Sphero Mini Lesson Plan

(an optional resource)

In the context of the *PPAT*® Assessment, this lesson plan format is a template provided for teacher candidates to use as they develop well-planned and structured lessons. This resource also can help a teacher candidate better understand and design meaningful daily lessons that will positively enhance instructional practice and student learning. It is intended for use in conjunction with Tasks 2, 3, and 4. You have the option of using your own lesson plan format.

Standards/Performance Indicators/Skills

Identify the state and national standards, performance indicators, and skills addressed by the lesson.

Students who demonstrate understanding can:

K-PS2-1. **Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.** [Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.] [*Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.*]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.
- With guidance, plan and conduct an investigation in collaboration with peers.

Connections to the Nature of Science

Scientific Investigations Use a Variety of Methods
- Scientists use different ways to study the world.

Disciplinary Core Ideas

PS2.A: Forces and Motion
- Pushes and pulls can have different strengths and directions.
- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.

PS2.B: Types of Interactions
- When objects touch or collide, they push on one another and can change motion.

PS3.C: Relationship Between Energy and Forces
- A bigger push or pull makes things speed up or slow down more quickly. *(secondary)*

Crosscutting Concepts

Cause and Effect
- Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Connections to other DCIs in kindergarten:
N/A

Articulation of DCIs across grade-levels:
3.PS2.A ; ***3.PS2.B***

Common Core State Standards Connections:

ELA/Literacy -
W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-PS2-1)

Mathematics -
MP.2 Reason abstractly and quantitatively. *(K-PS2-1)*
K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. *(K-PS2-1)*
K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. (K-PS2-1)

Learning Objectives/Goals

Describe the lesson's objectives and the learning outcomes that are appropriate for meeting curricular/classroom needs.

The students will be able to investigate and explore the different effects of pulling, pushing and rotating an object as well as coding. In this case, with a sphero mini robot.

Your verb is investigate which is on the analyze level of bloom's.

Assessment (the type[s] of assessment used throughout the lesson)

Identify the assessment that occurred before, during, and after the lesson.

Before: To begin with, the students would be asked how well their "driving" skills are and how well they can maneuver around objects.

During: The students would fill out the know and want to learn section of a KWL chart about Sphero Mini's

After: The students would be given a post test and/or complete the KWL chart.

Project fails to display the necessary data or does not do it properly.	Project demonstrates considerable knowledge about the topic.	Project reflects understanding of the topic.	Project demonstrates a thorough understanding of the topic.

Coding does not work, or has major flaws that prevents its intended use	Coding mostly works, and has only minor flaws	Coding works in the way the student intended	Coding is functional and refined with extra features that exceed the requirements.
Project shows no evidence of rotation	Project shows some understanding of rotation	Project shows an understanding of rotation	Project shows full understanding of rotations
Project does not have programming for the Robot represent a push on a obstacle	Project shows some understanding by programming Robot represent a push on a obstacle	Project shows understanding by programming Robot represent a push on a obstacle	Project shows complete understanding by programming Robot represent a push on a obstacle

Pre-Test Questions:

1. What is the first thing you would do with a sphero mini when you receive it?
    a. **Connect it to your device**
    b. Throw on floor
    c. Drive it around
    d. Make an obstacle course for it
2. What happens when you continually spin the sphero mini in a circle?
    a. It spins in a circle
    b. Goes nowhere
    c. Moves in a straight line
    d. Spins in a circle for a few spins then eventually changes directions and moves in different motions.
3.
    a.
4. What different objects can you place the sphero mini on and drive it around?

a. A table
b. The floor
c. A chair
d. A cabinet
e. All of the above

5.
6. When using the sphero mini, what obstacle was the sphero mini unable to move or knock over?
    a. A table
    b. A traffic cone
    c. A bowling pin
    d. A marble
7. Why do sphero minis try to roll over obstacles more often than pushing obstacles?
    a.
8. What ideas justify that heavy objects are difficult for sphero minis to move?
    a. The sphero mini was unable to move the object and the object stopped the sphero mini's momentum.
    b. The sphero mini moved the object easily.
    c.
    d.
9. What path would you select for your sphero mini to roll across to travel easiest?
    a. An empty floor space
    b. A rocky surface
    c. In a pool
    d. In a box full of crayons
10. Which obstacle would the sphero have an easier time traversing?
    a. A piece of paper
    b. A block
    c. A traffic cone
    d. A bowling pin
11. How could you determine that the sphero was affected by the obstacles in the course?
    a. The sphero mini was blocked and had a hard time going past the obstacle.
    b. The sphero mini was unaffected by the obstacle.
    c. The sphero mini was boosted and gained speed with the obstacle in its path.
    d. The sphero mini used the obstacle whenever driving to navigate directly through the course.

Lesson Structure and Procedures

Describe the sequence of events of the lesson elements, including the before, during, and after of the lesson (i.e., the engagement/opening, the procedures used, the activities for guided practice, and the conclusion).

Engage: What do you think will happen if you draw the path of the obstacle for the sphero mini? Have you ever driven a sphero mini robot? What do you know about the sphero mini robot?

Explore: How are you driving the sphero mini on the obstacle course? What happens when you draw the path for the sphero mini robot? Does it happen this way every time? What does your data suggest? When you changed the path of the sphero mini robot what happened?

Explain: Why do you think the path of the sphero mini robot changed? How is your claim supported by evidence? Considering what happened, how has your thinking about this changed? What do you think you need to find out more about?

Elaborate: Do you expect the same path for all sphero mini robots on the obstacle? How would you use this method to complete the obstacle? What else could you do to better understand the strategy to drive the sphero mini?

Instructional Strategies

Describe the teacher's approach to achieving the learning objectives and meeting the students' needs.

The teacher will approach the class by guided practice and open discussion. Guided practice will show the students what is expected of them and how they are able to achieve their goal. Open discussion between the students allows them to bounce ideas off of their peers and create the best route around their course.

Learning Activities

Describe the opportunities provided for the students to develop the skills of the objective.

The students will be required to create an obstacle course. The course will include all of the student's participation and will need to be challenging. After creating their course, the students will each take turns in a hands-on activity to direct their sphero mini robot through the obstacle course.

Resources and Materials

List the materials used to plan and deliver the lesson.

Sphero Mini Robots (Provided)

Bulletin board paper

Markers

Technology

Describe the instructional and/or assistive technology that was incorporated into the lesson to enhance instruction and student learning.

Sphero Mini Robot

Sphero Play App

Post Test

Differentiation/Accommodations/Modifications/Increases in Rigor

Describe the modifications made to meet the needs of all learners and to accommodate differences in students' learning, culture, language, etc.

- Students will be playing a game of Chutes and Ladders that is integrated with mathematics. The Sphero Mini will be used as a place marker as students answer missing factor multiplication problems. If students get the answer correct then the place marker (sphero) can be moved if the student answers incorrectly the place marker will stay in place. This activity can be used with addition, subtraction, division problems.

Classroom Management

Identify the strategies used that are consistent with the learning objectives of the lesson and that also met student behavior needs to help keep the students on task and actively engaged.

Extensions

Describe the activities for early finishers that extended the students' understanding of and thinking about the learning objectives/goals by having them apply their new knowledge in a different way.

Follow-Up Activity to the Lesson

Describe a quick activity for review or for building on the lesson that will deepen student understanding and interconnect concepts. (The activity may be incorporated in class the next day or throughout the unit.)

Additional Information Identify any area or lesson component that was not covered by this lesson plan format but that you feel is vital to include in a description of the lesson.

