

Physics 11 Team Project – Engineering a Hovercraft

PRESENTATION DAYS: _____

RACE DAY: _____

AS A TEAM OF THREE (Maximum):

- 1) Deliver a hovercraft with the following properties:
 - a. Maximum size of **20 inch x 28 inch**
 - b. Must carry its own energy source, i.e. battery(s).
 - c. Maximum of 3 electric motors (including CPU fans)
 - d. Must include one switch which will turn all motors on/off for safety

*Each group has access to one CPU fan, one small motor, and a battery case.
- 2) Keep an electronic log / record (visual & written) of your design & build.
- 3) Take lots of photographs and at least one video of it working.
- 4) Calculate a rough estimate of the efficiency of the hovercraft.
 - a. Determine the energy output from the change in kinetic energy of the hovercraft. Use the velocity during a trial run for your calculation.
 - b. Determine the energy input using the power of your battery and the time of your run.

EVALUATION

Race Results (25%) – Three race runs on a 10 metre long track will be made within a 15 minute window.

- 100%: Three completed runs (+/- 10% difference from average time)
- 95%: Three runs (+/- 25% difference in average times)
- 90%: Three runs (+/- 50% difference in average times)
- 85%: Three completed runs
- 80%: Two completed runs (+/- 25% difference in times)
- 75%: Two completed runs (+/- 50% difference in times)
- 70%: Two completed runs
- 65%: One completed run

If no runs are completed, then the team will receive 5% for every metre the hovercraft travels in its best run.

BONUS MARKS

- 10% for fastest completed run
- 5% for three completed runs with the fastest average time
- 5% for the most consistent three runs (smallest time range between the three times)

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Delivery of your hovercraft (25%)

Operational on race day: 15%

Safety Switch: 10%

Presentation (10min max) & Hand in your project log as a PowerPoint on a USB ((50%) *(-5% if not on a USB on Presentation Day)*

- 10% Build-log in photographs (annotated!)
 - Group Photos of members are included
 - Contribution of each member is clear & concise.
 - Elgineer / Builder / Safety Person / Group Leader etc.
 - Photographs are captioned
 - Significant features are indicated

- 25% Show-off the Physics
 - Design Drawings, Free-body diagram(s) on photographs
 - Dimensions are labelled on photographs
 - Circuit diagram of electrical components included
 - Basic calculations
 - final velocity (assume constant acceleration), electric power, voltage used, etc.
 - Efficiency of vehicle is calculated

- 5% Video of your working hovercraft

- 10% Conclusion Page – report your findings and recommendations for future improvements.

Resources

<http://www.rcgroups.com/forums/index.php>

<http://leeselectronic.com/en/>

<http://www.norburnrc.com/RC-Shop-Vancouver>

<http://www.rcpitstop.com/>

<http://hobbytown.com/>

<http://www.greathobbies.com/>

<http://www.hobbypartz.com/>

<http://www.hobbyking.com/hobbyking/store/index.rc>

“Design it, Build it, Launch it, Fix it, Race it!”