



Spark!Lab Dr. InBae
& Mrs. Kyung Joo Yoon

Invent it CHALLENGE

10th Anniversary



2021 ENTRY GUIDE

ME? An Inventor? Yes YOU!

Everyone can invent and the 2021 Spark!Lab Dr. InBae and Mrs. Kyung Joo Yoon Invent It Challenge is a fun way to learn the invention process by actually creating something new, either by yourself or with a group of friends!

Whether this is your first time inventing or your 100th, this Challenge is for you.

To enter the contest, YOU will create a new invention and then submit your idea **before April 27, 2021.**

What is an invention?

It's any useful creation that didn't exist before you thought of it!

What kind of invention should I make?

We're challenging you to use your brain power to **create an invention that makes sports more exciting, fun, fair, or safe for all.**

Many people enjoy watching or playing sports. From creating an invention that makes participating or watching a sport more exciting to making a sport safer to play, there are many different ways you can help.

Ask someone in your life what issues people face in trying to make sports for exciting, fun, fair, or safe for all.

Then, choose one issue and see if you can help solve or improve it with an invention!

How do I get started with creating my invention?

It's Just 7 Steps and you start with STEP ONE! Use this guide to learn the 7 steps in the invention process. Follow the steps and you'll end up with an invention of your own! (We've even left space for you to jot down your ideas and notes as you go in this guide!)

Got Questions? Ask! Head over to the **Website** to connect with Invention Experts at the Smithsonian, Judges, and other Kids who have won the Challenge in the past! They are all excited help you, if you run into trouble!



Why should I try inventing?

It's fun to invent! The creative process of creating something brand new is fun!

You learn to solve problems! There are problems all around you in the world. The Challenge teaches you how to work through a process to solve problems like an inventor. As an inventor, you'll start to see problems as opportunities to invent. You don't have to settle for what already exists—you can think of a better way!

You can improve our world, now! There have been MANY successful kid inventors that have changed our world with their ideas. You don't have to wait until you're an adult to make an invention that can be used by people around the world!

What do I turn in?

To enter the contest, you need to turn in a video showing us how you used ALL SEVEN STEPS to create your invention. Don't forget to document your process—that means to keep records (pictures, video and notes) about each step!

How can I win the prizes?

The secret to success is not a secret! The scoring guide (p. 13) tells you what the judges are looking for. Read it!

Dear Parents and Teachers,

We are delighted to bring you the 2021 Spark!Lab Dr. InBae and Mrs. Kyung Joo Yoon Invent It Challenge, designed to ignite the inventive spirit in children ages 5–18 and provide a hands-on opportunity to invent. The goal of our Challenge is to teach and engage young people in the process of inventing, opening their eyes to a new way to view and tackle everyday problems in the world around them. With your help, we're training the next generation of inventors to look beyond what exists for better solutions and empowering them to recognize that they can generate those solutions!



Invention takes students beyond just the creation of a new object, and into a mindset of creativity and problem-solving. Building on the rich Smithsonian Spark!Lab 7-step process for inventing, the Challenge guides students to identify problems, explore existing solutions, brainstorm and sketch a new creative solution, choose the right tools, techniques and materials to construct a prototype, test the invention and ask others to test it, tweak the invention based on feedback and consider how to market the new invention. Inherent in the process are skills of science and engineering, but also life-skills of persistence and dedication. The process trains students to break a problem and solution down into parts and encourages them to brainstorm multiple ways to find a workable solution, either on their own or collaboratively with a team.



For the Challenge, we are asking students to create an invention that makes sports more exciting, fun, fair, or safe for all. The need for sports to be accessible and fun for people of all abilities presents a unique opportunity for students to develop empathy and consider how participating in social activities like sports helps create a healthy society. You'll find that the Challenge resources present you with ways to spark your child or your students' thinking and support their discovery of a need they can address.



We encourage you to use this guide to support the engagement of your child, or your students, in the Challenge.



Happy Inventing!

Cricket and Lemelson Center
for the Study of Invention and Innovation

How to Use this Guide

New to invention? Not a problem! This guide, in tandem with the Challenge website, provides you with everything you need to support young inventors' participation in the Challenge and facilitate their submission of an invention.

TO GET STARTED—PREPARE YOURSELF!

- **Get yourself familiar with the invention process.** Take a look at the 7-steps recommended by experts at Smithsonian. Check out our lessons on how to teach and facilitate each step. (On the How to Enter Page)
- **Look at the scoring guide.** It's always good to start with the end in mind, so flip to **page 13**, to take a peek at how our expert judges have defined success—it won't be a surprise to see that it's linked to the process more than the product!
- **Get to know the submission requirements.** Review how we recommend students document their inventive journey through the 7-steps. It's important that they capture evidence of going through each part of the process, and share that evidence in their submissions. Submissions must be in video format, and be no larger than 2GB. Including audio in videos is a great way to share details about the inventive process with the judges.
- **Think about the timeline.** Submissions are due on Tuesday, April 27, 2021. Map out a timeline to work through each step in the process. (You'll want to set aside at least an hour for each step, typically with the Create It step requiring 2-3 hours.) It's helpful to do the steps over the course of a month to give your young inventor(s) time to grow their thinking and internalize the process.
- **Develop a Documentation Plan.** It's critical that students document and capture evidence as they go through each part of the process. Think about how and when documentation will take place – what devices you will use (still camera, video camera, etc.) and what help the students will need from you.

ACCEPT THE CHALLENGE AND GET STARTED

- **Explore the topic.** We recommend viewing the Topics and Related Resources document on **page 10** to learn about different ways to make sports more exciting, fun, fair, or safe for all.
- **Start chatting and brainstorming about the topic.** To brainstorm, think about how you or others engage with different sports, take time to talk to an adult about the issues people face in making sports more exciting, fun, fair, or safe for all.
- **Use the Entry Guide.** Be sure to review the 7-Step process, Topics and Resources, Scoring Guide, and Entry Guidelines.
- **Start the invention process!** Start the process by diving into the first step, Think It! On the following pages, you'll find specific guidance on each step.



Table of Contents

THE 7-STEP INVENTION PROCESS	2
• Think It	3
• Explore It	4
• Sketch It	5
• Create It	6
• Try It	7
• Tweak It	8
• Sell It	9
 SUPPORTING RESOURCES	 10
• Topics and Related Resources	10
• Scoring Guide	12
• How to Document Your Invention Process	14
• How to Enter	15
• Standards Alignment	16
• Getting Help	17

Key Steps of the Invention Process

Learn about each step of the process, and all the fun and hard work that goes into inventing.

To invent you have to:





THINK-IT: Have a great idea for an invention.

Developing an idea is sometimes the hardest step in the invention process! Invention is all about solving problems. The best invention ideas often address issues that affect lots of people. This year's Challenge is about creating an invention that makes sports more exciting, fun, fair, and safe for all. So, the first step is to identify one or more of these goals.

Thinking about this Challenge:

Observe, research, and interact with the world around you and write down any challenge you see presented in accomplishing the goal you chose.

- Look around you—how do people of all abilities participate in sports?
- Look at your local newspaper or on the Internet—what are the issues related to making sports in your community and globally safer?
- Ask friends, teachers, and family members or people working in sports-related industries (like players, referees, equipment manufacturers, and local sports organizations) about issues they face in trying to make sports more exciting and fair.

If possible, talk through what you've discovered with partners and groups of other students to spark more ideas.

Every invention
starts with an idea.

What's yours?

What problem
are you trying
to solve?



EXPLORE-IT: Investigate inventions and ideas of the past.

Have an idea?

If you've identified an aspect of sports you want to improve, you're probably not the first inventor to try to solve it. Don't let this discourage you—instead, do some research to learn how others have addressed the problem!

- What do you like about their solutions?
- What do you think you can improve?
- How can your invention be different?

Many inventions build and improve on ones that have come before. Identify specific features and benefits of your invention that builds on inventions of the past. Think carefully about who your invention helps and make sure your idea clearly solves the identified problem in a way that is uniquely yours!

Many inventions
build off of
other ideas.

How have other
people tried
to solve the
problem you're
working on?

How will your
invention be
different?

A large, empty grid of graph paper with a spiral binding at the top. The grid is composed of small squares and is intended for students to write their answers to the questions on the left.



SKETCH-IT: Draw pictures and diagrams to figure out how your invention might work.

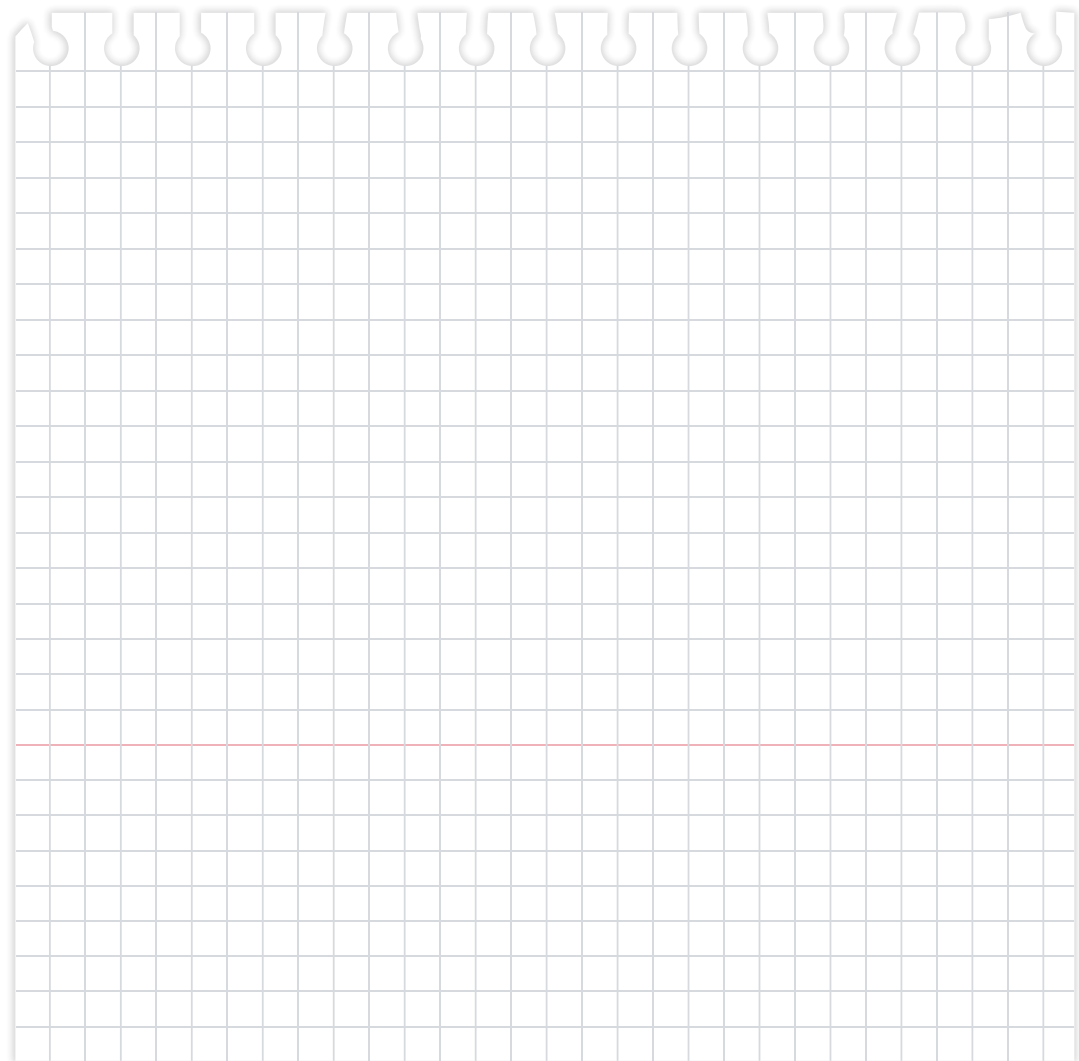
Once you have a basic concept of what your invention will be, make some simple sketches of your idea. Sketches help you take the idea in your head and put it on paper. Your sketches do not have to be perfect or artistic.

Sketches can help you think through not only what your invention will look like, but how it will work. You may want to make several sketches of your invention—from the front, side, looking down from above, or from the inside—to show how it will work.

Be sure to label your sketches to explain how the various parts and pieces function, so that you (and others) will know what you're/they're looking at!

*Can you draw
your ideas
out on paper?*

*Inventors use
pencil and paper to
sketch their ideas.*



4 Create It

CREATE-IT: Build a prototype or model of your idea.

For many inventors, this is the most fun part of the invention process! This is when you create a prototype, or model, of your invention.

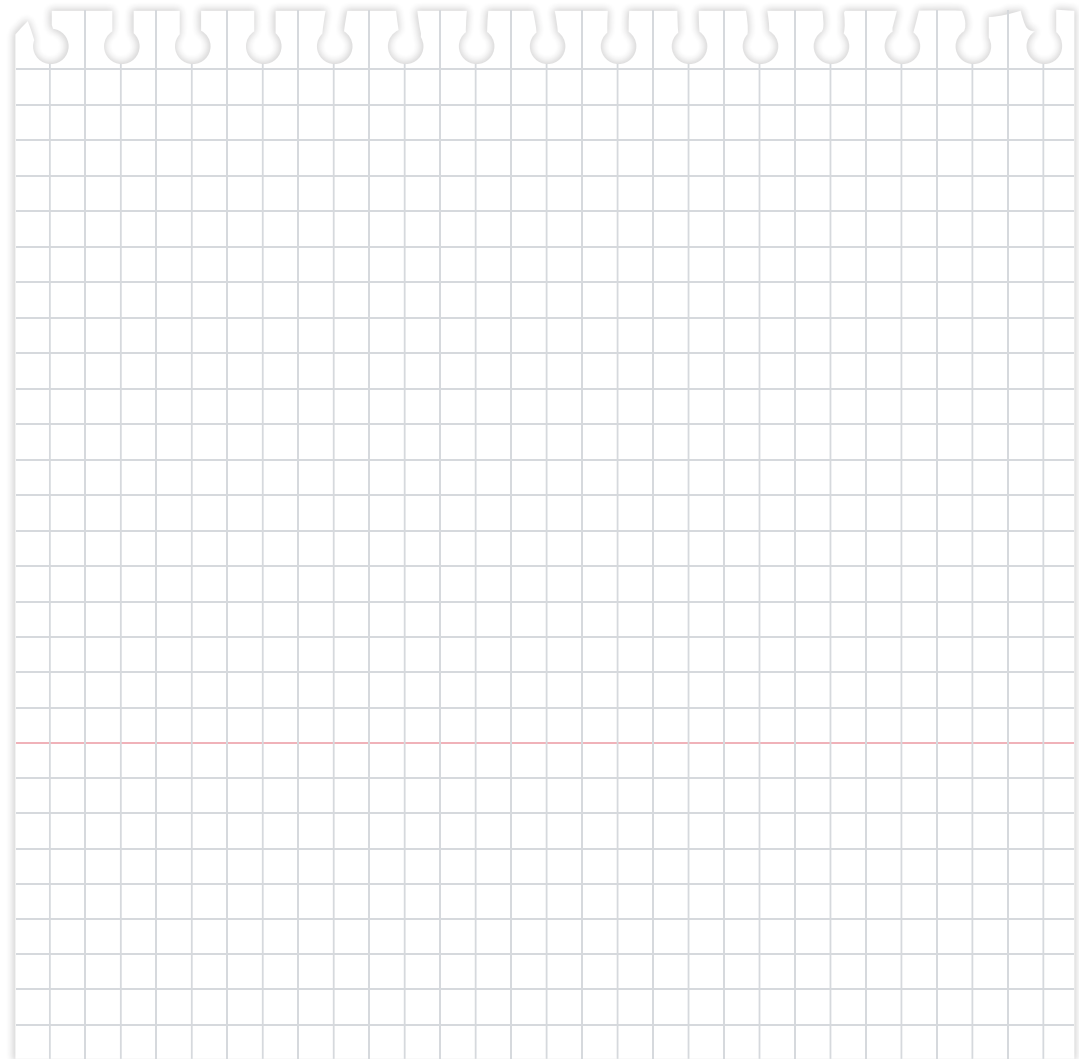
Using your sketches as a guide, build your first prototype. (Don't worry, this doesn't have to be perfect or even work!) Making your prototype/model helps you turn your concept into a three-dimensional form.

When you build your prototype/model, try using materials that you already have. Though the model does not need to actually work, it should show others what the pieces and parts look like. Remember to capture the steps you take building your prototype/model by video or photos.

A prototype is a model or a real-life example of your idea.

Inventors use simple materials to bring their ideas to life.

Create a prototype.





TRY-IT: Test your invention. Once your prototype/model is finished, ask friends, teachers, parents, and neighbors to try it! (If possible, ask some of the people you interviewed in the Think-it step or a person who your invention is intended for.) Have your testers perform some experiments to find out how well you prototype works. Write down the results of each test.

Ask your testers:

- What they like about your invention?
- What suggestions they have for making your invention better?

Be sure to write down what your testers say about your invention, so you have good notes for the next step of the process.

Test your invention.
What works well?

6

Tweak It

TWEAK-IT: Keep improving your idea. Using the feedback you got in the Try-it step, identify ways you can improve your invention.

Consider:

- Do you want to modify the design or change the materials it's made from?
- Do you want to add a new part to your invention, or take something away to make it simpler?
- How could you make your invention more effective?

Many inventors go through multiple rounds of trying & tweaking to keep improving their invention, until they get it just the way they want it!

How can you
improve your
prototype?

Inventors work
to make their
ideas better.



SELL-IT: Market your invention to people who might buy it. Once you have your final invention idea, it's time to introduce your idea to other people and encourage them to start using it!

Create a "fact sheet" and/or a video or written pitch about your invention.

Be sure to include the following information about your invention:

- Who is your "target audience"? Who should use your invention?
- What aspect of sports does it affect?
- How is it different from other inventions?
- How does it work?

Inventors think about how to convince other people to try or buy their invention.

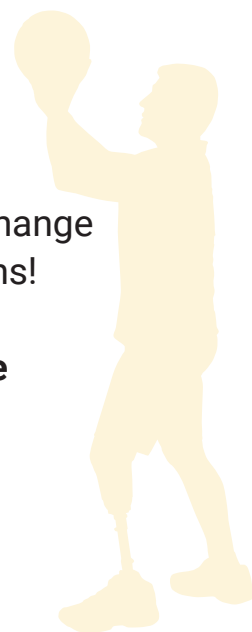
How would you talk about your idea to other people?



2021 Challenge: Become a Game Changer!

Whether it is a new or existing sport, think of a way to you can change the game. Use these ideas and resources to spark your inventions!

Ask yourself: **“What ideas do you have for making sports more exciting, fun, fair, or safe for all?”**



COMPETITIVENESS IN SPORTS

Making sports competitive means making it more exciting, fun, and fair for people who are participating. What can you invent to make sports more exciting and fun? What can you invent to make sports more fair?

Think About...

- What makes a sport exciting? How is a winner determined? What types of actions excite viewers and players?
- How can the rules for playing a sport be changed to make it more exciting, fun, or fair?
- How is fairness in a sport accomplished? What are the role of referees? How could those roles be changed to make sports more fair?
- What factors affect how much fun players have through sports? What could help players have even more fun?
- How can people of all levels of ability enjoy sports?

Resources

- [How to Compete in Sports](#)
- [What is Fair Play?](#)
- [Rules of Sport](#)
- [Inventions That Changed Sports History](#)
- [What if I Don't Like Sports?](#)





SAFETY IN SPORTS

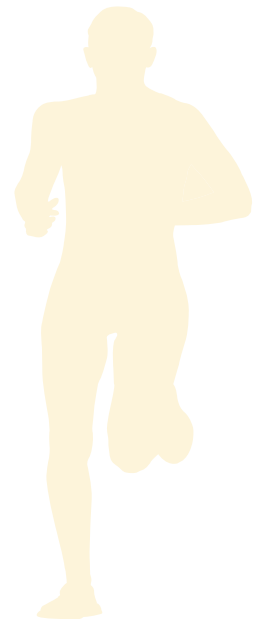
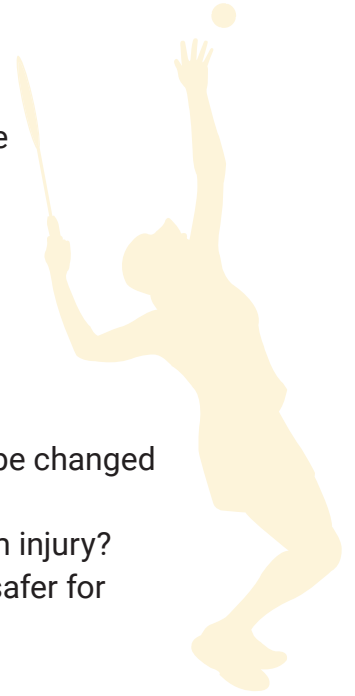
For people to enjoy sports they have to be safe. Lots of things contribute to being safe while engaging in sport. For one thing, the equipment you use can help protect you from injury. Another important part of safety is the rules of the game. Are there rules that help to protect players? What can you invent to help make sports more safe for all?

Think About...





- What types of sports equipment could be improved or invented?
- What is the role of referees or judges in sports? How could this role be changed to make sports safer?
- What changes to the rules of a game would help protect players from injury?
- How can players be encouraged to play sports in ways that make it safer for people of all abilities to participate?

Resources




- [Rules of Sport](#)
- [Enabling the Human Spirit Through Sports](#)
- [Become a Sports Official](#)
- [Protect the Ones You Love](#)
- [Children's Safety Network](#)



Invent It Scoring Guide

INVENT IT STEPS	1 REQUIRES DEVELOPMENT	2 APPROACHES STANDARD	3 MEETS STANDARD	4 EXCEEDS STANDARD
 1 Think It Identifies a way to make sports more exciting, fun, fair, or safe for all.	Mentions a way to make sports more exciting, fun, fair, or safe for all, but doesn't define or explain it.	Presents a way to make sports more exciting, fun, fair, or safe for all, but provides a minimal explanation.	Presents, defines, and explains a way to make sports more exciting, fun, fair, or safe for all.	Clearly presents and defines the scope of a way to make sports more exciting, fun, fair, or safe for all, providing detailed background and explanation.
 2 Explore It Demonstrates invention's originality	Presents an invention that copies existing ideas or products rather than building on them.	Presents an invention that shows some originality (relying heavily on existing ideas or products).	Presents an original invention and shows how it builds on similar past ideas.	Presents an innovative invention with attributes that reflect but go well beyond similar past ideas.
 3 Sketch It Demonstrates how the invention might work	Sketch is incomplete and doesn't show how the invention make sports more exciting, fun, fair, or safe for all.	Sketch is complete and somewhat demonstrates how the invention make sports more exciting, fun, fair, or safe for all.	Sketch is detailed and clearly labeled, demonstrating how the invention make sports more exciting, fun, fair, or safe for all.	Multiple sketches clearly demonstrate and provide examples of how the invention make sports more exciting, fun, fair, or safe for all.
 4 Create It Builds a prototype or model	Prototype or model is incomplete and does not reflect the sketch or plan.	Prototype or model minimally reflects the sketch or plan.	Prototype or model is complete and accurately represents the size, shape and function.	Working prototype or detailed model clearly shows how the invention will function and is accompanied by video, audio, or textual explanation.

Invent Scoring Guide

INVENT IT STEPS	1 REQUIRES DEVELOPMENT	2 APPROACHES STANDARD	3 MEETS STANDARD	4 EXCEEDS STANDARD
 5 Try It Tests the invention	States that invention has been tested or feedback has been gathered but does not provide evidence.	Shows evidence of some testing of the invention or that minimal feedback has been gathered.	Shows evidence of thorough testing of the invention and/or gathering of comprehensive feedback from potential users or experts in the field.	Shows evidence of extensive and repeated testing of different versions of the invention, and/or gathering of comprehensive feedback from both potential users and experts in the field.
 6 Tweak It Tweaks the invention	Proposes changes to the invention, but changes do not accurately reflect the testing of the invention or the feedback student received.	Proposes changes or improvements to the invention that somewhat reflect the testing and feedback.	Clearly improves the invention based on test results or feedback.	Significantly improves the invention based on test results or feedback and adds additional innovations of their own.
 7 Sell It Includes a “sales pitch” convincing others of the value of the invention	Provides basic information about the invention, but no reasons for using it.	Provides information about how the invention make sports more exciting, fun, fair, or safe for all, but doesn't include compelling reasons for using it.	Targets an appropriate audience, clearly defines the invention, shows how it is differentiated from similar products, and explains how it make sports more exciting, fun, fair, or safe for all.	Includes a convincing and compelling “sales pitch” that clearly explains how the invention make sports more exciting, fun, fair, or safe for all, and is different from any similar products that came before it.

Total Points for all categories, (possible 28): _____

**Entries will be assigned a score of zero if no criterion are met.*

How to Document Your Invention Process

Your submission requires you to give us proof that you've done each step of the invention process! So, you need to DOCUMENT—or create a physical record—of your progress through each step.

Some ways to do that are:

- Make selfie videos of you explaining what you've done in any step.
- Ask a friend or family member to film you as you are doing any step.
- Take photos of you doing each step.
- Keep a journal outlining what you do in each step.



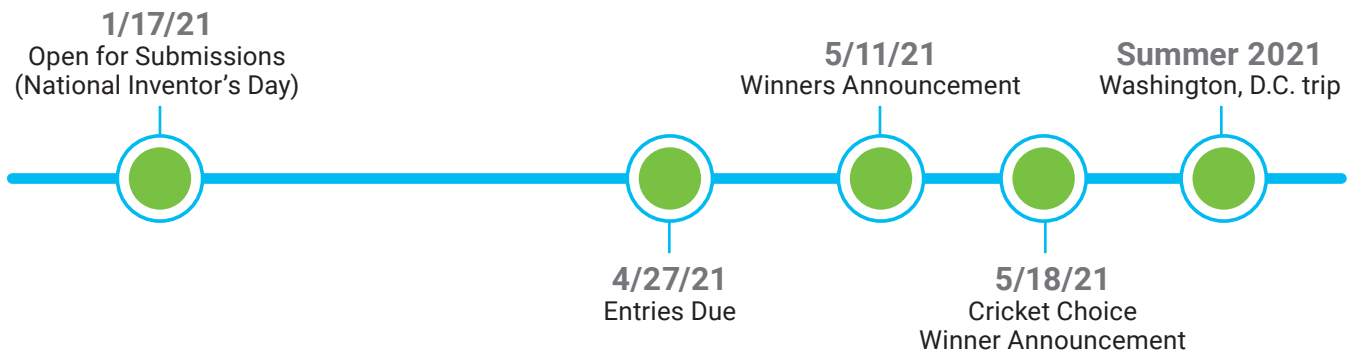
How to Enter

Use this checklist to ensure your entry meets the submission requirements.

- ☐ 1. Follow the 7-step Process of Invention described in this guide to create an invention that makes sports more exciting, fun, fair, or safe for all.



- ☐ 2. Document your journey through each step by taking notes and pictures, making drawings, and recording audio and video.
- ☐ 3. Gather your notes, pictures, drawings, and audio and video recordings and use them to create a single video documenting your journey through the 7-step Process of Invention. Videos must be no larger than 2GB in size and be one of the following file types: .mp3, .mp4, .avi, .mov, .mpg.
- ☐ 4. Once you have finished your video, use the Scoring Guide to check that your entry has addressed each of the 7 steps of the Invention Process.
- ☐ 5. Create a photo of the inventor(s) to submit along with your entry.
- ☐ 6. Anytime on or after January 17, 2021, go to the How to Enter page on the Challenge Website and download a Parental Consent Form (one for each entrant). Have the parent/guardian of each entrant complete and sign the form and take a picture of it or scan and save it.
- ☐ 7. Anytime on or after January 17, 2021, go to the Submit Entry page on the Challenge Website and follow the instructions to submit your video, photo, and Parental Consent Form. If submitting a team entry, you must submit consent forms for each participant. (Entries must be received by 11:59 PM EST on April 27, 2021.)



ISTE NETS'S STANDARDS http://www.iste.org/standards/standards-for-students	NEXT GENERATION SCIENCE STANDARDS http://www.nextgenscience.org	21ST CENTURY LEARNING STANDARDS www.p21.org	COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS www.corestandards.org	STEAM www.steamedu.com
<ol style="list-style-type: none"> 1. Creativity and Innovation 2. Communication and Collaboration 3. Research and Information Fluency 4. Critical Thinking, Problem Solving, and Decision Making 	<p>Dimension 1: Practices Asking questions; Developing and using models; Planning and carrying out investigations; Analyzing and interpreting data; Constructing explanations and designing solutions; Engaging in argument from evidence; Obtaining, evaluating and communicating information</p> <p>Dimension 2: Crosscutting Concepts</p> <ul style="list-style-type: none"> • Cause and Effect • Scale, Proportion, and Quantity • Systems and System Models • Structure and Function <p>Dimension 3: Disciplinary Core Ideas</p> <p>Engineering, Technology, and Applications of Science ETTS1A: Defining and Delimiting an Engineering Problem ETTS1B: Developing Possible Solutions ETTS2A: Interdependence of Science, Engineering, and Technology ETTS2B: Influence of Engineering, Technology, and Science on Society and the Natural World</p>	<p>Learning and Innovation Skills</p> <ul style="list-style-type: none"> • Creativity and Innovation • Critical Thinking and Problem Solving • Communication and Collaboration <p>Information, Media and Technology Skills</p> <ul style="list-style-type: none"> • Information Literacy • Media Literacy • ICT (Information, Communications and Technology) Literacy <p>Life and Career Skills</p> <ul style="list-style-type: none"> • Initiative and Self-Direction • Productivity and Accountability 	<p><u>CCSS.ELA -Literacy.CCRA.W.4</u> Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p><u>CCSS.ELA -Literacy.CCRA.W.6</u> Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.</p> <p><u>CCSS.ELA -Literacy.CCRA.W.7</u> Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.</p> <p><u>CCSS.ELA -Literacy.CC RA.W.8</u> Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.</p> <p><u>CCSS.ELA -Literacy.CC RA.W.9</u> Draw evidence from literary or informational texts to support analysis, reflection, and research.</p> <p><u>CCSS.ELA -Literacy.CC RA.SL.5</u> Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.</p>	<p>Science</p> <ul style="list-style-type: none"> • Conduct scientific inquiry through the Spark!Lab Process of Inquiry <p>Technology</p> <ul style="list-style-type: none"> • Conduct online research • Communicate an invention idea through a digital presentation <p>Engineering</p> <ul style="list-style-type: none"> • Solve a problem • Design an invention • Build a prototype <p>Arts</p> <ul style="list-style-type: none"> • Imagine and sketch an invention • Create a 3-D prototype <p>Math</p> <ul style="list-style-type: none"> • Measure and create a scale model of the invention • Analyze data to refine invention

Getting Help

You may find that you need assistance as you document your progress through the 7-step Process of Invention and create your final video entry. It is normal to need assistance, and we are definitely here to help you!

There are two basic ways for you to get help as you complete your journey through the 7-step Process of Invention and create your video entries.

1. If you need technical help on creating your video entry, please send an email to invent@cricketmedia.com and let us know how we can support you.
2. If you need guidance on how to progress through one of the 7-steps of the Invention Process, please send us your question by emailing invent@cricketmedia.com. One of our experts from Cricket or Smithsonian will respond to you within 48 hours!

Enjoy the challenge!

