**Daily Lesson Plan - 1/3**

Week 1

Day 3 - Introduction of Great American Dragster Derby (GADD) competition

Materials Needed:

 Description of teams and roles (see appendix or your modified version)

 Flip chart paper with markers (if needed for questions)

 “Sticky notes” if needed for brainstorming distributed among all members of the class)

 Computer with access to Internet

Length of Lesson:1 day (with follow up day)

|  |  |
| --- | --- |
| **Minutes** | **Activity** |
| Introduction5 minutes | When we met last we went on a field trip to learn about the motor sports industry. A lot of us think about motorsports just being drivers and mechanics. What other jobs did you see at the event? It would be great if we could just work in that industry to learn about it -- but we can’t, so I’m bringing the next best thing. We are going to have a racing program here at the school. For the next \_\_\_\_ weeks our PBL will be working towards a Great American Dragster Day. Show introductory video <https://youtu.be/_FUhFKR8CkA> We will have \_\_\_\_ racing teams and everyone will have a role on a racing team.  |
| 5 minutes - Make up of teams | Hand out the team descriptions and the task sheet or job description for each career. Initially everyone will have one of those five roles. Every team will have:DriverCrew ChiefMechanicArtistPublic Relations Specialist(P/R)Hand out task descriptions for each (see appendix). Later on for the race a few of you will also be: Race OfficialOfficial StarterFinish Line Officials (2 are recommended)Reporter/Media SpecialistBecause this is a careers class, you won’t just pick your teams. You will interview for the teams based on your skills. When we interview for teams, if you would like to be one of the other roles (Race Official, etc), then you need to interview for those as well.  |
| 10 minutes - Time to review | Give students about 5 - 10 minutes to review the summary of the five descriptions of each team member. |
| Timeline*Guidance* | This is a big project, and you remember that with PBLs, I don’t set the timeline. YOU will establish our timeline so that all teams will be ready for the Great American Dragster Derby - which is set for \_\_\_\_\_\_\_(date).We won’t set the timeline today. When we meet next I will bring in a business person who will walk you through that process and we will organize all these ideas. But for the remaining minutes of the class, let’s brainstorm what are some steps we need to take so that we have cars and teams ready to compete. *At this point pull out stickynotes and set them around the room or give a few to each student. You can do this activity in many ways. One way is to have every student write ideas on a sticky note for a minute or two. Then the Specialist sits and has the student stand, present the idea and paste the note on flipchart paper. Another way is to have the class speak up. The Specialist hands the sticky to the speaking student and says, “Write that down…..Now put that on the wall (or flipchart paper or whiteboard).* *Some ideas are below -- but the Specialist shouldn’t state these points. The Specialist should ask questions to elicit points for the timeline -- but resist putting these in any sort of organization or flowchart:**What needs to be done in order for us to race these cars? (cars need to be built, they need to be tested, etc)* *How will we know who works on what tasks? (we need to interview for positions, we need to write a resume for the position we want)**If the students want team shirts - how will they fundraise, etc.****Minimal Timeline***  Great American Dragster Derby (GADD) is \_\_\_\_\_\_\_ (set by the Specialist)Cars need to be builtLocation needs to be determinedTrack or start/finish determinedPublicize eventWill we do sponsorships? How can they be obtained and what will they be? Racing Teams need to be setNeed an expert to come in to show how to improve car speed (before or after building?)Students need to know what roles they could playStudents need to build a resume for the role they wantStudents interview for positionTeam branding/logoTeam shirts? |
| Review/ Preview | Today we learned about our Great American Dragster Derby project. You also learned about the roles for each Racing team. When we meet next, our guest speaker, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ company will help us write up our timeline so that we will be ready to compete successfully. When we meet next I will bring in a business person who will walk you through that process. S/he will take these ideas and help us organize them so we have a strong timeline.  |

**Appendix:**

**The GADD Teamwork and Careers Experience**

The Great American Dragster Derby® (GADD) allows students to experience what it is like to have a career in motorsports. They can choose to be involved with a race team and challenge for the win. They can also choose to experience what it is like to be a race official or a reporter/media specialist.

Generally, a class is divided up into 8 race teams. A race team should consist of a minimum of 2 students and a maximum of 4. Not all race teams need to have the same amount of students. Students can work on their own and assume all team functions.

**The Race Team**

The race team consists of the following individual functions (all team members can help build the racer):

* *Driver*: responsible for winding and launching the car, setting the steering, analyzing the runs, analyzing the competition, suggesting racing strategies.
* *Crew Chief*: responsible for building the racer, for recording racer set up and performance data, timing the car, interpreting data and suggesting improvements to the car set up.
* *Mechanic*: responsible for helping to build the racer, maintain it in perfect running condition, be able to change gear ratios and ballast at a moments notice, help wind the racer.
* *Artist*: responsible for the coloring scheme and decorating of the racer. Also helps with the design of the team presentation board or any advertising related to the race team.
* *Public Relations Specialist:* responsible for gathering information about the team and being the team representative to the reporter. Must be able to receive technical information from the race official and be able to communicate pertinent information to the different team members. Optional: Secure sponsorship for the racer from a small business in the area.

**Official Race Organization Team** (some students hold a position on the race team AND one of these roles)

The official race organization team meets once a week to discuss the best location for the event, as well as the crucial aspects of race day including where cars will begin and end, how times are determined, as well as where guests will observe the race. Team consists of the following individual functions:

* *Race Official/Track Builder:* responsible for working with the JAG Advisor and school officials regarding when and where testing sessions as well as where the race can be held. Must be able to lay out the track and run the event along with the instructor. Must enforce the GADD rules and should be able to run the drag racing elimination chart.
* *Official Starter:* the starter stands behind the two drivers and shouts “GO” when both drivers are ready to race.
* *Finish Line Official*: the finish line official calls the race timing as well as winners.
* *Reporter / Media Specialist*: responsible for writing up a race report that can be published on the GADD website as well finding ways to shoot photographs/video, perhaps involving the school media class (School Announcements, Newspaper, Yearbook, TV)

Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Race Team Roles

Mark your 1st, 2nd and 3rd choice of Race Team Role. Everyone will be on a race team.

Driver:

Crew Chief:

Mechanic:

Artist:

Public Relations Specialist:

In addition to being on a team, are you interested in any of these Race Official roles? Mark any of interest:

Race Official List

Race Official:

Official Starter:

Finish Line Official:

Reporter/Media Specialist:

**The GADD Driver … cool, calm and collected.**

As a driver, you are responsible to wind your racer according to your crew chief’s recommendation. You need to be able to focus among all the race hoopla on race day so you can accurately count the winds. Once your dragster is lined up on the race track, your main responsibility is to launch it straight AFTER the “GO” signal. If you become nervous and launch before you hear the “GO” command, you will forfeit the race.

* You should have fairly quick reflexes and upon hearing the command “GO” release your team’s racer instantly and smoothly.
* You are also responsible to know the racing characteristics of your car and the surface where you are competing.
* Testing will tell you whether your racer runs straight or tends to divert to either side during the run.
* You should be able to adjust the steering so your car runs as straight as possible. The shortest line between start and finish is a straight line.

*Building the racer … you never know too much.*

If you have building experience you should get involved in the building of your team’s racer. As a driver it is important that you know the workings of the differential (how the gears work) and how the wheels are attached to the rear axle. This becomes very important if on race day things go wrong during the winding portion just before the race and there is not enough time for the mechanic to fix it. The more you know, the better you will be able to quickly diagnose and fix a problem, thereby increasing your chances at winning the race. Review the handouts from your Specialists to learn more about the principles of aerodynamics, lift and weight to insure your dragster performs at its peak.

*Winding the racer.*

You will wind the racer for all test and race runs. You must use the rear wheels to wind the racer. A mechanical winder (manual or electric) is not permitted. Use the winding tool provided in the kit. Insert the winding tool into the left wheel to wind your racer. Make sure you wind it backwards. You can pack more winds into your racer if you stretch wind your motor. That means you hold the racer as your teammate unhooks the rubber motor in the front of the vehicle and stretches it to 3 or 4 times its original length. Now you start winding the car with your winding tool on the left wheel. As you have about 70% of the total winds packed into your motor you keep winding as your teammate moves the end he/she is holding closer to the motor hook up point. Practice makes perfect.

*The Start.*

At the start, you must hold your racer by the rear wheels. The front wheels are aligned at the start line. You may NOT push start your racer. It is considered a false start and gives the win to the opposing team. One option to hold your car is shown. This allows you to quickly lift your hand and your racer is free to accelerate towards the finish line. T

*Racing Strategy … know your competition.*

You need to observe your competition and time some of their runs to see how your team measures up. If you know that you are going against a much slower team, you can relax because your car is faster. If you are going against a team that has a faster racer than yours, you can still beat them by releasing your car the very moment you hear the “GO” command and hope that the opposing driver has a slower reaction time at the start.

Know your competition!

*Winning! … share the joy.*

You just won the final elimination heat and you are the champion. Don’t forget to mention all your teammates by name during the interview and give them credit towards the win. Winning is a team effort.

*Losing … don’t blame your team.*

You will not win every time. Shake hands with your teammates and the winning driver. Thank your teammates regardless of the lost race. You might have another shot at winning the next race. Think about how you could turn your racer into a winner next time.

**The GADD Crew Chief … the one calling the shots.**

As a crew chief, you are responsible for the completion of your team’s racer. You also need to be able to record data from each run and make new set up recommendations after considering all the variables.You write down the set up of the car such as amount of power used (how many rubber loops, width of the rubber loops), amount of winds, gear ratio, amount of ballast and the result of the run in seconds. Then you compare the data from the last run and try something new to make your racer go faster. Use the engineering sheets in the back of this publication to your advantage. The crew chief communicates the power/gear changes to the mechanic and makes sure the driver knows the minimum amount of winds it takes to make the racer cross the finish line.

On race day, race strategy comes into play. If you are going against a car that has been consistently slower than yours, you can go with a safe set-up. If you are going against a car that you know is faster than yours, you might try something that you have not done before in order to beat that car.

*Building the racer … you never know too much.*

You are responsible for leading your team in building the dragster. As a crew chief it is important that you know what you can change on your race car. The more you know, the better you will be able to react and change the set up, thereby increasing your chances at winning the race.

*Engineering knowledge … understanding and applying the Science.*

You need to read and understand the science that makes your racer tick. Every change you do to your racer brings along consequences. While more power might make your racer faster, more wheel spin at the start may be the consequence. If you find a set up that works really well for your car, keep it to yourself. The more data you collect with different set ups, the more knowledgeable you will be. There is no substitute for testing. Review the handouts from your Specialists to learn more about the principles of aerodynamics, lift and weight to insure your dragster performs at its peak.

*Race distance … to the finish line and not far beyond.*

Get the race distance from the race official and make sure you calculate how many winds it takes to make it to the finish line. Account for some wheel spin at the start and add a few winds. The power, gear ratio and ballast need to be adjusted so that your racer makes it past the finish line every time, but does not keep going too far to hit an object down the race track. Know the location where you are running and make sure your racer is not going to be wound so much that it will hit a wall or sidewalk past the finish line at high speed. Calculate the maximum amount of winds possible to prevent damage to your racer.

*Recording data from each run.*

Use the engineering data sheets to record all pertinent information such as gear ratio, amount of power, amount of winds and the elapsed time (ET) of the run. The Elapsed Time is the time it takes your racer to go from start to finish. You should use a stopwatch to record the ET from each run and use it to compare whether your car set up is headed in the right direction. After a day of testing, sit down and analyze your data. Then, think about what you would like to try to make your car faster such as more power, different gearing, increased amount of winds or changing the ballast. Use the science provided in this manual, your data collected and your wits to suggest set up changes for your racer in order to make it the fastest of all.

*Racing Strategy … know your competition.*

You need to observe your competition and you or a team member should time some of your competitors’ runs to see how your team measures up during testing.

*Race Day … it’s about the details.*

You should make sure that you crossed all your t’s and dotted all your i’s on race day. Make sure you pick a set up that has been consistently fast. Communicate to your mechanic all the tasks that have to be accomplished on the car well before the car goes to the start line. It helps to have a “to do” checklist before each run.

*Winning! … share the joy.*

You just won the final elimination heat and you are the champion. Don’t forget to mention all your teammates by name during the interview and give them credit towards the win. Winning is a team effort.

*Losing … don’t blame your team.*

You will not win every time. Shake hands with your teammates and the winning driver. Thank your teammates regardless of the lost race. You might have another shot at winning the next race. Think about how you could turn your racer into a winner next time.

**The GADD mechanic … the one wrenching on the car.**

As the mechanic you are responsible for the trouble free operation of your team’s dragster.

* You make sure that everything on the racer works to perfection.
* You make sure all wheels turn freely without excessive wobble.
* You make sure the gears mesh perfectly.
* You make sure that the rubber motor is in good condition.
* You make sure that the drive shaft assembly is in place, tight against the fire wall.
* You make sure the gears and the drive shaft are lubed.
* You make sure that the car features the exact set up recommended by your crew chief.

*Building the racer … you never know too much*.

You should be involved in the building of your team’s racer. As the mechanic it is important that you know what you can change on your race car. The more you know, the better you will be able to react and change the set up, thereby increasing your team’s chances at winning the race. Review the handouts from your Specialists to learn more about the principles of aerodynamics, lift and weight to insure your dragster performs at its peak.

*Race car maintenance … it’s very important.*

You should check the twin hex nuts holding the drive shaft assembly in place for tightness after each run.

Use WD-40 to lube the gears and drive shaft when needed.Check the rubber band motor for cracks and suggest replacing it when you see that it starts deteriorating.

*Righty-tighty, lefty-loosy.*

Make sure you know how to adjust the rear wheel gap fairly quickly by turning the right rear wheel in or out.

Practice a crown gear change a few times so you can do it in a few minutes.

Keep your tools handy. You should have the winding tool, the allen wrench and a 3/8 inch hex key close by at all times.

*Make sure you know how to fix your race car.*

Race car storage/transport … that is your job.

You are responsible to store the race car and the tools.

It is your responsibility to bring the car, tools and extra gears/rubber string to testing and the race.

*Race Day … make sure your race car is in top mechanical shape.*

You need to go over the whole car and check everything the day before race day. You do not want to have to rush on race day to change gears or similar. Just go over the whole drive train, make sure the nuts are all tight and check the rubber motor. After each run, check the the twin hex nuts on the drive shaft assembly and lube the gears/drive shaft.

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*Losing … don’t blame your team.*

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**The GADD artist … making it pretty.**

The artist for the team is not a full time position and should be taken on by the team member with the most artistic talent. As the artist, you are responsible for decorating the racer. Make sure to talk to your team, especially the public relations specialist about possible sponsorship. In that case you have to wait with the decoration until the sponsorship deal is finalized.

Present your team with a sketch of the paint scheme before proceeding to color the racer.

Go to aeroracers.com and go to the page that shows your racer. You can download the side view pdf and you can use it to test how your decorating ideas look on paper first.

Show it to your teammates and get them to agree on a coloring scheme.

Prep the completed racer for decoration by using medium grit (220 grit sandpaper) to sand away the laser burn marks.

If you have purchased Aeroracers, resources are provided so cars can be “wrapped” with logos. Here is the link: <https://aeroracers.com/what-is-a-wrap>

*Think before you color.*

Keep in mind that marker color will “run” on the wood unless you use a ball point pen to draw a line on the wood for the color to stop.

Use permanent markers to decorate the racer and the rims. (Permanent Sharpies work best)

Use a computer and color printer to make any stickers to glue to the car.

Read in the car’s assembly instructions as to how to color the windshield.

*Winning! … share the joy.*

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*Losing … don’t blame your team.*

You will not win every time. Shake hands with your teammates and the winning driver. Thank your teammates regardless of the lost race. You might have another shot at winning the next race. Think about how you could turn your racer into a winner next time.

**The GADD Public Relations Specialist … the spokesperson of your team.**

As the public relations (PR) specialist, you are responsible to put together and coordinate any press releases or news concerning your racing team. You are in charge of securing sponsorship for your race team.

*The race team “presentation” board.*

You are tasked to work with the Team Artist putting together a presentation page about your race team. It should be in printable format 8.5 x 11 inches (std. page) as well as being able to be emailed on the GADD website. This presentation page should be mounted such that it can stand on its own next to your car (ask your specialist for an example).

The page needs to contain:

The name and logo of your Race Team A photograph of your completed and colored racer

The names and functions of all team members

The Sponsor’s name(s) if applicable.

*Broadcasting your race team’s participation in the “big” race.*

Check to be sure you can use social media to broadcast your team’s progress to your friends, family and sponsors. Answer any questions they may have.

*Working with the race officials.*

You are the speaker for your team. If for example, your team finds that it needs more time for additional testing, you need to contact the race official and submit your request.

*Team photography.*

During all stages of this PBL, shoot some action pics to send to your friends. Shoot a picture of your whole race team including the race car for publication online. You can submit it to dragsterderby.com for publication on the GADD race team page.

*Sponsorship.*

Your class and Specialist will decide if you plan to ask for Sponsorships and how money is handled. If so, you could ask a family member, neighbor or small business for sponsorship of your race team.

In general, a receipt is given by the instructor and money covers the purchase of more racer car kits as well as racer hop up parts. Work with your team’s artist to include your sponsor’s name(s) on the car.

*Summary of your race team’s participation and race result.*

With the Reporter, broadcast your team’s race experience and results to your school, friends, family and sponsors.

*Thanking your sponsor.*

If your racer was sponsored, have all the team members sign a team photograph including a “Thank you” to be presented to the sponsor. That sponsor will be eager to contribute towards your next adventure or towards a future team from your school.

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*Losing … don’t blame your team.*

You will not win every time. Shake hands with your teammates and the winning driver. Thank your teammates regardless of the lost race. You might have another shot at winning the next race. Think about how you could turn your racer into a winner next time.

**Race Official**

As the race official you will work closely with your instructor to organize the race.

You communicate with all involved on when, where and how the race will be run.

*The venue to test and run the race.*

Work with your Specialist to review the venue (see GADD track layout page) where the race teams will test and the official race will be held. Keep noise control in mind. The venue needs to be fairly smooth like a schoolyard. It could be indoors in a multi purpose room as well. The length from start to finish line should be between 30 and 50 feet. The width should be between 15 and 20 feet. The run off area behind the finish line should be an additional 15 to 20 feet. It should be clear of objects that cars could run into. Once you have found a venue, use chalk or tape to mark a start and a finish line. Do a few test runs and report eventual problems to your Specialist. Once the venue and distance chosen are finalized, communicate the location and distance along with possible testing times as well as the date of the official race to all the PR specialists for all teams.

*The drag racing ladder.*

 Use a portable whiteboard to draw a large drag racing ladder. Use the pattern given to you by your Specialist. To figure out who races whom, put all the team names on identical pieces of paper, fold them up and throw them in a hat or similar. Have a neutral person like your Specialist pull the team names out of the hat. As the names are read out, write them down from team position 1 to 8. Drag racing works best with 8, 16, 32 teams and so on. What if you have only six teams? Then you would choose the grid for 8 teams. In addition to the 6 team names on the folded papers, you will add two marked “Single Run”. Whichever team draws the “Single Run” gets an automatic advancement to the next round. Those teams get to do two runs each if they wish, although there is no competitor in the lane next to them. (If you draw two single runs against each other, you have to put them back into the hat and draw again.)

*Teams with two out of three GADD race wins advance.*

In GADD, the winner in each round is the team that wins two out of three races. In many cases drivers get nervous and make elementary mistakes in the first race. In order to give them a chance at redeeming themselves, we recommend you run an minimum of two races or heats per round. If the same team wins twice in a row against the same competitor, the winning team moves on. If both teams win a race, then you run a third race to determine the winner. The winner goes on to the next round.

See the next page for a pre-race Drivers’ meeting checklist.

*Who is racing and who needs to get ready.*

The day of the event, you will announce who needs to come to the start line to race and who is on deck (needs to get ready). For example, as you call teams 1 and 2 to come to the start line to race, tell teams 3 and 4 that they are up next and need to get ready (on deck).

*Pre-Race Drivers Meeting.*

On race day, prior to the race, invite all drivers to a drivers meeting. In that meeting you need to go over how the race will be run and what you expect each driver to do. You need to re-iterate the following:

* How the drag racing ladder works.
* Who is racing whom in the first round 2 wins out of 3 races will decide which team advances to the next round.
* What it means to be called on deck. (Start winding, be ready to proceed to the start line.)
* After the team has been called to the start line, the driver has a maximum of 1 minute to line up his/her racer at the start line
* If the rubber motor snaps during the winding process while on deck, the team has 2 minutes to appear at the start line or forfeit that race.
* Drivers line their car up with the front wheels at the start line.
* Drivers hold their cars by the rear wheels only prior to launch.
* Let the drivers know the agreed upon “ready” signal that they are expected to give the official starter standing behind them, once their racer is in position and they are ready to launch.
* Give the drivers the launch command (such as GO! or the sound of an air horn etc.) to expect from the official starter which will indicate when they should release their racers.
* No push starting is permitted. Push starting the racer will result in losing the race.
* If two racers collide, the race will be re-run until there is a clear winner.
* If a driver releases his/her racer prior to the start signal, he/she loses that race.
* Inform the racers that decisions of the finish line officials as to who won the race are not up for discussion.

**Official Starter**

As the official starter, you will be responsible for starting each race.

You give both drivers on deck a time limit of 2 minutes to wind their racers.

Once the drivers are called to the start line, they have 1 minute to position their racers to launch.

Make sure both drivers are separated by a few feet so their racers have less chance to collide.

Make sure that the front wheels of their racers are at or on the start line.

Drivers are only allowed to hold their racers by the rear wheels/tires so they cannot push start their cars.

Ask your Specialist to show you a picture of how you should recommend the drivers hold their racers at the start.

Have both drivers give you the signal that they are ready to race.

It is best to inform the drivers before the start of the race which “ready” signal you are looking for.

Work with the race official so he/she informs the drivers during the pre-race drivers meeting of the “ready” signal.

Stand behind the drivers and shout “GO” without counting down or giving them a warning. That way their reaction time to launch their car makes a difference in the race.

After the cars have launched, make sure the drivers on deck are ready to come to the start line.

**Finish Line Official (2 recommended)**

NHRA recommends there are two finish line officials on race day. The finish line officials determine who the race winner is by determining which car’s front tires crossed the finish line first.

It is a good idea to record the finish line on video so you can go back and look at the recording in case of a race that is too close to call.

The decision as to which racer won the race should be unanimous by both finish line officials. If the race is too close to call, have the drivers go back to the starting line and run it again.

**Reporter / Media Specialist**

The official reporter follows the whole dragster derby event, from initial team forming to the final race. The reporter also works as a photographer/videographer and shoots team pics, dragster building, race action photos/video such as start line action and team member reactions after a win or a loss to be published in the final report.

Shadow the teams as they test and get their reactions.

Make sure you interview the winning team after the finals. Start with the driver and then each member of the team.

After the finals are run, make sure you have access to the completed drag racing ladder so you can use it to write the story.

With the Public Relations Specialists review the reflection activitiy/Press Releases so that you can prepare an article and/or video about the event containing some photographs to be published in the school paper/website and/or on the official GADD website.

Remember to keep everything in good taste and put a positive and fun spin on the article / video.