INSIDER GUIDE
for
PARTICIPANTS

THE TECH CHALLENGE
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Welcome to The Tech Challenge. It's easy to get started!

Form a team
Gather 2-6 students (including you), in grades 5-12, who are interested in doing this project with you.

Register
Registration is open - so register now! As part of your registration you will be given a temporary membership to The Tech Museum so that you can visit anytime you want!

Mark your calendar
In addition to the event day, plan on attending the supporting events at The Tech Museum including Information Clinic's, Workshops and Challenge Trials.

Check out the website
The Tech Challenge website (http://techchallenge.thetech.org) can be a great resource. Check the website often for updates on workshops, trials and information about the Event Day.

- **Once registered** - Advisors will be sent a confirmation e-mail that will contain a URL that will allow them to update your registration information.
- **The Stuff You'll Need** page has websites of stores for supplies.
- **This Year's Challenge** page has more details about the judging criteria and rules.
- Answers to frequently asked questions can also be found here.

Can't find an answer to your question? Email us at challenge@thetech.org.

THE SPIRIT OF THE TECH CHALLENGE

In addition to being familiar with the judging criteria, judging process, and rules, be sure that you understand The Spirit of The Tech Challenge:

Participation

Showing up gets you half way there. After that you need to be a good team member, both contributing ideas and listening to the ideas of your teammates. Work together and help each other out, share your skills. The Tech Challenge is also about learning new skills and taking risks. You will encounter challenges along the way. How do you respond to those challenges? Do you persevere and learn from the experience? Always take time to reflect on what you have learned.

Process

How do you do what you're doing? Innovators go through a process of brainstorming, researching, experimenting, designing, testing, redesigning, and testing again. It's all a part of innovating. Keep in mind the goals of your design and it will keep your process focused.

Performance

What makes your innovation work well? Does it work as designed? Will your design work reliably and is it robust enough to deal with any variation it may encounter on the event day? Each test rig will have some amount of variation. Your device should be able to work regardless of your testing conditions. Does it perform the task efficiently? Is it elegantly designed, meaning does it make you stand back and say, "That's cool"?

Imagination

You can invent a solution to the challenge that no one has thought of before, or you can develop an innovative improvement to existing solutions. The important thing is that your solution is better than any other solution that is currently available.

Fun

Enjoy yourself while you are working on The Tech Challenge. Show off your creativity any way you can, in your design, in your documentation, in your brainstorming. Come up with the craziest and wackiest ideas. Show off your team spirit and what makes your team unique.

Remember the 3 B's:

1. Be confident!
2. Be encouraging!
3. Be yourself!

SUGGESTED PROJECT TIMELINE

Your team will go through four phases in your project: Euphoria, Sweat, Panic and Success. The sooner you start your Tech Challenge project, the more time you will have to design, test, and try out multiple solutions. You will have more time to enjoy the benefits of registration including temporary membership to The Tech Museum - It's never too late to get started!

Stage 1

Get organized: Decide on a few regularly-scheduled team meetings.
Start thinking: Research the challenge background and rules. Analyze the Challenge – break it into smaller parts. Keep an eye out in the world around them for ways this problem can be approached and solved!
Prepare for the Information Clinic: Create a list of questions to ask. Plan to take notes and pictures at the clinic.
Attend Information Clinic: Learn more about this year's Challenge.

Stage 2

Planning: Create a timeline with milestones.
Brainstorming and research: Test everything.
Design journals: Record every move in a design journal (or notebook). Pick three or four favorites from the brainstorm list and develop those ideas more fully with sketches, words, and quick models – Take pictures.
Complete team registration if you haven't already.
Advisors: Have the teams attend a **Team Workshop** & you should attend an **Advisor Training**.

Stage 3

Decide on one design to pursue.
Analysis: Take good notes at every meeting or trial and to spend time analyzing what works well and what needs improvement.
Review judging criteria: Understand what judges are looking for by reading the judging criteria on the website.
Attend Challenge Trials: See if you can replicate your success here at the museum.

Stage 4

Test and redesign: This month will be filled with testing and troubleshooting
Organize the documentation: Organize your notes. Remember the judging criteria and find relevant examples in your experiences.
Creative Flair: Express your creativity on the event day.
Final Days: Focus and finish the device, the design journal and the team presentation. Practice your device operation and presentation in front of adults.
Final Challenge Trial: This one is especially busy – arrive early and bring tools & supplies!
Tech Challenge Day: Bring friends & family to cheer your team on.
After the event - Throw a party! Celebrate your team's accomplishments!

CREATING A STRONG TEAM

Most teams consist of four or five members. However, this doesn't mean that your team can't be larger or smaller (*2-6 people allowed per team*). The following are some tips for getting the most out of your team.

Have regular team meetings

During these meetings your team will brainstorm ideas, assign roles, get supplies, build the device, and test and rebuild your solution for The Event Day. Most teams work between 20-60 hours on their Challenge solutions! There is no minimum or maximum number of hours you need to work on your device.

Determine roles

When you start meeting as a team, each member's role or job on the team will become clear. Some team members may have multiple roles or several team members may have the same role. And roles may change as time goes by. Here are some examples of team member roles: builder, treasurer, designer, materials gatherer, photographer, coordinator, team leader, or marketer. Based on your team needs, you might create other jobs!

Work together

You need to work together to come up with your best solution! Listen to each other and take advantage of the different skills and strengths of all team members.

Find an advisor

Adult advisors do not need any special skills or understanding of engineering. Their role is to guide you through your process. At times, working with an enthusiastic advisor can be difficult. Remember, The Tech Challenge is for YOUR ideas, designs and devices. Your advisor is there to guide you along the way. Here are some tips on how to work with your advisor…

- Have your team set the agenda at team meetings.
- Have your advisor help with troubleshooting, getting supplies, and providing tools. If you do not know how to use a tool or put something together, have your advisor teach you. Keep in mind your advisor reserves the right to use some of those power tools for safety reasons. Remind yourselves and your advisor that mistakes are there to be made. You learn more from them.
- When they have nothing else to do, send them for pizza! It's OK to tell your advisor to "stay out of the way" sometimes. Just be sure to use their help for safety reasons!!

We provide training for new advisors so be sure to get them signed up. You can also download the Guide for Advisors and Parents for them from our website.

Have fun!

Keeping the fun-factor in mind throughout the process can help your team stay on track!

TIPS FOR SUCCESS

Start tinkering!
Thomas Edison said, “Invention is 2% inspiration and 98% perspiration.”
The sooner you get started, the easier it will be to pace your team’s work and be ready for The Tech Challenge Test Trials here at the museum.

Try a variety of ideas
In the course of building and testing, you will always find things that do not work as you imagined, or that work far better than expected. Often pieces and parts of a variety of designs will create the most robust and successful inventions.

Think robust
Your device must be robust enough to operate successfully regardless of any variation in the testing area.

Reliability is an important part of the judges’ evaluation of your project. They want to see that your device can work repeatedly without trouble.

Slow and steady...is not such a cliché.
Judges are not looking for speed. They want efficiency. Your device should be robust, reliable, and not unnecessarily complicated.

Test, test, test!
Put your contraption into action. It is the best way to get useful information about how well your design will work. Be sure to test different parts of your contraption as you build it so you can make adjustments along the way. As the event day nears, run dress rehearsal tests as if a judge is standing there with a timer running. The more you test, the fewer surprises you’ll run into on the event day.

BRAINSTORMING

Brainstorming is a great way to generate ideas as a team. It's also a technique you can use to develop specific design ideas to test, build and modify. Follow these four rules for brainstorming to encourage the sharing of lots of ideas!

No put-downs: avoid placing judgment on ideas. You never know which ones will turn out to be useful.

Repeats are ok: hearing another team member say the same word or idea will spark more ideas!

Hitchhiking is welcome: people can often build on (modify, expand) each other's ideas.

Encourage outrageous ideas: often the craziest ideas have some hint that will help solve the problem. There are many different ways to approach brainstorming. Try a few of these:

Popcorn: shout out ideas quickly, like popping popcorn. This one usually requires a couple of people writing down the ideas.

Other People's Shoes: think of ways different people would solve your problem such as Bart Simpson, an alien, Santa Claus, your science teacher, your dog, etc...

Wildest Idea Session: try to come up with the wildest ideas. Finish the sentence, "Wouldn't it be wonderful if..."

SCAMPER: This is a great method for coming up with alternatives to ideas you already have.

Post-it note brainstorming: each person writes each of their ideas on a post-it note and all the ideas are put up on the wall.

Getting unstuck
As your team tackles The Tech Challenge, use the questions listed below to help you to better grasp the problem, develop your initial ideas, or work through challenging parts of your design:

- What is the problem to be solved?
- Can we redefine the problem?
- Can we divide the problem into smaller parts?
- What are the rules?
- What do we not know about the problem?
- Can we sketch the problem?
- Can we build models to help us brainstorm and visualize our idea?
- Is there something familiar that could be used?
- Are there any patterns that we recognize?
- Is this problem similar to a problem we know how to solve?
- What's the easiest part of the problem to tackle?
- What are the craziest ideas/ most practical ideas? Can we mix them?
- Are we all working together to come up with ideas?
- Do we all have specific roles on the team?

THE TECH CHALLENGE SUPPORTING EVENTS

Supporting events are offered to help your team complete a successful Tech Challenge project. For the complete list of dates visit our website http://techchallenge.thetech.org.

Information clinic
Here's your chance to ask questions about the challenge and gather engineering ideas. The official test rig will be available for viewing. Talk to experienced teams and experts working on our challenge themselves.

Orientation and Training for New Advisors
If your advisor is new to The Tech Challenge, ask them to come to our training. We will prepare them to support and guide you through your project without taking over!

Team Workshops
If you are new to The Tech Challenge, the team workshops can be a great way to build some useful skills for your Tech Challenge project. Workshops cover brainstorming, material selection, documentation, etc.

Challenge Trials
Don't be afraid to test your device numerous times. You should aim to have some part of your solution ready to test, by the first test trial. These trials are a useful way to see what changes need to be made to your challenge solution. Even if you do not have a functional device, you should aim to attend as many trials as possible. It's a good opportunity to learn from other teams.

Please note that the official Challenge Trials are the only days you can test your device on the test rig at The Tech Museum. We'll have many of these events scheduled, so find a few times that work for you!

GETTING READY FOR EVENT DAY

Get into the spirit of Event Day by finalizing your design solution, organizing your team, and preparing your documentation in ways that demonstrate your creativity, spirit, ingenuity and teamwork! Judges will look at three areas as they determine winners for The Tech Challenge competition.

1. Device Performance
Your team will get the chance to show off your challenge solution at one of the test rigs. The judges will see how well your design meets the challenge!

2. Engineering Process
The judges will be curious to know how your team arrived at its challenge solution. Judges consider your documentation and ability to discuss your process just as important (if not more important) as your actual invention!

Come ready to share the highlights of your team's experience. Judges will look at your team's documentation of its engineering process, from brainstorming through final tests and debugging. Your project notebook or journal does not need to be highly "polished;" judges enjoy looking at those messy brainstorming notes and early sketches.

3. Style and Presentation
Every team is unique. The judges want to see what makes you a strong, creative team. Practice talking about your invention and your process with confidence. Find a creative way to display your team's personality. Maybe it's cool costumes, an interesting team name or even a performance!

Why is everyone so happy about failure?
Every great engineering project comes with plenty of failure...or rather plenty of learning experiences. How else will you learn what doesn't work? You can use that information to make your solution better. Yet, some great learning experiences come at unfortunate times. If everything starts going horribly wrong on the Event Day, don't lose heart. You may become a front-runner for the Featured Judges Choice Award: **The Most Spectacular Failure Award.**

Remember: *Only through failure will you reach success!*

RESOURCES

To start the search for the “stuff” to build your Tech Challenge project, look no farther than your own garage. You can also head to local hardware stores, toy stores, dollar stores, garage sales, flea markets, Goodwill, or the Salvation Army.

The Resource Area For Teachers (RAFT) is a great source for random “stuff” that could be useful to your team. Ask your teacher if he or she is a member at RAFT. Your adult advisor can also get access to RAFT.

Here are a few local and online stores that you may not be familiar with.
American Science and Surplus: www.sciplus.com
Halted Specialties Co. (HSC): www.halted.com
The Science Source: www.thesciencesource.com
D & J Hobby: www.djhobbies.com

Cool Websites for Inspiration

How Stuff Works
www.howstuffworks.com

David Macaulay’s Building BIG
http://www.pbs.org/wgbh/buildingbig/
Curious about how what it takes to build bridges, domes, skyscrapers, tunnels or dams? Check out this interactive website.

How Everyday Things are Made
http://manufacturing.stanford.edu/

Inventor’s Toolbox
http://www.mos.org/sln/Leonardo/InventorsToolbox.html
Sponsored by the Boston Museum of Science, this site describes a wide variety of simple machines and how they help make work easier.