Appendix C

A Day at the Races

Advancement

The Science of Speed includes two competitive components: aesthetic judging and performance at the races. Neither of these results should figure significantly in the assessment of students' work. Rather, the focus should be on the scientific process and the completed process, in other words, the portfolio.

Having said that, the question remains, "What determinations are made to advance students to school, regional, state, and national competitions?" Answers vary depending on the event protocols.

It is critical that students are apprised at the outset what criteria will be used to determine advancement to race events. That is, before you begin the Science of Speed investigation, apprise the students of the criteria for advancement. The portfolio assessment criteria should be a significant factor in determining advancement.

Recommended Criteria

1. All components of the portfolio must be complete.
2. Aesthetic/design points, or ranking as listed on the "Final Data Sheet," constitute 50% of the determination.
3. Race speed, or ranking as listed on the "Final Data Sheet," constitutes 50% of the determination.

Race-Day Preparation

Sequester Cars

1. Publish the date and time for submission of cars.
2. Collect all materials including the car and portfolio, which must contain scale design drawings.
3. Apprise the students of the date and time for pit stop check-in (see below).

Judging

Train the judges how to evaluate and assess the cars, design drawings, and other portfolio materials. It is most helpful to have sample work so that the judges can have open conversations about the rubrics. Training avoids the necessity of normalizing scores, which is time consuming.

Rank all cars prior to A Day at the Races. This will determine the results for the aesthetic/design award and the aesthetic/design points used to determine half of the overall award, the grand champion. Do not publish these results; the suspense will captivate the attention and interest of the students on race day.

Judging Criteria

1. Aesthetic/design points (50%)

An aesthetic/design judging sheet should be created to facilitate the assessment. Three components could be included in the judging: 1. Design drawings. 2. Wind tunnel tests – this aspect of design is measured by lift and drag. 3. Curb appeal – this is a purely subjective element.

2. Speed/performance (50%)

Cars should be randomly sorted and raced. A double-elimination bracket is highly recommended (see explanation under "Race Formats"; sample brackets in Appendix D).

If possible, a prerace spreadsheet should be produced to automatically tabulate results and score combinations. The aesthetic/design points can be entered in advance so that all results can be posted immediately following the races.

Track Setup and Race-Day Preparation

Regardless of the race system, the distance from the start line to the finish line should be 65 feet, 7.5 inches (20 meters). Prior to race day, race officials should test each lane with a test dragster to ensure there is parity of time, in other words, one lane is not faster than the other. Officials should retest the lanes before the "Final Four." For example, in a double-elimination race when four cars remain, two in the upper bracket and two in the lower bracket, the lanes should be retested.

Secure the area with stanchions, and post signage. There is no substitute for redundancy. If possible, have backups for each piece of equipment. This includes timing equipment, launch pods, and so forth. Test the backup equipment.

Prepare a pit area so that students can check in and confirm that their cars are race-ready. Establish whether you will allow students to apply lubricants at this juncture. The pit area and check-in procedure before the race should be well supervised.

Race Day

Meet with the race team and confirm responsibilities such as manning the start and finish areas, data entry, crowd control, music, audio system, refreshments, and so forth.

Student designers should check in at the specified time. It is highly recommended that after students have checked in and prepped their cars, they not be afforded random access to the pit areas. In large race formats such as 32- or 64-car, double-elimination events, students should be afforded access to the pit areas to check wheels, apply lubricants, and so forth at set intervals such as when 16 cars remain and when four cars remain.

Race Formats

There are three basic options for race formats. Each is based on two lanes and a 32-car field; see sample brackets in Appendix D.

1. **Race for Time**

   Cars race once and the times are recorded. Thereafter, the cars may be ranked by time or speed. No cars are eliminated with this method.

   Time: 1 hour (not including setup and teardown time)
   Rounds: 1
   Races: 16
   Cartridges: 32

   - Less competitive, students focus on their prediction based on the trial time and subsequent modifications
   - Less time consuming

2. **Single Elimination**

   Cars advance when they win, and they race until defeated.
   Time: 2 hours (not including setup and teardown time)
   Rounds: 5
   Races: 31
   Cartridges: 62

   - Simple concept and bracketing
   - More competitive
   - Arbitrary (It is possible that fast cars are eliminated early while slower cars advance based on seeding.)

3. Double Elimination

Cars race until they lose twice. Following a first loss, the car is placed in the lower bracket (sometimes referred to as the losers' bracket). The winner of the lower bracket must defeat the winner of the upper (winners') bracket twice to be the overall winner.

Time: 4 hours (not including setup and teardown time)
Rounds: 10
Races: 62 or 63
Cartridges: 124 or 126

- Requires careful planning and organization
- More competitive
- Every car guaranteed at least two races
- Not arbitrary (If a fast car is eliminated in the upper bracket, the car may advance.)
- Exciting to watch
- Tournament feeling

Awards

Three awards may be given:

- **Aesthetic/design**
- **Speed**
- **Grand champion**

Equal value should be given to the aesthetic/design and speed categories. It is conceivable that a student earn the grand champion award without winning either the aesthetic/design or speed award.

Purchase ribbons or medals for **all** students who advance to A Day at the Races. Finalist awards are recommended. Above all, house a permanent trophy in your school that records the names of the three awardees annually. Be sure the trophy is large enough to accommodate a plate that holds the names of winners for years to come. Create a tradition. Showcase the finalists.