NATIONAL STEM LEAGUE

RACING CHALLENGE

December Points Race Challenge DEADLINE

January 6th, 2015

Shocking Mini Oval 200 pts

Deadline: Submit your report, upload your video, and give us your link by midnight January 6th, 2015.

Maximize your points!!! Suspension, Shocks, and Springs! While your team completes this challenge, you can also be completing Mechanical Certification Suspension, Shocks, and Springs, page 63 in your Mechanical Certifications Booklet.

Objective: Test the effects of wedging the springs on your car on a mini oval. Race your car with no wedging. Then wedge the springs and repeat. Race for 20 laps going clockwise, and repeat going counterclockwise. Collect data, tabulate and analyze results. Use your engineering log book to set-up the data collection table. Prior to the race, record the information on the top of the data table: date, conditions, car ID, battery charge, track length, car settings, drivers, PIT crew, and data recorders. Record times for each trial. Calculate average times and speeds after all data has been collected.

You must submit all information in one cohesive report. If you record the challenge in your engineering notebooks and take pictures of the pages, then cut and paste the images into a document! Always include a title page with your team

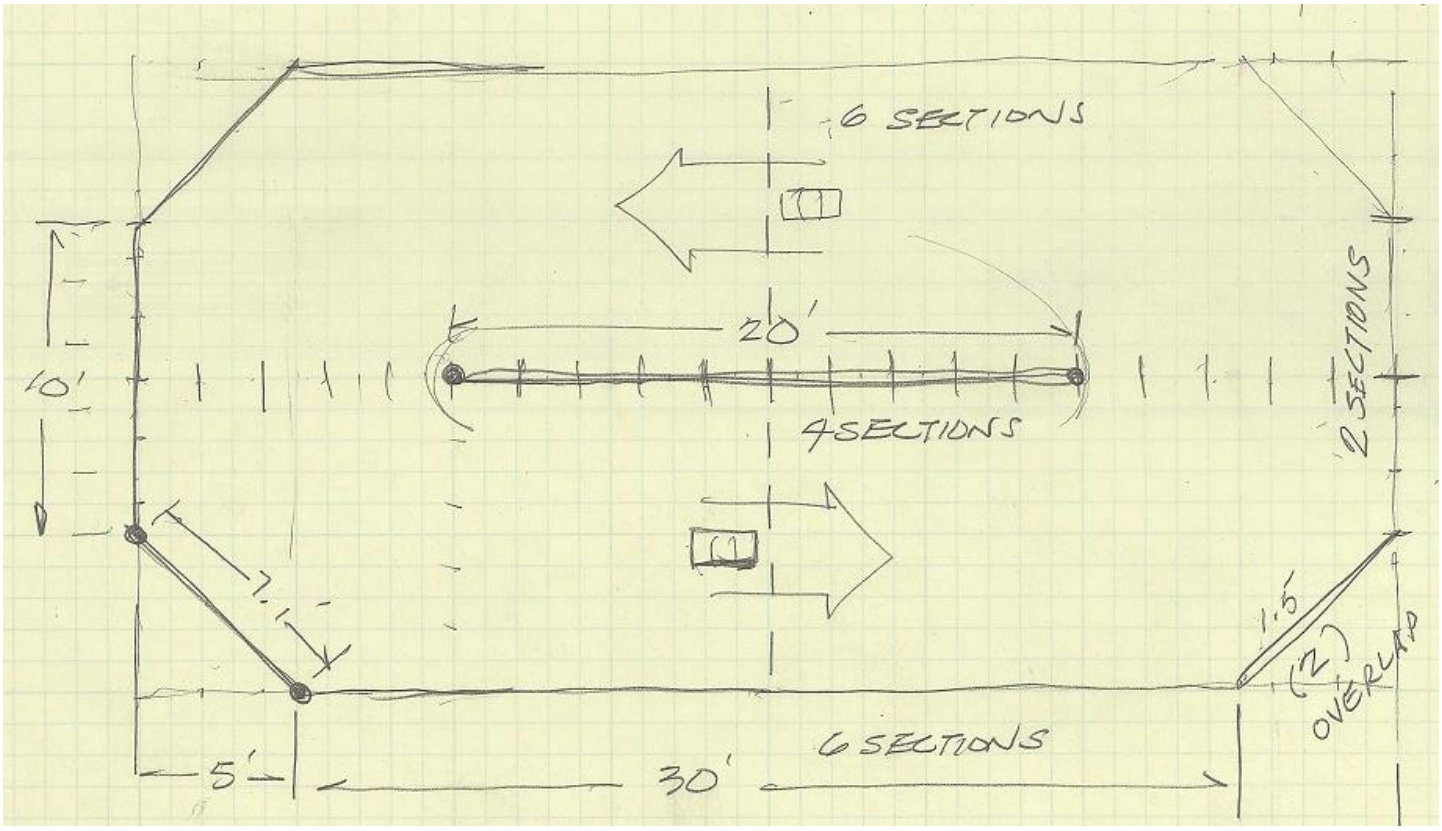
information, date and description. If you are attaching supporting video or other documents separately, then please define these items as an APPENDIX in your report or include a table of contents!

Springs and Weighting Wheels!

" Your car oversteers when it spins out because the rear turns faster than the front. Your car understeers when it doesn't turn enough and pushes toward the outer wall of a turn. How much of the car's total weight sits on each tire is a big factor in how well your car handles and whether it understeers, oversteers or perfectly steers." (p. 67, NSL Racing Mechanical Certifications Booklet)

For this challenge we are going to change just one variable to see the effects on your car. We will "wedge" the springs. For the RC cars, C-shaped wedges inserted into the coils of the springs on the shocks can be used to achieve the effect of changing the weight distribution on the tires.

1. Race your baseline (no wedges on the springs) car around the mini oval track for 1 lap clockwise. Repeat for going counterclockwise. See Figure 1. With a fully charged battery, set the car at the Start Line. With two or more people measuring drive time for the car on the track, drive a single lap.



2. Repeat Event 1 except drive 20 consecutive laps instead of only one lap. Timers measure total elapsed drive time for the 20 laps. Record the data: Total drive time, # laps, time per lap, # crashes, and observations on how the car performed.

3. Plot total elapsed time for the 20 laps.

4. Complete the Explore Activity: Explore Activity: Weight Balance and Wedging pages 77 and 78 in the Mechanical Certifications Booklet.

5. After completing the Left Side Weight, race the car around the mini oval track for 5 minutes clockwise. Record data. Repeat for counterclockwise. Record data.

6. After completing the Cross Weight, race the car around the mini oval track for 5 minutes clockwise. Record data. Repeat for counterclockwise. Record data.

7. Analysis

- Calculate average times and speeds per attempt. Graph the three trials: y-axis laps and x-axis time, for baseline, left weighted, and cross weighted going clockwise.
- Repeat for counterclockwise.
- Document difficulties encountered.
- Which set-up performed best: baseline, left weighted or cros-weighted? In which direction?
- Summarize results.

4. Deliverables:

One complete report with a table of contents. All images should be pasted into the one report. Short video of your race earns 10 bonus points. Report must have the team name on it, and sign-off from the coach.