Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Make it Move**

***The Challenge:***

A 250g load of unknown material has been found on an abandoned factory site. It must be moved to a safe area for testing. This material could be toxic, flammable, and/or corrosive. Therefore, it cannot be touched by human hands. This material needs to be moved carefully, safely, and accurately.

In a small group, design, build, and demonstrate a prototype of a machine that will meet these needs and will use pneumatics and/or hydraulics as its source of power.

http://www.fotosearch.com/bthumb/LIF/LIF139/NU104010.jpg

***The prototype must:***

* be operated only with syringes
* be operated by one operator
* be reasonably accurate
* move the 250g object at least 5cm vertically and at least 15cm horizontally

***Steps:***

1. Discuss and record possible solutions for the problem. Include labeled diagrams and short blurb for each possible solution.
2. Choose a solution to develop and justify the design choice.
3. Using 8 ½ by 11 blank paper, draw a labeled diagram of your design.
4. Construct your invention. Test and modify your invention.
5. Using 8 ½ by 11 blank paper, draw a labeled diagram of the final product if it is different from the original diagram.
6. Evaluate your final product and record thoughts.

**Criterion F: Attitudes in Science**

|  |  |
| --- | --- |
| Achievement Level | Descriptor |
| 0 | You do not reach a standard described by any of the descriptors given below. |
| 1-2 | You **require some guidance** to work safely and **some assistance** when using material and equipment.  You require **some guidance** to work responsibly with regards to the living and non-living environment.  When working as part of a group, you need **frequent reminders to cooperate with others**. |
| 3-4 | You **require little guidance** to work safely and **little assistance** when using material and equipment.  You **work responsibly** with regards to the living and non-living environment.  When working as part of a group you **cooperate with others on most occasions**. |
| 5-6 | You **require no guidance** to work safely and uses material and equipment **competently**.  You work responsibly with regards to the living and non-living environment.  When working as part of a group, you **cooperate with others**. |