



Bernoulli's Principle Floating Ping Pong Balls

Georgia Standards of Excellence

SKP2. Obtain, evaluate, and communicate information to compare and describe different types of motion.

a. Plan and carry out an investigation to determine the relationship between an object's physical attributes and its resulting motion (straight, circular, back and forth, fast and slow, and motionless) when a force is applied. (Examples could include toss, drop, push, and pull.)

S2P2. Obtain, evaluate, and communicate information to explain the effect of a force (a push or a pull) in the movement of an object (changes in speed and direction).

a. Plan and carry out an investigation to demonstrate how pushing and pulling on an object affects the motion of the object.

b. Design a device to change the speed or direction of an object.

c. Record and analyze data to decide if a design solution works as intended to change the speed or direction of an object with a force (a push or a pull).

S4P3. Obtain, evaluate, and communicate information about the relationship between balanced and unbalanced forces.

a. Plan and carry out an investigation on the effects of balanced and unbalanced forces on an object and communicate the results.

S8P3. Obtain, evaluate, and communicate information about cause and effect relationships between force, mass, and the motion of objects. A.

a. Analyze and interpret data to identify patterns in the relationships between speed and distance, and velocity and acceleration. (Clarification statement: Students should be able to analyze motion graphs, but students should not be expected to calculate velocity or acceleration.)


- b. Construct an explanation using Newton's Laws of Motion to describe the effects of balanced and unbalanced forces on the motion of an object.
- c. Construct an argument from evidence to support the claim that the amount of force needed to accelerate an object is proportional to its mass (inertia).

Objective: The purpose of this activity is to observe Bernoulli's Principle using a hair dryer, ping pong balls, balloons, and other spherical objects.

Supplies and Materials:

- Hair Dryer
- Ping Pong Balls
- Balloons with small weights in them.
- Other spherical objects of your choice.

Procedure

1. Hold the hair dryer with the nozzle pointed up and turn it on.
2. Carefully place a ping pong ball in the stream of air about 1 foot from the nozzle and release it. 
3. Observe what the ping pong ball does.
4. Now try to place multiple ping pong balls in the stream to see if you can get them to float.
5. Place a small smooth weight (like a hex nut) in a balloon and inflate it, tying it off.
6. Place the weighted balloon in the stream of air as you did the ping pong balls.
7. Record your observations.



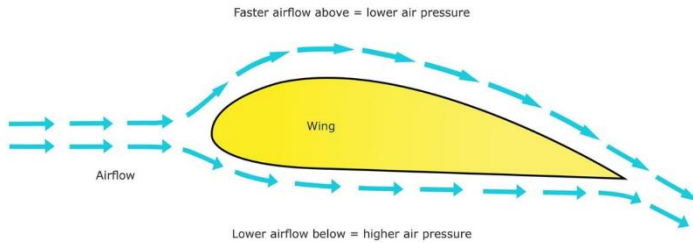
Discussion:

Bernoulli's principle states that as air moves around an object, it creates different pressures on that object. Faster air means less pressure. Slower air means more pressure. an increase in the speed of a fluid occurs

simultaneously with a decrease in pressure or a decrease in the fluid's potential energy. Examples of how this principle is applied includes vintage sprayers and airplane wings.



The principle is named after Daniel Bernoulli, a swiss mathematician, who published the principle in his book in 1738.



Extension:

What objects can you float using the hair dryer?

Does changing the velocity of the hair dryer change what you can float in the air stream?