# Deformation: Foam Compression Worksheet Answer Key

**Pre-Activity** Define stress and strain.

Stress is: The amount of force exerted on a given area.

Strain is: The change in dimensions of an object when influenced by an external force

**Hypothesis**

What type of object, hard or soft, requires the most compression? Why?

Harder objects require the most compression because they are more difficult to compress, compared to softer objects.

**List Materials**

* ****calculator
* ruler
* piece of Play-Doh®
* marshmallow (small)
* piece of foam
* piece of bread
* NXT brick and software
* LEGO MINDSTORMS base set

**Write the Procedure**

1. Measure the amount of rotations for an object using the MINDSTORMS data logging program.
2. Calculate strain by measuring the initial length and change in length using a ruler and Equation 1.
3. Once all data has been obtained for one object, begin to look at other objects and calculate strain with Equation 1.

**Data Collection**

*Equation 1*: Strain = (L change)/ L

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Object****(hard or soft)** | **Number of motor rotation for compression****(power)** | **L (cm)** | **Lchange (cm)** | **Strain** | **Does the object go back to its original shape?**example data |
| Play-Doh | **5** | **1** | **0.5** | **2** | **no** |
| bread | **4** | **3** | **0.8** | **3.75** | **yes** |
| marshmallow | **7** | **1.2** | **0.9** | **1.33** | **yes** |
| foam | **6.5** | **1.8** | **0.7** | **2.57** | **no** |

**Graphing**

Create a graph of the number of rotations vs. the strain for the objects listed in the above table

**Results & Conclusions**

1. Which object had the greatest strain/deformation?

Bread had the greatest strain.

1. Which object had the most rotations?

Marshmallow had the largest number of rotations.