**Creative Design: Egg Drop**

**Marci Howdyshell and Lisa Ruman**

**Benchmarks:**

* Benchmark B: Describe and illustrate the design process.
  + Use a simple design process to solve a problem (e.g. identify a problem, identify possible solutions and design a solution).
  + Describe possible solutions to a design problem (e.g., how to hold down paper in the wind).
* Benchmark A: Distinguish between fact and opinion and explain how ideas and conclusions change as new knowledge is gained.

**Objective:**

Students will learn use their creativity and basic knowledge of forces to design their own “Egg Shock Absorber.” They will work in groups and will have to draw out their design before attempting it.

**Materials (teams of 2 or 3):**

* Raw Eggs (one for each team of students)
* 10 Cotton Balls
* 10 Q-Tips
* 10 Rubber Bands
* 10 Straws
* 10 Paper clips
* 10 Marshmallows
* 1 5x5 piece Aluminum Foil
* 1 5x5 piece Plastic Wrap
* Small chunk of clay
* Plastic or tarp onto which they can drop the eggs
* High place to stand to drop the eggs: play structure, bleachers, etc

**Target Concept:**

* Students will learn about the process of designing something based upon their prior knowledge
* Students will work on their teamwork skills

**Procedure:**

*Shock Absorber*

1. Review what forces are – they will be dropping objects today to see what happens when they hit the ground. (What force pulls it to the ground when they drop it?)
2. Discuss what a “shock absorber” is”- when something hits something else really hard, it applies a lot of **force** onto the other object, which can then damage that object. We sometimes use shock absorbers to reduce the impact of that force. A good example of this is a helmet. When someone is riding a bike on a street with cars, it can be dangerous. If they got in an accident and a lot of force was applied to their head, they could quite easily die. The helmet, therefore, is made to reduce the impact of the force onto the head and possibly save a life.
3. Have the students try to come up with examples of things that cushion us from strong forces such as air bags, shock absorbers in cars (for when you drive over a pot hole, for example), rubber on tracks, helmets, etc.
4. Separate the students into groups. I found that pairs worked best. Give each group a bin with several materials inside. We had plastic wrap, aluminum foil, Q-tips, straws, paper clips, cotton balls, marshmallows and rubber bands. Vary as desired. However, each group should have the same number of the same materials.
5. Tell them that their job is to design and build a shock absorber to protect an egg from a fall. Each group is to create a casing around their egg. The challenge is to be able to drop the egg (we dropped them from a play set in the playground) without the egg breaking. They may not put anything on the ground below the egg to protect it.

Tell the group that the steps are as follows:

1. Observe the supplies given. Discuss ideas with your partner. Teachers and scientists should walk around and offer advice.
2. Draw a plan on paper, labeling it carefully.
3. Show the plan to a teacher to get permission to continue. (They might need the egg now. Tell them to be very careful not to break the egg during the procedure!)
4. Each team creates their shock absorber
5. When all of the groups are finished, take the eggs outside/to the gym to test them! Wrapped eggs will need to be unwrapped to determine whether they broke or not.
6. After the students get back, do a class poll to see how many eggs broke and how many didn’t. Ask each group to share with the class what they used to make their shock absorber, what they learned in the process and what they would change (if anything) if they had to do it again. How could they improve their design?

**Target Observations:**

* Students should see that their shock absorbers must cover the entire egg (because it can turn when it drops) and must have plenty of cushion. It seemed that the simplest designs tended to be the ones that worked the best.
* Students should learn more about the design process and be able to work and share ideas with their partners.