GEORGIA | PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

FOUNDATION SKILLS

PATHWAY: All Pathways

COURSE: All CTAE Courses

UNIT FS2.12: Bernoulli's Principle

INTRODUCTION

Annotation:

This lesson covers the Bernoulli's principle and related practical applications.
Note: Station Activities should be setup prior to class, see section 6. Also see materials and equipment section for all required materials.

Grade(s):

x	9th
x	10th
x	11th
x	12th

Time:

Two 50 minute periods

Author:

Philip Ledford and Dr. Frank Flanders

Additional Author(s):

Students with Disabilities:

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation.

FOCUS STANDARDS

GPS Focus Standards:

CTAE-FS-2 Academic Foundations: Learners achieve state academic standards at or above grade level.
AG-BAS-19: The student demonstrates the application of physics in agriscience.
a. Explains areas of physics used in agriscience.
ACCT-AM-2: Students will understand the relationship between air pressure, temperature, and density.
a. Identify vertical airflow and atmospheric stability.

GPS Academic Standards:

SP3: Students will evaluate the forms and transformations of energy.

SCSh3: Students will identify and investigate problems scientifically.
c. Collect, organize and record appropriate data.
e. Develop reasonable conclusions based on data collected.

SCSh6: Students will communicate scientific investigations and information clearly.
a. Write clear, coherent laboratory reports related to scientific investigations.

National / Local Standards / Industry / ISTE:

UNDERSTANDINGS & GOALS

Enduring Understandings:

Students will understand that a basic knowledge of scientific principles can be used in many fields of study and practical applications in everyday life.

Essential Questions:

Why is Bernoulli's principle important?
How does Bernoulli's principle apply to life outside the class room?

Knowledge from this Unit:

Students will:

- examine the history of Bernoulli's principle.
- define Bernoulli's principle.
- examine practical applications of Bernoulli's principle.

Skills from this Unit:

Students will analyze demonstrations of Bernoulli's principle and explain how Bernoulli's principle is used in aeronautics and other practical applications.

ASSESSMENT(S)

Assessment Method Type: Select one or more of the following. Please consider the type(s) of differentiated instruction you will be using in the classroom.

_____ Pre-test
x Objective assessment - multiple-choice, true- false, etc.
_x_ Quizzes/Tests
__ Unit test
_____ Group project
_____ Individual project
_____ Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
__ Self-check rubrics
__ Self-check during writing/planning process
__ Journal reflections on concepts, personal experiences and impact on one's life
__ Reflect on evaluations of work from teachers, business partners, and competition judges
__ Academic prompts
__ Practice quizzes/tests
x Subjective assessment/Informal observations
__ Essay tests
_x_ Observe students working with partners
__ Observe students role playing
_____ Peer-assessment
__ Peer editing & commentary of products/projects/presentations using rubrics
__ Peer editing and/or critiquing
_____ Dialogue and Discussion
__ Student/teacher conferences
__ Partner and small group discussions
__ Whole group discussions
__ Interaction with/feedback from community members/speakers and business partners
x Constructed Responses
__ Chart good reading/writing/listening/speaking habits
_x_ Application of skills to real-life situations/scenarios
_____ Post-test

Assessment(s) Title:

Marshmallow Launcher Activity

Bernoulli's Principle Quiz

Assessment(s) Description/Directions:

Have students complete the activity according to the PowerPoint.

Administer quiz to students.

Attachments for Assessment(s):

Marshmallow Launcher PowerPoint

Bernoulli's Principle Quiz

LEARNING EXPERIENCES

Instructional planning: Include lessons, activities and other learning experiences in this section with a brief description of the activities to ensure student acquisition of the knowledge and skills addressed in the standards. Complete the sequence of instruction for each lesson/task in the unit.

Note to the teacher: The equation in the power point is not meant to be understood. It is only there for the students to see and briefly familiarize themselves with.

Sequence of Instruction

1. Identify the Standards. Standards should be posted in the classroom for each lesson.

• **AG-BAS-19:** The student demonstrates the application of physics in agriscience.
a. Explains areas of physics used in agriscience.

•**ACCT-AM-2:** Students will understand the relationship between air pressure, temperature, and density.
a. Identify vertical airflow and atmospheric stability.

SP3: Students will evaluate the forms and transformations of energy.

• **SCSh3:** Students will identify and investigate problems scientifically.
c. Collect, organize and record appropriate data.
e. Develop reasonable conclusions based on data collected.

• **SCSh6:** Students will communicate scientific investigations and information clearly.
a. Write clear, coherent laboratory reports related to scientific investigations.

2. Review Essential Questions.

• Why is Bernoulli's principle important?
• How does Bernoulli's principle apply to life outside the class room?

3. Identify and review the unit vocabulary and information by power point presentation.

• **Velocity** – the speed of motion

• **Pressure** - the force per unit area applied to an object

• **Lift** - the force that pulls an object outward, or upward.

• **Fluid** – a continuously flowing substance either gas or liquid.

4. Bernoulli's principle on a piece of paper demonstration.

• Pass out a piece of paper cut about 4 inches by 8.5 inches long to each student. Have the students blow over the very top of the paper.

(**What should happen**): The paper should lift upward rather than downward. The velocity of the stream of air you produce has a low pressure on top but on bottom the velocity is lower and the pressure is higher, thus giving the paper lift.

5. Present the Power Point on Bernoulli's principle.

6. Bernoulli's Principle Demonstration

Four stations should already be setup around the room. Students should be assigned to 4 groups. Each station should only take 5 or 7 minutes to complete. (see attachment)

1. Ask students to explain Bernoulli's principle in their own words.

2. Review the definition of Bernoulli's principle.

3. Briefly review the different applications of Bernoulli's principle.

4. Discuss what the materials are and how to use them for each station. Ask the students to record and explain what happened during the activities at each station.

6. Marshmallow Launcher Activity (see attachment)

8. Post-Activity quiz.

• See quiz attachment.

Attachments for Learning Experiences:

Applications of Bernoulli's Principle Power Point

Bernoulli's Principle Demonstration

Bernoulli's Principle Quiz

Marshmallow Launcher

Notes & Reflections:

CULMINATING PERFORMANCE TASK (Optional)

Culminating Unit Performance Task Title:

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

Attachments for Culminating Performance Task:

UNIT RESOURCES

Web Resources:

http://home.earthlink.net/~mmc1919/venturi.html

http://www.av8n.com/how/htm/airfoils.html

(VIDEO): http://www.youtube.com/watch?v=kXBXtaf2TTg

(These will help explain Bernoulli's Principle, the first link is technical but the interactive program on the page is helpful.)

Attachment(s):

Materials & Equipment: empty drink cans or plastic cups, **transparent** straws, large trash bags, 3 or more ping pong balls, tape and paper, notebook or printer paper, beakers and water.

Marshmallow Activity:

½ inch PVC pipe

½ inch elbow fittings

½ inch T fittings

½ inch cap fittings

Small marshmallows

What 21st Century Technology was used in this unit:

x	Slide Show Software		Graphing Software		Audio File(s)
	Interactive Whiteboard		Calculator		Graphic Organizer
	Student Response System		Desktop Publishing		Image File(s)
	Web Design Software		Blog	x	Video
	Animation Software		Wiki		Electronic Game or Puzzle Maker
	Email	x	Website		