Nine Steps to Inventing:

1. Think of a problem that needs to be solved.
2. Brainstorm possible solutions.
3. Choose the best idea
4. Find out: Has this idea already been invented?
5. Draw a detailed picture.
6. Construct a model.
7. Test and redesign your invention until it works.
8. Think of a catchy name for your product.
9. Design a colorful display or backboard to advertise your invention.

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Nine Steps to Inventing
Step 1: Think of a Problem

Ideas for inventions are everywhere—if you just learn how to recognize them. Once you get into the habit of inventing, ideas will constantly pop into your mind. Your mind becomes open to improvements that could be made in your world instead of simply going through life accepting things as they are. For example, think of the simple paper clip. Why are there so many variations? Why did anyone ever bother to adapt it, modify it, or rearrange it? The need to create, to improve upon an existing idea, or to find the status quo unacceptable is fundamental to inventors.

Teaching students to look for problems that need to be solved is an excellent way to stimulate their inventiveness. Even months after your invention competition or celebration, you will have students come up to you saying, “I thought of a new invention last night!” or “I’ve already got my idea for the invention competition next year!” No greater reward will come to you than to know that your students are actually thinking—even when you are not present! You have planted a seed that continues to grow and flower long after your students have left your classroom. Beware, however, because you, too, may find yourself inundated by invention ideas of your own!
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Step 2: Brainstorm Solutions

Brainstorming? Why bother? In school, students are taught to seek out the one right answer. The answer to the question “Why bother?” may lie in nature.

Envision a pine tree. How many cones are on an eighty-foot pine? Anyone with ten pines tress in their backyard will surely answer, “An infinite number!” What is the purpose of a pinecone? What does it house? Each pinecone is filled with hundreds of future pine trees. Imagine, first, if every one of those seeds sprouted and grew into a living pine tree. Visualize now, however, if each pine tree had only one pinecone. Each pinecone had only one seed. The future of pine trees would be gloomy indeed!

This analogy of the pine tree is like the human generation of ideas. If we are filled with ideas, we will have better success if we have produced hundreds of ideas instead of just one. Student inventors will experience far more success than frustration if they have generated numerous ideas to fall back on in case their selected idea fails to work. It seems, in fact, that out of one hundred ideas produced, the last ten are the most original and creative. The purpose of the invention program is not to win prizes, but to inspire students to become creative problem solvers. Will all of our students become inventors? Of course, not! However, if we have taught them the process of idea generation, then we have secured our country’s future with students who can think!

To enhance creativity and inventiveness, let us teach students to not only produce numerous solutions themselves but also to be tolerant of this quality in others. Idea-generation involves risk-taking. A classroom environment that promotes self-confidence, experimentation, and risk-taking is critical to the brainstorming approach. “If we can give students the self-confidence to stick their neck out, they will be more likely to be creative.” (Flowers, 1987).
Just as a forester would select the strongest, best seedlings to nurture, so, too, your students have a similar task. They have undoubtedly generated an abundance of brainstormed solutions; now they must narrow down their list.

This convergent process focuses on selecting those ideas which the student believes will bring the most success. The student utilizes criteria to make these decisions. The criteria, however, may sometimes be intuitive, while in other cases you may need to assist this selection process by suggesting criteria such as:

1. Usefulness to society
2. Marketability
3. Originality
4. Differs from existing inventions

One field-tested method is to have young inventors put stars beside their top 3 ideas and then make judgments as to which ideas would be most likely to succeed.
Be sure students take the time to check to see if each of their ideas has already been invented. They may do this in many ways, including the following:

1. Asking parents, neighbors, and teachers if they have ever heard of such an invention;
2. Checking in catalogs, such as Hammacher Schlemmer website: Hammacher.com;
3. Calling or visiting various stores to see if they carry such a product;
4. Searching through encyclopedias and invention books;
5. Visiting the website for *Thomas Register of American Manufacturers online*. This site is very high-level and challenging to navigate, however, and would be difficult for young students;
6. Google>More>Even More>Specialized Search>Patents. This tool is exceptionally easy to follow. Students enjoy the diagrams and blueprints contained within the site as they see what real patents look like.
At this time, young inventors need to draw a detailed picture in their inventor’s journal, or notebook, to record flashes of insight. To further document ideas, each picture should be labeled, dated, and briefly explained. This will help ensure that great ideas do not “get away”. In fact, it is recommended that students keep their inventor’s notebook next to their beds to jot down ideas which come to them as dreams. Famous inventors have often experienced this dream phenomenon, as documented by the German scientist, Friedrich Kekule’s discovery of the chemical structure for the benzene ring as he dreamed of a snake chasing its own tail.
Nine Steps to Inventing
Step 6: Construct A Model

To construct a model, students must visualize a three-dimensional version of their idea. This skill may be challenging for some students, yet it is a significant step in sharing their idea with the world! The 3-D model may be a working prototype of their innovation, which actually functions. This working model might be a scaled version of the actual concept to make it small enough for a student to handle. For example, one student’s innovative idea involved putting an emergency braking system on a supertanker in the ocean. Needless to say, the prototype was not life-size! Alternatively, the model which a student constructs might be a non-working prototype, which does not actually function, but will provide a three-dimensional sample of their concept. Encourage students to be resourceful in creating and constructing their models by utilizing recycled materials or repurposing discarded supplies. When Dr. Forrest Bird, inventor of the medical respirator and National Inventors Hall of Fame inductee, built his first prototype, he utilized an old strawberry shortcake tin container!
Nine Steps to Inventing

Step 7: Test and Redesign

The prototype, when tested, may need to be adjusted or modified several times to solve the problem in the best way. For example, one young inventor created a home pretzel maker, which she named the Perfect Pretzel Preparer. However, the first time she baked her pretzels, they came out anything BUT perfect. In fact, it was just a big blob of pretzel dough. The student went “back to the drawing board” and modified her design slightly to create a new prototype. Her final product produced perfect homemade pretzels.

We applaud young inventors for their thinking because that is the path to discovery! Our purpose is to stimulate the creative thinking process. It is important to realize that an idea in and of itself has merit. However, we also encourage students to take their concept to the next level by creating a prototype that best represents their design idea in a three-dimensional model. The Inventors’ Journal documents ideas. A well-designed model communicates their creativity to the world!
Think of a “catchy” name for your product! The name must call attention to the invention but also describe the importance and use of the invention. It will be one of the first things that people will notice, so it has to “sell” them on its originality and usefulness. Brainstorm numerous ideas for names, until you discover the perfect title. Consider using alliteration, which is the repetition of the same sounds at the beginning of words or in stressed syllables. For example, one young inventor called his invention “Russ’s Rad Raincoat”, utilizing not only alliteration but also the technique of naming the invention after yourself. Isn’t that what famous inventors do? Dr. Forrest Bird, inventor of the medical respirator and inductee into the National Inventors’ Hall of Fame, called his infant respirator the “Baby Bird”. Give your invention that personal touch!
Nine Steps to Inventing
Step 9: Design A Display

Advertise your invention! An eye-catching display or backboard will enhance any invention by attracting the judges visually to notice a student's fantastic creation. Be creative! Add multi-color, three-dimensional letters, or texture. Would the addition of pockets for game pieces, brochures, or your inventor's journal be an advantage to enhance the overall portrait you are painting? Consider including actual "before-and after" photographs to illustrate the usefulness of your invention. Take the photos from behind or at an angle that does not show faces, just hands and the product in action. Be sure to include a neatly-drawn diagram or blueprint of your invention designed on graph paper with a ruler for added quality. Inventors think outside of boundaries, so do not limit your display. Consider letting the letters extend above the board or have the board mounted onto an unusual frame, as one young inventor did when her display board was attached to a wire mannequin that stood five feet tall!

A three-dimensional invention model with a neat, colorful display board will be a source of pride to a young inventor. Remember, however important the advertisement might be in "selling" your idea, the purpose of the invention celebration is to reward ingenuity, creativity, and inventiveness, not merely artistic attractiveness.