HBOSC challenges.
Additional assessment and extension activities have been included in the Post Activity packet which includes the Howard B. Owens Selective Response Post Program Assessment.
All visiting teachers and chaperones will be invited to complete and HBOSC program evaluation /feedback form.

Modifications and Accommodations: TBD by the Visiting Teacher and HBOSC Instructor

Refer to the PGCPS UDL website to identify specific strategies or technologies to address specific needs of individual students: http://www1.pgcps.org/udl

- Advanced Learners
  - Will be given more difficult Ozobot Programming Challenges..
- English Language Learners
  - Will be shown demonstrations, videos and grouped with fluent English partners.
- Students with Disabilities
  - If necessary, will have their Ozobot calibrated by the HBOSC Instructor, be paired with a supportive partner and assigned appropriate Ozobot programming challenge tasks.



See You Soon!