




SCIENCE		TECHNOLOGY		ENGINEERING		ART		MATHEMATICS	
									
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*** TASK: CON 03 ***									
Super Strength Egg									
STEAM		✓		OUTLINE					
SCIENCE				<b>AIM:</b> To demonstrate the strength of an eggshell when weight and pressure is applied to it. <b>TIME:</b> about 15 to 20 minutes <b>REF:</b> <a href="http://www.sciencefairadventure.com/ProjectDetail.aspx?ProjectID=176">http://www.sciencefairadventure.com/ProjectDetail.aspx?ProjectID=176</a>					
TECNOLOGY									
ENGINEERING									
ART									
MATHEMATICS									
OUTCOMES		✓		DIGITAL TECHNOLOGY					
ST2-2DP-T				selects and uses materials, tools and equipment to develop solutions for a need or opportunity					
ST2-3DP-T				defines problems, describes and follows algorithms to develop solutions					
ST2-11DI-T				describes how digital systems represent and transmit data					
ST3-2DP-T				plans and uses materials, tools & equipment to develop solutions for a need or opportunity					
ST3-3DP-T				defines problems, and designs, modifies and follows algorithms to develop solutions					
ST3-11DI-T				explains how digital systems represent data, connect together to form networks & transmit data					
COMMENTS									
The hardest natural substance on earth is a diamond. It's made from layers of compacted carbon and can only be scratched by another diamond. Diamonds form by carbon being exposed to high temperatures and pressures for millions of year's deep underground. Eggshells are certainly no substitute for diamonds, but you may be surprised at just how strong they really are. In this experiment we'll explore the strength of eggshells by exerting pressure that gradually increases. How much weight will your eggshell handle before it cracks under pressure?									

## EQUIPMENT

Two raw eggs of the same size  
Masking tape  
Fingernail scissors  
Rigid cardboard and cup

Several Large cans of food  
Several small cans of food  
Kitchen scales  
Pen and journal to record results (optional)

## METHOD

1. Wrap a strip of masking tape around the middle of each egg. Keep a gap between the ends of the masking tape. In other words, do not wrap the tape so it touches end-to-end.
2. Carefully make a small hole in each egg shell between the gaps in the tape. You can do this with the sharp tip of your fingernail scissors.
3. Empty the contents of each egg into a cup. Do this by pouring the contents of the egg through the holes you created.
4. Place the end of your fingernail scissors in the centre of the holes you created. Cut around the middle of the eggshell covered with the masking tape. Separate the halves and trim off all jagged pieces until it's smooth and flat. You'll have 2 halves per egg (4 halves in total) of equal size. (NOTE: It's recommended to wash your egg shells at this point).
5. Place the half-eggshells on a hard flat surface (such as a table or tile floor), dome-side up. Place them in an arrangement so that they are close together and make a square.
6. Cut a square from your rigid cardboard that's about 2 cm larger on all sides than your egg formation.
7. Lay the square cardboard on top of the egg formation.
8. Place your largest can gently on the cardboard.
9. Stack on several additional cans one at a time. How many cans are you able to stack before one or more of the eggs starts to crack?
10. When one of the eggs crack, STOP! Take the cans off the egg platform and weigh them on your kitchen scale. Add the total to see how much weight your egg platform was able to withstand before cracking.
11. Write your results in a journal.

## NOTE

It's recommended you wear latex gloves as touching raw eggs can pose a health risk. It's also recommended that you wash the inside of your eggs shells once you've cut them open. This will allow you to remove any access eggs whites and yolk from the interior walls of the shell.

## OBSERVATION

How much weight did your egg platform withstand? Do you think it would have made a difference if you used more eggs for your platform? e.g. 8 eggs instead of 4. What colour eggs did you use? What if you were to use eggs of a different colour (e.g., white as opposed to brown). Would the result be the same?

## RESULT

The strength of the egg is within its dome shape. No single point of the dome supports the whole weight of the cans on top of it. The weight spreads along the curved walls to the wide base, allowing the eggshells to support more weight. The principles in this demonstration are valuable to architects who strive to design safe buildings and structures that must support thousands of tons of weight.