BERNOULLI'S BLAST

INTRODUCTION

This series of demonstrations illustrates Bernoulli's principle and introduces basic fluid dynamics. They could also be done as stations in the classroom, with students more active in the creation of the phenomena observed. The series is designed to emphasize student-created diagrams. The exercise teaches them to make diagrams, which are one of the very important ways that scientists use models to explain phenomena. This is a great time to emphasize notebook practice, and the ways that scientists use notebooks to develop their thinking in words and pictures.

MATERIALS

+ Ping pong balls and plastic cups—blow across top of cup to lift the ball
+ Beach ball—toss it with spin to show curving of trajectory
+ Foam plane—show wing profile, and show that planes fly upside-down
+ Hair dryer and ping pong ball—lift the ball with just air (be sure to show that it's not just blowing the ball up)
+ Fan and beach ball (or balloons)—dramatically larger version of hair dryer
+ Bernoulli noise maker—swing to show motion of air through tube
+ Ping pong ball and funnel—blow in the funnel and trap the ball

STANDARDS

NGSS 3-PS2-1
Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

NGSS 5-PS2-1
Support an argument that the gravitational force exerted by Earth on objects is directed down.

NGSS MS-PS2-2
Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

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This series of performance expectations will require students to engage in many experiences trying to explain the behavior of objects due to forces acting upon them. This activity also engages students in the Science and Engineering Practices of Asking Questions, Developing and Using Models, and Constructing Explanations. It provides the opportunity to examine the Crosscutting Concepts of Cause and Effect, Scale Proportion and Quantity, and Systems and Systems Models.

NAME: DATE:

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Your teacher will demonstrate for you some examples of how pressure and changes in air pressure can do some surprising things.

Scientists make diagrams to figure things out. For each demonstration, draw a picture of what you observed. Use arrows, labels, and words to explain how it worked.

DEMONSTRATION 1	DEMONSTRATION 2

DEMONSTRATION 3	DEMONSTRATION 4

Define Bernoulli's principle using your own words.