Balloon Powered Race Car Lab

Objectives – To create a balloon powered racecar for maximum speed and distance; and use the speed formula. \( V = \frac{d}{t} \)

Materials – 9-inch balloon(s) is mandatory.

Rules –

- Groups: 2 people design 1 car, 3 people must design 2 different cars (must be completely different in design).
- Detailed outline of car construction, including two drawings of the car (top and side views) and labeling materials on the car. This will include materials to be used and the general design of your car.
- The car must be powered by no more than 2 – 9” balloons.
- You can build the car out of anything, but remember, you cannot exceed $5.00.
- You will bring materials from home to assemble your car in class.
- It must have at least 3 wheels. Wheels are defined as anything that is round and goes around.
- The wheels cannot be wheels from a toy car. They must be made of something that was not originally meant to be used as wheels.
- The car may not leave the ground.
- Cannot cost more than $5.00 to build.

Hints:

- Think lightweight (it’s hard to get a large mass moving)
- Axle and wheel movement should be smooth with little friction
- Make sure wheels are straight so car travels in a straight line
- Traction between wheels and floor is important (need to have some friction)

Race Day Procedure –

1. Using your RACE DAY SHEET provided, calculate 5 speed trials of your car. Calculate the distance your car travelled, while one partner records the time. Time will be recorded on GO and end when the car stops.
2. Record all of your results and do an average of the 5 speed trials to find the average speed of your balloon-powered car.
3. On race day a track area will be set up (most likely our classroom).
4. Answer your lab questions in full sentences.
5. Cars that follow all of the rules will be eligible for awards.
6. Winning cars will be displayed in the lobby, as well as on our web page!

Awards –
Awards will be given in three categories:
- Best design
- Fastest car (in 5 meters)
- Furthest distance travelled

Lab Questions:
1. Did your car work the first time? If not, what did you do to modify it? Explain how that worked.
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_________________________________________________________________________
_________________________________________________________________________

2. If you could make more improvements on your car, what would you do?
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_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________

3. Describe how the balloon supplied energy to your car.
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_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________

4. Was it difficult to calculate the average speed of your car? Why or why not?
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_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________

5. What factors/things influenced the speed of your car?
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_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
6. Give TWO tips or pieces of advice to someone who had to construct a balloon-powered car?

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________________________________________________________________________
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7. What did you learn from building and testing your balloon car?

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________________________________________________________________________
________________________________________________________________________

Lab Evaluation Questionnaire:

I. What did you like best about the lab? Be specific and tell why.

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________________________________________________________________________
________________________________________________________________________
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II. Which part did you find to be the most difficult? Be specific and tell why.

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________________________________________________________________________
________________________________________________________________________

III. If you were able to repeat the lab, what would you do to improve it? Be as specific as you can and remember no experiment is ever perfect! (Remember our potato experiment)

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
## RACE DAY WORKSHEET:

<table>
<thead>
<tr>
<th>TRIAL #</th>
<th>Distance (meters, cm, mm)</th>
<th>Time (Seconds)</th>
<th>Speed ((v=d/t))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<td>3</td>
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<td>4</td>
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<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>AVERAGE</td>
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</tr>
</tbody>
</table>

- Be sure to include all units!
## Grading Rubric:

<table>
<thead>
<tr>
<th>Lab write-up</th>
<th>Point value</th>
<th>Description</th>
<th>Points earned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations and data</td>
<td>15</td>
<td>Completed data table, Correct calculations, thorough thoughtful process, time commitment</td>
<td></td>
</tr>
<tr>
<td>Conclusion</td>
<td>10</td>
<td>What went wrong? How your design changed; what you changed. Relate ideas back to your hypothesis.</td>
<td></td>
</tr>
<tr>
<td>Procedure/Materials</td>
<td>10</td>
<td>Detailed, labeled drawings of car (including two drawings of the car (top and side views)), list of material used.</td>
<td></td>
</tr>
<tr>
<td>Problem/hypothesis</td>
<td>5</td>
<td>Problem/hypothesis clearly stated</td>
<td></td>
</tr>
<tr>
<td>Questions</td>
<td>20</td>
<td>Answered all questions correctly, with supporting evidence and thoughtful responses.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total Points</strong> /60</td>
<td></td>
</tr>
</tbody>
</table>
Rocket Racer Design Sheet

Draw a diagram showing your best design for a rocket racer.

Show your racer as seen from the front, top, and side.

Each square on the graphs = 1 cm.

Name: __________________
<table>
<thead>
<tr>
<th>Problem Or Objective</th>
<th>What is the problem or objective...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form Hypothesis</td>
<td>Make a prediction</td>
</tr>
<tr>
<td>I Think...</td>
<td></td>
</tr>
<tr>
<td>Make a Plan and Follow it</td>
<td>Experiment Procedure</td>
</tr>
<tr>
<td></td>
<td>Materials needed</td>
</tr>
<tr>
<td>Observe and Record</td>
<td>Draw or write what you observed... Use a chart</td>
</tr>
<tr>
<td>Draw a Conclusion</td>
<td>See if your hypothesis is accepted or rejected...</td>
</tr>
</tbody>
</table>