iRobot

Grades: 2nd, 3rd
Team Size: 1-2 competitors
Duration: 45 minutes (includes instruction time)
Supervisor: Beth Nazario, Francis Esmonde-White

Summary Description

Participants will be tested on the following:

- Knowledge of basic computing and robot automation concepts including software.
- Understanding of how computers and robots solve problems.
- Ability to identify the correct color code sequence to have Ozobot complete an objective.
- Ability to operate an Ozobot using color codes to complete a challenge.

Concepts Covered

There are three sections on the test. The following describes each section.

1. **Computing and Robotic Basics (Section A):** This section tests basic knowledge of software programming languages, robotic sensors, actuators, inputs and outputs, parts, automation, etc.
2. **Practical Computing (Section B):** This section tests the participant's understanding of how a task can be solved using color coded instructions to guide a robot to complete a defined objective. Participants will demonstrate creating a sequence of color codes to program a robot to correctly complete an assigned objective.
3. **Robotics Challenge (Section C):** This section tests the participant's ability to program and run their robot to achieve a goal. The task will be accomplished using the Ozobot and color-coded markers (or stickers).

Rules/Competition Format

Overall:

- Participants are not allowed to bring anything along with them, all materials needed for the event will be provided.
- Participants can only use the color-coded markers and stickers provided to them during the competition.

A) Computing and Robotic Basics:

Section A will comprise a written examination. Each team will be provided with writing instruments and all necessary materials.

B) Practical Computing Section:

Section B will contain a hands-on activity in which each team will be asked to solve a problem on paper using Ozobot color codes. A color code reference sheet and set of markers will be provided so the team can identify or mark necessary color code sequences for a given action.

C) Robotics Challenge Section:

Section C is a robotics challenge designed to be completed using the Ozobot. Each team will have access to exactly one Ozobot along with a set of specific objectives for their robot to complete. WESO volunteers will evaluate the ability of the robot to meet the challenge objectives. The resources section below outlines training material to create efficient color codes to trigger Ozobot actions.

Scoring

Total Score: 50 points
In all sections, spelling does not count as long as answers are intelligible.

Breakdown:

- Section A (10 points)
    - Multiple-choice and matching questions.
- Section B (20 points) - Practical Computing
    - The activity will be scored based on the correctness of the solution and whether it addresses all parts of the question.
    - Use a set of markers (preferred) or color coded stickers to specify the correct color code sequence required for a given action. If an incorrect color code is entered, it can be overwritten using a blank sticker. Teams can use color coded stickers as the last option from a sealed pack. Use of markers will be preferred, and considered for accuracy and efficiency while breaking a tie.
    - This activity will require the students to add ColorCodes and/or lines to a pre-made pattern to solve a problem. This might be something like navigating a simple maze, collecting items (by passing them), or avoiding specific numbers. The challenge could be similar to the Ozobot Classroom “Even and Odd Numbers Maze” example.
    - Participants may test their answers with the provided Ozobot, but the results may be judged only using visual inspection of the written response.
    - Using color code stickers in this section will incur a 5-point penalty.
- Section C (20 points) – Robotics Challenge
    - This exercise will have the students solve a task to have the Ozobot try to stop at a specified location. The challenge could be similar to the Ozobot Classroom “Reignbot Landing” example.
    - Ozobot programming using color codes
        - (5 points) Correct color codes for Ozobot to complete objective successfully. Teams can use markers (preferred) or stickers with guidelines same as section B.
        - (15 points) Score based on final distance from target (closer is better).
        - Using color code stickers in this section will incur a 5-point penalty.

Tie Break Criteria

First Tie Breaker: Use of markers over sticker codes and fastest completion of code sheets.
Second Tie Breaker: Neatness of code sheets with least overwrites and efficiency of the code.

Materials Distributed by WESO

You will get a new package of stickers and markers this year. If your school did not participate in iRobot in 2022 or 2023, you will get a full Ozobot kit this year.

Additional Materials useful for practices

Each school will be given one Ozobot that they have to share with all the participating grades. The Ozobot comes with a basic manual and markers for color coding. Sticker sheets with color codes will be provided. The participants should learn using marker color coding and sticker sheets both for programming the Ozobot. While students do NOT need to memorize color codes, it will help with timing if students are familiar with them. Additional sticker sheets can be bought from Amazon.

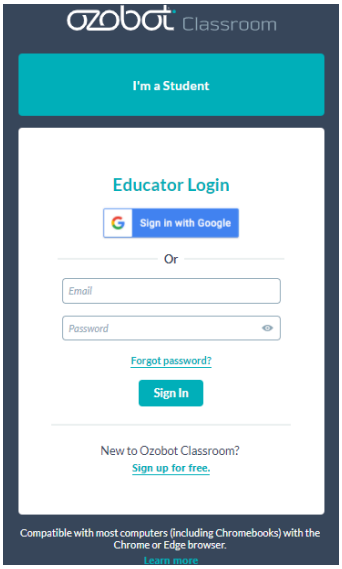
Materials to be brought to competition - None

Event Questions

Please go to https://wesoscience.org/events/ for information on how to submit questions about this event.

Additional Resources/References

- CS Unplugged – Kidbots Rescue Mission and Kidbots Move to a Number
- Introduction to Color Codes (Link for this lesson is also available in pacing guide)
- Ozobot ColorCode Tips – https://files.ozobot.com/stem-education/ozobot-tips.pdf
- Full list of Ozobot ColorCodes (2023): https://static.ozobot.com/assets/5c9cf3b3-ozobot-color-chart-and-guide-2023.pdf
- Get to know Evo (Link for this lesson is also available in the pacing guide)
- Pacing Guide (has links to all lesson plans - follow 1 through 10 for this event)
- Ozobot Classroom (requires setting up a FREE educator account, a great resource for Ozobot-specific lesson plans)



Sign up for a FREE educator account on Ozobot.com to get access to the training materials recommended for the event. The links in the PDF documents REQUIRE an educator login to work.

Useful Ozobot Classroom examples:

Even and Odd Numbers Maze – https://classroom.ozobot.com/lessons/Inv5IsZdvLTxCDGlbkIrWKYwlq

Reignbot Landing - https://classroom.ozobot.com/lessons/lnWbs9HDeFSduD7FaXzYpxfAeR

Sample Questions

Section A

1) Circle the ways Ozobot can be programmed:
    a) Spoken commands
    b) Color codes
    c) Blockly
    d) Python

2) What is a sensor? Circle the correct answer.
    a) Song notes at certain scale
    b) Device that measures a signal
    c) Blinking lights
    d) All of the above

3) What kinds of sensors are included on the Ozobot Evo? Circle the correct answer(s).
    a) Wheels
    b) LEDs
    c) Line following
    d) USB C
    e) Speaker
    f) Proximity

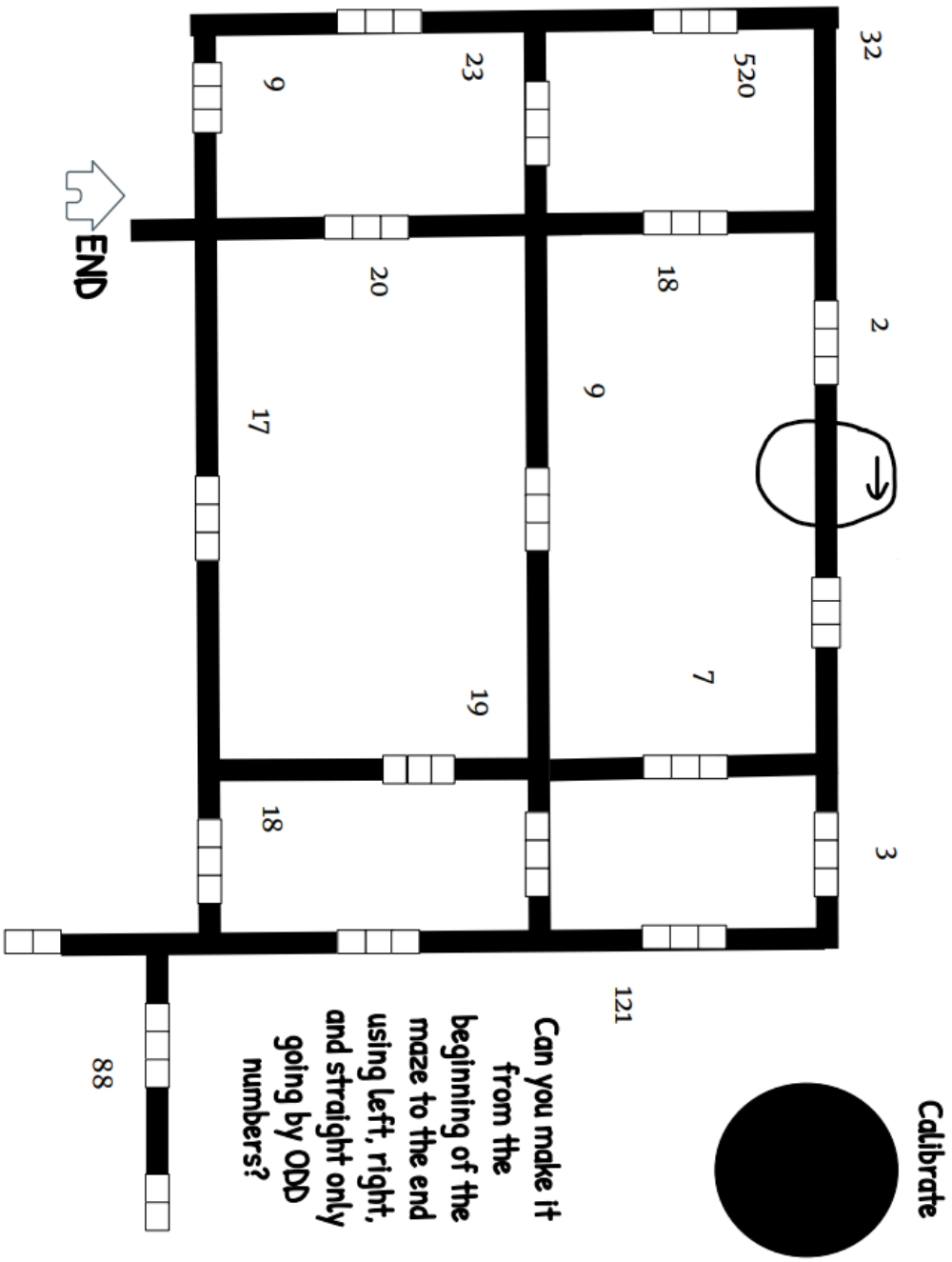
4) Match the items in column A to their associated type in column B

Column A		Column B
Program		ColorCodes
Proximity		Memory
Storage	Wheels	
Actuator		Sensor

5) Where does Ozobot store the energy for working?
    a) Breakfast Cereal
    b) Heat
    c) Battery
    d) None of the above

Section B

On the sheet below mark the correct color code sequences to get Ozobot to the end by only going through odd numbers. Use your markers to fill in the correct color codes on the sheet. Ozobot will start in the circle, facing in the direction of the arrow in the circle. A page showing the color codes is provided, do not write on the reference pages.



Section C

In this section, you will use a Speed Color Code, 30-second Timer Color Code and a Line Switch/Jump Color Code to send Ozobot on a trip. Your Ozobot is trying to get home. Look at the Activity Sheet. Each activity sheet includes a Start Path where the Ozobot will travel. You can use up to 5 activity sheets, which are provided. You can test your Ozobot in your test area before your final run. Use of markers is preferred to fill the code spots with correct codes. You can use stickers to fill the code spots, but you will lose points for using stickers.

1. Look at the challenge course

Look at the challenge course. Decide how you will get Ozobot home.

2. Color your codes on the activity sheet

On the **Start Path**, fill in color codes to tell your Ozobot how fast to move, to continue to move at the end of the line, and make sure to stop in the right place. You can test the Ozobot in your test area.

3. Close your markers and wait for your turn

Once you are ready to try to get your ozobot home, select the activity sheet you will use for your attempt. Close your markers and raise your hand. Wait for your turn to bring your final activity sheet and Ozobot to the challenge course judging area.

4. Run your robot

Put your Activity Sheet paper fully inside the starting zone and align it to make Ozobot go home. Turn on your Ozobot and place it on the “Start” circle in front of the Start Point. Watch Ozobot move. The judges will measure how far the Ozobot is from home.

Example Activity Sheet (not to scale):

Example Challenge Course (not to scale):

START AREA
KEEP OUT
DANGER
HOME

Reference Color Code Sheet