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| **PROJECT OVERVIEW** | | | | | | | | | | |
| **Name of Project:** Great American Dragster Derby (GADD)/Racing PBL (STEM project) | | | **Duration (days): 4 - 6 weeks intermittent** | | | **Written For:**  ☐Period Schedule  ☒Block Schedule | | | ☐Trimester  ☒Semester | |
| **Subject/Course: JAG** | | | **Teacher(s): James Cochran** | **State: Indiana** | | **Grade Level(s):**  ☐7/8  ☐9/10 | ☒11/12  ☐Alternative Ed.  ☐Out of school | | | ☐Any |
| **Other Subject Areas to Be Included:** Click here to enter text. | | | | | | | | | | |
| **Project Summary**  What will the students be doing? What challenges will they face? What is the purpose? | This is a STEM PBL. Racing Teams build a single dragster (racing car) and tune it using STEM principles. Individual students interview to be on a specific racing team. This activity culminates in a “Great American Dragster Derby” where teams compete to have the fastest car. Here is a video: <https://www.nhra.com/YES#>  We focused more on the “business of racing.” Here is a link to some images from our class: h[ttps://drive.google.com/open?id=1YlgATOEYEpMfEvx5SLfdbQpn7IK7geKj](https://drive.google.com/open?id=1YlgATOEYEpMfEvx5SLfdbQpn7IK7geKj) | | | | | | | | | |
| **Driving Question**  What problems/questions will students be learning about? | How can we work together as a team to achieve success? What does it take to compete well and have a winning team? What does “winning” really mean? If we compete well, we don’t need to achieve first place to consider ourselves successful. Personal achievement, competing well, and other E Leadership & Self-Development Competencies (level 3) are aspects of long-term success and ultimately “winning” at life. One challenge of this PBL is to wrestle with those ideas of “winning” and “success.” | | | | | | | | | |
| **Entry Event**  How will you introduce the topic in an engaging way? | For our school, the entry event was held at the Indianapolis Raceway in Speedway where the NHRA and US Army hold a partnership every year discussing careers in the motorsports industry. Students listen to a 15 minute presentation, then visit booths (and watch racing) designed to share the appeal of careers both in the military and in motorsports.  This link shows the 2018 season:  [https://www.nhra.com/news/2017/nhra-youth-and-education-program-will-celebrate-30th-season-2018.](https://www.nhra.com/news/2017/nhra-youth-and-education-program-will-celebrate-30th-season-2018) If you are not close to a motorsports hub, you could have a different entry event, perhaps show clips from “Days of Thunder” movie or the new Born Racer movie clip (<https://www.youtube.com/watch?time_continue=51&v=pJb8j6yZf-0>) or clips of winning team cross the finish line at an Indy car race. There are lots of possibilities. | | | | | | | | | |
| **Public Product**  How will students be able to demonstrate what they have learned? | **Team:** | Great American Dragster Derby (GADD) Racing Competition at school | | | How will students demonstrate competency attainment as a team?  Compete successfully with team. | | | Presentation Audience | | |
| ☒Class | | |
| ☒School | | |
| ☐Community | | |
| **Individual:** | Participate in the racing competition, involved as an individual member. | | | How will students demonstrate competency attainment individually?  Compete successfully with team. | | | ☒Experts | | |
| ☐Web | | |
| ☐Other:Click here to enter text. | | |

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| **PROJECT OVERVIEW** | | | | | | | | | | | | |
| **Competency Attainment**  What competencies should students understand, know and be able to do as a result of the PBL? | | | What competencies will you introduce? (Level 1):  A1: Identifying occupational interests, aptitudes and abilities  What competencies will be in progress during this project? (Level 2):  C17: Demonstrate time management  C18: Follow directions  C19: Practice effective human relations  E30: Demonstrate commitment to an organization  F33: Base decisions on values and goals  F34: Identify process of decision making  F35: Demonstrate ability to assume responsibility for actions and decisions  F36 Demonstrate positive attitude  Which competencies will students be able to demonstrate mastery by the end of this project? (Level 3):  B7: Construct a resume, B9: Conduct a job search, B13: Complete a job interview, E26: Demonstrate team membership, E27: Demonstrate team leadership, E29 Compete Successfully | | | | | | | | | |
| **Formative Assessments**  (Check all that apply)  How will you assess student learning throughout the PBL? | | | ☒Checklists | | | ☐Notes | | | | | | ☒Preliminary  Plans/Outlines/Prototypes |
| ☒Concept Maps | | | ☐Online Tests/Exams | | | | | | ☐Quizzes/Tests |
| ☒Journal/Learning Log | | | ☐Practice Presentation | | | | | | ☐Rough Drafts |
| ☐Other (see PBL Library for ideas): Click here to enter text. | | | | | | | | | |
| **Summative Assessments**  (Check all that apply)  How will you assess student learning at the completion of the project? | | | ☐Essay | | | | ☒Peer Evaluation | | | | |  |
| ☐Multiple Choice/Short Answer  Test | | | | ☒Self-Evaluation | | | | |  |
| ☐Oral Presentation, with rubric | | | | ☐Written Final, with rubric | | | | |  |
| ☒Other (see PBL Library for ideas): Car is judged by experts/race is timed with 1st, 2nd, 3rd place recognized | | | | | | | | | |
| **Reflection Methods**  How will you provide intentional opportunities for students to reflect on learning throughout the PBL? | | | **(Individual, Group, and/or Whole Class)** | ☐Journal/Learning Log | | | | | | ☒Focus Group | | |
| ☒Whole-Class Discussion | | | | | | ☐Fishbowl Discussion | | |
| ☒Survey | | | | | | ☐Other (see PBL Library for ideas):  Click here to enter text. | | |
| **PROJECT OVERVIEW** | | | | | | | | | | | | |
| **Career Association:**  How will you build student leadership into the PBL? | | | **Which CA Goal(s) will be covered in this PBL?**  ☒Leadership  ☐Community Service  ☒Career Prep  ☐Civic Awareness  ☐Social Awareness  ☒Fundraising | | **What roles will your officers lead in planning?**  Leadership:  *Officers take the lead in identifying timelines and in obtaining/*  Community Service: *suggesting guest speakers. Fundraising is required to*  Career Prep:  *provide “seed money” for any project.*  Civic Awareness:  Social Awareness:  Fundraising: | | | | | | | |
| **How will you incorporate committees, or the rest of your class?**  Leadership: *Entire class is involved in research of the community*  Community Service: *suggest ways to fundraise.*  Career Prep:  *Within small groups students share their expertise through*  Civic Awareness: *their various roles within the group*  Social Awareness: .  Fundraising: . | | | | | | | |
| **Which Career Pathways will be incorporated into this PBL?**  ☒Arts & Communication  ☒Business, Management, Marketing & Technology  ☒Engineering/Manufacturing & Industrial Technology  ☐Health Sciences  ☐Human Services  ☐Natural Resources & AgroSciences | | | | | **Which employers/businesses will you work with throughout this project?**  NHRA (National Hot Rod Association) and the US Army participate in the YES program. In addition we involved interested individuals -- from the auto industry and motor sports industry and judges as well as from the local businesses as sponsors. A guest speaker (advertising, marketing, or Public Relations P/R) often facilitates the “working backwards” timeline. In addition, they can assist in training student to secure sponsorships (or other aspects of fundraising). Finally,an Engineer/STEM employer can assist with improving racing speed once cars are built). | | | | | | | |
| **Employer Engagement Strategy:**  How will you utilize employer connections to increase relevance? | | | **Circle One:**  ☒Meet and Greet  ☒Classroom Presentation  ☒Project Observation  ☒Skype/Webinar  ☐Mock Interview  ☐Other: Click here to enter text. | | **Circle Two:**  ☐Service Learning  ☒Company Tour  ☒Mentoring  ☐Co-Develop PBL/Scaffolding  ☒Critique of Public Product  ☐Other: | | | | | | **Circle 3:**  ☒Job Shadow  ☐Limited Time Work Experience  ☐Pre-Apprenticeship  ☐Internship/Apprenticeship  ☐Summer Job  ☐Other: Click here to enter text. | |
| **PROJECT OVERVIEW** | | | | | | | | | | | | | |
| **Scaffolding**  What lessons, exercises, and activities will be integrated into the project that build a student’s understanding and experience with the content?  How is this scaffolding be leading students towards the Driving Question and ultimately to a high-quality Public Project? | | | **Prior to the Project Beginning:** (What do you need to do to prepare for the project to begin?)  If you use the same entry event as we did (trip to the Raceway sponsored by the US Army and NHRA), you’ll need to know more about that event and make field trip arrangements. You’ll want to know more about this particular industry to see the says this topic intersects with jobs/careers in your local area. You’ll want to know your students’ interests. Do they enjoy racing (Formula One/NASCAR, motorcycles, etc). Can you foster energy and interest in this topic with your particular students? You’ll need permission from some location to hold the event and the Specialist should set the day of the Great American Dragster Derby (GADD) event in advance of the PBL announcement. You may wish to secure employers who will assist with the “working backwards” timeline, train students in fundraising (if you choose to do fundraising/sponsorships on cars or t-shirts or if you want someone to sponsor winners/trophies), and who can assist in improving speed of cars (an engineer). In a pinch a teacher or volunteer from DECA, BPA, PLTW, FFA, 4H or other program might assist you. Some may worry about the appeal of this project: Because the focus was more on teamwork and had a wide appeal regarding careers, we found the topic appealed to a wide range of students. As a beginning project, to build camaraderie and team membership, this PBL met expectations.  Review the lesson plans from NHRA and decide if you want to encorporate additional lessons (for example, specific STEM principles) into this PBL. Additional lesson plans from NHRA could supplement this PBL: These include math, science, language arts and “Business Behind the Scenes”: <http://www.nhra.net/YES/Lesson%20Plans/Full%20Lesson%20Plan.pdf>.  **Launching the Project:** (How will you SPARK their attention?)  Our advantage is that Indianapolis is a motor sports capital, so this field trip s often a highlight of JAG (even without the PBL), but for this PBL, other entry events would also work equally well. If you are not close to a motorsports hub, you could have a different entry event, perhaps show clips from “Days of Thunder” movie or the new Born Racer movie clip (<https://www.youtube.com/watch?time_continue=51&v=pJb8j6yZf-0>) or clips of winning team cross the finish line at an Indy car race. There are lots of possibilities.  .**Project Navigation:** (What are the main ideas and lessons you will need to take from the first day, through completion of the PBL?)  Students should know how PBLs work and the expectations on the students. Typically our students have watched the IDEO Deep Dive video and have established rules for brainstorming.<https://youtu.be/M66ZU2PCIcM> A copy of that lesson plan is here: <https://drive.google.com/open?id=1OvAPeclvnrGksy8_CDgYJRogDfHTwCLde9pV5jWTyDw> After week 3, students meet weekly in their teams where the cars are fine-tuned, sponsorships are being obtained and a review of timeline and project status is shared. Problems or concerns can be brought up in class as group discussion and lessons might need to be designed and incorporated into this PBL to assist with issues of communication and conflict. The timeline outlines some specific dates to be set based on our experience; however, these deadlines are set based on your GADD date. | | | | | | | | | | |
| **Accommodations**  What modifications will you need to make to fit the needs of all students in your classroom? | | | Adjustments may be made based on 504 or IEP accommodations | | | | **Revision & Critique:**  How will you provide opportunities for students to review their work and provide feedback for improvement? | Journaling and team collaboration gives opportunity for feedback.. Employers also assist. Students should be given opportunities to test their designs, timing them to insure fastest speed. | | | | | |
| **Resources**  How will you incorporate business professionals, employers, community leaders, organizations, technology, funding and other resources to implement this project? | | | **WHO** will you be incorporating? | | | | **HOW** will you be incorporating? (please describe) | | | | | | |
| ☒School Staff | | | | You can partner with the STEM classes or PLTW programs to expand the pool of participants or foster a more competitive experience. School administration can sponsor, assist with location for the GADD, act as judges. They should plan to attend as spectators. | | | | | | |
| ☒Business Professionals/Employers | | | | can sponsor, assist with location for the GADD, act as judges. They should plan to attend as spectators. Engineers can discuss how basic STEM principals can increase speed. Business professionals can assist with learning how sponsorships are obtained and with car branding. | | | | | | |
| ☒Community Leaders/Organizations | | | | can sponsor, act as judges. They should plan to attend as spectators. | | | | | | |
| ☒Technology | | | | In future programs CAD or 3D printing might be another option for this PBL. Obviously and understanding of racing technology -- both cars and track -- is needed | | | | | | |
| ☒Materials | | | | Cars purchased: “Nitro” Top Fuel Dragsters from <https://aeroracers.com/product-category/home/products/gadd-dragsters>. Note the website shows how to create “wraps” to put sponsorships onto cars. | | | | | | |
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|  | **STUDENT LEARNING GUIDE** | | | | | | | | | | | | |
|  | **Project:STEM-GADD/Racing PBL** | | | | | | | | | | | | |
|  | **Driving Question:** How can we work together as a team to achieve success? | | | | | | | | | | | | |
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|  | **Description of Activity/Product**  What will students, specialists, guests, etc. be doing during this portion? | | | | | | | | **Learning Outcomes/Targets**  What knowledge, understanding & success skills will students need to successfully complete this portion? | | | | |
|  | ☒Formative  ☐Final Product | Timeline Activity | | | | | | | Must be completed in order to meet deadline of GADD. | | | | |
|  | ☒Team  ☐Individual |
|  | ☒Formative  ☒Final Product | Writing a resume (draft)  Mock interviewing | | | | | | | Specialist may need to teach the basics of resume writing and interviewing prior to this activity. Students follow guidelines to write a resume that matches their skills to a particular job or task in the PBL.  Students might mock interview to practice their interviewing skills before they actually interview for the position. | | | | |
|  | ☐Team  ☒Individual |
|  | ☐Formative  ☒Final Product | Final Resume  Final Cover Letter | | | | | | | JAG Indiana requirement | | | | |
|  | ☐Team  ☒Individual |
|  | ☒Formative  ☐Final Product | Car Completion & race test | | | | | | | Test run for racing car | | | | |
|  | ☒Team  ☐Individual |
|  | ☐Formative  ☒Final Product | Great American Dragster Derby (GADD) | | | | | | |  | | | | |
|  | ☒Team  ☐Individual |
|  | ☒Formative  ☒Final Product | GADD Reflection activity | | | | | | | If students choose to write a press release, they may need an example. Have an easy way to share pictures taken throughout the event as well as at the GADD event. | | | | |
|  | ☐Team  ☒Individual |

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| **PROJECT CALENDAR** | | | | |
| DAY 1 | DAY 2 | DAY 3 | DAY 4 | DAY 5 |
| **PROJECT WEEK ONE** | | | | |
| ***Entry Event and introduction of PBL and Timeline:***  Career in MotorSports Field Trip or other entry-level event.  Here is a checklist to help you prior to beginning this PBL: <https://docs.google.com/document/d/1UK5rwqswKQx3UMOqFGRJ1ATsesSfLsAzDV6jTPVSC3A/edit?usp=sharing>  Take pictures. | NHRA lesson Plans that might be applicable this week as follow up to the Field Trip: <https://www.nhra.com/YES#>  Science: Acceleration at Work:  Technology: Precision-Precisely!  Engineering: Innovation & Safety  Sponsorship: Business Behind the Scenes: | Introduce statement/driving question. Share team structure using your own handout (see appendix) Taken from this link: <https://drive.google.com/file/d/1pxfArrew0HwC_dvAIKIWMMW9Lvdfvs0c/view?usp=sharing>  Begin Brainstorming what is needed to have a successful racing team and what may be required:  Lesson Plan: <https://drive.google.com/open?id=1qSrPGjUdYI10Oy_IDPEW5weUJGj8zwZrzoRHrrq3aNg> |  | Guest Speaker assists with building PBL timeline working backwards  Lesson Plan: <https://drive.google.com/open?id=1kYDMPNvZc_O4Nhe19dxjXJ2_4ag5Ccmvd-TNwdo6Nys> |
| **PROJECT WEEK TWO** | | | | |
| ***Interviewing/Selection of Roles Week***  Select Crew Chiefs and hand out task sheets for roles.  Students write resumes for positions they want - Interviews are the end of the week.  Lesson Plan:  <https://docs.google.com/document/d/1RAubCxfTH72RCx7G2CpIM2sV-jGkVW4t6h0mdsTMtbg/edit?usp=sharing> |  | Finish resumes. Interview Practice  Peer interviewing or you could bring in employer interviewers to review resumes and to assist students in practicing interviewing.  NHRA lesson Plans that might be applicable this week: <https://www.nhra.com/YES#>  Language Arts: Let the race begin. (note you could look at other roles to add to your PBL at this time) |  | Crew Chiefs interview applicants for remaining positions including  other positions such as  Race Official Official Starter Finish Line Official Reporter/Media Specialist  Lesson Plan:  <https://docs.google.com/document/d/1oTKbjylt-cjjdhIl_OCX8kf-A_O2MoadftIJHWmIv00/edit?usp=sharing>  Take pictures of interviewing |

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| **PROJECT CALENDAR** | | | | |
| DAY 1 | DAY 2 | DAY 3 | DAY 4 | DAY 5 |
| **PROJECT WEEK THREE** | | | | |
| ***Car Building & Design week:***  Teams meet and review tasks sheets  Lesson Plan: <https://docs.google.com/document/d/1sjzHVKmgiD8xwc0qIsCar00JPFGJcuRGAhc5YBNx3JY/edit?usp=sharing>  This week: team name is decided, cars are built. If you will be fundraising, sponsorships are discussed. If you are not using sponsorships for fundraising purposes, you can still include sponsorships on cars. Appropriate Team colors and designs (t-shirt/car) are discussed and decided. | Additional Note for Day 1: 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> | NHRA lesson Plans that might be applicable this week: <https://www.nhra.com/YES#>  Science: Acceleration at Work:  Technology: Precision-Precisely!  Engineering: Innovation & Safety  Math: Calculate the Win  (Understanding Sponsorship and marketing): Business Behind the Scenes:  Take pictures of cars being built | Click here to enter text. | Click here to enter text. |
| **PROJECT WEEK FOUR** | | | | |
| ***Car Testing week/Car Design & Public Relations/Sponsorship planning Week***  Teams meet and review task sheets.  This week: car building is finished. Testing and car improvement begins. Guest speaker engineer might come in to assist students to maximize car speed. In our PBL students used tools to improve speeds. For example,we brought in a drill to “true” wheels and decrease friction. We learned that overwinding is just as detrimental as underwinding a car. | *Day One continued:*  Concurrently, a Guest Speaker for Public Relations (P/R) can assist in marketing or obtaining Sponsorships and communicating with Artists about look of cars. Public Relations works with artists to design flyers for GADD announcements and invitations  Artists present and obtain approval of flyers and car design/wraps. Then render flyers/wraps for printing and distribution. | Lesson Plan (for the week):  <https://docs.google.com/document/d/1NoYIdrlZ3pzbSLTAhmMXEz0qTaeiIwk55ZNJnQr1YzQ/edit?usp=sharing>  Take pictures of preliminary testing, working with engineers and other employers. Take pictures of sponsors. | NHRA lesson Plans that might be applicable this week: <https://www.nhra.com/YES#>  Science: Acceleration at Work:  Technology: Precision-Precisely!  Engineering: Innovation & Safety  Math: Calculate the Win  (Understanding Sponsorship and marketing): Business Behind the Scenes: | Click here to enter text. |

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| **PROJECT CALENDAR** | | | | |
| DAY 1 | DAY 2 | DAY 3 | DAY 4 | DAY 5 |
| **PROJECT WEEK FIVE** | | | | |
| ***Finalize event (for Friday or following week)***  Teams meet for a final time before raceday  This week: event promotion and raceday )  P/R prints flyers, distributes announcements and promotions for GADD, invitations are sent and guests are secured.  GADD is the end of the week or next week.  Specialist verifies location is available and ready for raceday. | You might choose to follow this lesson plan. It is optional Page 43 of this link:<http://www.nhra.net/YES/Lesson%20Plans/GADD-Focus-on-Teamwork-Careers-and-STEM.pdf> | Team pictures  Dragster pictures  Sponsor logos  Race day set up pictures  Pictures the day of the event  Pictures of teams who placed and who competed  Pictures of teams with sponsors (if appropriate)  Pictures of teams with school administration | Click here to enter text. | Click here to enter text.  Great American Derby Day today or next week.  Review lesson plan 5 on page 45 of this link: <http://www.nhra.net/YES/Lesson%20Plans/GADD-Focus-on-Teamwork-Careers-and-STEM.pdf> |
| **PROJECT WEEK SIX** | | | | |
| **PBL reflection and GADD recap**  Lesson Plan:  <https://docs.google.com/document/d/1Me5BCBYIUrmZMxWtohdYLy-prhUNB7rQnaYJ4qtpkPE/edit> | Click here to enter text. | Click here to enter text. | Click here to enter text. | Click here to enter text. |

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| **ADDITIONAL INFORMATION** |
| The following is included so a Specialist understands how this organization supports Youth and Education.  NHRA YOUTH AND EDUCATION SERVICES®  NHRA is an acronym for National Hot Rod Association. Founded in 1951, the company was originally created as a means of getting hot-rodders off the streets and into a safer environment. Today, the NHRA is the world’s largest motorsports sanctioning body and the foremost promoter of drag racing in the world! It entertains millions of racing fans per year, with the fastest and most spectacular form of entertainment on wheels. The NHRA’s premier racing series features 24 national championship events each year.  The NHRA Youth & Education Services (YES) Program was founded in 1989. It is the only full-time education program in motorsports that provides quality programs and activities for schools and youth organizations nationwide. Not only is the YES Program FREE, it focuses on the importance of goals and continued education, while allowing students to learn about and explore various career opportunities. The program will show students how S.T.E.M. (Science, Technology, Engineering, and Math) is applied to both, real world situations and NHRA Drag Racing, which they will have the opportunity to see live at the track!  NHRA YES program/Drag Racing site (includes lesson plans): <https://www.nhra.com/YES>  Article on Army/NHRA partnership: <https://www.nhra.com/news/2017/nhra-youth-and-education-program-will-celebrate-30th-season-2018>  **Stem and NHRA links:**  General images: <https://drive.google.com/open?id=1YlgATOEYEpMfEvx5SLfdbQpn7IK7geKj>  Dragster purchase site: <https://aeroracers.com/product-category/home/products/gadd-dragsters>  Dragster Derby youtube video: <https://youtu.be/DaSazHC_sHI>  F1 in Schools website: <https://www.f1inschools.com/>  STEM Behind the Wheel: Designing Race Cars: <https://www.stemjobs.com/racecar/>  HERE ARE A FEW EDUCATIONAL VIDEOS TO CHECK OUT:  NHRA Sports Science <https://www.youtube.com/watch?v=f9fG1CTvu0I&feature=youtu.be>  How a Top Fuel Dragster Works <https://www.youtube.com/watch?v=-VF0JwxQqcA>  The NHRA YES Facebook page is a one-stop shop for all information and updates on the program. Educators can find informative video presentations on NHRA championship drag racing, news links to the positivity of the program, program dates, contact information and much more. [www.facebook.com/NHRAyes](http://www.facebook.com/NHRAyes) |