ROBOT OLYMPICS
KAYCIE ROGERS, EAST JACKSON ELEMENTARY SCHOOL

Unit Overview

This third grade unit integrates engineering, English Language Arts (ELA), mathematics, and social studies to teach students about robotics and the components of a country. In the first half of the unit, students delve into writing by conducting research on a country to create an informational booklet. The second half of the unit is dedicated to building a robot, which will represent the "athlete" in the culminating Robot Olympics. Throughout the unit, students gain skills in research, writing, engineering, and coding.

Standards Addressed

1. **ELA3.RI1:** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

2. **ELA3.RI3:** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

3. **ELA3.RI4:** Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area.

4. **ELA3.RI5:** Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic quickly and efficiently.

5. **ELA3.RI7:** Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

6. **ELA3.W2:** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
   b. Develop the topic with facts, definitions, and details.

7. **ELA3.W4:** With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose.

8. **ELA3.W7:** Conduct short research projects that build knowledge about a topic.

9. **M3.MD.8:** Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and

exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

10. **Social Studies Map and Globe Skills Standard 4.** Compare and contrast the categories of natural, cultural, and political features found on maps.

11. **Social Studies Map and Globe Skills Standard 8.** Draw conclusions and make generalizations based on information from maps.

12. **Social Studies Information Processing Skills Standard 1.** Compare similarities and differences.

13. **Social Studies Information Processing Skills Standard 5.** Identify main idea, detail, sequence of events, and cause and effect in a social studies context.

14. **Social Studies Information Processing Skills Standard 15.** Determine adequacy and/or relevancy of information.

15. **STEM-EA-2.** Demonstrate and follow safety, health, and environmental standards related to the STEM workplace and apply specific engineering tools, machines, materials and processes in a safe and orderly manner to formulate, analyze, and verify engineering practices and solutions.
2.6 Safely and effectively manipulate materials, tools, and processes.

16. **STEM-EA-4.** Apply knowledge of the engineering design process to solve engineering/ technological problems in the STEM workplace.
4.7 Develop a working prototype of the solution
4.8 Test the prototype using engineering tools, concepts, and methods.
4.9 Analyze the results of the testing and modify the solution as needed.

Day 1 – Let's Travel To…Introduction
Standards Addressed: 12

Essential Question: What is the difference between a state, a country, and a continent?

1. Before the unit begins, pair students to work together. Begin the unit by revealing the group assignments. Move students to make sure pairs are sitting with one another.

2. Direct the class to form a group of four for an activity (two pairs). Direct groups to select one person to serve as the secretary (the person who will write the notes). Tell the class that they have three minutes to name as many countries as they can. They may not use any resources.

3. When time is up, instruct students to stop their discussion. Ask for volunteers to share the countries their group named. As students respond, write their responses on the board in one of three categories: continents, countries, and states. As students share out states and continents instead of countries, address misconceptions and compare and contrast the three categories.

4. When groups are finished sharing out, explain that the next project they will be learning about a country and that their country will compete in the Olympics. Assign each pair a country. You may assign pairs a country randomly, or you may consider letting pairs decide which country they want to research.

5. Explain the timeline of the unit to the class. Tell them that they will begin with researching the country and that they will use the research to write an informational book. Next, they will build robots which will serve as the "athlete" in the culminating Robot Olympics.

Day 2-3 – Researching Our Country
Standards Addressed: 1, 3, 4, 5, 8, 10, 11, 14

Essential Question: What can I learn about my country?

1. Make sure you reserve the computer lab or the laptop cart for a minimum of three days (depending on how long you want to give your class to conduct research).

2. Explain that the next two days will be dedicated to researching the country. Distribute the **Country Research Guide** to each student. Briefly go through the contents of the guide.

3. Give a brief lecture on conducting research using the **How to Conduct Research** PowerPoint. The PowerPoint includes examples of credible websites and uses the example of the United States throughout.

4. Pass out one laptop per pair. Students will be working together to conduct research, but completing the research guide individually. You may prefer for your students to work independently, depending on your resources.

5. As students begin to work through the research guide, circulate the room and work with pairs. Spend additional time with pairs who need more guidance.

6. At the end of the day, assess the class asking a question about the country they are researching. You may consider creating a [Kahoot](#) quiz and asking questions from the categories they are researching that day. Make sure to select review questions that align to the academic level of your students, as well as pacing for the **Country Research Guide**. Consider the level of your class and think about how far they should get in the guide each day as you select your review questions. Some examples of questions you may ask include, "Name one geographical feature of your country," "How do you say 'hello' in your country's language?" "Name an animal from your country."

7. At the end of each day, collect the **Country Research Guide** and laptops (if applicable) from the students.

Days 4– Turning Research into Informational Text, Part I
Standards Addressed: 1, 3, 6, 7, 8, 10, 13, 14

Essential Question: How do organize research into a plan for my book?

1. Give each pair a laptop. Give each student their **Country Research Guide.** Explain that they will spend the next two days turning the research into a graphic organizer that will then use to write the **Let's Travel To…Booklet.**

2. Give a short lesson on writing informational text using **The Writing Process** PowerPoint. Briefly review the steps of the writing process, including planning, first draft, revising, editing, and publishing (slide two).

3. Give a lesson on how to organize research in the graphic organizer (slides three through six). As a class, practice the process with the example provided on slides three and four (favorite food). Ask for a couple of volunteers go through the writing process. Next, use the country research as an example (slide five). Walk the class through the process of turning research into informational text using geographic features of the United States as the example (slide six).

4. Give each student the **Let's Travel To...Graphic Organizer**. Each student will complete the graphic organizer individually. Tell the class that the **Country Research Guide** aligns to

the **Let's Travel To…Graphic Organizer.** Go through each page and make sure students know what to include in each category.

5. Circulate the room to provide guidance to pairs needing additional help. Go through another category with the struggling students, ensuring that each student writes about their own country. Ask probing questions, such as, "What makes a hook strong?" "What types of information should you include in the beginning versus the details?"

6. Ensure that all students have completed at least the geography category of the **Let's Travel To…Graphic Organizer** by the end of the day**.**

7. At the end of the session, collect the **Let's Travel To…Graphic Organizer** and the **Country Research Guide.**

Days 5-6– Turning Research into Informational Text, Part II
Standards Addressed: 1, 3, 6, 7, 8, 10, 13, 14

Essential Question: How do organize research into a plan for my book?

1. Distribute the **Let's Travel To…Graphic Organizer** and the **Country Research Guide.** Review the graphic organizer and remind students that they will be using the information on the research guide to complete the graphic organizer. Instruct the students to complete geographic features, government, language, currency, main exports, and flora and fauna by the end of day six.

2. As students work, circulate the room and provide guidance. Pay special attention to the students who need extra guidance. Ensure that all students complete all categories by the end of the day six.

3. At the end of each session, collect the **Let's Travel To…Graphic Organizer Booklet** and the **Country Research Guide.**

Days 7-8 – Turning Research into Informational Text, Part III
Standards Addressed: 1, 3, 6, 7, 10, 13, 14

Essential Questions: How do I turn my graphic organizer into a first draft?

1. Distribute the **Let's Travel To…Graphic Organizer** and the **Country Research Guide** to each student.

2. Provide a brief lesson on informational text and complete sentences using **The Writing Process** PowerPoint (slides seven through nine). Provide a lesson on how to turn details

into sentences (slide seven). Have students practice informational writing with the favorite food example from slide eight.

3. After they practice, continue the lesson with slide nine, explaining how to turn the graphic organizer content into informational text. Use the geographic features of the United States as the example. Ask the class for volunteers to help write the section. Try projecting the slide onto the white board and having the students write on the board in the space provided.

4. Explain to students that now that they have drafted their text in the graphic organizer, they will now write the text on notebook paper. They will write on notebook paper since it will need to be peer-reviewed before writing the final draft in the **Let's Travel To…Booklet.** Using their **Let's Travel To...Graphic Organizer** and the **Country Research Guide,** students will transfer the information in paragraph form on notebook paper**.**

5. As students work, circulate the room and provide guidance. Pay special attention to the students who need extra guidance.

6. At the end of class, collect the **Let's Travel To...Graphic Organizer** and the **Country Research Guide**.

Days 9-10 – Turning Research into Informational Text, Part IV
Standards Addressed: 6, 7, 13

Essential Question: How do I use peer edits to help finalize my final draft?

1. Distribute the **Let's Travel To...Graphic Organizer,** the **Country Research Guide**, and the **Let's Travel To…Booklet** to each student.

2. Give a brief lesson about revising and publishing from **The Writing Process** PowerPoint (slides nine through eleven). Instruct students to get into groups of four (two pairs). Distribute the **Let's Travel To…Peer Feedback Rubric** (two per person, because each student will review two students' drafts). Explain that students will exchange booklets with two group members, then proofread and provide feedback using the **Let's Travel To…Peer Feedback Rubric** (two per person). Model proofreading and providing feedback by using either an example you wrote or from another class.

3. As students edit, circulate the room and provide guidance. Pay special attention to the students who need extra guidance.

4. Instruct students to inform you when their work has been peer-edited. Circulate the room and give approval to students who can start to write their final drafts in the **Let's Travel To…Booklet**.

5. At the end of each session, collect the **Let's Travel To...Graphic Organizer Booklet,** the **Country Research Guide**, and the **Let's Travel To…Booklet**.

Day 11-13 – Building the Robot
Standards Addressed: 2, 15

Essential Question: How do I build a robot?

1. Begin the class by explaining to students that now that they have completed the country research and booklet, they will spend the next three days building their robot. The robots will represent their country in the Robot Olympics. Show students a premade example of the type of robot they will build.

2. Distribute one robotics kit to each pair. Briefly go through the instruction manual with the class. Ensure that students know how to navigate the manual. Go over the different parts of the robot, as well as the tools. The manual should include the name and a picture of each part. Tell students that this manual will guide them through the building process.

3. On the first day, go through the first one or two steps of the building process with the class. Make sure to point out that each action you take is directed by the manual.

4. Each day, circulate the room to provide guidance to pairs. Make sure to ask each pair about the steps in the building process, including what was included in each step and difficulties they have faced in each step. Much of the instruction for this segment occurs as student encounter problems in the building process. When students run into issues in the building process, make sure to guide them the right direction without providing the answers. Allow students to navigate their way through the building process independently.

5. Monitor each pair's progress to ensure the whole class is finished with the build by the end of day three.

6. At the end of each session, have students return their robots to the designated space.

Day 14– Programming the Robot, Part I

Standards Addressed: 2, 15

Essential Question: How do I make my robot move?

> **A NOTE FROM THE TEACHER**
> *New to coding? Don't fret. When it comes to robotics, much of what I know how to do learned from my students. Don't be afraid to let students figure out how to build and program independently.*

1. Make sure to reserve the computer lab or laptop cart for at least five days.

2. Begin the day by telling students that they will be programming their robots to do the various Olympic activities. Note that the robot kits should come with programming software, but the software may differ between various brands.

3. Instruct one student from each pair to retrieve the completed robot from the designated space.

4. Provide a brief lesson on the basics of robot programming before allowing students to program on their own. Consider demonstrating for students how to: turn the robot on and off, troubleshoot if the robot's power light does not turn on, use the basic chips (delay chip, on chip, motor chip), connect chips together to form a working program, and download a program from the computer to the robot. Make sure to include some intentional mistakes to demonstrate how to correct them.

5. Instruct students to start exploring the program. Tell them to begin with programming the robot to turn on and off. Allow students the remainder of the class to explore the coding program. Circulate the room as they test the program and provide guidance to pairs who may need extra help.

6. At the end of class, have students return their robots to the designated space.

Days 15-16– Programming the Robot, Part II
Standards Addressed: 9, 15

Essential Question: How do I program my robot to perform a series of tasks?

1. Tell students that the next two days will be dedicated to programming their robots to do a series of tasks. Each of the tasks vary in difficulty level. Specifically, they will be working towards their robotics certification.

2. Distribute one **Robotics Certification Challenges** activity sheet to each pair. Explain that each challenge is a different difficulty level, with one being the easiest and four being the most difficult. In the space provided in each box, they must draw the code for each challenge. Explain the different challenges:

   a. Level One Challenge: Students will program the time, speed, and command instructions to make the robot travel a straight distance of exactly two meters.
   b. Level Two Challenge: Students will program the robot to turn. To earn a level two certification, students must figure out how to program the robot to travel two meters, turn around, and return to its exact starting point.
   c. Level Three Challenge: Students will program the robot to travel two meters, make a left turn with an exact right angle, travel forward a short distance, then flash its lights to signal that the job is complete.
   d. Level Four Challenge: Students will program the robot to follow a square path.

3. Tell students that the challenges are self-paced. To receive the certification, pairs must demonstrate the challenge for the teacher, which the teacher will either approve or, if the challenge is not ready to approve, offer feedback. Once pairs receive certification in one challenge, they may move onto the next.

4. At the end of each session, have students return their robots to the designated space.

Days 17-19– Programming the Robot, Part III
Standards Addressed: 9, 15, 16

Essential Question: How do I program my robot athlete to compete in the Robot Olympics?

1. Before you begin the class, mark the floor with painter's tape to make the gymnastics area and the race course. For the gymnastics area, tape of an area four feet by four feet. For the race, make a four-lane course. Each lane should be about two and a half feet wide, and about ten feet long.

2. Distribute the **Robot Olympics Event Plans** to each student. Explain that the next three days will be dedicated to programming the robot for the Olympics, which will take place on day 20. Tell students that now that they have practiced coding and earned their certification, they are ready for the Robot Olympics. Have volunteers read the information about the two events from the first page of the booklet.

3. Go through the booklet with the class, explaining your expectations for each component. Explain that you will provide the materials for the chariots, including the basket, axel, wheels, and glue/tape. Explain that for the event plans, they must select a song, program the robot, and record the code in the boxes provided on page two of the booklet. Tell students that they should practice the program on the space you have taped off. Tell them that each time they change the code, they should practice on the designated space.

4. Next, display the **Robot Olympics Judge's Rubric** for the students and ensure they understand the expectations for the activities.

5. Explain that before they begin coding for the events, they need to sketch a plan for the chariot. Tell students to make sure the sketch includes all parts of the chariot, including the basket, the axel and the wheels. Circulate the room to provide guidance to students in their designs. Students should show you the sketch of the chariot and you should approve it before they begin construction.

6. Once you give approval, instruct students to begin constructing their chariot. Circulate the room and provide guidance on constructing the chariot and attaching it to the robot. Tell the class that they should test the robot with the chariot attached, since the extra weight will change the way their robot moves. Ensure that students test the routines with the chariot. Tell students that, if needed, they will need to either modify the code or revise their chariot.

7. Circulate the room to provide guidance to students. When pairs start practicing with the robots in the taped off space, observe and provide feedback on their program.

8. On day 19, remind students that the Robot Olympics is tomorrow. Make sure each team has what they need ready for the competition. Consider giving each group a large tub, in which they store their robot, flag (which you will provide the following day), country sign (which you will provide the following day), chariot, **Robot Olympics Event Plans**, and any tools they may need in case of repair.

9. At the end of each session, have students return their robots to the designated space and collect the **Robot Olympics Event Plans**.

Days 20-21 – Robot Olympics
Standards Addressed: 16

Essential Question: Did I program my robot athlete to compete well in the Robot Olympics?

1. Before you begin class, make sure to do the following:
   a. Print enough **Robot Olympics Judge's Rubric** for each pair;
   b. Make sure the room still has the areas taped off for the gymnastics and the races;
   c. Randomly create heats for the competitions. Display the heats for the class to see, so that they know when and against whom they are competing;
   d. Set up laptops at the event arena so that students can load programs as needed or troubleshoot any problem situations;
   e. Print out country flags and country sign for each pair;
   f. Prepare prizes for the winners (optional); and
   g. Search for the Olympics theme song and make sure you have it cued for the opening ceremony.

> **A NOTE FROM THE TEACHER**
> *To help increase engagement and competitiveness, consider including all third grade classes for an "Olympics Festival". You can have students bring a famous dish and dress in traditional clothing from their country on that day. Create heats where students' robots compete against students' robots outside their class.*

2. Just before the event begins, have students gather their equipment. Distribute the country names and flags. Have the class line up outside the event arena to prepare for the Olympics Opening Ceremony, ensuring that each student is standing next to their partner. When the music begins, have teams parade in a circle around the class, holding their country sign, flag, robot, and chariot.

3. Explain that the next two days will be dedicated to the Robot Olympics. Distribute the **Robot Olympics Event Plans** to each pair. Review the **Robot Olympics Judge's Rubric** with the class and ensure that students know what you will be looking for. Give students a

few minutes to prepare and tell them to bring you the **Robot Olympics Event Plans** when it is their turn.

4. Begin the competition with the Ancient Olympics chariot race. Continue to hold multiple heats until all students have competed. Bring all first-place winners back for a final championship heat to determine who wins the gold, silver, and bronze medals for the chariot race event.

5. When the race is complete, direct attention toward the gymnastics area. Have each team perform individually, but have a second team ready on the side so that you can proceed quickly to the next team when one finishes.

6. Calculate the scores for the gymnastics routines to determine who wins the gold, silver, and bronze medals.