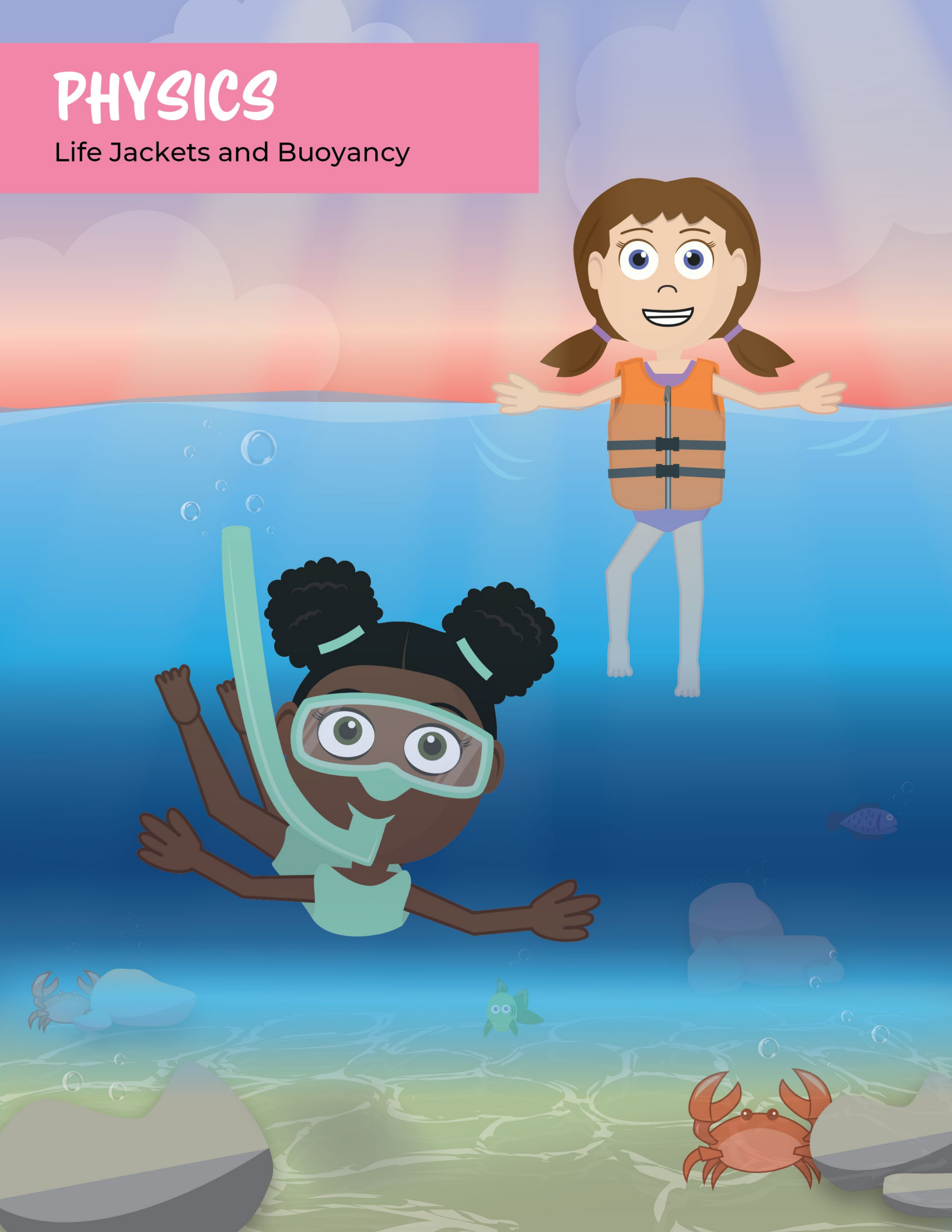
PHYSICS

Life Jackets and Buoyancy



Life Jackets and Buoyancy

NGSS

5-PS1-1

Objective

The student will understand buoyancy and its application in life jackets.

The student will be able to build a functional personal floatation device from unorthodox materials.

Vocabulary

Buoyancy: The ability or tendency to float in water or some other fluid.

Life Jacket: A device designed to help keep a person or animal afloat - whether they are conscious or not.

Patent: A form of intellectual property.

Background

A personal flotation device (abbreviated as PFD; also referred to as life jacket, life preserver, life vest, life saver, cork jacket, buoyancy aid, flotation suit, etc.) is a device designed to help keep a person or animal afloat - whether they are conscious or not.

In most of the world, life jackets or life vests are now mandatory on airplanes that travel over water. These usually consist of a pair of air cells or bladders that can be inflated by triggering the release of carbon dioxide gas from a canister – or by blowing into a tube with a one-way valve to seal in the air.

Life jackets are also provided on both recreational and commercial seafaring vessels - so all crew and passengers can wear one in an emergency. In addition to humans, personal flotation devices are even available for dogs and some other animals.

Most people are familiar with the story of the Titanic, which struck an iceberg a century ago - many know there were not enough lifeboats on board to rescue

all the people, but interestingly, there were enough life jackets for all the people aboard, and most everyone was wearing one. Of course, in the frigid water of the North Atlantic, the life vests alone were not enough to save many people.

Simple flotation devices are used by many children learning to swim.

Materials

- Resource handout

Soup Can Demonstration (assortment of supplies listed for the whole class)

- Identical soup or vegetable cans (unopened; 1 per group)
- Paper cups
- Straws
- Paper towels
- Rubber bands
- Paper clips
- Tape
- Balloons
- Plastic bags or lunch bags
- Glue
- Corks
- Foam pieces
- String
- Foil
- Hose or tubes
- Small containers
- Paper towels
- Bucket

Procedure

1. **Introduce topic**

Today we will learn about buoyancy. Who has ever worn a life jacket? Has anyone you know ever been saved by one? We will be making life jackets which can keep a soup can afloat.

2. **Soup Can Demonstration**
    a. Discuss the rules for building a life jacket:
        i. The device can be made up of several parts, but the final product must be one combined piece.
        ii. Must be able to affix the device to the can within a 20-second period (so students cannot just add foam or balloons to it for an hour).
        iii. Some portion of the can must touch the water and get wet.
    b. Put students into teams of 2-3 and allow 10-15 minutes to plan their design. Students should create a list of materials and a drawing of their design before the time is up.
    c. Students build their life jackets and test whether they can keep a can of soup afloat.
3. Clean up the room!

Guiding Questions

- Why is buoyancy important when building a life jacket?
- What are some of the best materials for a life jacket and why?
- What conclusions can you draw from your observations?
- In what types of careers might bouyancy be important/relevant?

Career/Future Application

PFD's are used in many maritime and military careers. Problem solving and teamwork are used in every STEM field. Buoyancy is especially important in some engineering projects such as boat design or oil rigs.

Sources

Scan QR Code for Website

http://tryengineering.org/lesson-plans/life-vest-challenge