

# Reach for an Idea and Make it Your Own

## Hands-on Activity

Build a mechanical grasper using cardboard and brass fasteners.

## Mechanical Graspers

Mechanical graspers can be much stronger and more adaptable than human hands. Engineers have created unique designs of mechanical graspers that provide dexterity and strength to assist individuals in moving devices they are unable to move with their own strength. For example, NASA engineers have developed devices that can be used on space missions.

**Can you think of how an astronaut might use a mechanical grasper? What other uses might one have for this type of device?**

## Definitions

Tension: A pulling stretching force

Compression: A pushing squeezing force

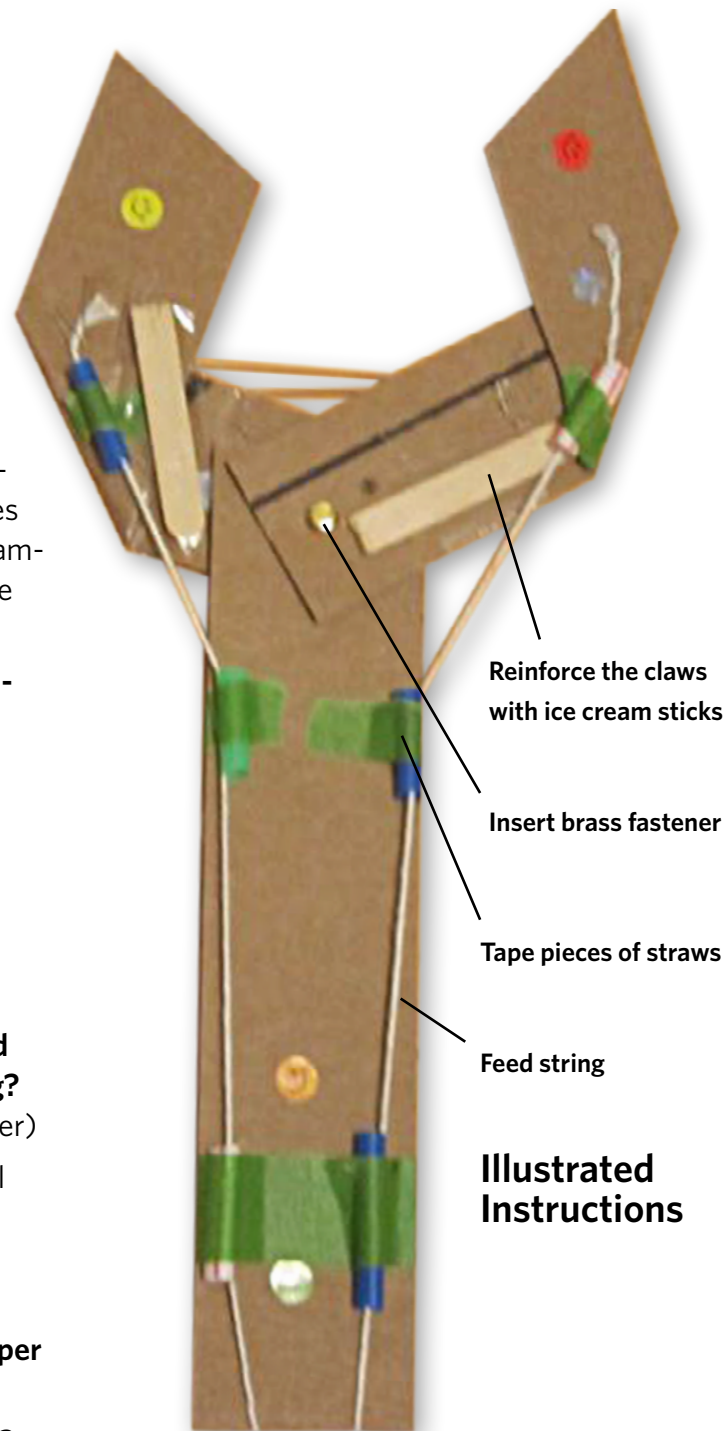
Friction: A force that resists motion

**What's the effect of changing the length of a cardboard section, or of changing the attachment point of a string?**  
(Changes will alter the force required to move the grasper)

Like the grasper you made today, exoskeletons (artificial external supporting structures) can be used to enhance the strength and dexterity of humans by extending their capacity and range of motion.

**What are some advantages of using a mechanical grasper or an exoskeleton?**

**Can you think of inventions that use this same concept?**

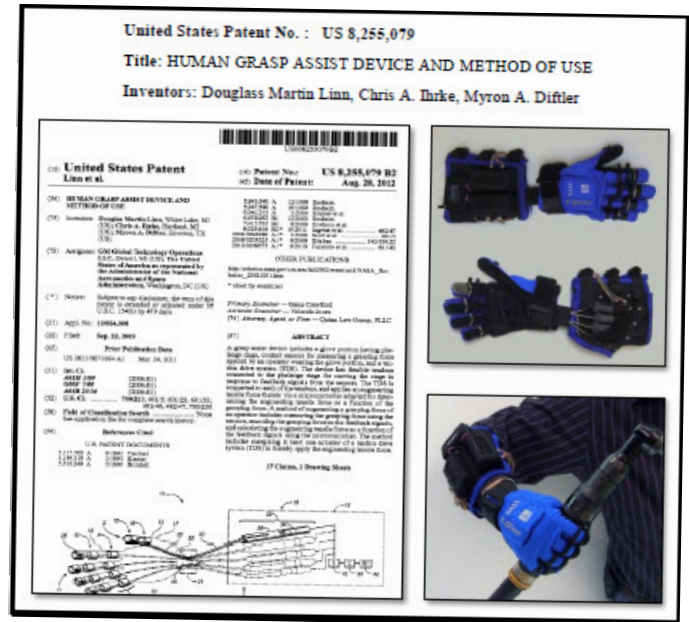


UNITED STATES  
PATENT AND TRADEMARK OFFICE

uspto

## What is a Patent?

A Patent is a temporary property right granted by the government that allows an inventor to stop others from making, using, or selling their invention for a certain amount of time without his or his permission. This gives the inventor a chance to make money from their work. Patents also allow the public to learn how an invention works so that others can learn from the invention, come up with ways to improve the it, or create an invention of their own.



## Design a Trademark

Trademarks, sometimes also called brand names, help us tell the difference between one person's product or service and another. Most trademarks are words, designs, or a combination of such but trademarks can take many other forms. Sounds, scents, shapes and colors can also function as trademarks.

*Today, you made a mechanical grasper!*

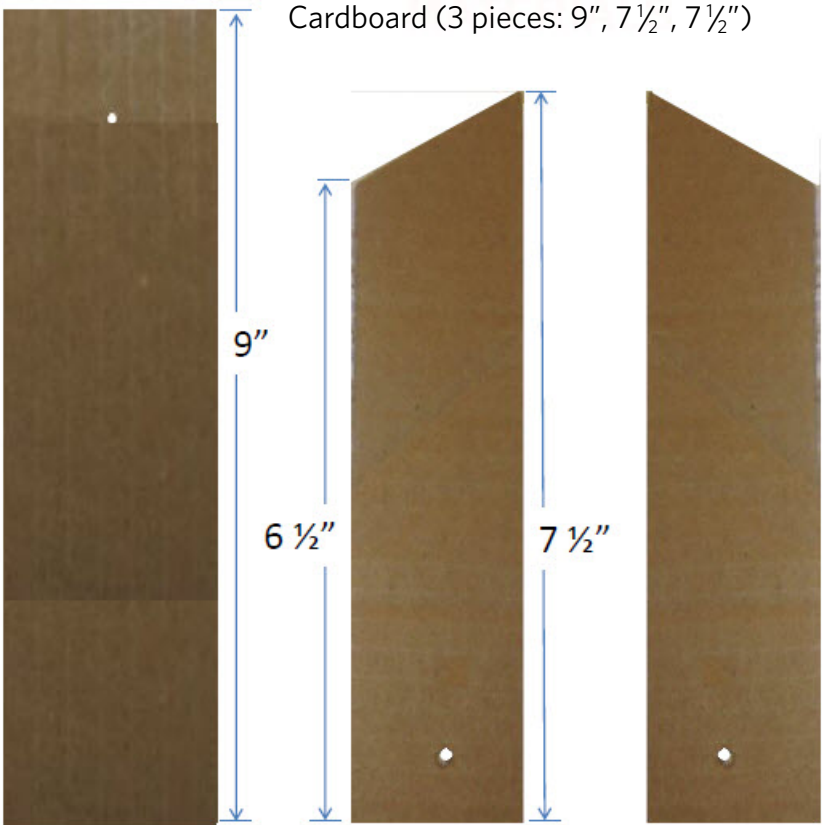
Think of what design, name, or symbol you would use to help the world identify and distinguish your grasper from those made by others.

**Draw your trademark in the space on the left.  
Make sure it is unique to you.**

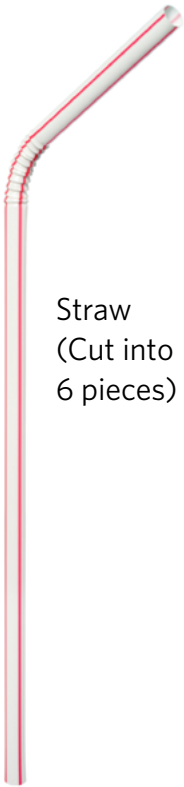
To learn more about inventors and intellectual property, including patents and trademarks, visit [uspto.gov/kids](http://uspto.gov/kids) or contact us at [education@uspto.gov](mailto:education@uspto.gov)

United States Patent and Trademark Office (USPTO)  
Office of Education and Outreach  
600 Dulany Street Alexandria, VA 22314

# Materials



Cardboard (3 pieces: 9", 7 1/2", 7 1/2")



Straw  
(Cut into  
6 pieces)



Ice  
Cream  
Stick  
(1 or 2  
sticks)



String  
(2 pieces: appr. 18" each)

Brass Fastener  
(1/2" or 1")



Heavy Duty Tape



Rubber Band #16

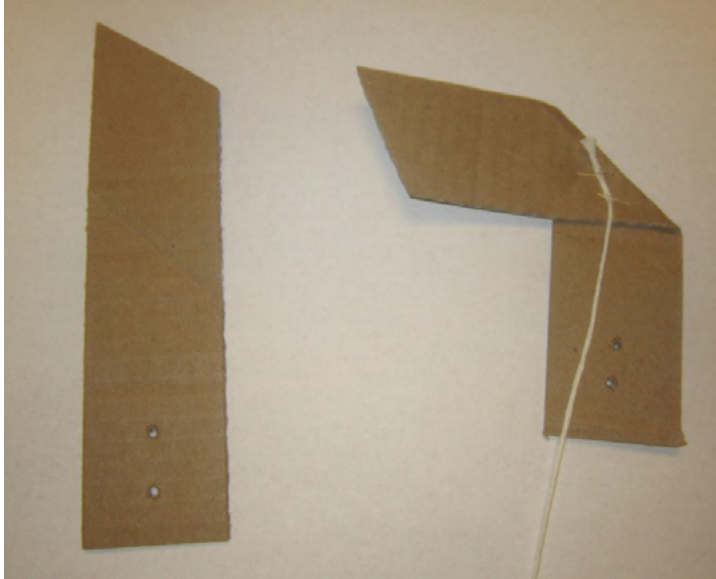


Stapler



# Mechanical Grasper

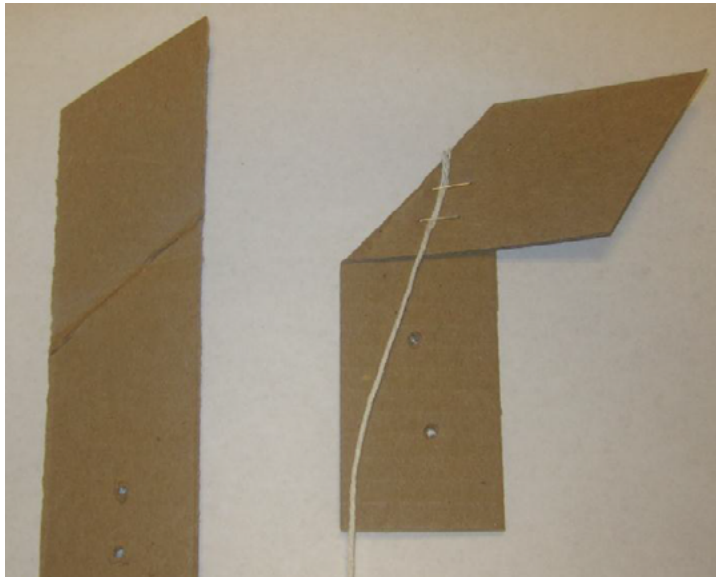
## Building Instructions



### Step 1

See the materials list for cardboard size.  
Fold the first cardboard strip as shown.

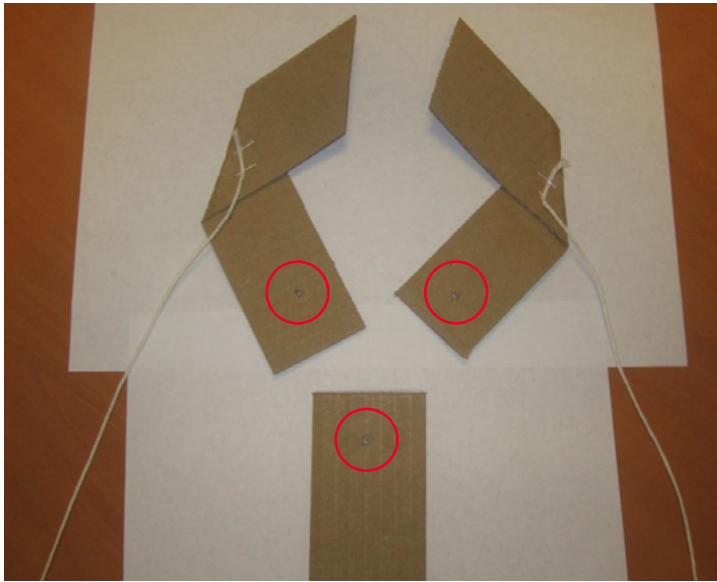
Attach a string using staples.  
The staples will hold the string and keep the cardboard folded.



### Step 2

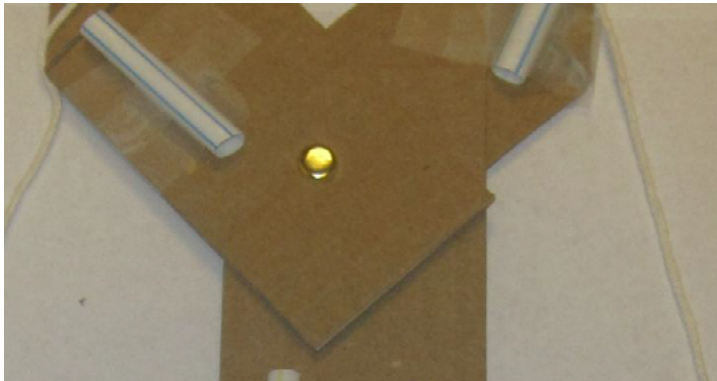
Fold the second strip as shown.

Attach the other string using staples.  
The staples will hold the string and keep the cardboard folded.



### Step 3

Attach the three cardboard strips using the holes as shown.



### Step 4

Attach the three strips of cardboard using a fastener.

Each strip goes on opposite sides of the main strip.



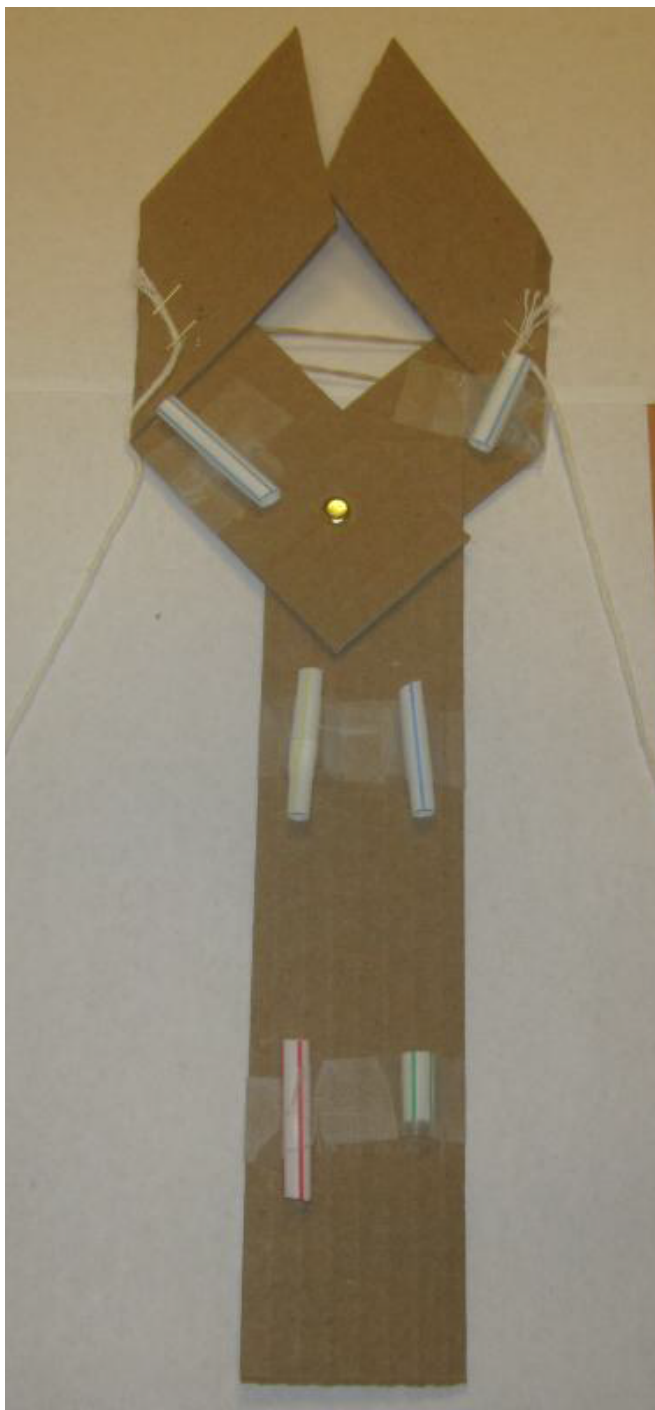
### Step 5

Flip over and use tape to attach rubber band. Reinforce with staples.



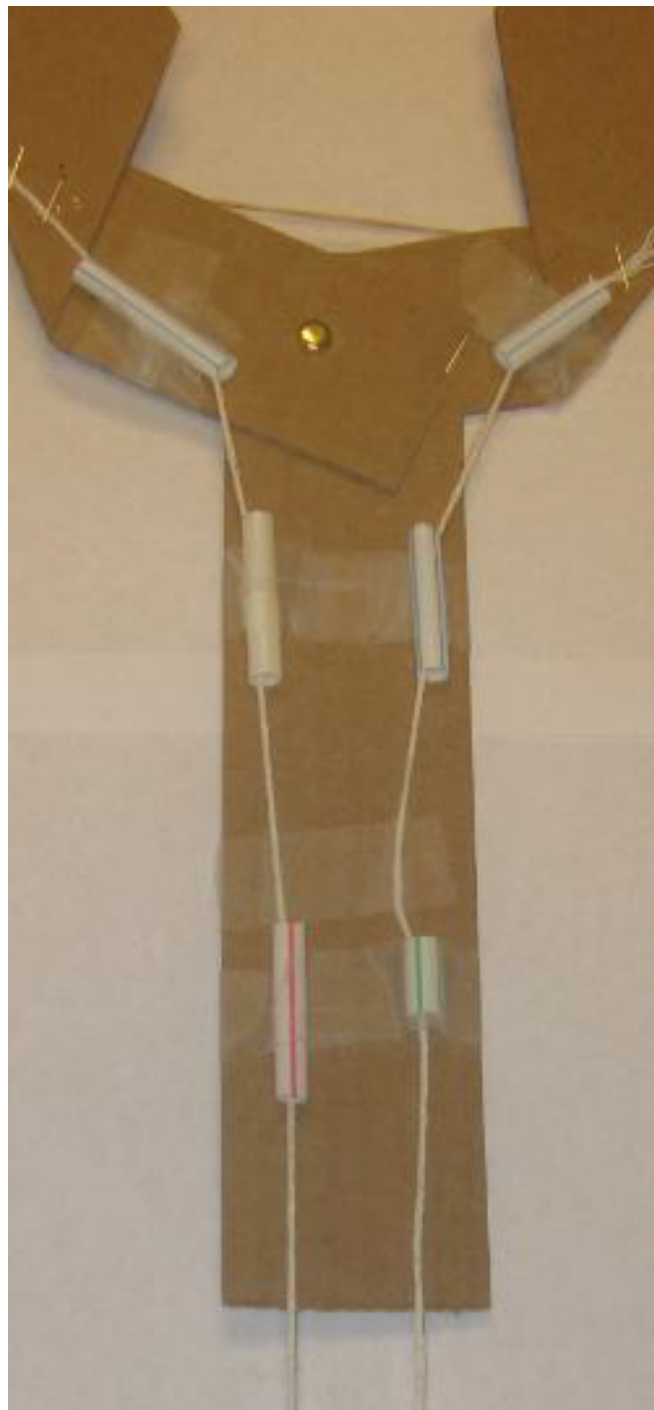
## Step 6

Flip over and use tape to attach 6 straw pieces.



## Step 7

Feed string through straw pieces.



## Step 8

Reinforce the grasper.

Tape a small piece of wood or ice cream stick on each side of the grasper for reinforcement.

## Step 9

Decorate and have fun!

