



VOCABULARY

Adviser	A person at least 18 years old who monitors safety, acts as a mentor and who may provide things like transportation, encouragement, and snacks. We allow one adviser per team. While your adviser should help with any tools for safety, they shouldn't give you design suggestions or do the project for you.
Axle	A rod, stick, or shaft that goes through a spinning part like a wheel or gear. An axle either stays still while the wheel or gear spins freely around it, or it locks tightly to it so they both spin together.
Brainstorming	Coming up with ideas, sometimes wild ones, for a solution to a problem. It's possible to brainstorm on your own, but most find it works best as a team activity.
Cam and follower	A type of mechanism made of an unevenly shaped wheel (the cam) and a stick or bar that rests on it (the follower). When the cam spins, its bumpy shape pushes the follower up and down or back and forth. For examples of cam and follower mechanisms in action, check out the animations and diagrams in this webpage by designer Rob Ives.
Chemical reaction	A process in which one or more substances are changed into others. Chemical reactions are not allowed in this year's challenge.
Criteria	The requirements for success.
Compressed air	Air held under pressure in a container: the force generated when the air is released is used to operate machines, tools, etc. For the Tech Challenge, we limit the amount of pressure allowed from compressed air to 5 psi (pounds per square inch).
Constraints	A control or limit to a design. For example, a constraint might be that your game needs to fit into two large Ikea shopping bags.
Design	The creation of a plan for the construction of your device. Sometimes used to refer to the device itself.
Device	The solution you and your team are designing, engineering and building for The Tech Challenge. This year your device will be a mechanical game.
Dimension	A dimension is a measurement such as length, width, or height. If you talk about the dimensions of an object or place, you are referring to its size and proportions.
Empathy	Being able to understand and share the feelings of another.

Energy storage	The physical part of a device that holds potential energy so you can use it later. Some mechanisms can help store energy and others help turn stored potential energy into kinetic energy and mechanical motion.
Engineer	A person who designs, constructs and tests devices, materials and systems while considering constraints caused by safety, practicality, rules and cost.
Engineering analysis	Looking at a problem using scientific analytic principles and processes so you can see the properties of what you are designing. To start, break down a problem into its basic parts to look at relationships between its pieces and things other than your device.
Failure	Sometimes you feel this when your device doesn't work, but a big part of engineering is finding failure points and fixing them. So running into a roadblock with your device is an opportunity to use your engineering brain to make your device even better.
Failure point	When a break in a system causes a device to work improperly or not work at all. One of the jobs of an engineer is to find failure points so they can fix them, and it's one of the reasons we test again and again.
Final design	The final plan for the construction of your device, agreed upon by the whole team. The team develops the final plan after brainstorming, prototyping and testing again and again. Sometimes this term is used instead of final device.
Final device	The device your team will bring to the showcase, the product of all your team's brainstorming, designing, prototyping, testing and re-testing. This should be documented in your Team Journal.
Game	A fun, hands-on activity that has a clear objective, a way to score or succeed, and gives the player feedback on how they are doing. For The 2027 Tech Challenge, a game must be a portable, physical device that uses mechanical motion.
Game controls	The built-in mechanical parts that a player actually holds, pushes, or turns to play the game.
Game objective	The main goal of a game. This is what the player is trying to achieve to win or score points.
Game pieces	The loose objects that a player or mechanism acts upon in a game. Examples include balls, chips, pucks, tokens, marbles, rings, capsules, and similar objects.
Game mechanics	The rules or elements that govern and guide player actions in a game. This term is often used in tabletop games and video games to describe what a player can do and what happens in response.
Gears	A type of mechanism made of wheels with teeth around the edges that lock together. When you spin one gear, it forces the other gear to spin, which is a great way to change the speed or direction of motion. Check out the Mechanical Animal activity on The Tech Interactive website for some examples of moving gears.
Human power	Power available from or supplied by the physical effort of human beings, like pushing, pulling or throwing.

In-game feedback	How the game itself tells the player they are doing well or poorly while they are playing. For example, depending on what a player does, the game can react with a sound, a visual cue, or a vibration.
Innovator	Someone who creates something new or makes changes to something that already exists in order to meet a specific need. For example, for the 2027 Tech Challenge, you and your team will design, build, and playtest a mechanical game for a real-life player.
Iteration	The different versions of the device you build as it changes due to the Engineering Design Process.
Kinetic energy	The energy of movement. Anything in your device that is moving mechanically in a straight line, spinning in a circle, sliding back and forth, or swinging back and forth has kinetic energy.
Levers	A type of mechanism made of a stick or bar that rests on a pivot point (called a fulcrum). Pushing down on one end makes the other end go up. Think of a seesaw or a catapult. Check out the Mechanical Animal activity on The Tech Interactive website for some examples of moving lever
Linear motion	Moving in a straight line in one direction. (See also Mechanical motion)
Linkages	A type of mechanism made from a series of connected sticks or bars that transfer motion from one place to another. If you push or pull on one end of a linkage, the other end might slide, swing, or wiggle! Check out the Linkages activity on The Tech Interactive website for some examples.
Living document	A document that is continually being updated. For example, your Team Journal.
Mass and spring	A type of mechanism that pairs an object (the mass) with a bouncy, coil or elastic band (the spring). The spring acts as the energy storage, holding onto potential energy when you squash or stretch it. When a player, game piece, or another mechanism lets go, that potential energy in the spring becomes kinetic energy in the mass to push or pull back into place. Check out the Mechanical Animal activity on The Tech Interactive website for some examples of a moving mass and spring.
Mechanical Motion	Mechanical motion usually falls into four categories: Linear motion  Moving in a straight line in one direction Oscillation  Swinging back and forth along a curve. Reciprocation  Moving back and forth in a straight line. Rotary motion  Spinning continuously around a center point.
Mechanism	A system of two or more moving parts that work together to create action in your game. Examples of mechanisms include levers, gears, springs, pulleys, and linkages. Check out the Mechanical Animal activity on The Tech Interactive website for more examples.

Momentum	A measurement of mass in motion. Any object in motion has momentum.
Needfinding	The part at the beginning of the user-centered design process when you discover what your user actually needs. You do needfinding by practicing empathy, asking great questions in a user interview, and using careful observation.
Nominal	Approximate; that is, there may be minor variances between the measurements stated in the rules and drawings and the actual test rig, for example.
Observation	Watching your user carefully to see how they interact with things, instead of just listening to what they say out loud. Good observation means noticing behaviors—like if they struggle to reach something, use one hand more than the other, or look confused—so you can design something that fits them perfectly.
Oscillating motion	Swinging back and forth along a curve. (See also Mechanical motion)
Perseverance	Not giving up in the face of failure. Your team may experience setbacks, but it doesn't have to give up. Getting past those failures can be fun and rewarding.
Playtesting	The process of observing target players while they try out a game prototype. By having real people play a prototype, game designers get to see real reactions and find out what is confusing or broken so they can fix it in their next prototype.
Potential energy	Stored energy that can be used later. An object has potential energy because of its position or shape. For example, a heavy ball on top of a ramp or a rubber band pulled tight all have potential energy that can turn into movement.
Prototype	A first and usually functional form of a new type or design of a construction. As part of The Tech Challenge, teams will iterate and improve their prototypes until they find a final solution.
Pulley	A type of mechanism made of a spinning wheel with a rope or string tied around the outside. Pulleys help you lift things or change the direction of a pull, like raising a flag on a flagpole or lifting a bucket from a well.
Reciprocating motion	Moving back and forth in a straight line. (See also Mechanical motion)
Repeatability	The ability of your device to demonstrate the same results under the same conditions, i.e. to work every time you test it.
Rotary motion	Spinning continuously around a center point. (See also Mechanical motion)
Safety	Your No. 1 priority! Safety involves using tools correctly, wearing goggles and protecting your head when working on and testing your device, and more. While your team should appoint a safety monitor, everyone on the team is responsible for safety!
Solution	The design your team builds for The Tech Challenge.
Specifications	Detailed descriptions of design criteria for a piece of work.
Team journal	A record of all the brainstorming, research, prototyping and other work that goes into developing your team's device.
Transfer of energy	When energy is converted from one form into another, or moves from one place to another. For example, when a ball rolls down a hill the potential energy is converted into kinetic energy.

User (or Target User / Player)	The specific person, or group of people, who will use a device. In user-centered design, engineers and designers focus on understanding a “target user” and their needs through interviews and observations of a real-life person. By considering the needs of one user, designers get the feedback they can use to improve their design for everyone
User-Centered Design	An approach to the design process that puts human needs, capabilities, and behavior first. Designers aim to develop empathy for their users and utilize techniques like interviews and observations. (also known as human-centered design) • Game designers might interview and observe real people and use that information to decide on features, themes, or even the mechanics of their game. Getting feedback and playtesting is also essential for designers to fully understand their user and improve their game.
User feedback	The data your player gives you after trying your game. Feedback usually comes in three forms: what they like, what they wish was different, and new “ <i>what if</i> ” ideas.
User interview	A special conversation where your team learns from a user before brainstorming ideas or prototyping solutions. Instead of guessing, you ask your user questions to discover their wants, needs, likes, and dislikes.
Visual cues	Colors, shapes, and symbols that help players understand how to control the game and how well they are doing. Good visual cues show players what to do. For example it may show them where to push, pull, or twist or act as in-game feedback so the game is easy to learn and play.
Weight distribution	The way in which the weight of an object is distributed across its structure or components.

Sources: Collins Dictionary, Wikipedia, Vocabulary.com, Merriam-Webster.com, and American Heritage dictionary.