NASA TECHRISE STUDENT CHALLENGE

2022-23 Challenge Overview

https://www.futureengineers.org/nasatechrise

The Challenge

NASA is calling on middle and high school students to join the second NASA TechRise Student Challenge, which invites students teams to submit experiment ideas to fly on a high-altitude balloon.

Students in sixth to 12th grades at a U.S. public, private, or charter school -including those in U.S. territories- you are challenged to team up with your schoolmates to design an experiment under the guidance of an educator.

The high-altitude balloon will offer more than four hours of flight time at 70,000 feet and provide exposure to Earth's atmosphere plus views of our planet.

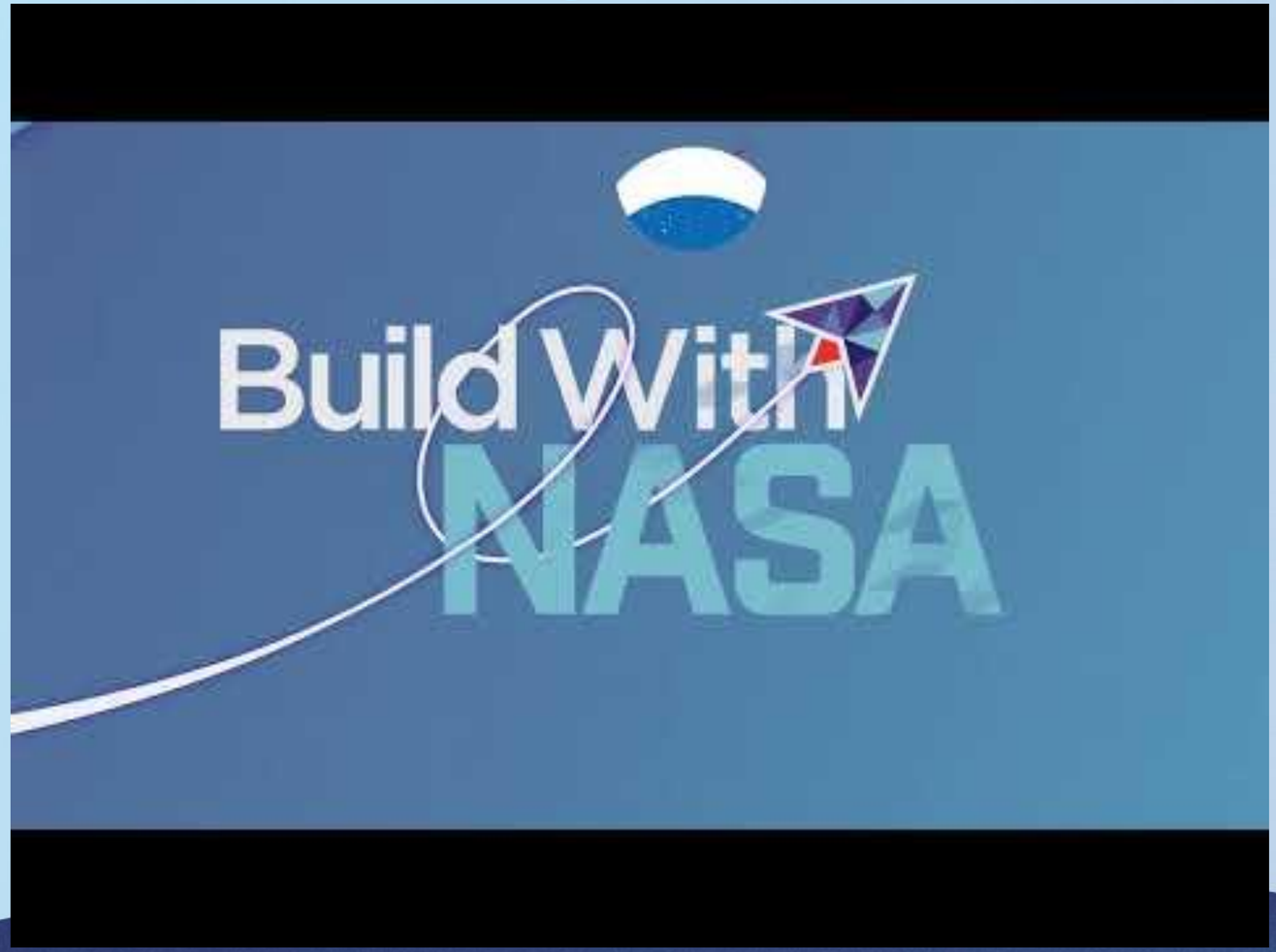
The NASA TechRise contest aims to inspire a deeper understanding of Earth's atmosphere, surface features, and climate; space exploration; coding; electronics; and the value of test data.

Prizes

60 winners will be selected to build their payload. The prize package consists of:

- $1,500 to build the experiment
- A 3D-printed flight box in which to build the experiment
- An assigned spot to test the experiment on a high-altitude balloon test flight
- Technical support from Future Engineers advisors when building the experiment

Watch the Challenge Video!



Challenge Timeline

Regions

- Teams will compete in one of 20 competitive regions

Steps to Enter

- **STEP 1: FORM A TEAM**

Your team needs to have at least 4 students and one educator/teacher.

- **STEP 2: REVIEW PROPOSAL TEMPLATE AND DESIGN GUIDELINES**

Your entry needs to be a written proposal that describes your experiment. It's important to review both the proposal template/guide and the balloon design guidelines to understand the requirements.

- **STEP 3: LEARN ABOUT BALLOONS**

Watch the balloon video and learn about balloon flights, including the types of things your experiment may see or experience.

- **STEP 4: PLAN YOUR EXPERIMENT**

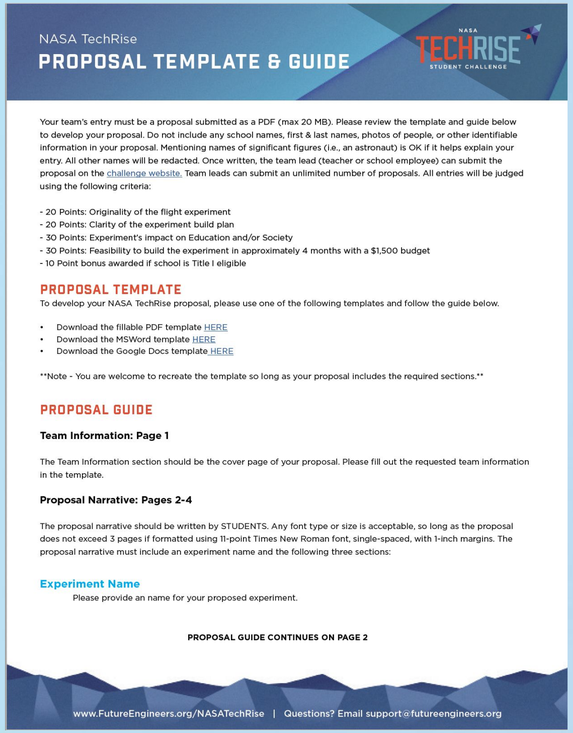
Use the brainstorming and design resources to explore experiment ideas and explore how to build your idea.

- **STEP 5: SUBMIT YOUR PROPOSAL**

Once your proposal is done, save it as a PDF so that the team leader (educator/teacher) can submit it online.

Proposal Template & Guide

Write up the experiment idea using [Proposal Template & Guide](#).



NASA TechRise

PROPOSAL TEMPLATE & GUIDE

Your team's entry must be a proposal submitted as a PDF (max 20 MB). Please review the template and guide below to develop your proposal. Do not include any school names, first & last names, photos of people, or other identifiable information in your proposal. Mentioning names of significant figures (i.e., an astronaut) is OK if it helps explain your entry. All other names will be redacted. Once written, the team lead (teacher or school employee) can submit the proposal on the challenge website. Team leads can submit an unlimited number of proposals. All entries will be judged using the following criteria:

- 20 Points: Originality of the flight experiment
- 20 Points: Clarity of the experiment build plan
- 30 Points: Experiment's impact on Education and/or Society
- 30 Points: Feasibility to build the experiment in approximately 4 months with a $1,500 budget
- 10 Point bonus awarded if school is Title I eligible

PROPOSAL TEMPLATE

To develop your NASA TechRise proposal, please use one of the following templates and follow the guide below.

- Download the fillable PDF template HERE
- Download the MSWord template HERE
- Download the Google Docs template HERE

Note - You are welcome to recreate the template so long as your proposal includes the required sections.

PROPOSAL GUIDE

Team Information: Page 1

The Team Information section should be the cover page of your proposal. Please fill out the requested team information in the template.

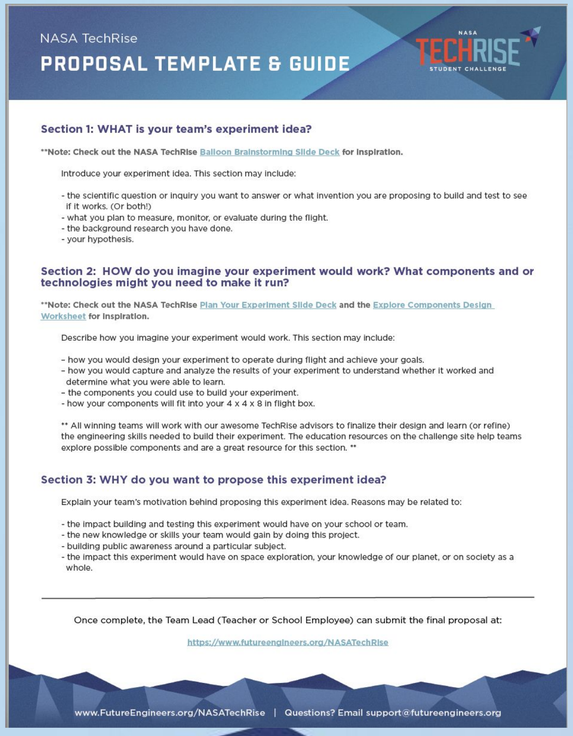
Proposal Narrative: Pages 2-4

The proposal narrative should be written by STUDENTS. Any font type or size is acceptable, so long as the proposal does not exceed 3 pages if formatted using 11-point Times New Roman font, single-spaced, with 1-inch margins. The proposal narrative must include an experiment name and the following three sections:

Experiment Name

Please provide an name for your proposed experiment.

PROPOSAL GUIDE CONTINUES ON PAGE 2



NASA TechRise

PROPOSAL TEMPLATE & GUIDE

Section 1: WHAT is your team's experiment idea?

**Note: Check out the NASA TechRise Balloon Brainstorming Slide Deck for inspiration.

Introduce your experiment idea. This section may include:

- the scientific question or inquiry you want to answer or what invention you are proposing to build and test to see if it works. (Or both)
- what you plan to measure, monitor, or evaluate during the flight.
- the background research you have done.
- your hypothesis.

Section 2: HOW do you imagine your experiment would work? What components and or technologies might you need to make it run?

**Note: Check out the NASA TechRise Plan Your Experiment Slide Deck and the Explore Components Design Worksheet for inspiration.

Describe how you imagine your experiment would work. This section may include:

- how you would design your experiment to operate during flight and achieve your goals.
- how you would capture and analyze the results of your experiment to understand whether it worked and determine what you were able to learn.
- the components you could use to build your experiment.
- how your components will fit into your 4 x 4 x 8 in flight box.

** All winning teams will work with our awesome TechRise advisors to finalize their design and learn (or refine) the engineering skills needed to build their experiment. The education resources on the challenge site help teams explore possible components and are a great resource for this section. **

Section 3: WHY do you want to propose this experiment idea?

Explain your team's motivation behind proposing this experiment idea. Reasons may be related to:

- the impact building and testing this experiment would have on your school or team.
- the new knowledge or skills your team would gain by doing this project.
- building public awareness around a particular subject.
- the impact this experiment would have on space exploration, your knowledge of our planet, or on society as a whole.

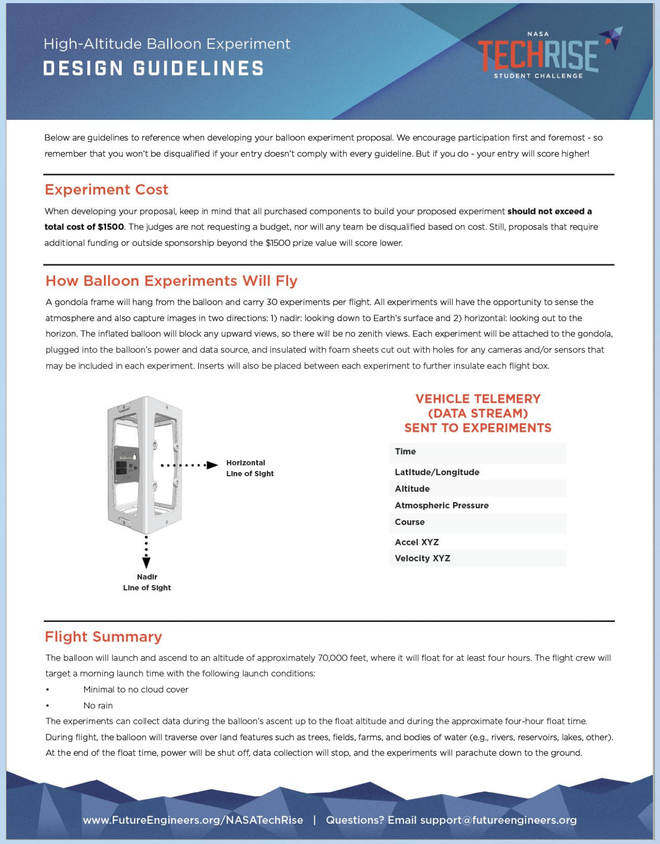
Once complete, the Team Lead (Teacher or School Employee) can submit the final proposal at:

https://www.futureengineers.org/NASATechRise

Design Guidelines

Review the Design Guidelines before submitting your proposal. A few examples include…

- Your experiment must fit in a 4 inches x 4 inches x 8 inches box
- Your entire balloon experiment, including the 3D-printed box, screws, electronics, and all components inside, can weigh no more than 1 kilogram (2.2 pounds)
- Your experiment idea must be realistic so that it can be built within ~4 months



High-Altitude Balloon Experiment

DESIGN GUIDELINES

Below are guidelines to reference when developing your balloon experiment proposal. We encourage participation first and foremost - so remember that you won't be disqualified if your entry doesn't comply with every guideline. But if you do - your entry will score higher!

Experiment Cost

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

How Balloon Experiments Will Fly

A gondola frame will hang from the balloon and carry 30 experiments per flight. All experiments will have the opportunity to sense the atmosphere and also capture images in two directions: 1) nadir: looking down to Earth's surface and 2) horizontal: looking out to the horizon. The inflated balloon will block any upward views, so there will be no zenith views. Each experiment will be attached to the gondola, plugged into the balloon's power and data source, and insulated with foam sheets cut out with holes for any cameras and/or sensors that may be included in each experiment. Inserts will also be placed between each experiment to further insulate each flight box.

VEHICLE TELEMERY (DATA STREAM) SENT TO EXPERIMENTS

Time
Latitude/Longitude
Altitude
Atmospheric Pressure
Course
Accel XYZ
Velocity XYZ

Flight Summary

The balloon will launch and ascend to an altitude of approximately 70,000 feet, where it will float for at least four hours. The flight crew will target a morning launch time with the following launch conditions:

- Minimal to no cloud cover
- No rain

The experiments can collect data during the balloon's ascent up to the float altitude and during the approximate four-hour float time. During flight, the balloon will traverse over land features such as trees, fields, farms, and bodies of water (e.g., rivers, reservoirs, lakes, other). At the end of the float time, power will be shut off, data collection will stop, and the experiments will parachute down to the ground.

www.FutureEngineers.org/NASATechRise | Questions? Email support@futureengineers.org

Entries Due by Oct. 24, 2022, 11:59 PM PT

- A proposal needs to be written by students and submitted by a teacher/educator. All proposals must include the following sections:

- **WHAT** is your team's experiment idea?

- **HOW** do you imagine your experiment would work? What components and or technologies might you need to make it run?

- **WHY** do you want to propose this experiment idea? What impact will building and testing your experiment have on your school team? What impact will this experiment have on space exploration or your knowledge of our planet, or on society as a whole?