**Experiment: Measuring Forces**

**Aim**

To discover how the mass of an object affects the amount of force needed to move it.

**Hypothesis**

The \_\_\_\_\_\_\_\_\_\_ mass an object has, the \_\_\_\_\_\_\_\_\_\_ force will be needed to

more / less

more / less

\_\_\_\_\_\_\_\_ it.

push / pull

**Equipment**

|  |  |
| --- | --- |
| * Balance * Set of spring balances | * 5 objects: |

**Method**

For each object:

1. Weigh the object on the balance and record its mass.
   1. If an object is heavier than 3 kg it cannot be used.
   2. Some objects may be too light to be used.
2. Calibrate your spring balance.
3. Place the object on a bench and use your spring balance to push / pull it three times.
   1. If your spring balance reaches its maximum force, stop using it immediately and switch to a bigger one.
4. Record the amount of force required to **start** your object moving (**not** the amount required to keep it moving).

**Variables**

|  |  |  |
| --- | --- | --- |
| *Independent Variable (what are you changing?)* | *Dependent Variable (what are you measuring?)* | *Controlled Variables (what are you keeping the same?)* |
|  |  |  |

**Results**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Object** | **Mass (g)** | **Friction Force (N)** | | | |
| **Trial 1** | **Trial 2** | **Trial 3** | **Average** |
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**Graph**

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**Discussion**

Answer the following questions in your book or device:

1. Did your results support your hypothesis? Explain your answer.
2. Use your graph to estimate how much force would be required to move a 1 kg object. (Hint: you’ll need a line of best fit first.)
3. What is the name of the force created when you pull or push an object? Is this a contact or non-contact force?
4. What is one improvement you could make to your method, and how would it be helpful?