**Putting Robots to Work with Force & Friction Activity – Making Robots Work Worksheet –
Example Answers**

![C:\Users\yowell\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\NA8DQGH4\MC900241567[1].wmf]()

**Pre-Experiment Questions**

1. How can machines help us to move objects?

**Machines can help us move objects by pushing, pulling, lifting, or squeezing objects.**

1. What factors can make it easier or harder to push an object forward?

**Friction and extra weight can make it harder to push an object forward.**

**Data Collection**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Bottle Number** | **Predicted Weight of Sand (g)** | **Actual Weight of Sand (g)** | **Predicted Pushing of Sand (cm)** | **Actual Pushing of Sand (cm)** |
| **1** | **2g** | **43g** | **100cm** | **82cm** |
| **2** | **75g** | **125g** | **90cm** | **80cm** |
| **3** | **90g** | **187g** | **153cm** | **79cm** |

**Analysis**

1. Why did the robot travel different distances for each *bottle of sand?* Hint: What remained the same? What was different?

**The heavier containers didn’t travel as far because they were harder to push.**

2. In the space below, create a line graph of the actual pushing distance vs. the actual weight of the sand.