

Marco! Photon!

Lesson

Title:	Marco! Photon!
Subject/Topic:	Geography
Grade Level:	Middle School
Approximate Time:	2 Class Periods (45 Minutes)
Prerequisites	
Lesson Overview	The Marco! Photon! lesson combines geography with coding. Students will explore how humans categorize and make sense of the world around them by learning about relative and absolute location. Then, with the help of Photon, students will travel around the world to specific longitude and latitude coordinates. This lesson can be extended further by completing a similar activity by having Photon travel around the world's physical features and landforms as well.

Essential Question(s):

How do we categorize and make sense of our world?

Anticipated Learning Outcomes

- The Learner will:
- Identify specific locations on the world map using Longitude and Latitude
 - Determine how physical features impact travel
 - Code Photon to move across the map

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Standards

<p><u>ISTE Student Standards</u></p>	<p>4d: Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.</p> <p>7c: Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.</p>
<p><u>ISTE Educator Standards</u></p>	<p>5b: Design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.</p> <p>6b: Manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.</p>
<p><u>TEKS Standards</u></p>	<p>Grade 6. §113.18. (b) Knowledge and skills. (4) Geography. The student understands the factors that influence the locations and characteristics of locations of various contemporary societies on maps and globes and uses latitude and longitude to determine absolute locations. The student is expected to:</p> <ul style="list-style-type: none"> • (A) locate various contemporary societies on maps and globes using latitude and longitude to determine absolute location; • (D) identify and locate major physical and human geographic features such as landforms, water bodies, and urban centers of various places and regions;

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Planning

Materials (including technology)

- Maps:
 - Free political Map: <https://www.nationalgeographic.org/maps/world-political-mapmaker-kit/>
 - Physical Map: <https://www.nationalgeographic.org/maps/mapmaker-kit-world-physical/>
 - **Please Note: Directions on how to set up the map are included on the websites above**
 - **You may want to create more than one depending on floor space and class size.**
- Student Map
- Photon
- Devices (Laptop + Magic Dongle, or Tablet)
- Highlighters
- [Lesson Slide Deck](#)
- [Activity Slide Deck](#)
- [Marco! Photon! Activity Directions](#)

Teacher Set Up

- Charge Photons
- Set Up World Map (directions included on the National Geographic Website)
- Print World Map Worksheet back to back:
 - [Map Notes](#)
 - [Detailed Coordinates Map](#) (National Geographic Version)

Procedures

Activity	Instructor's Notes	Scaffolding/ Pacing
1. Anticipatory Set	knowledge to help make connections?	

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1. Display the Lesson Slide Deck with the world map. If you would prefer students to get out of their seats, they can gather around the floor map as well.
2. Ask students:
 - a. **What do you see in the image?** Encourage them to state the obvious and not to make assumptions yet. For example, I see lines. I see shapes.
 - b. **What do you think the image is showing you?** Encourage students to start making assumptions and predictions. Encourage unfiltered responses but challenge their thinking by following up with “what makes you say that?” Possible responses: I see lines and continents. I think this is a map of the world.
 - c. **What does this image make you wonder?**
3. **Discuss:**
 - a. Discuss wonder questions.
 - b. Facilitate a conversation about relative location. For example, which country is North of Mexico? Which ocean is Hawaii located in?
 - i. **Connect:** When we discuss locations that are in comparison to other locations, we call that relative. The locations are not exact, instead, they are approximate.
 - c. Direct student attention to the lines on the map, if students did not bring them up. Ask students what they think they are or maybe used for?
4. **Share:** Explain to students that they are longitude and latitude lines and that by the end of the day, students will be able to identify absolute locations on the map using longitude and latitude lines.

Consider posting these questions somewhere in order to refer back to.

2. Lesson

Describe the lesson procedures step-by-step.

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1. **Define and Teach:** Referring to the Slide Deck, explain to students that we will define and practice using longitude and latitude lines.. Pass out the student map that contains definitions.
 - a. Referring to the student worksheet:
 - i. Ask students to use their finger and run it along the lines that are going across the page left to right. These are latitude lines. Highlight one of the lines. What do you notice about the lines? Emphasize that although the lines look like they stop and start on a map, remember the earth is round and the lines go all the way around. They go from North to South.
 - ii. Now, run your finger from the bottom of the map to the top. These are called longitude lines and they go around the globe east to west.
 - iii. Longitude and latitude lines are divided by degrees from the Equator or from the Prime Meridian. They are divided into 60 minutes and one minute equates to about 1.1 miles or 1.8 km.
2. **Model:** Demonstrate for students how to find an absolute location using longitude and latitude.
 - a. Which continent is located at 60°N , 100°W ? **North America**
3. **Guided Practice:** Complete the last two examples together:
 - a. Which continent is located at 60°N , 100°E ? **Asia**
 - b. Which continent is located at 20°S , 20°E ? **Africa**
 - c. What are the coordinates of the south tip of **South America**?
 - d. What are the coordinates of **Russia**?

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4. **Practice:** In small groups or pairs, answer the following using longitude and latitude:
 - a. What are the coordinates for Cairo, Egypt?
 - b. What are the coordinates for Sydney, Australia?
 - c. What are the coordinates for Mumbai, India?
 - d. Create your own. Give us the coordinates or the location name and we'll locate it!
5. **Photon Activity:** Go over the Marco! Photon! Activity directions and answer questions about the activity.
6. **Independent work time:** Allow students to work on their task and assist as needed.
7. **Display of knowledge:** Once the students have completed their slide deck, assign groups to evaluate the work of another group filling out the feedback form included in the Marco! Photon! Activity document.
8. **Wrap Up:** Discuss with the students the following:
 - a. What challenges did they encounter?
 - b. How did they address the obstacle?
 - c. If you received feedback from a group with inaccuracies, how would you fix your work?
9. **Exit Slip:** One minute essay. Tell the students they will write a one minute essay answering the question: how do we categorize and organize the world around us? They should include an example as well.
 - a. Provide 30 seconds to think about their answer.
 - b. Put one minute on the clock and students write the whole time.
10. **Teacher Review:** Review the feedback and group slides yourself to ensure accuracy.

Consider assigning more than one group to evaluate depending on the level of your students.

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3. Assessment	How will you assess your students mastery of the learning objectives?	
	A feedback form was included in the activity for groups to evaluate each other. The teacher will also review the task to ensure student mastery.	
4. Wrap up/Closure	How will you tie this lesson together at the end beyond assessment? What reflections should your students complete?	
	Students will be able to answer the question: How do we categorize and organize the world around us?	
5. Extension	How could this lesson be extended?	
	The same activity and lesson format could be completed with physical landforms. Locations could remain the same or be different. The obstacles could then include mountains, deserts, archipelagos, etc.	