Lesson Plan

Hey there!
My name is Alex Reader and I am the founder here at STIIX.

I am a former engineer & teacher- and I have a huge passion for helping shape students minds through STEAM.

If this is your first STIIX lesson, we just want to say thank you! We hope both you & your students enjoy the hands-on activities, and please know we are here for any support along the way.

Car Project

Topics: Friction, Energy Transfer
Career Exploration: Automotive Eng.
Length: 2-3 Hours
Teams: 1-3 students

All of our projects follow the infamous 'Engineering Design Process', shown below. This process is so meaningful to me because not only is it applicable here for this activity, but also in life...Design constraints are representative of the real world, failure is okay, and constantly making improvements is what is all about!

The purpose of this lesson plan is just to point you in the right direction to all the helpful resources we provide to help make this activity a smooth, memorable, and impactful one!

If any question pop up at all after scanning through, please do not hesitate to call or email!

480.747.7852 Info@hellostiix.com

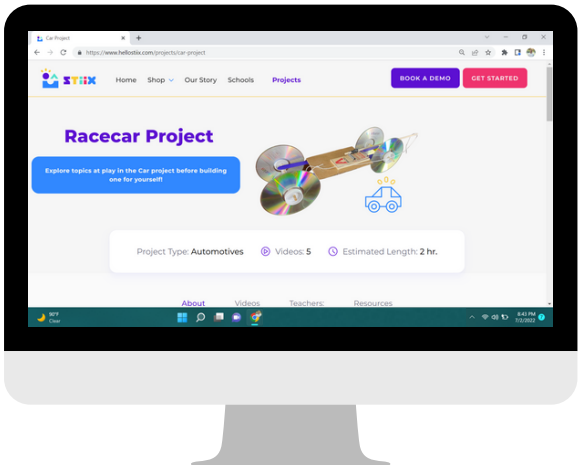
The Engineering Design Process

So where do I start?

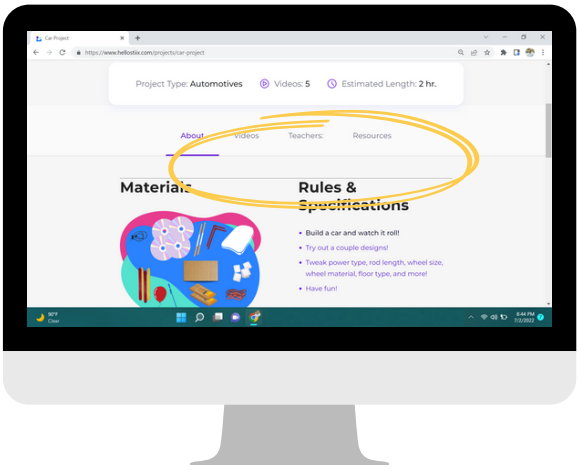
In case you have not found it already, you will want to navigate to the CAR project page.

To locate it, click on the "Projects" tab on our website and click the icon, or feel free to scan this QR code:

SCAN ME



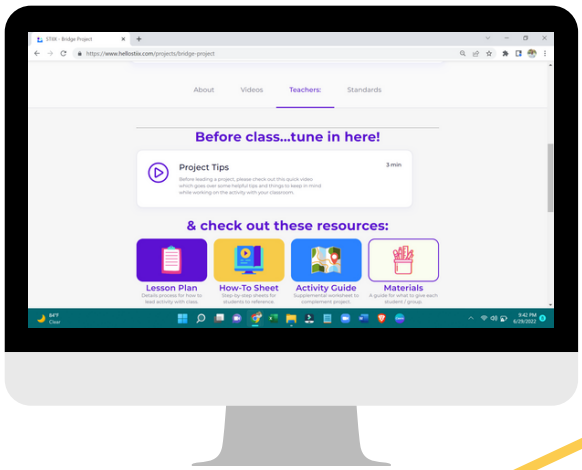
If you see this, you are in the right place



Scroll down and you will see where the project videos are housed, along with the rest of our resources for you!

Beforehand:

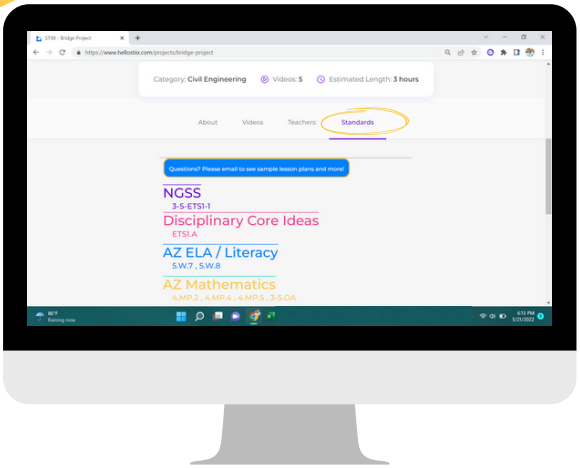
Don't worry, preparation is super minimal! We want to make this as easy as possible for you!



Be sure to check out our TEACHER TIPS VIDEO that we make for each project. In them, we detail helpful insight for how to best lead the project at hand!

1.

2.



Our projects align with some of the latest national standards. Click through the 'Standards' tab to see how the content meshes with your grade band & initiatives..

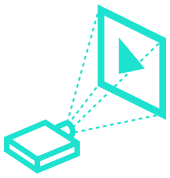
Car Project Objective:

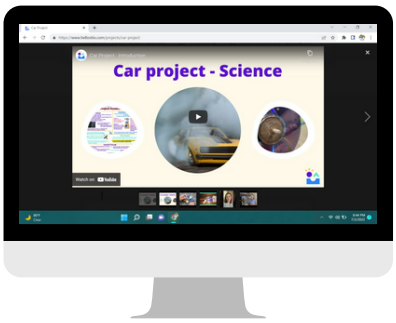
Students will be able to design and build a working racecar powered by one or multiple types of energy transfer (mouse trap, rubber band, balloon) before testing its performance in relation to the related form. The setting of this project is in STIIX-Ville, where the fictional town needs cars for their new highway system.

Key Vocabulary

Please keep an eye & ear out for the following vocab words:
Force, Elastic, Potential Energy, Kinetic Energy, Friction, Internal combustion engine, Wheel, Lever

The Process:





1. Project & Play Videos (10-15 mins.)

STIIX has a series of 5 videos we play for the students to introduce the project and how to go about building it.

- V1 = Introduction
- V2 = Academics
- V3 = 'How- To'
- V4 = Testing & Eval.
- V5 = Industry Spotlight

Optional: Allow well-behaved and respectful students to be the ones who play the videos for the class

Optional: Pause when prompted to discuss the inquiry-based learning questions!

2. Group up & Brainstorm (5-10 mins.)

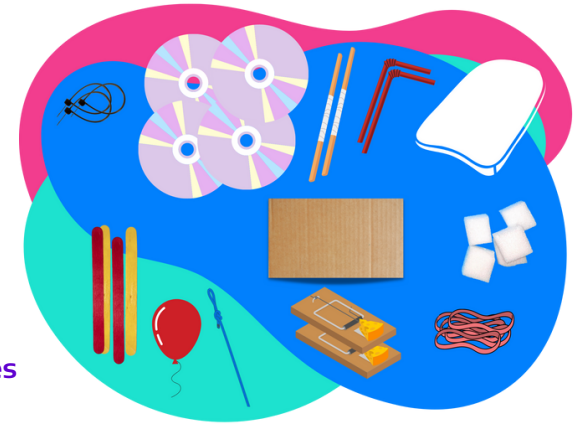
- Break up into teams of 1-3
- Prompt them to recollect our task
- Showcase example(s) if applicable
- Get ideas / design solutions down on paper
- Think of it as thinking time... talk to partners, ask questions, THINK BIG!
- Once you green light their design, they are free to get their materials
  - Green light if it looks to be an appropriate design and they have a plan omn how to construct it

3. Pass out Materials (<5 mins.)

Take time to set out materials in an organized fashion for students before class, while videos are playing, or while they are brainstorming.

Individual Mats.

- x4 CDs
- x8 Popsicle Sticks
- x2 Straws
- x3 Dowels
- x4 Foam Blocks
- x1 Mouse Trap
- x1 Balloon
- x1 Foam Base
- x1 Lg. Zip Tie & x4 Sm. Zip Ties
- x1 String
- Rubber Bands (as needed)

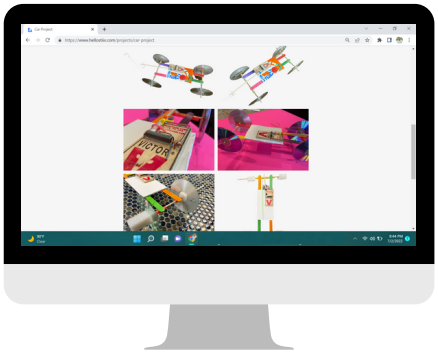


Shared / Group Mats.

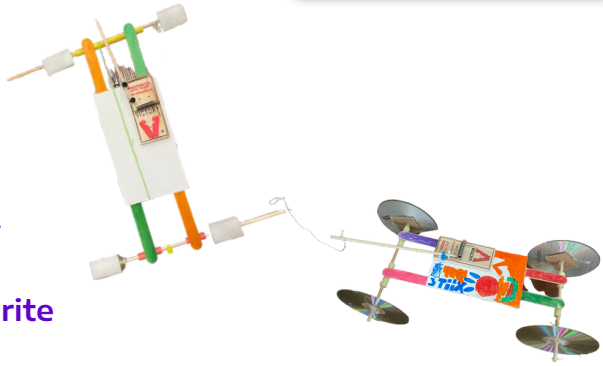
- Hot Glue
- Gloves
- Scissors
- Newspaper Sheets

4. Get to Building (1 - 1.5 hrs.)

- Pass out "Step-by-Step" sheets
  - If students ask you questions, ask them if they have referenced the sheet before you answer/help them
- Optional: Leave the "Gallery" section of the project page up while students are building

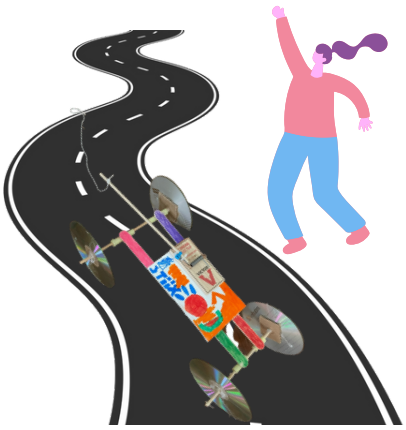


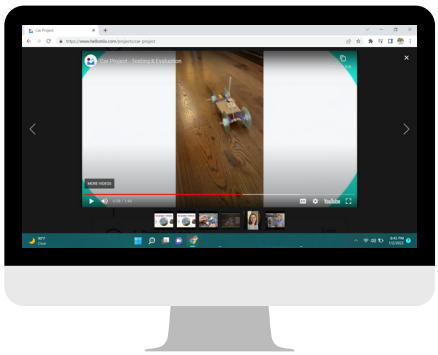
- Hot glue guns will be used
  - Make sure students are wearing gloves while using it & working over newspaper sheets to prevent a mess
- If project will carry over into another day, have students write name on car or sheet of paper all their supplies are on



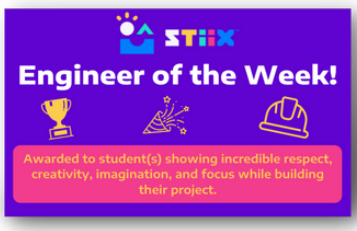
5. Testing / Cleanup (~15 mins.)

- Follow testing instructions per the 4th video
- Optional: Have students calculate the 'Structural Efficiency' of their bridge (weight held / weight of bridge)
- Can also play V5 (Industry Spotlight) at the end of the project once project is wrapping up





- While other groups are testing, groups to clean up workspace
  - Up to teacher: some students may prefer to bring home bridge as souvenir instead of test/break it
- Award the engineer of the week sticker(s)



Extension Activities:

Check out the following options to lengthen or compress this lesson.

- Decorate the vehicle
- Build another vehicle car powered by a different source
- Film tests in Slo-Mo and analyze
- Watch additional videos related to Cars
- Use a different materal to build a 2nd bridge & compare

- Skip testing portion
- Students ahead can help out others who may be behind

Optional Supplements:

Check out our activity guides, quizzes, and more on the project page to see if implementing those makes sense for your classroom!

Social-Emotional

RELATIONSHIP SKILLS

STIIX activities ideal for working in teams of 2-3 solving practical problems together.

SOCIAL AWARENESS

For open-ended challenges, different people have different ideas. How can we decide on the best one, or better yet, combine thoughts?

RESPONSIBLE DESISIONS

Our materials are age appropriate, but also need to be used safely and responsibly. Students' teams are counting on them to bear that responsibility and contribute.

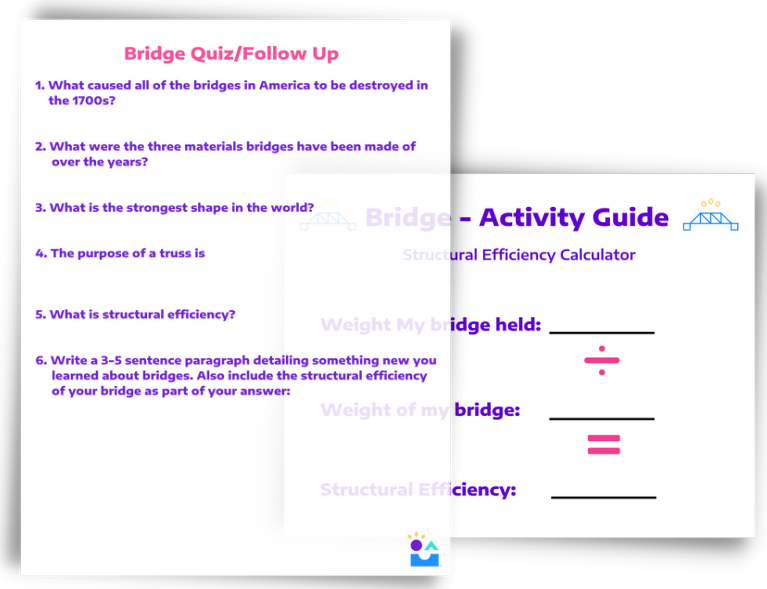
SELF MANAGEMENT

The Engineering Design Process creates ups and downs throughout the project. How do the students handle the inevitable obstacles and victories?

SELF AWARENESS

Our projects introduce students to some of the hottest STEM career fields. Our hope is they resonate with a project and spark a passion for a future career field!

Reading / Writing



Task students with some reflection questions from our provided 'Follow Up Quiz', or reinforce some topics through our activity guide handouts.

Both are found in the 'Resources' tab on the project page.