**6-MS-PS2-1** Assessment-Egg Collisions

*Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.*

*Children tap eggs, trying to crack each others' egg first. Photo Sheri Lane Dunbar.*

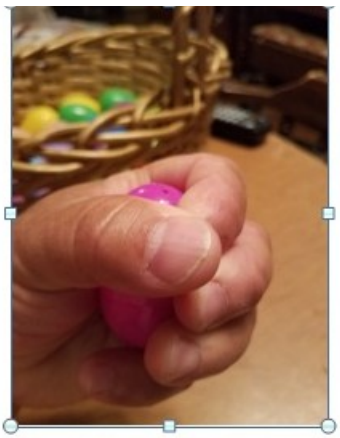
In many parts of south Louisiana, there is a tradition during the Easter holidays where children and adults alike have a contest often referred to as pacquing eggs. In the contest, two people each select a boiled egg. One person holds his/her egg in the palm of hand while a second person positions their egg directly above the other egg. The person with the egg above, on cue, when agreed taps his egg on the egg below.

Usually the eggs are positioned so that the more narrow ends of the egg face each other. When boiled, this narrow end of the egg tends to fill up with egg yolk and is more "solid" than the more rounded part of the egg (on opposite end).

1. Which statement best describes the event of egg pacquing(knocking)?
   a. an object at rest tends to stay at rest, and an object in motion tends to stay in motion, with the same direction and speed.
   b. the acceleration of an object produced by a net (total) applied force is directly related to the magnitude of the force, the same direction as the force, and inversely related to the mass of the object.
   c. if you exert the same force on two objects of different mass, you will get different accelerations (changes in motion).
   d. for any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction.

2. Boudreaux and Thibodeaux are pacquing eggs. Thibodeaux wins the pacquing contest, over and over. Boudreaux's egg gets cracked when Thibodeaux hits it. Boudreaux gets another egg, and it breaks, then a third egg. A photograph of the way Boudreaux holds the egg is shown.

Theodule's method



Mrs. Boudreaux's method

Two new ways of holding the egg are suggested by Boudreaux's wife and another method by his cousin Thibodeaux.

a. Which holding method would be a good solution for Boudreaux to try to finally win the contest?

b. Explain why the new method will help Boudreaux win the contest.

**ANSWER KEY**

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Item MC #1 d. D is the best answer for the actual event that is happening.

While one egg is held stationary, the impact of the second egg creates an crack in one of the two eggs(on rare occasion-both eggs). There are a number of factors that affect which egg breaks. Answer d refers to two interacting objects(the two eggs) and describes a force exerted for both eggs.

Item #2

a. Mrs. Boudreaux's method should be the answer that most students will select. It is probably the most natural way to hold an egg for support. One does not want the egg to be impacted on any point other than the top.

b. A student may explain that Mrs. Boudreaux's method may provide support or pressure on the egg's top helping the egg shell to resist the impact. This is just a supposition.
   It is possible that a student may suggest Theodule's method and in part b explain that less pressure on the impact point would be better; allowing the shock of the impact to resonate throughout the entire egg..and reducing the focus of the force on the top.