NASA TechRise Student Challenge FAQs
Updated September 29, 2021

What is the NASA TechRise Student Challenge?

- The NASA TechRise Student Challenge invites teams of sixth to 12th-grade students to design, build, and launch experiments on NASA-supported test flights. Guided by an educator, student teams affiliated with U.S. public, private, and charter schools can submit ideas for experiments to test on either a suborbital rocket with about three minutes of microgravity (i.e., weightlessness) or a high-altitude balloon with exposure to Earth's atmosphere and views of our planet. A panel of judges will review the submitted experiment ideas and select 57 winning entries. Each winning team will receive $1,500 to build their experiment, a 3D-printed flight box in which to build it, and an assigned spot to test their experiment on a NASA-sponsored suborbital flight operated by one of the following flight providers – Blue Origin, UP Aerospace, or Raven Aerostar. Additionally, Future Engineers will provide technical assistance and office hours throughout the experiment build period to help winning teams prepare their experiment for flight.
- Details at: https://www.futureengineers.org/nasatechrise

What is an entry in the competition?

- An entry is a student-written Proposal submitted by the educator affiliated with the team (Team Lead). The proposal will explain the team's proposed experiment idea and must specify whether the experiment is meant for a rocket or balloon flight. Teams are not required to build anything or have prior technology skills to submit an entry. If selected as a winner, the teams will then embark on their educational journey to build, refine, and fly their experiment for testing on a NASA-sponsored flight. Please use the NASA TechRise Proposal Template & Guide to submit your proposal.

What's the Timeline for the NASA TechRise Student Challenge?

- Challenge announcement: May 25, 2021
- Open submission period: August 18, 2021 to November 3, 2021
- Winners Announced & Experiment Build Starts: January 21, 2022
- Experiment Build Period: Winning teams can start building their experiment immediately after the winner's announcement on January 21, 2021. The winners will also be notified of their vehicle assignment and provided with a specific cable to simulate the vehicle's power and data connection during the experiment build period. NASA encourages teams to complete and mail all experiments to Future Engineers on or before June 30, 2022, to align with the 2021/22 academic school year. It is important to have a realistic scope for your project based on this schedule and team availability. Per the rules, however, all experiments must be mailed to Future Engineers no later than October 31, 2022.
- Experiments Launch on NASA-sponsored flights: Early 2023

What is the maximum number of students allowed on a team?

- There is no maximum number of students on the same team, but all student teammates must attend the same school.

Can one teacher/team/school submit multiple entries?

- Yes! Teachers/schools may submit multiple entries, but each entry should be unique. Prizes, however, are limited to one winner per school, regardless of how many proposals are submitted.

How and when do we submit our entry? Do we have to submit the proposal in a specific format?

- Teams should write a proposal that explains their experiment idea using the NASA TechRise Proposal Template & Guide. The final proposal must be saved/exported as a PDF file and submitted to the NASA TechRise challenge website on or before or 11:59 pm Pacific Time on November 3, 2021.

What are the differences between a suborbital rocket and a high-altitude balloon?

- The NASA TechRise suborbital rocket flights take an approximately 11–16-minute trip to the edge of space, where at the peak of flight, all experiments will experience about three minutes of microgravity (i.e., weightlessness). Suborbital rocket experiments will be focused on what's going on INSIDE the flight experiment box during microgravity. The high-altitude balloon will ascend for approximately 1 hour until it reaches an altitude of 70,000 ft, at which point it will float at that altitude for at least 4 hours. During flight, the experiment will be able to sense the atmosphere and take images of Earth. You can learn more about the vehicles and the test opportunities by watching the "About High-Altitude Balloons" video and the "About Suborbital Rockets" video on the challenge website.

I see that there are two rocket providers. Are we supposed to choose one?

- No, teams do not need to (or get to) choose which rocket their experiment will fly on. There are two rockets, with two sets of unique requirements, but all proposals should be developed using these general NASA TechRise suborbital rocket design guidelines and the Proposal Template. If selected as a winner, your team's experiment will be assigned to fly on either Blue Origin's New Shepard or UP Aerospace's SpaceLoft rocket. During development, the winning teams may need to make slight design changes to comply with the specific requirements of your assigned rocket. Future Engineers will advise teams as needed on those vehicle requirements

Can you perform multiple tests within one experiment?

- Yes. You can perform multiple tests as long as the experiment idea(s) fits within the size and weight limit of the vehicle you can propose multiple tests in one flight box.

Will the experiment be exposed to the outside environment at altitude?

- It depends!
    - For the high-altitude balloon flight, YES, the experiments will be mounted on a gondola frame that hangs from the balloon and rises to 70,000 feet.
    - For the suborbital rockets, NO. The experiments inside Blue Origin's New Shepard rocket will be in a pressurized, climate-controlled cabin, similar to being inside a commercial airplane cabin during flight with no outside exposure. The experiments inside the UP Aerospace SpaceLoft rocket will have the same

ambient pressure as if they were outside of the rocket, but the temperature will be different since the outer skin of the rocket heats up during flight.

Will the flights have coastline views?

- No. The high-altitude balloon will be launched at an inland location in Baltic, South Dakota. However, there may be views of local bodies of water (e.g., lakes, rivers). There are no views on the suborbital rocket flights.

Will the experiments have line of sight to the exterior of the rocket or the balloon?

- On the rocket flight, experiments will be enclosed inside of the rocket and therefore there will be **no** line of sight to the exterior and no views down to Earth.
- On the balloon flight, the experiment will have a line of sight in two directions during flight – Down to the Earth (Nadir) and out to the horizon (Horizontal).

I see that the Flight Vehicle Tech Sheets are different from the Design Guidelines, how should I think about these in terms of my team's proposal?

- After your team selects a vehicle, please design your proposal using either the Rocket Design Guidelines or the Balloon Design Guidelines. Since there are two rocket vehicles with their own unique requirements, we have created a generalized set of Rocket Design Guidelines. All teams proposing a rocket experiment should design to these general guidelines. If your team wins, you will be assigned to a vehicle, and may need to make design small design adjustments, depending on the vehicle. The Tech Sheets can be used to learn more about each specific flight vehicle, and will come into play more when winners start developing their experiments.

Will the winners get the payloads back after the flights?

- The flight providers will do their best to retrieve and mail the payloads back so that students can analyze their experiment data and results. (In other words - YES, but we have to give full disclosure that there is always a small chance that an experiment can't be retrieved).

How are the entries judged?

- All entries will be judged against other entries submitted in their geographic region. (There are 20 competitive regions.) Within each region, entries will be separated into two judging groups – rockets and balloons. In their reasonable technical opinion, the judges will determine how well each entry addresses the Judging Criteria to select the winners in each region. For more detailed information on the Judging Criteria and the judging process, please check out the Challenge Rules.

How many winners will be selected?

- A total of 57 winners will be selected across the U.S. states and territories. Please refer to the Challenge Rules to see how many entries will win in each of the 20 competitive regions.

Is this Challenge open to International Participants?

- No. This challenge is only open to schools in the United States and its territories. For full eligibility details, please visit the Challenge Rules.

What is the difference between the Entrant and the Team Lead?

- The Entrant is the eligible sixth-12th grade-serving U.S. public, private, or charter school. The Team Lead is the teacher, educator, or other adult employee of the school that will lead the student group and assist them in submitting their proposal.This means that the school will be awarded the prize money and the experiment build will be part of the school's insured activities. You can find more information about this in the Challenge Rules.

Who is eligible for the competition?

- ∉ United States public, private, and charter schools incorporated in and maintaining a primary place of business in the United States that serve students in the range of 6th to 12th grades are eligible to assemble a Team (or multiple Teams) and enter. Eligible schools include schools in the fifty United States, District of Columbia, U.S. Territories or Possessions, and schools operated by the U.S. for the children of American personnel overseas. Unfortunately, Department of Defense Dependents Schools and other federal entity schools are not eligible to participate.

Why are Department of Defense (DOD) schools excluded from this challenge?

- NASA is conducting this public challenge under the authority of the America COMPETES Reauthorization Act, which directs prize funds to non-federal entities only. DOD schools are a federal entity and are, therefore, restricted from winning a prize. The COMPETES Act intends to stimulate innovation outside the federal sector.

Can homeschool students participate?

- It depends. In the pilot year of the NASA TechRise challenge, participation is limited to public, private, and charter schools. All prize money will be awarded to the school, and all experiment build activities will fall under the school's liability insurance policy. Homeschool students affiliated with a larger homeschool charter or umbrella school that carries the necessary liability insurance may form a team with other students and an adult employee at their affiliated school.
- Independent home school students who are NOT affiliated with a public, private, or charter school are ineligible to participate in this pilot year; however, this will be re-evaluated if future TechRise competitions are held. These eligibility requirements are specific to the NASA TechRise challenge. All other challenges on the Future Engineers site are open to homeschool students, and there will be at least three other challenges in the 2021/22 school year … so stay tuned!

Can students from different schools be on one team?

- No. In the pilot year, participation is limited to students from the same school; however, this will be re-evaluated if future TechRise competitions are held.

Can afterschool clubs participate?

- Yes, if the club is part of school activities and a school employee can serve as a Team Lead, the school club is eligible to participate.

Can offsite afterschool programs join the TechRise Challenge?

- In the pilot year of the NASA TechRise challenge, participation is limited to public, private, and charter schools; however, this will be re-evaluated if future TechRise competitions are held. These eligibility requirements are specific to the NASA TechRise challenge. All other challenges on the Future Engineers site are open to students affiliated with afterschool programs, and there will be at least three other challenges in the 2021/22 school year … so stay tuned!

Do I need to get parent signatures for students to participate?

- Parent signatures are not required to enter the competition; however, if your team's proposal is selected as a winner, the Team Lead may be required to obtain consent from all Team members' parents'/legal guardians regarding participation in the -challenge and experiment Build activities. When required, a consent form will be provided.

My class will change throughout the timeline of the proposal. Can I add students to my team?

- Yes, students may be added to the team so long as they attend the same school as the Team Lead. However, if selected as a winner, the Team Lead may be required to obtain parent/legal guardian consent for any student involved in the experiment build and therefore will have to do so if a new student is added during the Experiment Build period.

Can the "Team Lead" or Teacher change throughout the challenge timeline?

- Yes, a substitute Team Lead can be appointed, provided -the new Team Lead also works at the school and satisfies the eligibility requirements. - You can find more information about this in the Challenge Rules.

Can Future Engineers help us with our entry?

- Future Engineers cannot mentor teams or provide advice on any experiment idea/s.
    - However, Future Engineers can answer any logistical questions your team has regarding completing or submitting your proposal. They will also be available to clarify the Challenge Rules and Design Guidelines or answer any other questions you might have along the way.
    - Additionally, after the entry period is closed, and if your team's proposal is selected as a winner, Future Engineers will provide technical assistance and office hours throughout the Experiment Build period to help prepare your experiment for flight.
    - Please reach out to support@futureengineers.org for assistance.

Can a student team get help from someone other than a teacher or other employee at our school?

- Yes, you can. Teams are welcome to reach out to anyone that they think can assist them with the challenge with the following exceptions:
    - Students are expected to write their own team proposal.

- Participants shall neither directly nor indirectly use U.S. Government facilities, Flight Provider facilities, nor consult with NASA personnel or NASA contractors.

What support will I receive to build my payload if my team is selected as a winner?

- Future Engineers will provide technical assistance and office hours throughout the experiment build period to help winning teams prepare their experiment for flight.

Is $1500 the maximum our team can spend on our experiment?

- When developing your proposal build plan, keep in mind that all purchased components to build your proposed experiment should not exceed $1500. The judges are not requesting a budget, nor will any team be disqualified based on cost, but proposals that require additional funding or outside sponsorship beyond the $1500 prize value will score lower.

What sensors can my team use?

- You are more than welcome to use any sensor that would be appropriate for your experiment. While we have provided a Hardware Component List, this is by no means a required component list. We realize that there are many components out there that will work in a flight experiment. Teams are free to choose any sensors, however, we do advise you to choose sensors that align with the Rocket Design Guidelines or Balloon Design Guidelines. For fairness, Future Engineers is not able to advise on what specific components should be included in your team's proposal. However, if your team wins, a Future Engineers expert will review your hardware components to ensure compliance with the vehicle requirements.

What microcontrollers can my team use? For example, can we use a Rasberry Pi?

- You are more than welcome to use any microcontroller that would be appropriate for your experiment. While we have provided a Hardware Component List, this is by no means a required list. We realize that there are many microcontrollers out there that will work in a flight experiment. Teams are free to choose any hardware components; however, we advise you to choose ones that align with the Rocket Design Guidelines or Balloon Design Guidelines.
- Something to note is that there are voltage and amperage limitations listed in the Design Guidelines. Some microcontrollers do not work as well with such restrictions, so if you are interested in using a Rasberry Pi, we would advise you to look at the voltage and amperage design guidelines and then look at the different types of Raspberry Pi microcontrollers that will work successfully with the limitations. Another consideration is that we have a few flight simulator support materials on the Challenge Page that are focused on the CircuitPython language. If you want to be able to leverage those resources, you may want to use a microcontroller that can be used with CircuitPython.

How will the provided DB9 connector or USB be used to power a microcontroller and various other electronics?

- First, we want to point out that there is no DB9 connector on the Blue Origin flight. If your team proposed a rocket experiment, wins, and is assigned to a Blue Origin rocket flight, it would be powered through USB.

- That aside, the DB9 connector on the UP rocket flight or Raven balloon flight will connect to the payloads through a circuit board called the Payload Interface. That circuit board has the DB9 connector on the exterior. On the interior, the Payload Interface has connectors on standard JST-XH pin headers that provide connections to 9V at 1A max, 5V at 1.5A max, and 3V at 1.5A max and ground.
- Depending on what electronics you need to power, you can use any of the power supplies referenced above. For a Raspberry Pi, for example (and we would only recommend a Pi that complies with the power limitations above), you can power it directly from the 5V at 1.5A and ground pins. The interface also converts the flight data from RS422 to UART, so you can connect the UART RX pin on any compatible microcontroller or to the TX pin on the payload interface to receive flight data from the vehicle.

Can we use DNA or viruses in our proposal idea?

- Viruses are not allowed. DNA that is within a sterile solution can be used. It is important to note that the experiments may sit in the dark for several months as they await launch day. Therefore, we advise that teams ensure their solution has a long shelf life and can withstand environmental conditions listed in the Rocket Design Guidelines and Balloon Design Guidelines.