



Is there something cool about science, math, engineering, or technology that you want to share with your class and family? Write about it here.

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## My STEM Stories™

### Introduction to Invention

Did you know that ideas are valuable?



**STEM  
Inventor:**

# Vocabulary

Term	Definition	Picture or Simplified Definition
<b>Brainstorming</b>	Brainstorming is collecting and sharing a lot of ideas to solve a problem.	
<b>Creative Thinking</b>	Creative thinking is using your knowledge and things you learn in school to come up with a new idea.	
<b>Inventor</b>	An inventor is a person who comes up with a new way to solve a problem.	
<b>Intellectual Property</b>	Intellectual property is a law that protects inventions.	
<b>Entrepreneur</b>	An entrepreneur is someone who turns ideas into a business and then gets to be their own boss!	

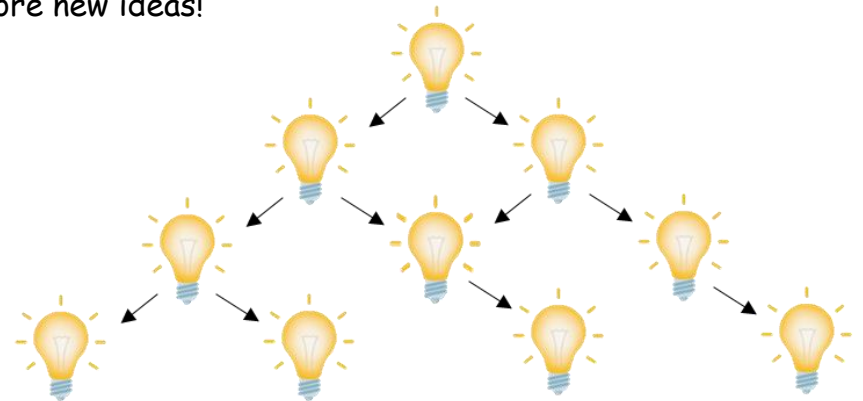
An example of the term in the inventor stories

# Ideation and Innovation

We all come up with ideas. Sometimes they are about something we wish we had to play with (like a cool piece of playground equipment). Other times they are about something we wish we could change (like how we could make it easier to clean our room). But how do you know if your idea has value? Would you believe me if I told you that ALL ideas have value?

## It's True!

Even if an individual idea may never become something you can hold in your hand, or turn into a product or service, it still has value. This is because all ideas are sure to do at least one thing—they lead to new ideas. And those ideas lead to even more new ideas!



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New ideas are what drive innovation and inventions like rain and sunlight help make new plants. Just like you need a lot of rain and sunlight for a single plant, a single invention is the result of many, many, many ideas.

Did you know that many famous (and many not so famous) inventors carry a small notebook with them? This is so they can write down their ideas as soon as they think of them. They know that every single idea they have has value. They know that all ideas deserve to be written down, so they aren't forgotten. They know that even if they can't use their idea right away, they might be able to use it in the future—either as it is, or as the spark for another idea.



# Useful Phrases for Having Constructive Discussions

## Asking Clarifying Questions

Can you be more specific?

Could you rephrase that?

What is your evidence?

Can you give me another example, so I can understand?

## Adding to an Idea

I agree, and I have an addition: \_\_\_\_\_.

I know that too because \_\_\_\_\_.

I would like to add to that idea.

Yes, that makes sense, and I would also like to add

## Respectfully Disagreeing with an Idea

Could you explain, because I have a different idea?

I respect your point, and in my opinion \_\_\_\_\_.

I see your reasoning and disagree with some of the idea because \_\_\_\_\_.

# TELL US ABOUT YOU AND YOUR INVENTTION



As early as 500 BCE, people wanted to protect their ideas and inventions. They wanted to encourage new ideas but also wanted to stop others from imitating or copying their ideas.

Giving value to an idea is an important part of **intellectual property law**. Intellectual property laws are designed to protect ideas and innovations. However, they are complicated and continually being updated as new innovations are created that don't fit old patterns. Professionals who work in this field must have a good understanding of law, business, and technology.



When you are working on a new product or idea it is important to have a lot of different ideas and perspectives.

Do you agree or disagree with that statement and why?  
Make sure you justify your answer.

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# LET'S MEET SOME INVENTORS

Andrea Sreshta and Anna Stork,  
Co-Founders of LuminAID



**The Challenge:** Anna and Andrea were architecture students in New York City in 2010 when they heard about a massive earthquake in Haiti. They wondered what they could do to help the people affected and rescuers. In addition to the need for food, water, and shelter, they heard about increasingly dangerous night conditions caused by the lack of reliable sources of electricity. This inspired them to turn their attention to light.



11-year-old Nashville student Andrew Pelham thinks he has invented a way to keep parents from forgetting their babies in the car. He entered The Rubber Band Contest for Young Inventors and invented the E-Z Baby Saver, a simple device made of duct tape and rubber bands. The device renders parents unable to walk away from the car when a child is still inside. It is a strap that stretches from the back seat to the front and attaches to the driver's side door.



Austin Meggitt's, an 11-year-old from Amherst Ohio, was tired of struggling to carry his baseball bat, glove and ball on his bike. As a solution to his problem, he invented the *Glove and Battie Caddy*, which includes a bar above the handlebars, for clipping his bat and hanging his glove and ball. His invention worked so well that soon all his friends wanted one and he earned US Patent No. 6029874.

Four Southern California kids, sisters Amy (13) and Alyssa Hansen (10), and brother and sister Kaycee (10) and Nickolas (12) Johnsen, created *Boogie-2-Boogie*, a wave-riding board for two. It has a light on the front that parents can trigger when it is time to come in. They were the TOY challenge 2004 winners. Hasbro®, a famous toy company and one of the sponsors, made action figures of the team members as prizes.

**The Solution:** The two students turned innovators and entrepreneurs designed an inflatable solar-powered lantern. In 2015, they pitched their product on *Shark Tank* and received offers from all five investors and has helped them get their lantern to people in more than 100 countries.



Anna's and Andrea's invention is inexpensive and packs flat to make shipping thousands of lights to areas affected by natural disasters or other emergencies easy. The light battery can be recharged using the small solar panel on the top of their lantern. There also is a built-in USB port to recharge your cellphone or mobile device. LuminAID's lantern replaces reliance on candles or kerosene lamps, which can cause fires and contribute to unhealthy indoor air quality —and can't charge their devices. LuminAID not only helps people who lose power or rely on unsafe sources to provide light, but also those who enjoy hiking and camping in the outdoors and remote areas.

## JD Albert and Barrett Comiskey, Co-Founders of E Ink

JD Albert and Barrett Comiskey met when they were in college in Cambridge, Massachusetts. Even though they were studying different subjects—JD was studying mechanical engineering while Barrett was studying math—they both joined the MIT Media Lab. The MIT Media Lab is an organization that focuses on bringing together ideas and ways of doing things that people normally don't think go together. (Read more about the MIT Media Lab here: <https://www.media.mit.edu/about/mission-history/>.)



While they were at the Media Lab, JD and Barrett got the idea that they wanted to make electronic paper. Electronic paper is something that would feel like paper but would work like a tablet. They also wanted it to be thin, lightweight, and flexible so you could roll it or fold it as you would a newspaper.

They tried out a lot of different ideas. The first idea they tried was to make tiny balls the size of a piece of birdseed. These

Andithya Ganesh, from Plano Texas, invented a bionic glove that helps hand amputees regain mobility. He started a company IntentSense to help commercialize his invention and was a recipient of a Thiel Foundation fellowship award.

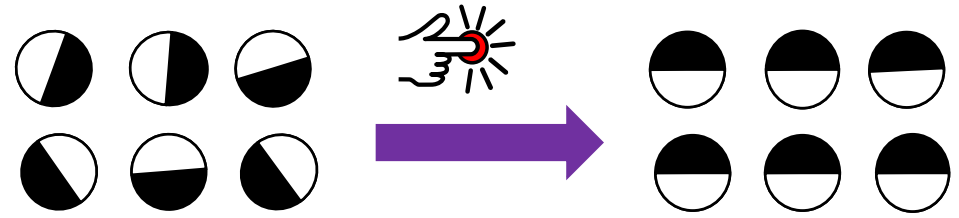
The Flying Monkeys, a team composed of 11- and 12-year-old Girl Scouts from Ames, Iowa, won first place at the FIRST® Lego League Global Innovation competition in 2011. Their invention, the BOB-1 Hand Device, enabled a toddler born without fingers to hold a pencil and write for the first time. The team was granted Patent No. US 8840157 for their invention.

At age 14 Chandler Mocacha of Oxford Michigan invented a "Wheelchair Backpack Holder" so that a wheelchair's backpack conveniently swivels forward via a lever. For his invention he was granted Patent No. US 7344055.

# LET'S MEET SOME YOUNG INVENTORS

When she was 8 years old, Kylie Simonds of Naugatuck, Connecticut was diagnosed with cancer. Though she is in remission she remembered having a lot of trouble pushing the heavy I-V poles and tripping over the wires. Kylie invented the I-Pack, a pediatric IV backpack for kids receiving chemotherapy or transfusions, that comes in many colorful designs. She received a patent and is trying to raise money to put the backpack into production.

Max Loughan, of Reno Nevada, loves to invent things. The 13-year-old, invented an energy harvester from a coffee can, some wire, two coils and a spoon. The harvester conducts radio waves, thermal, and static energy, and turns it into electricity.



balls were white on one side and black on the other. Electricity could make them spin around so that the black side would show any writing on the paper. However, when they ran more experiments with them, they figured out that it was going to be very hard to produce these little balls on a large scale. They also discovered that someone else already thought of the idea and had a patent. A patent is like a note from the government saying that you are the only one who can use a specific idea for 20 years. So, it was back to the drawing board!

JD and Barrett were a little disappointed that they had to start over again, but that is how it goes sometimes. They went back to the library and back to the lab to research and test new ideas. In the end, they discovered that when they combined two ideas from different areas of science—medicine and electronics—they could create a new way to make electronic paper that no one had ever thought of before.

Their idea was to make very small rubber "bubbles," and inside they would put some liquid and very small pieces of special colored sand-like material. This sand-like material could move around inside the bubble, or "microcapsule," and allow you to write different things on the electronic paper.

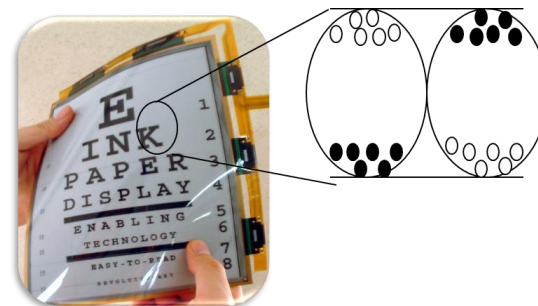
JD and Barrett tested their idea and shared it with people they knew. Eventually, they decided to start a company called E Ink and asked people from around the world to join their company and help them. They hired people from India, China, England, and Canada to help them improve their idea and to turn their idea into a product.



*Barrett, Katharine, and Kim from the E Ink research team.*

Everyone worked together sharing ideas, successes, and even failures. Sometimes, when they had to solve really hard problems and needed more ideas and different perspectives, they would form collaborations with other companies.

After years of hard work, JD, Barrett and the team at E Ink started selling their electronic paper! The first product didn't look exactly as they imagined it back in the Media Lab, but that was OK. They had invented something totally new even if there was still a lot of room for improvement.



After working on their inventions and company for almost 10 years, both JD and Barrett decided to try something new. Barrett went to business school and has since built a number of new companies. JD wanted to help other people with their ideas and splits his time between consulting as an engineer and teaching new inventors at the University of Pennsylvania.