# **Lesson Plan Format**

Standards/Performance Indicators/Skills – this should come from the lesson plan used

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

7.PS3.5 Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

Verb: Construct

Learning Objectives/Goals – work to make sure to follow SMART guidelines. Work to create the objective at the "Apply" level of Bloom's Taxonomy as possible.

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

Students will collaborate and demonstrate with drones how to measure kinetic energy at different lengths and angles.

Verb: Demonstrate

Assessment (the type[s] of assessment used throughout the lesson) – include at least two formative assessments in the original lesson plan. In Module 3 we will do a pre/post assessment.

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

Pre-Test Questions

- 1. Define kinetic energy?
  - a. When energy is at a stand still
  - b. When energy is in motion
  - c. When energy does not exist
  - d. When energy is paused
- 2. Identify which course required the most kinetic energy?
  - a. Course 1
  - b. Course 2
  - c. Course 3
  - d. The drone never moved
- 3. Identify the equation used to solve for kinetic energy?
  - a. KE = 1 2 mass × velocity 2
  - b. KE = 1 mass x velocity 4
  - c. B x H = Area
  - d. Velocity 2 x 3 mass = KE
- 4. How do you change the direction of the drone?
  - a. You grab it with your hands and turn it
  - b. Use the left or right stick to maneuver it
  - c. Let it hover and push it
  - d. It does not turn
- 5. What did you conclude about potential energy
  - a. Potential energy occurred the most when the drone was ascending and landing
  - b. The teacher did not review potential energy
  - c. Potential energy occurs the most when the drone is flying through the course
  - d. Potential energy occurs when the object is at an absolute stand still
- 6. Specify the object that held the most kinetic energy?
  - a. The target
  - b. The hoop
  - c. The drone
  - d. The teacher

7.Break Down the difference between course 1 and 2

- a. Course 1 has one turn and course 2 has two turns
- b. Course 1 was straight and course 2 had one turn
- c. Course 1 has two turns and course 2 had one turn
- d. Course 1 was straight and course 2 had two turns

8. Arrange in order the courses from least to most kinetic energy.

- a. Course 2,3 1
- b. Course 3,2,1
- c. Course 1,2,3
- d. Course 2,1,3

9. Determine the difference between course 2 and course 3

### e. Course 2 has one turn and course 3 has two turns

- f. Course 2 was straight and course 3 had one turn
- g. Course 2 has two turns and course 3 had one turn
- h. Course 2 was straight and course 3 had two turns
- 10. Predict what course had the least kinetic energy?

#### a. Course 1

- b. Course 2
- c. Course 3
- d. None of the above

Kenzi & Tawni Rubric

#### 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).

This lesson will fit into a larger piece of instruction with cross-curricular teaching by combining Science and English Language Arts. This will be evident through the whole-group discussion and explicit teaching of the vocabulary and the writing prompt that is used. The teacher will explicitly teach the students the necessary vocabulary that will engage students in the hypothesis of the kinetic energy that the drone will use to fly and later, the writing that students will complete using the vocabulary that was taught in the lesson. The use of English Language Arts and Science is used in the lesson because in order for the drone to fly, there has to be some sort of kinetic energy and during the lesson, students will hypothesize which path has the most kinetic energy using the three paths that the drone flies. After the activity, students will write a small paragraph, using the five vocabulary words to describe what they learned and experienced with the drones and their paths.

**Engage:** The educator will introduce the vocabulary and the students can complete a crossword puzzle to show their understanding of the words.

Crossword Puzzle: <u>https://puzzel.org/en/crossword/play?p=-NGErgOEdffWl-r56pRO</u> Vocabulary:

- Kinetic energy: is the type of energy an object has because of its motion.
- Hypothesis: proposed explanation made on the basis of limited evidence as a

starting point for further investigation

• Mass: is the quantity of inertia (resistance to acceleration) possessed by an object or the proportion between force and acceleration referred to in Newton's Second

Law of Motion

- Velocity: the speed of something in a given direction
- Motion: the action or process of moving or being moved

Students will write their hypothesis about what route they think will have more kinetic energy.

**Explore:** The students will test their hypothesis with the drones going through the hoop, making turns, and landing on the landing pad using the three routes.

**Explain:** The educator will have the students come back into a whole group discussion. The educator will ask the students questions to reflect on as a group.

- 1. What route was the easiest when flying the drone?
- 2. What route had the most kinetic energy?
- 3. Did your group drive the drone slow, medium or fast?

An object's kinetic energy is based on its mass and velocity, the speed and direction of movement. So, the heavier an object is, and the faster it's moving, the more kinetic energy it has.

**Elaborate:** The students will write in their science journal about what they learned and experienced with the drones.

Prompt: Use the five vocabulary words to describe what you learned and experienced with the drones.

**Evaluate:** Students will take a test over the vocabulary that was learned throughout the lesson.

Instructional Strategies - this is what the teacher does.

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

The educator started the class in a whole group discussion with the vocabulary. Then the educator grouped the students into pairs and gave step by step instructions on how to fly the drone through the hoop onto the landing pad. The educator gave the students time to interact with their peers and problem solve as they fly the drone through the hoop onto the landing pad. After flying the drone through the hoop and onto the landing pad the students will write about the kinetic energy and how making turns, flying up, and flying down made a difference. Lastly, the educator will bring the group back together after the challenges have been completed and have a whole group discussion and allow the students to reflect over the lesson and drone activity. The students will then individually write in their science journal over the given prompt.

Learning Activities - this is what students do.

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

Students will be paired with a partner and they will fly the drone through the hoop three times and land it on the landing pad. Each time the students fly the drone there will be a different route they have to take to fly the drone through the hoop and land it on the pad.

Route 1: Fly the drone straight through the hoop and land it on the landing pad.

Route 2: Fly the drone around the corner, through the hoop, and land it on the landing pad.

Route 3: Fly the drone around the corner, through the hoop, and around the corner to the landing pad.

Resources and Materials – if a handout is used, include it.

List the materials used to plan and deliver the lesson.

- Drones
- Hoop
- Landing Target
- Computer
- Pen/pencil
- Science Journal

#### Technology

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

Crossword Puzzle: <u>https://puzzel.org/en/crossword/play?p=-NGErgOEdffWl-r56pRO</u>

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 on the lower level will be paired with a more knowing other to help complete the activity and will be able to stand closer to the hoop and target when flying their drone.

Students who are on level will be paired with a partner to help complete the activity and will stand from the middle mark on the floor to fly their drone through the hoop and onto the target.

Students who are on the higher level will be paired with a partner to help complete the activity and will try to complete the task from the farthest line from the hoop and target.

- Focus Student 1- Have the student come during extra hours to practice using the drone with the teacher.
- Focus Student 2- Have directions printed out and for the student with English as a second language print off the directions in their first language. If available, have an audio translator with headphones.

## Classroom Management

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

If students are acting out they will be asked to be serious when using the drones and to fly them right. If students do not listen they will no longer get to participate and will have to watch the others as they fly the drones.

#### 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.