Egg Drop Lab Report – Astro-Turf

This group is made up of Steven Mathis and Philip Liao.

Question

What would happen if we made our container a small “box” inside a larger box with a parachute?

Hypothesis

If we make our container a small “box” inside a larger box with a parachute, then it will fail.

Material List

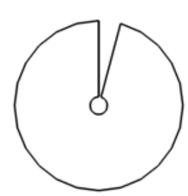
- Cardboard – 600 cm^2
- Poster board ~700 cm^2
- Tape (Duct and Scotch) – no more than one roll
- Glue ~ quarter bottle of glue
- Straws – 4 straws
- Cotton ~ 60 cotton balls
- Toilet Paper ~ 2.5 meters
- Stopwatch
- Spool with string
- Tape measure
- Egg

Procedure

Make the parts

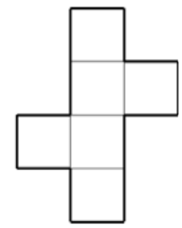
How to make the parachute:

1. Draw and cut out a circle that is 10cm in radius
2. On the cut out circle, draw another circle in the center that measures a 1 centimeter radius.
3. Draw a line from the center to the edge of the circle. From this line measure a 15 degree angle and draw another line on the angle. Now you should have a circle that looks like this:



4. Now cut out the smaller circle and the wedged like shape.
5. Your circle should now look like Packman, take the mouth and put it together like this: tape it

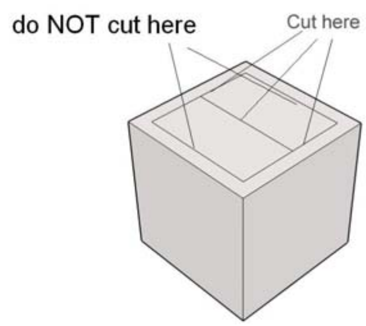
How to make the box/container –Read the whole step before doing it



1. To create the cube, draw a shape that looks like this on poster board: 6 squares that are 7cm x 7cm
2. Cut it out
3. Fold along the lines, you should apply tape when 2 sides meet except never apply tape to the uppermost square, this will make the flap to put the egg in.
4. Now attach cotton balls inside the box on each side. About 3 cotton balls on each side. Attach the balls on the side using glue. Now add toilet paper loosely around the inside, but make sure there's enough room to make the egg nice and snug.

Now make the bigger box

1. To create the box, draw 6,10x10cm squares on a piece of cardboard.
2. Cut them out now attach cotton balls to any face with the largest surface area, to every square. Put 9 cotton balls on each side.
3. Now once the glue has dried assemble the squares to make a cube, don't tape it together yet. Choose a square, on the face of the square without cotton balls. Draw a square in the middle that measures 8x8cm. Now draw a line down the center. Cut on that line, as well as the lines that it intersects, like this:



Once this is complete, find the smaller box made earlier, and set it on any square other than the one with the flap at the top. Also make sure that the smaller box is placed on top of the cotton balls. Now build the larger box around the smaller one. Make sure the square with the flap is at the top, but don't yet start tapping. Add toilet paper along the sides and bottom. Now tape the vertexes together with tape.

To make the cane at the bottom at bottom of the box

1. Draw a circle 5 cm in radius on a piece of poster board and cut it out.
2. Draw a line from the center of the circle to the edge, then measure a 15 degree angle from that point and draw another line form the center of the circle to the edge in that angle.
3. Cut out the wedge. It should now look like Packman. Bring the mouth together, very much like you did with the parachute.

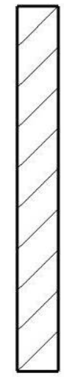
Connect the Parts Together

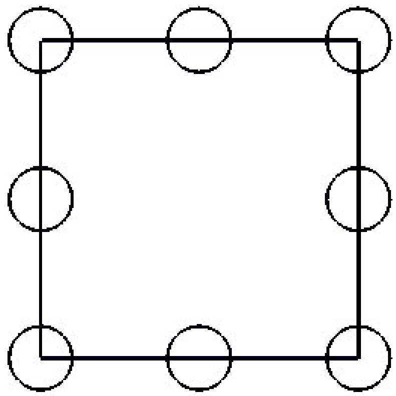
Connect the Bottom of the box with the cone.

1. Inside the cone put a little bit of crumpled toilet paper in it.
2. Now tape the cone to the bottom of the box.

Connect the box to the parachute

1. Take 4 straws that are 18 cm long, if they are longer, reduce their length to 18cm. Now cut the straws in half.
2. With each straw, cut in a swirl like this:
   This provides more flexibility for the straw.
3. With tape, ravel the straw in the same spiral shape, start 3 cm from one end of the straw. With the same piece of tape, tape the straw to the parachute. Do this 7 more times. Attach the straw-strings in these places (where the circles are) on the top of the box:





How we'll Collect Data

The Data we'll collect is the acceleration and the velocity.

To find the Velocity

1. To find the Velocity, we first will need to find the height. To find the height, Partner A will take a spool with string while standing at the height. Then he will unroll the spool until Partner B (situated on ground level) tells Partner A that the string has reached the floor. Then to make sure the string is the right length, Partner B will pull a little bit on the string so no excess string is in curves and ridges. After this, Partner A will cut the string. Then we will measure the string.
2. After the height is found, we will now drop the container. Partner A will be at the measured height. He will drop it when Partner B tells him to. Partner B will be timing the time he tells Partner A to drop the container and when the container hits the floor.
3. Now that we have all the data, we will find the velocity (speed/ distance).

To find the Acceleration

1. We will take the Final velocity (To be verified) subtracted by the initial velocity (0m/s) divided by the time (to be verified).

Data Table

Height (m)	Time (s)
5.88	1.5

Analysis

The distance in this experiment was the height of where we dropped the egg. This height is 5.88 meters. The time it took the egg to fall to the ground was 1.5 seconds. Therefore, the average speed of the egg when it was falling was 3.92 m/s. The average velocity was 3.92 m/s down, the initial velocity being 0 m/s and the final velocity was 7.84 m/s. The acceleration was 5.226 m/s^2. Our egg weighed 61.32 grams. The gravitational potential energy of the egg at its highest point before it was dropped was 3.534 J (Ug = 3.534 J). The average kinetic energy was 0.471 J (E_K = 0.471 J). The highest point of kinetic energy (the moment before the egg impacted with the ground) was 1.88 J. However, this is not the actual amount of kinetic energy, because of the fact that we couldn't accurately measure the mass, we used the weight. And that the final kinetic energy was wrong because it was affected by the air resistance, if it were to be conducted in a vacuum, the levels of potential energy and the highest point of kinetic energy would be about equal. The egg is doing work when gravity pulls on it, moving the container towards Earth.

Conclusion

After we made a box inside a larger one and attached a parachute to the larger box, and dropped it, the container proved to be successful. Therefore, we proved our hypothesis wrong. In our experiment, we chose t make our container a small box within a larger box because it would provide protection. We added cotton and toilet paper because it has little mass, is soft and would protect the egg fairly well. We added the parachute to create air resistance to retard the pull of gravity. We added the cone at the bottom to make sure that the container would land on the cone which was placed at the bottom of our container, this made it so every time, the container would land upright. For our experiment, we could have improved it by making more containers to test if our container was just "lucky". We could also have dropped the container more times to make sure that every time the egg was safe, or that one time we had a fluke and the egg landed safely. We could also try using a different egg as well, just in case our egg (that one time) was different and only survived because it is different.

Bibliography

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