

The National Science Foundation and the
National Nanotechnology Initiative present



Handbook 2017-18

Why should I enter?

- ◆ Scholarship money
- ◆ An all-expense paid trip to Washington, D.C., to attend the 2018 USA Science & Engineering Festival
 - ◆ An honorarium for your teacher

The National Science Foundation (NSF) is sending up the signal and asking for your help! We are calling all middle and high school students to gear up and compete in this year's "Generation Nano: Superheroes Inspired by Science!" Create a written entry and either a comic or a 90-second video that illustrates your science-powered superhero in action. Winners will receive scholarship money and the opportunity to showcase their creation at the 2018 USA Science & Engineering Festival in Washington, D.C.

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ABOUT THE COMPETITION

When is the entry deadline?

Sept. 18, 2017, to Jan. 8, 2018, 11:59 p.m. EST

Who can enter the Gen Nano competition?

Middle and high school students who are U.S. citizens, nationals or permanent residents

What types of entries are accepted?

A complete entry has two components: a written essay and either a short comic OR a 90-second video

How are the winners selected?

A panel of expert judges reviews each entry and scores them based on three elements: Use of science and technology, creativity and artistic/technical quality

What are the prizes?

- ◆ Scholarship money to the first and second place high school team/individual and first and second place middle school team/individual
- ◆ All first place teams/individuals also win a trip to Washington, D.C., for the 2018 USA Science & Engineering Festival
- ◆ Honorarium for teacher(s) involved with the first place teams/individuals

DESCRIPTION

The idea of a superhero armed with fantastical powers and tremendous technology has mesmerized the world for nearly a century. The ability to fly without wings, climb buildings like a gecko or see through walls is popularly interpreted as magical or of no scientific foundation. As we make advances in science and technology, we're discovering that superhero powers may not be that farfetched. Through science and technology applications like targeted drug delivery, smart materials, molecular motors, advanced sensors and artificial red blood cells, we may not have to wait until that fateful day when we're bitten by a radioactive spider in order to become superhuman.

NSF and the [National Nanotechnology Initiative](#) (NNI) are excited to continue "Generation Nano: Superheroes Inspired by Science!" While Gen Nano started as a competition based on nanotechnology, we are thrilled to expand the competition to all fields of science and engineering. The competition asks middle and high school students to use scientific research to drive or equip an original superhero. Students can envision science that is grounded in current research but not yet possible, allowing them to learn about the potentials and limitations of real-world science and technology. A complete entry consists of two components: a written section and either a short comic or a 90-second video. Entrants should introduce their superhero and demonstrate how they incorporated scientific research into their superhero's story and how it drives them on their mission. Winners will be chosen from both the middle school and high school categories.

HOW TO APPLY

Step 1: Register at <https://gennano17-18.skild.com>. This is where you will write your essay, upload your comic or video and upload permission forms.

- ◆ As an individual:
 - Register as a team leader.
 - Fill out the registration information.
 - Indicate if you are under 14 years of age.*
- ◆ As a team:
 - Select a team leader, who will register first.
 - The team leader will then invite the other members to join.
 - Every team member must register and fill out the registration information.
 - Indicate if you are under 14 years of age.*

Every student will receive an automated email from gennano@nsf.gov to activate their account. If you do not receive this email, please email us at gennano@nsf.gov.

**Students under 14 years of age – your parent/guardian will need to register and submit on your behalf.*

Step 2: Complete your entry (see the "Entry Guidelines" section in this guide for more information).

- ◆ Complete your written entry and upload your comic or YouTube video link.
- ◆ Insure all forms are completed, signed and uploaded, including:
 - Permission form – required for every student
 - NSF Form 1515 – one per team (see the "Entry Guidelines" section in this guide for more information)

Step 3: Submit your entry.

- ◆ Any team member can submit the entry.
- ◆ You must hit the "submit" button for an entry to be submitted and eligible for judging.

TIMELINE

Sept. 18, 2017	Competition opens
Jan. 8, 2018	Submissions due
January 2018	First round of judging
February 2018	Second round of judging
April 6-8	Winners present their displays at 2018 USA Science & Engineering Festival

ENTRY GUIDELINES

Students and parents should review the entry form on the [online platform](#) for more details about the submission requirements and process. The platform is where students will register and submit their entry and is accessible at <https://gennano17-18.skild.com>.

A complete entry consists of two components: a written entry and either a short comic or video, as described below. A successful entry will be original, creative and visually appealing. No gratuitous violence or other inappropriate content will be permitted.

Written Entry

◆ **General information**

- Superhero name: Give your superhero a unique name.
- Superhero tagline: What is your superhero's slogan or tagline? (50 character limit)
- Summary: A short description of your superhero's story and science-enabled mission. (250 character limit)

◆ **Science and story:** Each section has a 1,600-character limit including spaces (about 250 words).

○ **Section 1: Who is your superhero? Who are they and what is their story?**

- Clearly and concisely describe the main attributes of your superhero.
- Provide any necessary background information about them, including abilities, backstory, accessories, strengths and weaknesses.
- Tell a story: What challenge or obstacle does the superhero face and how do they address it or overcome it?
- What is the superhero's mission? What motivates them? Are they on a quest for justice? Are they on a mission to make the world a better, safer or cleaner place?

○ **Section 2: How does your superhero use science and technology in their mission or quest?**

- Is it something they wear or use to travel, a gadget, a physiological adaptation or something else? Make sure the description focuses on the attributes gained by the science and technology research.
- How does it help the superhero? Give a background of the research behind your chosen technology.
- How does current research support your superhero?
- What further reasonable advances are needed to make your superhero's science a reality? The technology doesn't have to be currently possible, but there must be research to support that it may be in the future.
- Note: This section does not need to be overly technical, but you do need to use references to current research to support your superhero's technology. These will be included in the "Reference" section in this guide.

◆ **References**

- You should include at least two references to current science and technology research either in the form of popular news articles or scholarly journal articles (not Wikipedia).

Comic Entry

Your comic should have the following elements:

- Clearly introduce the superhero, the science and technology used and tell a story. Emphasize how the science and technology is useful in overcoming the story's conflict.
- Give insights not provided in the written entry to create a novel presentation.
- Have enough detail that it could stand alone and tell the superhero's story and how they use science and technology.
- Be sure to tell a story the viewer can understand.
- Technical elements:

- Can be composed either by hand or using a digital comic generator or drawing program.
- Must be saved as a JPEG file.
- Must be visually striking and edited to a high standard and should deliver clear and understandable messages using nontechnical language.
- **Do not include any copyrighted imagery or content (resources for non-copyrighted images below).**

Video Entry

Your video entry should have the following elements:

- ◆ Clearly introduce the superhero, the science and technology used and tell a story; and
 - Emphasize how the science and technology is useful in overcoming the story's conflict.
 - Give insights not provided in the written entry to create a novel presentation.
 - Have enough detail that it could stand alone and tell the superhero's story and how they use science and technology.
 - Tell a story the viewer can understand.
- ◆ Technical elements:
 - Should be a 90-second single video, in high resolution (i.e. 1280 x 720) if possible.
 - Does not have to include credits but if it does, these will be included in the 90-second time limit.
 - Must be uploaded to YouTube and you must provide a link to the video on the entry form.
 - Be visually striking and edited to a high standard and should deliver clear and understandable messages using nontechnical language.
 - Do not include any copyrighted imagery or content (see the "Resources" section in this guide for suggested places to obtain non-copyrighted images).
- ◆ Additional guidance: Your video entry can be acted out, animated, a photo montage, stop motion or any other form. Be creative!

Required Forms/Other Information

- ◆ **Permission form**
 - Every student must fill out this form, have it signed by their parent/guardian, and upload it with the other entry information.
 - This form grants permission to both participate in the Gen Nano competition and to travel to Washington, D.C., (with a chaperone) if selected as a winner.
- ◆ **NSF Form 1515**
 - One form per team must be filled out and uploaded with the other entry information.
 - Check the box "NSF and External Use" to allow NSF to post your comic on the Gen Nano website and social media platforms.
- ◆ **Upload a thumbnail image**
 - A single image that represents your entry.
 - 450 x 450 pixels in size.

JUDGING AND PRIZES

Judging Rounds:

- ◆ Middle school students and high school students will be judged separately.
- ◆ All entries will first be screened for compliance with the rules.
- ◆ NSF reserves the right to adjust the numbers of finalists based on the number and quality of submissions. Individuals and teams will be notified by email if they have progressed to the next round.
- ◆ Each entry will be anonymously evaluated based on the stated criteria and will be scored on a sliding scale by each judge.

Round One

- ◆ Judging occurs online by a panel of experts.
- ◆ The highest scoring entries from the first round will advance to the next round.
- ◆ Each comic or video that moves on to the second round will be posted on the competition website for public viewing.

Round Two

- ◆ Judging occurs online by a panel of experts.
- ◆ A first and second place winning entry chosen for both the high school and middle school category.

The Judges:

- ◆ Experts with expertise in science and technology and/or graphic design.
- ◆ Will convene separate panels for each judging round.
- ◆ Will score each entry on the criteria described in the "Scoring" section in this guide.

Scoring:

Each entry will be scored based on three categories for a total of 100 points:

- ◆ Use of science and technology (50 percent)--How accurately did the entrant incorporate science and technology into their story to address the chosen societal mission.
- ◆ Creativity (25 percent)--The originality and quality of both the superhero and their story, as well as the application of science and technology.
- ◆ Artistic and technical quality (25 percent)--The visual appeal and refined execution of the comic or video.

Prizes:

- ◆ Attend the [2018 USA Science & Engineering Festival](#) in Washington, D.C., April 6-8, 2018. The biannual, award winning USA Science & Engineering Festival is the largest festival of its kind and the only national science festival. The festival features speeches by inspirational scientists, exhibits from some of the biggest names in STEM, and interactive and informative demonstrations.
 - Paid trip for each first place winner (both the middle school and high school team/individual) and one chaperone (per team) to attend the festival in Washington, D.C., April 5-8, 2018.

- Winners will design an exhibit describing their superhero and the science/technology the superhero used, to be displayed in the NSF booth at the festival. The display can include, but is not limited to, posters, a hands-on replica of the gear and an interactive activity.
- ◆ Scholarship money
 - First place winner receives \$1,500 per team member.
 - Second place winner receives \$1,000 per team member.
 - Teacher honorarium receives \$500 – awarded to a teacher(s) that encouraged the first place teams/individuals on their journey.

RESOURCES

Students may choose to utilize the following resources for science and technology research and multimedia for their comic or video creation (but are not limited to these resources).

Science and Technology Resources

- ◆ National Science Foundation: <https://www.nsf.gov>.
 - Classroom resources: <https://www.nsf.gov/news/classroom/index.jsp>.
- ◆ National Nanotechnology Initiative: <http://www.nano.gov/>.
 - Basics of Nanotechnology: <http://www.nano.gov/nanotech-101#content>.
 - Nanotechnology and You: <http://www.nano.gov/you#content>.
- ◆ The Science Of: <http://www.thescienceof.org/>.
- ◆ The Nerdist, Because Science: <http://nerdist.com/videos/because-science/>.
- ◆ [Imagine Magazine](#)
- ◆ "The Physics of Superheroes," by James Kakalios (book).
- ◆ "Becoming Batman: The Possibility of a Superhero" and "Inventing Iron Man," both by E. Paul Zehr (books).
- ◆ Science, How the World Works: <https://www.brainpop.com/science/>.
- ◆ Discovery Education: http://www.discoveryeducation.com/students/index.cfm?campaign=flyout_students.
- ◆ *Wired* articles:
 - "The Magical Bulletproof Material That Made Iron Man Give Up Iron": <https://www.wired.com/2015/01/iron-man-graphene/>.
 - "The Physics of Bullets VS. Wonder Woman's Bracelets": <https://www.wired.com/2017/06/physics-bullets-versus-wonder-womans-bracelets/>.
 - Other articles by Rhett Allain
- ◆ How Stuff Works?: <http://science.howstuffworks.com/>.
- ◆ The Rudiments of Wisdom Encyclopedia: http://www.rudimentsofwisdom.com/themes/themes_science.htm.
- ◆ NISE Net's website: <http://whatisnano.org/>.

Storytelling Resources:

- ◆ Storyboarding:
 - Storyboarding for kids: <https://prezi.com/3fublvvoamua/storyboarding-for-kids/>.
 - Storyboarding tips: <http://tubularinsights.com/storyboarding-tips/>.

- ◆ Superhero resources:
 - Free Smithsonian online course "The Rise of Superheroes and Their Impact on Pop Culture": <https://www.edx.org/course/rise-superheroes-impact-pop-culture-smithsonianx-popx1-1x-2>.

Multimedia Resources

- ◆ Copyright definition and information:
 - <http://www.copyrightkids.org/whatcopyframes.htm>.
 - <https://www.common sense media.org/videos/copyright-and-fair-use-animation#>.
 - <https://www.slideshare.net/pwoessner/copyright-fair-use-and-creative-commons-presentation>.
- ◆ Comic generation:
 - Pixton (not free): <https://www.pixton.com/>.
 - Toon Doo: <http://www.toondoo.com/>.
 - Chogger: <http://chogger.com/>.
 - Marvel: http://marvel.com/games/play/34/create_your_own_comic.
- ◆ Video editing:
 - Loopster (online): <https://www.loopster.com/>.
 - Free Video Editor (Android).
 - Movie Maker Filmmaker (Android).
 - Splice (iPhone/iPad).
 - Quik (iPhone or Android).
 - Adobe Premiere clip (iPhone or Android), may need an adobe account.
 - Magisto (iPhone or Android).
 - FilmoraGo (Android).
- ◆ Free, non-copyrighted image sources:
 - Freerange stock: <https://freerangestock.com/>.
 - MorgueFile: <http://morguefile.com/>.
 - Wikimedia Commons: https://commons.wikimedia.org/wiki/Main_Page.
 - Library of Congress
- ◆ Free, non-copyrighted audio sources:
 - YouTube audio library: <https://www.youtube.com/audiolibrary/music>.
 - Freesound: <https://www.freesound.org/browse/>.
 - MusOpen: <https://musopen.org/music/>.
 - Jamendo: <https://www.jamendo.com/?language=en&p=tags>.
 - Sound Bible: <http://soundbible.com/>.
 - Free Music Archive: <http://freemusicarchive.org/>.

SUMMARY OF RULES

Please carefully review all of the following rules.

Eligibility

- ◆ Each submission must be made by an individual student or a team of two or three students.
- ◆ All students must be enrolled in a middle or high school or be home schooled in the U.S., its territories or possessions at the time of entry (e.g., the fall 2017 semester or the spring 2018 semester), and be in good standing.
- ◆ Students must be U.S. citizens, nationals or permanent residents.
- ◆ Students are limited to participating in one project for this competition.
- ◆ Previous winners (first, second, third place or people's choice winners) are not eligible to enter again.
- ◆ Each entrant must submit a Parental/Guardian Permission Form and NSF 1515 form (one per team), available on the competition platform.
- ◆ Employees, contractors, officers or judges of the sponsoring organizations and their children are not eligible to enter the competition.

Entry Rules

- ◆ All entries must be received during the competition submission window.
- ◆ All entries must be submitted in English.
- ◆ A competition entry constitutes an agreement to adhere to the rules and stipulations set forth by the contest sponsors.
- ◆ Each entrant certifies, through submission to the contest, that the entry is their own original, creative work and does not violate or infringe the creative work of others, as protected under U.S. copyright law or patent law.
- ◆ By entering the contest, the entrant agrees to hold harmless, NSF for all legal and administrative claims to include associated expenses that may arise from any claims related to their submission or its use.
- ◆ All judges' decisions are final and may not be appealed.
- ◆ Entrants retain all copyright and equivalent rights but give NSF nonexclusive rights to use their names, likenesses, quotes, submissions or any part of their submissions for educational publicity and/or promotional purposes. These include but are not limited to website display, print materials and exhibits.
- ◆ NSF will not be responsible for any claims or complaints from third parties about any disputes of ownership regarding the ideas, solutions or images.

Other Rules

- ◆ Any entrant or entry found in violation of any rule will be disqualified.
- ◆ Winners and their parents or guardians are responsible for all taxes or other fees connected with the prize received and/or travel paid for by the sponsoring organization.
- ◆ NSF reserves the right to modify or cancel the competition at any time during the duration of the competition for any reason, including but not limited to an insufficient number of qualified entries received.
- ◆ Should NSF decide to bring winning contestants to Washington, D.C., or to any other location for promotional and other purposes, expenses paid by NSF will be within the limits set forth in law according to federal travel regulations.

- ◆ All contestants agree that they, their heirs and estates shall hold harmless the United States, the employees of the federal government and all employees of NSF for any and all injuries and/or claims arising from participation in this contest, to include that which may occur while traveling to or participating in contest activities.
- ◆ All finalists must be accompanied by a parent/guardian on the trip to Washington, D.C.
- ◆ NSF has the final say on any point not outlined in the entry rules.

FREQUENTLY ASKED QUESTIONS

- ◆ **Can entrants be from any middle or high school anywhere in the U.S.?**
Yes. All student participants must be enrolled in middle or high school or the homeschool equivalent in the U.S., its territories or its possessions at the time of entry (i.e., the fall 2017 semester). Please review the "[Rules](#)" section in this guide for more information.
- ◆ **Is there a specific grade-point average that qualifies a student to be "in good standing?"**
No. We rely on your own educational institution to determine if you are in good standing.
- ◆ **What should I submit?**
A complete entry consists of two components: a written entry and a comic or a 90-second video. Please review the "[Guidelines](#)" section in this guide for more information.
- ◆ **What is the length limit for the written entry?**
The written entry must be submitted in two sections, each of which is limited to 1,600 characters, including spaces. Please review the "[Guidelines](#)" section in this guide for more information.
- ◆ **How will my comic entry be submitted and in what form?**
You are required to submit your comic as a JPEG file on the competition platform.
- ◆ **How will my video entry be submitted and in what form?**
You must upload video submissions to YouTube and provide a link to the video on the entry, if possible record in HD (i.e., 1280 x 720).
- ◆ **Does the video have to include credits identifying the video creator and any volunteers?**
No. Your video does not have to include credits.
- ◆ **If I include credits on my video are they included in the 90-second limit?**
Yes. The entire video should be 90 seconds.
- ◆ **Once I submit my video, can I revise it or replace it with another video prior to the Jan. 8, 2018, deadline?**
No. Once you submit a video to the contest it is considered a final submission and cannot be revised or replaced. However, you can save your entry on the competition platform and edit it before submitting.
- ◆ **What characterizes a winning entry?**
Entries are scored based on creativity, scientific accuracy and the visual appeal of the comic. Please review the "[Judges and Prizes](#)" section in this guide for more information.

◆ **How will semifinalists and finalists be notified?**

All winners will be notified via email, either to your own email or to a parent/guardian or trusted teacher's email account.

◆ **Do I need parental/guardian permission to participate?**

Yes. Every student and their parent or guardian must fill out and submit a Parental/Guardian Permission Form, available on the competition platform. Please review the "[Rules](#)" section in this guide for more information.