**BELLMORE-MERRICK CENTRAL HIGH SCHOOL DISTRICT**

*S. H. Calhoun High School & W. C. Mepham High School*

*Ms. Nigro*

*Regents Physics*

*Dynamics Unit*

Name: Date: Period:

**CONSERVATION OF MOMENTUM ACTIVITY**

**Objective:**

To measure the distance traveled by dynamic carts of different mass.

[](http://www.google.com/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=t02K4a4-S3bZ5M&tbnid=jpH-nkYVq8ec3M:&ved=0CAUQjRw&url=http://www.amazon.com/EISCO-Dynamics-Cart-Set-Wheeled/dp/B00CLC6G9Y&ei=B4mPUoa1K6ahsQS6j4H4BQ&psig=AFQjCNGxoIfCMJmpk6RAi81DTkux1uuizw&ust=1385224662180300)

**Materials:**

Cart with piston

Cart without piston

One meter string

Several masses

**Procedure:**

Find the mass of each of the two carts.

Add masses to the carts as instructed by your teacher. Each team has a different scenario.

Fill out the table below:

|  |  |
| --- | --- |
| Mass of cart **with piston** (*kg*) = | Mass of cart **without piston** (*kg*) = |
| Mass added (*kg*) = | Mass added (*kg*) = |
| **Total mass (*kg*) =** | **Total mass (*kg*) =** |

Attach a string between the two carts.

Compress the piston on the cart.

Place the two carts so that the piston is between them.

Place two meter sticks together with the 0 cm mark where the two carts meet.

Press the button allowing the piston to release.

Note the displacement (including direction) each cart travels just before the string pulls back on them.

Repeat the experiment 3 times and average your results.

Write your data on the table below:

|  |  |  |
| --- | --- | --- |
| **Trial** | **Displacement of cart with piston (*m*)** | **Displacement of cart without piston (*m*)** |
| **1** |  |  |
| **2** |  |  |
| **3** |  |  |
| **Average** |  |  |

Calculate the product of mass and displacement for both carts:

|  |  |
| --- | --- |
| **total mass** x **average displacement**  **(Car with piston)** | **total mass** x **average displacement**  **(car without piston)** |
|  |  |

Complete the table below from your whole class’ data:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Team** | **Cart with Piston** | | | | **Cart without Piston** | | | |
| **Mass added to the cart with piston** | | **Total mass (**in*kg***)** | **Average displacement (**in*m***)** | **mass x displacement** | | **Total mass (**in*kg***)** | **Average displacement (**in*m***)** | **mass x displacement** |
| + 0.0 kg | |  |  |  | |  |  |  |
| + 0.5 kg | |  |  |  | |  |  |  |
| + 1.0 kg | |  |  |  | |  |  |  |
| + 1.5 kg | |  |  |  | |  |  |  |
| + 2.0 kg | |  |  |  | |  |  |  |
| + 2.5 kg | |  |  |  | |  |  |  |
| + 3.0 kg | |  |  |  | |  |  |  |
| + 3.5 kg | |  |  |  | |  |  |  |

**Patterns:**

Answer the following question:

A 3 kg cart and a 5 kg cart initially at rest are pushed apart by a spring between them. How far will the 5 kg cart have travel at the time the 3 kg cart has traveled 7 m?

-Draw a picture

-Choose a positive direction

-Choose an equation

-Substitute with units

-Solve with units