Names: Partner 1 _____ Partner 2 _____

Worksheet: Soap Box Derby

What is a Soap Box Derby?

The Soapbox Derby competition began in 1934. It is a series of events where girls and boys race homemade gravity-powered cars, down a gradually sloping road. The bodies of cars were originally constructed from boxes which were used to ship soap – hence the name soapbox derby. More information on the Soapbox Derby and be found at the official website (http://www.aasbd.org/) and Wikipedia (http://en.wikipedia.org/wiki/Soap_Box_Derby).

We will be conducting our own version of a soapbox derby, but instead of measuring time and speed, we will be measuring distance.

Material for each team:

One 1 foot board (inclined plane), a sheet of graphing paper, 1 meter stick and 1 toy car or ball (this will be your vehicle).

Procedure:

In our derby we will not be competing against each other. We will be releasing our "vehicle" from the top of an inclined plane that has been raised to various heights and measuring how far it travels. Our racetrack has been laid out on the classroom floor. To make our distance measurements, there are lines drawn on the floor for each meter distance from the start line. If you vehicle stops between lines, use your meter stick to measure the additional distance.

Whenever you see a, , partners should record data in your data log or lab book

First trial:

- Place the downslope end of your clipboard on the start line.
- Using your meter stick to measure, raise the upslope end of the clipboard 2 cm. Have a teammate hold the clipboard at this height or use a book to keep it at that height. Record this height in your data log.
- Place your vehicle at the very edge of the top of the clipboard and release. As this is a gravity-powered event, do not give it a push.
- When the vehicle comes to a rest, use your meter stick and the meter marks on the floor to measure and record the total distance traveled from downslope edge to the board to farthest tip of your vehicle.

In this lab, we set the initial height of the top of the clipboard – the first variable recorded. The second variable is the distance traveled.

1. What influenced the outcome for the second variable?
2. Which of the two is the dependent/respondent variable?
3. The independent/manipulated variable?

Hypothesis/prediction:

4. If we doubled the height of the incline to 4 cm, will the vehicle travel twice the distance?
5. Explain your reasoning.

Whenever you see a , partners should write out answers **together**. If you don't know the answer, ask another group for help before moving on.

TRY IT! (second trial):

- Using your meter stick to measure, raise the upslope end of the clipboard to 4 cm. Have a teammate hold the clipboard at this height or use a book. Record this height in your data log.
- Place your vehicle at the very edge of the top of the clipboard and release. Do not give it a push.
- When the vehicle comes to a rest, use your meter stick and the meter marks on the floor to measure and record the total distance traveled.

Results/analysis:

6. How would you explain your results for the second trial with respect to your hypothesis?
7. What forces may have affected your results?

Let's try it a 3rd time. This time set the height to 3cm.

8. Do you think the distance will be midway between the 1st and 2nd trial?
9. Or (if not)…what's your best guess?

Record your 3rd trial data in your data log.

Graphing the data:
Using your data log, and graphing paper, create a line graph to show the data for the 3 trials. The x (horizontal) axis should have units extending up to 10 cm. The y (vertical) axis will be used for distance units. Your teacher will tell you what the total range for this axis will be.

10. Use the meter stick to draw a line from the 2 cm plot point to the 3 cm plot point. Is the 4 cm point on this line?
11. Is this a linear graph?
12. If you were to extend the curve/trend of your graph, where would the distance travel point be for incline height of 6 cm?

Try it setting it to 6 cm and see!

Applying what we have learned:
Science is about learning about the world. One of the ways scientists study the world is through trial and error. The data/results from trials can sometimes fall into patterns. Scientists often use patterns to make predictions.

13. What pattern did you see in your results?
14. How did you make your prediction for the 6 cm trial?

If there is time, try settings to heights of 8 cm and 10 cm, to see if the trend continues.