

STEP 1: Basics

READ THE CHALLENGE YOURSELF!

- For Technical and Scientific Challenges the details are VERY important. Even Elementary teams will be expected to follow all the specifications in the Challenge.
- Attention to detail is critical when solving a technical challenge.
- What is a Technical Device? It is a machine or a device that uses Technical Methods to perform a task.
 - This year's definition of **Technical Methods**: *Technical Methods refer to the use of principles in fields such as chemistry, computer science, electricity, hydraulics, mathematics, mechanical engineering, physics, or structural engineering. Other technical fields are also acceptable.*
- Teams should ONLY use the definitions in the Challenge!!
- While teams can touch, provide power, and manipulate Technical Devices, the less team member involvement the higher the SCORES FOR Technical Innovation and Technical Design

STEP 2: Be Prepared

- Set managerial goals for yourself.
 - What do you want your team to get out of the program?
 - You may have academic, social, special skill, technical, and/or arts related goals
- Have a notebook for each team member to: write down research goals, list design ideas, draw technical diagrams, write story ideas, create storyboards, list resources, produce supply lists, keep track of successes and failures....
- Have a large pad of paper or a white board for the team to share notebook ideas
- Have a large work area with floors that will not be damaged by team construction or are protected. Plastic, drop cloths, or craft paper can be used to cover the floor. Something that rolls up makes clean-up easier too!
- Make a paper copy of the Challenge for each team member to mark up.
- Know every pizza shop, recycling depot, home improvement store, craft store, and hardware store in your area.
- Read *Rules of the Road (RotR)!!!!*
 - Look for safety concerns (*RotR* pg 21-23)
 - Learn about expense categories. (*RotR* pg 18-20)
 - Be **very familiar** with the Interference rules (*RotR* pg 13-16) MAKE SURE YOUR TEAM MEMBER PARENTS UNDERSTAND the Interference rules

READ THE CHALLENGE YOURSELF.....AGAIN!

STEP 3: Initial Planning

Read the Challenge and Rules of the Road with the team.

- The Challenge has sections. The Team Challenge Overview has general rules.
 - The Challenge Overview is what MADi uses to decide if you have made a “good faith” attempt to solve the Challenge and if you have met the Intent of the Challenge
- The Central Challenge (sections I-IV) has the rules that the team will use to solve the Challenge. Any definitions given in the Challenge ARE the definitions that will be used to appraise the Challenge. Teams cannot substitute dictionary or internet definitions!!!
 - Remember: Central Challenge rules supersede Rules of the Road and any Published Clarifications supersede the Challenge rules!! ALL THREE MUST BE FOLLOWED!
- Read out loud with elementary or younger middle school teams. Make sure you/they read exactly what is written. Reading out loud may also help older teams by making them slow down and see ALL the requirements not just the “cool” highlights.
- Have the team members underline or highlight what they think are important features on their paper copy of the Challenge.
 - What is the technical device supposed to do?
 - What are the research requirements?
 - What are the design limits (size, weight...)?
 - Is there anything that cannot be used?
 - Are there story requirements?
- Discuss any questions the team has about the Challenge. Help younger teams with vocabulary definitions. This can be an interactive process with the read through, i.e., pause for questions at the end of each section. Have everyone brainstorm possible answers
- Have the team come up with lists of solution ideas. Have other team members think of why they think an idea will or will not work.
 - Make sure this is constructive criticism.
 - They should not just say “It won’t work” or “That is a dumb idea”.
 - They should cite specific rules in the Challenge OR cost, material, time, technical, scientific, or skill difficulties. This is a great way for teams to become aware of some of the complexities of the Challenge and the strengths of their team members
- Discuss the ways to score points. Technical Challenges can be solved in many ways. The team will want to maximize the points they think they can earn.
 - Use the scoring pie chart in section D as a visual reference.
- Break the Challenge down into small pieces. Create a flow chart for their solution
 - Can the steps be broken down further? Many small simple steps will make solving the Challenge easier.

Step 4: Design and Construction

Be the team's go-for, driver, social secretary, timekeeper, cheerleader, and psychologist.

REMEMBER, IT IS THEIR SOLUTION!!!

- Based on their earlier brainstorming have the team create a rough device
- Will a scale model be helpful or should they make it full sized?
- Have the team create a supply list to create their device.
 - Are there materials they can not use?
 - Are the planned materials within the cost constraints?
 - Can they buy less? Do they need more?
 - Can the store do basic cuts?
 - Are the materials available? Are there other sources?
 - Will all the planned materials work together?
 - Are there materials that would be less costly, easier, or safer to work with?
 - Have them do research about aspects of their design that might be improved
- Does the device meet all of the criteria in the Challenge?
- If the current solution doesn't work *for any reason* have them come up with a fix or a totally new solution.
 - It **will** be necessary to repeat this step numerous times! Don't let them get discouraged
- Help the team get any skill training they need.
 - Do they need to learn to use any special tools?
 - Do they need to learn more science/engineering concepts?
 - Is the skill set or tools beyond what they can use safely?
- You can stop the team immediately if you feel part of the process or solution is unsafe. ***YOU CANNOT tell them how to fix it or do it for them EVEN IF IT IS SAFETY RELATED.***
 - You CAN tell them they need to find another way that does not involve the unsafe element
 - You can get them additional training so they are being safe.
- Teams can use computers, kits, assembly blocks such as Lego or K'nex , off the shelf parts, and remote controlled devices BUT remember only the unique work created by the team will earn scores for Technical Design and Innovation.
 - Unique work means combining the parts in a different way or writing their own code not copying off the internet.
 - Ideas only; assembly only; using scripts or plans from published instructions, texts, or the internet; or changes that are just cosmetic will result in lower Design and Innovation scores.
- Try and keep the team on schedule and moving from design to construction to testing in a reasonable amount of time. TESTING is the most important phase!!!
- Buy pizza. Buy more pizza.

Step 4a: I see a *big* disaster

Some *what ifs* of team device planning, construction, and testing.

- *The team has a device that you think does not fit the rules of the Challenge.* YOU CAN: Read the team the relevant part of the challenge VERBATUM, do not paraphrase! Then ask if the team thinks the solution fits. You can suggest the team send for a team clarification. (see RotR p25-26) The ICMs will give them a very clear yes/no answer. If they say no they will use the Challenge rules to explain why they said no.
 - Team clarifications are private and will NOT be shared with any other team
- *You think the team is spending too much time on a low scoring aspect of their solution.* YOU CAN: Initiate a team discussion about scoring. Show the scoring pie chart again.
- *You think there is no way the team will be finished building the device in time for the tournament.* YOU CAN: Keep reminding them of timelines or have a big countdown calendar in their meeting area. YOU CAN: Ask them to do a complete performance so they realize (hopefully) how much remains to be done. No matter what, be prepared for some long sessions as tournament day approaches.
- *The team has a solution you think can't be completed within the time limit.* YOU CAN: Suggest the team do a timed performance even if it is early in the process.
- *The team is designing a solution that is huge, heavy or too delicate to move.* YOU CAN: Have the team practice moving the props through a standard door. Tape a start line on the floor and time the team's set up on the performance site about 8-10 feet away. Have the team pack the devices and props into the team's transport vehicle.
- *The team has a plan that requires a skill set the team does not have.* YOU CAN: Bring in an expert or teach the team the skill yourself. Remember it is the "skill" being taught. No part of the team's solution can be included in the teaching sessions. Take the team to the library or give them access to the internet. Supply the team with texts on the subject. Research is a VERY important aspect of solving the Technical and Scientific Challenges.
- *The team has a solution that requires a skill you feel is unsafe for them to use even with adult supervision.* YOU CAN: Explain why you feel this is too dangerous for them to do. Tell them they need to come up with a modified or a different solution. *Remember: You CANNOT tell them how to fix it or do it for them EVEN IF IT IS SAFETY RELATED.*
- *They don't appear to listen or heed any of your blatant hints.* YOU CAN NOT tell them what to fix or how to fix it! Repeat the Team Managers Mantra "*It is the TEAM'S solution*" and go enjoy a cup of herbal tea.

Step 5: Double Check, Triple Check Quadruple Check even!!!!

HAVE EVERYONE RE-READ THE CHALLENGE.

- Does everyone still have a copy of the Challenge? Hand out more if needed.
- Check if there are any Published Clarifications?
<https://www.destinationimagination.org/challenge-program/clarifications/>
- Check and see if there are any restrictions at your tournament site (see RoR pp 21-23 and the MAD I prohibited items list). It is YOUR responsibility to contact your Regional Director for any restrictions at your Tournament.
- Re-read all parts of the Challenge that apply to each scoring element. Does the device meet ALL the challenge requirements?
 - If the team has multiple devices do this for each one!
- If the team has questions or are unsure that any part of the solution is “legal” have them write for a team clarification. (see RotR p24-25)
 - BETTER SAFE THAN SORRY!!!

Step 5: Testing and Tweaking

For technical devices this is the most important process. Devices need to be tested to see what works and what doesn't. Keep reading the Challenge to stay on course. **Do not wait until the last minute for testing!**

- You need to encourage the team to physically test their device. The sooner in the process the better! Keep testing and practicing throughout the design process
 - Does it work the way they think it will?
 - Does it do everything the Challenge says it must?
 - What do they do when it breaks?
 - Does the power supply last long enough?
 - Can everything plug into ONE outlet at the site?
 - Is there a design that will work better?
 - When they modify or change the device does it still meet all the Challenge requirements?
 - Do any of their story or side trip elements, costumes, scenery, decorations... get in the way?
 - Can it be done in the time limit?
- Assist the team with getting any thing they need to test their solution. This might be a large flat space or a taped Performance Area.
- Help the team in filling out paperwork. It is very important the Appraisers know what they are looking for. Ask questions to narrow the team's focus. Help the team to balance solution details with the SHORT time appraisers will have to read the form.

- EL level team managers can fill out the forms for the team but they **MUST BE in the teams own words!!!** You cannot interpret, clarify, or paraphrase.
- Talk with the team about what they want to show the appraisers after their performance.
 - Is there some great engineering that can't be easily seen?
 - Did they make 5 prototypes before they came up with this design?
 - Did they learn new skills?
 - Did they use innovative materials?

Step 7: How do I get help???

- Ask a parent, teacher, neighbor, co-worker to teach your team a new skill or help the team to learn about topics you that scare you.
- Ask for a team clarification. (See RoR p24-25). Let the International Challenge Masters answer the team's questions.
- Check out the MADi website. (<http://www.madikids.org/index.php/start-a-team-2/>) Your Challenge Masters will be posting frequent updates and helpful documents in the Challenge Specific Information section.

The End : The grand performance!

- Stay calm. The team will follow your lead.
- Pack carefully. Walk and carry gently....props and devices break easily. Remember if something had to be dismantled for travel or breaks during transport THE TEAM has to put it back together. Adults CANNOT help, not even to hold something in place while it is being fixed or reattached.
- Adults with the team are cheerleaders and pack mules! Remind all family members they cannot help the team do anything. This includes, hair, make-up, unpacking and repairs.
- Have a complete emergency kit. If possible have duplicates of things they can not perform without. Teams almost always have last minute repairs and changes.
- Have a complete set of paperwork with spares. Give the spares to a second person.
- Remember you will not be allowed to plug in ANYTHING in Prop Storage or anywhere in the school. Not for repairs, not for a quick practice or test.
 - Are your batteries charged?
- Remember anything that could be messy or damage the tournament site must be done before you get there or in emergencies, outside. This can include: hot glue, paint, colored hair spray, or glitter.

- **IF YOU SEE THE TEAM DOING ANYTHING THAT COULD DAMAGE THE SCHOOL PLEASE STOP THEM IMMEDIATELY.**
- Don't tell the team where or how to set up.
- DURING the performance remember to breath. Don't mouth the words of the story. Sit on your hands if necessary.
- AFTER the performance give the Appraisers time to talk to the team. Appraisers will tell you when it is time to come out and help move your props

BUY LOTS OF PIZZA AND CELEBRATE!