Welcome to the 5th module of The Creative Parent's Toolbox. Module 5 covers Gender Biases & Electricity.
<table>
<thead>
<tr>
<th>Pedagogy</th>
<th>Physics Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 1 Building a Growth Mindset</td>
<td>Forces</td>
</tr>
<tr>
<td>Module 2 Asking Better Questions</td>
<td>Motion</td>
</tr>
<tr>
<td>Module 3 Engineering Design Process</td>
<td>Structures</td>
</tr>
<tr>
<td>Module 4 Motivating Learners</td>
<td>Flight</td>
</tr>
<tr>
<td><strong>Module 5 Gender Biases</strong></td>
<td><strong>Electricity</strong></td>
</tr>
<tr>
<td>Module 6 Creating an Ideal Learning Environment</td>
<td>Power</td>
</tr>
</tbody>
</table>
Now, I want you to picture an engineer! What do they look like, what are they wearing? What are they doing?
Is this what you pictured?
Ask your child what they imagine an engineer to look like. What does an engineer wear and do? What do you think their answer will be?
Attitudes towards people

When we meet someone for the first time we judge them by:

- the way they look
- the way they dress
- the way they speak
- their mannerisms

We build a view about them that can guide the ways we interact with them.
The Primacy Effect

- Our initial evaluation of people is done very quickly and the impressions that we develop tend to be lasting ones.
- This is the Primacy Effect.
- Even though the first impression may not be accurate, it can still be lasting.
Categories become stereotypes

- When we evaluate people we do so by fitting them into a category based on what we know of people and the world.
- This is called Stereotyping.
- All individuals in the category have the same characteristics (in our mind).
Our brains use Stereotypes as a short-cut

- It is not possible for us to intimately know everyone we meet.
- So our brains use stereotypes to give us a general system to guide our interactions with others.
Boys are strong.

Girls are graceful.
Boys have trucks.

Girls have dolls.
Boys build houses.

Girls keep houses.
Boys are doctors.

Girls are nurses.
Boys are pilots.

Girls are stewardesses.
Problems with Stereotypes

- When we stereotype someone, we ignore their individuality, how she may be different.
- We ignore all information about the individual that does not fit the stereotypical image we have of them already. So if a girl says “I want to become a firefighter”, we will not hear that if we think girls should only play with dolls.
“Like a girl”
A child sees 25,000 ads a year - when her mind is most sensitive
**Growth Mindset**

“A girl is not defined by what society sees in her. She is defined by what she sees in herself” -- Girl Rising

<table>
<thead>
<tr>
<th>What you shouldn’t say to a girl</th>
<th>What you should say to a girl</th>
</tr>
</thead>
<tbody>
<tr>
<td>“That’s ok! That was hard. Not everyone likes math/science or solving problems”</td>
<td>Encourage her to solve problems, become self-reliant and confident. If she says “It is too hard”, encourage her to “Give it another try”, or “Can you try another way?”</td>
</tr>
</tbody>
</table>

If you see a girl with a doll, please do not say, “Is that your baby?”. You would not say that to a boy, so don’t say that to a girl.

Instead, ask, “What are you planning to do with your doll?”

| “You are so cute”. “You little princess”. “You are wearing such a beautiful dress”. | These are usually front and center when we praise girls. Change the trend! Focus on character traits, instead of beauty and clothes. Ask a girl, “What is your favorite game?” Then ask her follow-up open-ended questions (like we practised in Module 2). |

| “Is your favorite color pink?” | If a girl tells you that her favorite color is pink, ask her “Why do you think girls are only supposed to like pink? What do you think the world would look like if men and women only wore blue and pink?” |

And now that you are ready to inspire your girl, we want to talk about something that a lot of people believe is magic… And in a way it really is.. Electricity!

Electricity is important to us but a lot of people don’t know how to explain it. We are going to jump right in and try to learn a few new things about our friend Electricity.
We've all seen electricity. One of the most impressive ways electricity shows itself is in lightning. Lightning is electricity – born from the particles of frozen raindrops high in the sky bumping into each other a little too much. All these tiny bumps and collisions build a great electrical charge. Lightning happens when this charge reaches for the ground or to another cloud.

info: http://www.weatherwizkids.com/weather-lightning.htm
http://i.kinja-img.com/gawker-media/image/upload/s--OG-lZrRJ--/17wl4kpeam089.jpg
You can also see evidence of electricity in cities – especially at night. All the glow from buildings, roads, and cars is created by electricity!
All over Earth

In fact, you can find electricity all over the world! See, electricity is really important for people. But what exactly is electricity?
Electricity starts with an atom. This is a model of an atom. Everything in the universe is made up of atoms.

Atoms are made up of a nucleus, in the middle and electrons spinning around the center. These electrons are how we produce electricity. Electrons can be seen here as the objects moving around the center.

Reference on size of atom:
https://www.youtube.com/watch?v=_INF3_30IUE
How small are atoms?

Ants are generally pretty small, so when I tell you that an ant has too many atoms to count – somewhere in the billions – and that an ant brain alone is estimated to have 25,000 atoms (and they aren't known for their large brains), you can start to understand that atoms are incomprehensibly small. And, they're everywhere. fish, bedbugs, bananas, air, water, you, me, we're all made of atoms.

Every atom is held together by electricity – you can think of yourself as being made of electricity. And everything we’ve ever seen or touched is, too.
Let's get an even deeper understanding of the size of atoms!

Watch this video to dive even deeper into the size of the atoms we are talking about.
Since we are just going to talk about the electricity, we are going to focus on electrons, remember the things spinning around the atoms. In this video you can see a bunch of atoms spinning around all the atoms. Electricity is produced by electrons jumping from atom to atom in a circuit.
So, atoms are really really small and electricity is an even smaller *part* of an atom – an electron! All atoms have electrons, and electricity is everywhere!

Electricity has been changing our lives for a while yet the science behind it has stayed the same for some time. Watch this video to dive even deeper.
When electrons in atoms move, they carry electrical energy from one place to another. This is called current electricity or an electric current. Electric currents are also involved in powering all the electrical appliances that you use, from washing machines to flashlights and from telephones to MP3 players.
Electricity in a circuit

With electricity existing everywhere in such minute scale and with such seemingly chaotic behavior, it does seem like magic must have intervened at some point in order for humans to learn how to harness and control it. But it didn't – we just learned over many thousands of years from our observations.

This is one result of controlling the flow of electrons in a circuit.
So, now we know a little bit about electricity, watch this video by Bill Nye to really grasp what we are talking about. It’s not an easy thing to understand so watch this video and see if you can explain to someone what electricity is in a few sentences.
How do we control electricity?

Two good words to know when talking about transferring electricity are: Conductors and Insulators. We all know what conductors and insulators are but we may not know it yet!
So, what is a conductor?

Maybe you’ve been told not to put a fork in an electrical socket but do you know why? Because a fork is a conductor.

A conductor is anything that allows electrical current to flow from one point to another. Conductors are what help us get electricity to our homes. They are the insides wires that connect to our electrical appliances. However, we come in contact with conductors every day and we may not exactly realize it. Many things conduct electricity, can you think of a few?
Examples of Conductors...

Conductors can be anything that is metal or something that lets an electric current flow freely through the circuit.

So then what is an insulator, you guessed it, anything that doesn’t conduct electricity. It’s the opposite of a conductor. If the inside of a wire is a conductor then the outside plastic is the insulator! Insulators prevent us from being shocked and also keep the electricity from being wasted.
Can you think of other insulators?

Some common **insulator** materials are glass, plastic, rubber, air, and wood. **Insulators** are used to protect us from the dangerous effects of **electricity** flowing through **conductors**. Sometimes the voltage in an **electrical** circuit can be quite high and dangerous.

Here is a Circuit. Let's try again since we've covered a lot.
Try and explain what electricity is in as few words as possible!
The more we practice explaining concepts the better we can understand!
How do we get electricity?

Great, so now we know a little more about electricity, but if it’s all around us, how do we get electricity’?
Well, you can not just get electricity, you have to generate it. To do that you need to have a generator!

Generators collect electricity by movement between magnets and conductors! This movement causes electrons in the atoms of the conductor to tear away from their atom. So, electricity isn't actually created in a generator, but collected!

You can make your own generator or just watch this video to get a better grasp on how this works.
Fossil fuels, like burning coal, this is one way that engineers are able to generate electricity. The coal is burned to heat up water and produce steam. The steam is used to turn turbines that move a generator and presto we have electricity.

http://upload.wikimedia.org/wikipedia/commons/3/3e/Shuozhou_coal_power_plant.JPG
Dams, like the hoover dam works in a similar way. Instead of steam moving the turbines of the generator, water is let out of gates near the bottom of the dam that moves the turbines. Pretty cool too!

Wind is also another way to turn a turbine of a generator. Except we can’t always control wind like steam or water so wind turbines do not produce as much electricity as other sources.

http://upload.wikimedia.org/wikipedia/commons/5/55/A_close_shot_of_wind_turbines_wind_farm.jpg
Let’s Review...

- Electricity is **everywhere**
- **Electrons** moving from atom to atom = **electricity**
- We can control electricity through a **circuit**
- There are many ways to **generate** electricity
Congratulations!
You just finished the fifth module!
Let’s do our own design! Try one of these design challenges to test out forces yourself! And remember, try to explain electricity to a friend, the more you practice the better you’ll understand.