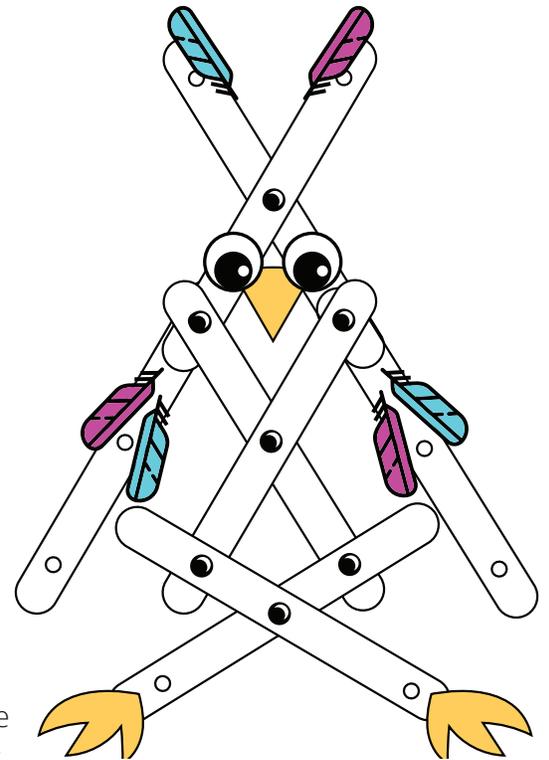
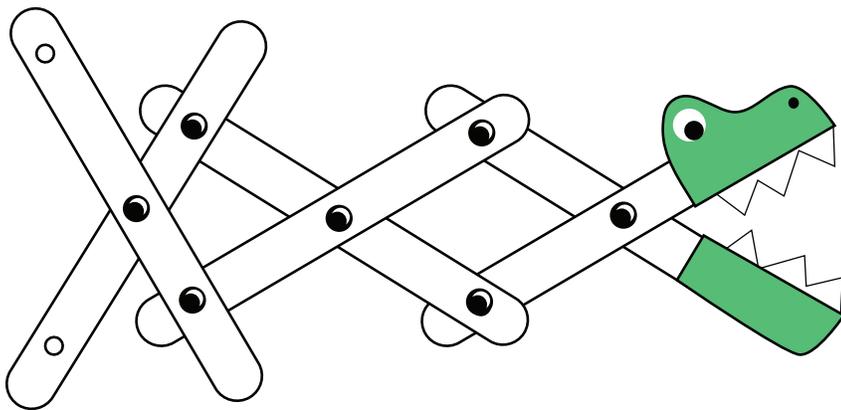


Do try this at home!

Who says all the fun has to happen at The Tech? This DIY engineering activity can be put together with cheap store-bought materials or objects you find around the house!

Linkages Activity



What are linkages?

Linkages are an exciting exploration of mechanical motion and a favorite of many museums and makerspaces. A linkage is created by connecting two or more rigid parts to make a flexible hinge; you can keep it simple, or develop complex mechanical motion by connecting multiple linkages to create all kinds of contraptions. (Think flapping wings, dancing robots, chomping sharks!) At The Tech we especially love how linkages inspire the creation of whimsical characters with surprising motions.

Materials

Linkages can be created from all kinds of easily accessible materials. Don't worry if you don't have a clear vision of what you want to make immediately. Sometimes it's helpful to gather materials first and see what inspires you.

That said, there are basic parts to every linkage creation. As you treasure-hunt around your home, consider what materials can give your creation structure, flexibility and personality!

Linkages are a wonderful way to make use of decorative odds and ends around your home. Bits of ribbon, lace and string or junk drawer items like buttons are great ways to dress up your creation.

Subject:

Design Thinking

Age: 8-12

Time: 20+ minutes

Key terms:

Mechanics

Motion

Structure

Things you can use

Don't limit yourself to the items on this list. Use whatever you have on hand — be creative!

Structural pieces	Fasteners that allow the structural pieces to move
<ul style="list-style-type: none"> • Cardboard • Jumbo craft sticks 	<ul style="list-style-type: none"> • Metal brads • Paper fasteners • Pipe cleaners 
Add personality	Tools
<ul style="list-style-type: none"> • Googly eyes • Rhinestones • Feathers • Construction paper • Yarn • Beads • Pom poms • Scrap cloth 	<ul style="list-style-type: none"> • Crop-A-Dile Power Punch • Hole puncher • Clear tape • Hot glue • Scissors • Multi-cutter 

Instructions



Once you've gathered your materials, take a moment to imagine your design. How would you like it to move? Does it have flapping wings? A wiggly head? A mouth you can open and close? Whatever motion you design will give it character, so think about what kind of personality you want to give it.



Next, prepare the structural pieces. To create a variety of movements, we like to use a combination of jumbo craft sticks and cardboard cut into strips. Craft sticks provide stiffer movement, whereas cardboard can allow for more flexibility.

Layer the pieces into the shape of your design and play with the motion. Think about how can you connect the pieces to create the motion you desire. Punch holes at the connection points and attach with a paper fastener.

Finally, decorate your design! Consider what kind of personality the motion gives it. Does it move smoothly or sharply, slow or fast? Create your character's story visually with color and decorative items such as pom poms or beads. Use your imagination!

Extras

Go green! Try cutting up cardboard food boxes for structural pieces, connect materials with old pen cases for a 3D linkage creation or recycle junk materials anyway you can dream up.

Sometimes you want small connections to create the motion you desire. Use a multi-cutter tool to cleanly cut craft sticks without risk of sharp edges.



Cardboard is soft enough for a standard hole puncher, but for jumbo craft sticks we use a **Crop-A-Dile Power Punch**. However, keep in mind it will only punch through larger craft sticks, at least 0.5 inch wide. Make sure to get a size that works with your craft sticks.



Here are some exploratory questions to ask yourself as you work on your contraption:

How does changing the connection points affect the motion?

Are there other materials you can use to link the structural pieces?

What can you add to give parts of your design more support?