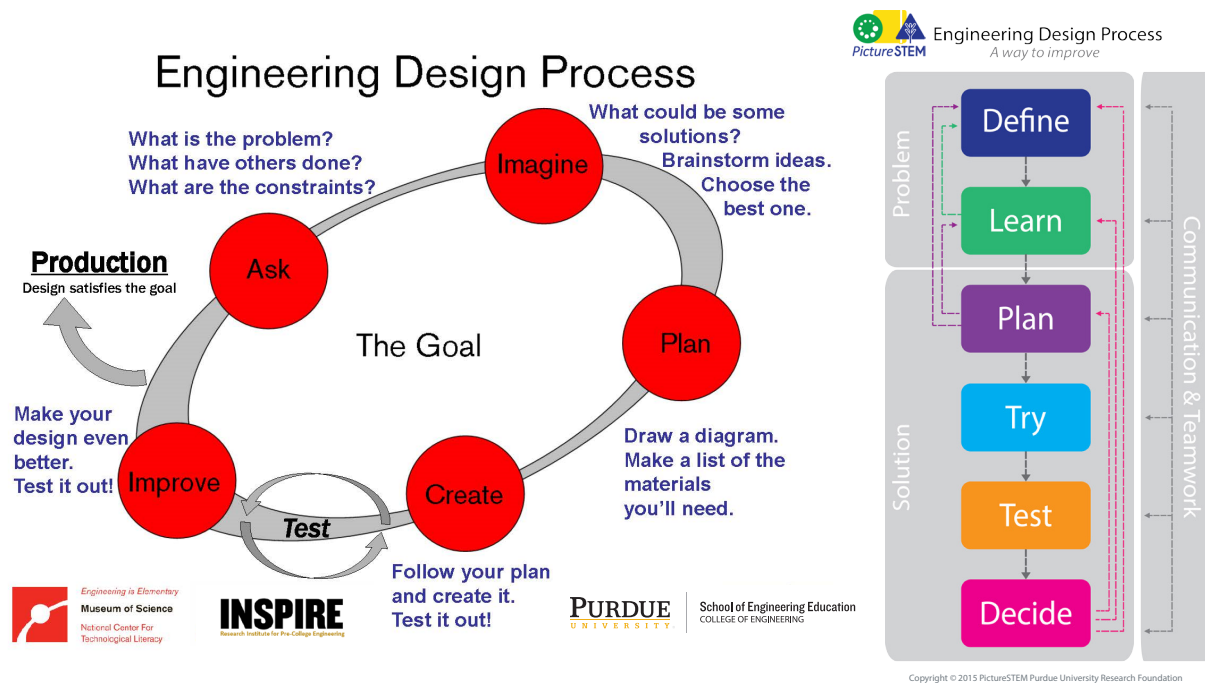


What can your kids learn about engineering?

- **Design Process.** Engineers use a design process to design products and processes that benefit people and communities. Engineers must first understand (and sometimes identify) the problem they are addressing (expert engineers are much better at this than new engineers!). They brainstorm many different approaches to solving the problem, build prototypes, test ideas, and make improvements. Below are two examples of engineering design processes.



- **Apply mathematics, science and social sciences to make a difference.** Mathematics and science knowledge and skills are important for success in engineering—engineers analyze data to make data-based decisions. However, they also need good teamwork and communication skills.



View this resource and others at:
engineering.purdue.edu/INSPIRE

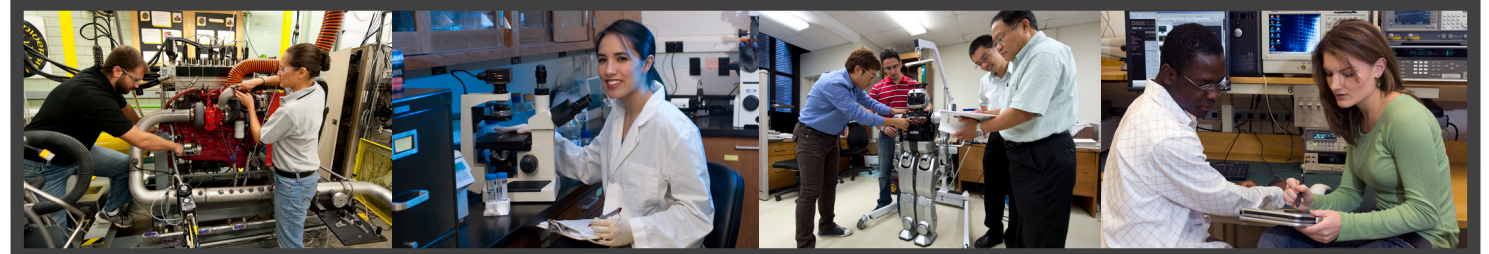


A PARENT'S GUIDE TO INTRODUCING ENGINEERING AT HOME

Why help your kids learn about engineering?

- **Many schools are now teaching engineering.** Most states are adopting standards that specify engineering topics that should be taught at each grade level. Elementary, middle and high school teachers are learning how to teach engineering to all students.
- **Engineering motivates mathematics and science learning.** One reason that some states have decided to include engineering in K-12 schools is because research has shown that engineering contexts can motivate K-12 students to learn mathematics and science.
- **Engineering promotes learning in general.** Engineering design challenges often incorporate:
 - Reading and writing skills, as engineers need to gather information related to the projects they are working on and need to communicate their work to others.
 - Social studies skills as K-12 students are prompted to consider the person (or group) that they are designing for, which means that they may need to understand cultures and other countries (if the design challenge prompts the student to think about how the design is used in another country).
 - The opportunity to build and create things which can be motivating for some students.
- **Allow students to fail in a productive way.** Engineers test their ideas out, learn from the tests, and make improvements to their work. It is okay if an idea fails at first, because there is opportunity to learn from the failure and revise the idea. Engineers rarely get it right the first time.
- **Allow students to consider engineering as a career.** Many adults realize later in life they would have enjoyed engineering, but didn't understand what it was when they were choosing a major. If every child learns enough about what engineering is and what engineers do, they can make a choice about whether they are interested in a career in engineering.

Engineers apply science and mathematics knowledge and skills and use their creativity to solve problems or meet the needs/wants of people, animals, the community, the environment, etc.





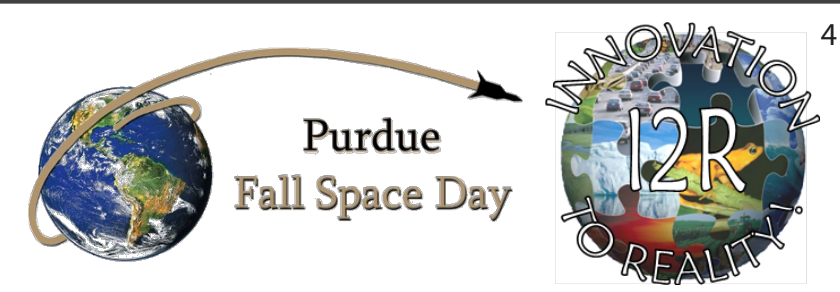
Let children ask questions. Children are naturally curious. Foster their curiosity by encouraging them to ask you questions and then helping them to figure out how/where to find answers. It's great for you to answer their questions, but also great to look at a reference book or on the internet together. Engineers solve problems, but another key part of engineering work is identifying and understanding problems.



Visit a science or children's museum. Science museums allow children to explore engineering, science and mathematics concepts at their own pace, often through hands-on experiences that are enhanced through signs that provide more explanation of the concepts. Many children's museums also have exhibits that communicate science and engineering concepts.



Movies: Two examples are Iron Man (the engineer superhero) and TinkerBell (the fairy who has a talent for "tinker"ing).



Summer Camps and Special Activities. What programs are available in your community? Purdue has a Fall Space Day, Super Saturday sessions throughout the year and summer camps.



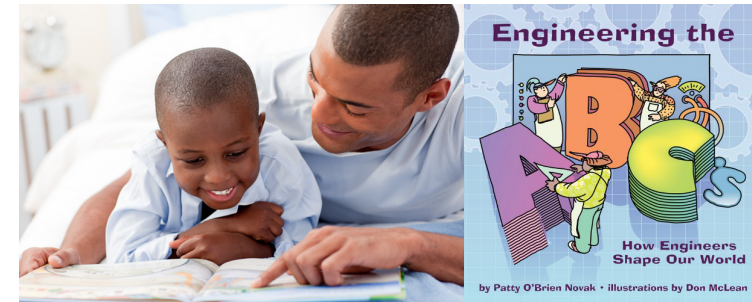
Hands-on play with everyday items. While playing with everyday items, children can imagine new uses for familiar things. An engineer will "play" with everyday items too in order to create a simple "prototype" or "mock-up" of something that they are designing. Give them time to explore on their own, interspersed with "that's great" and "did you think about trying ..."



Play with puzzles. Trains are also a common toy. Why? One reason is because the train tracks can be changed into many different configurations—allowing a child to design and redesign the tracks. You might ask your child to layout the tracks around "constraints"—the tracks need to fit in a certain space, or need to go around an object. Or you might ask your child to lay out the tracks to meet different goals.



Play with blocks. (wooden blocks, foam blocks, Legos, Lincoln Logs, etc.). Ask your children questions about what they are building: What are you building? Who is it for? How will they use it? Why did you...?



Read books. Engineering the ABC's: How Engineers Shape Our World is a book out that is appropriate for 4-8 year olds. If you read a story about an engineer who is driving a train, point out that there are other types of engineers too, who design cars and buildings and toys instead of driving trains.



Let your child take things apart. Even very young children can enjoy and benefit from the experience of taking things apart and then trying to put them together again (as long as there are no choking/electric/other hazards!).



Develop mathematics and science skills. You can find books and software at your library (or store) so your child can practice mathematics and science skills.



Kits. You can purchase kits for building circuits, kits for buildings cars, kits for science experiments, etc.

HOW DO ENGINEERS HELP THEIR CHILDREN LEARN ABOUT ENGINEERING?

The suggestions provided are some of the common responses provided during a research study where 24 engineers were interviewed and an additional 57 were surveyed.