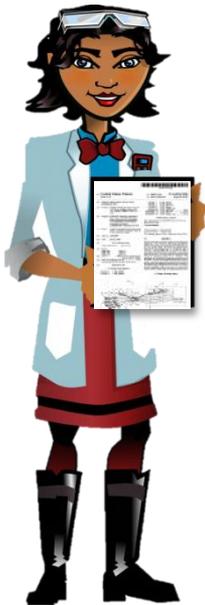


# Reach for an Idea and Make it Your Own



## 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.

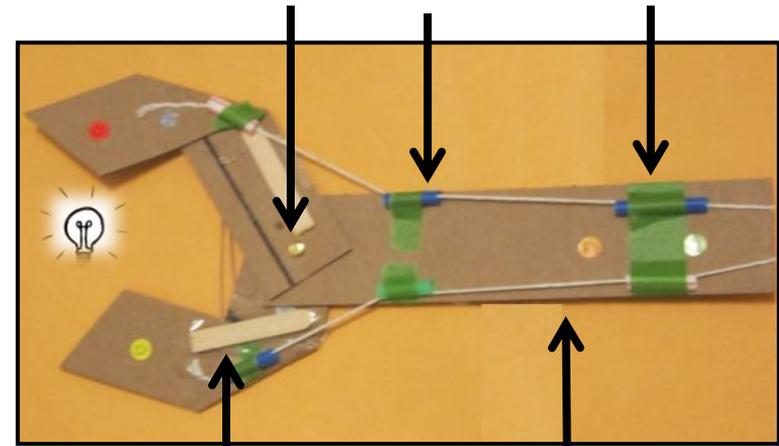
[What are some advantages of using a mechanical grasper or an exoskeleton?](#)

[Can you think of inventions that use this same concept?](#)

## Illustrated instructions

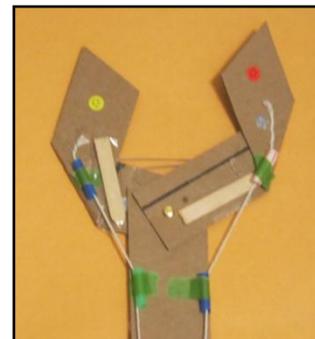
Insert brass fastener

Tape pieces of straws



Reinforce the claws with ice cream sticks

Feed string



FRONT



BACK

# 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.



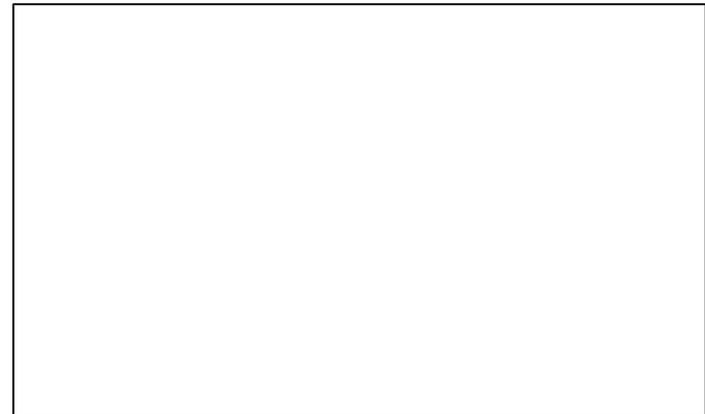
# Design a Trademark

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 below.  
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

**United States Patent No. : US 8,255,079**

**Title: HUMAN GRASP ASSIST DEVICE AND METHOD OF USE**

**Inventors: Douglass Martin Linn, Chris A. Ihrke, Myron A. Diftler**

US008255079B2

(12) **United States Patent**  
Linn et al.

(10) **Patent No.:** US 8,255,079 B2  
(45) **Date of Patent:** Aug. 28, 2012

(54) **HUMAN GRASP ASSIST DEVICE AND METHOD OF USE**

(75) **Inventors:** Douglass Martin Linn, White Lake, MI (US); Chris A. Ihrke, Hartland, MI (US); Myron A. Diftler, Houston, TX (US)

(73) **Assignees:** GM Global Technology Operations LLC, Detroit, MI (US); The United States of America as represented by the Administrator of the National Aeronautics and Space Administration, Washington, DC (US)

(\* Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 479 days.

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(22) **Filed:** Sep. 22, 2009

(65) **Prior Publication Data**  
US 2011/0071664 A1 Mar. 24, 2011

(31) **Int. Cl.**  
A61H 1/00 (2006.01)  
G06F 7/00 (2006.01)  
A61B 2/04 (2006.01)

(52) **U.S. Cl.** ..... 700/213; 601/5; 601/23; 601/33; 601/40; 482/47; 700/250

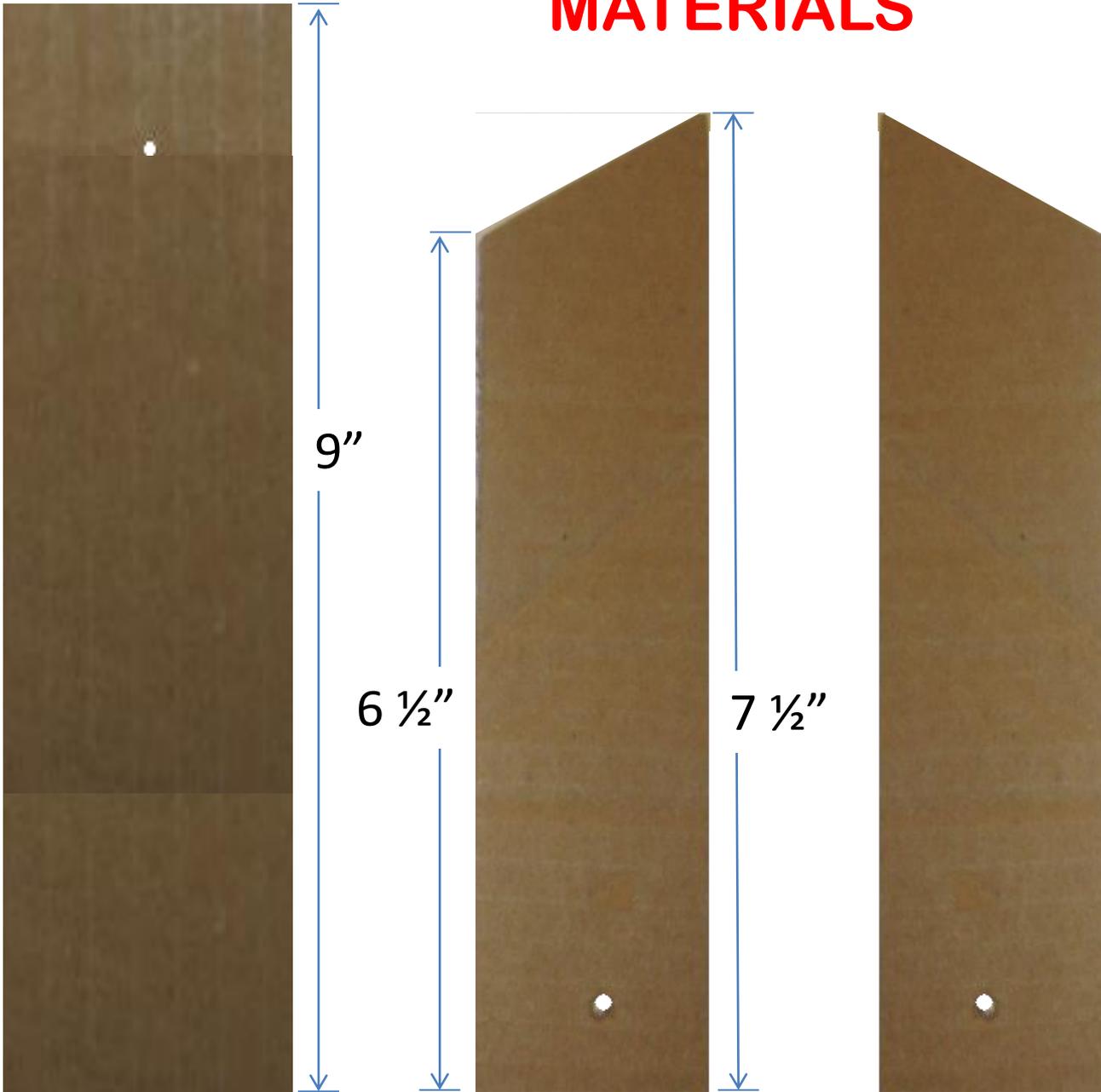
(58) **Field of Classification Search** ..... None  
See application file for complete search history.

(56) **References Cited**  
U.S. PATENT DOCUMENTS  
5,117,700 A 6/1992 Trechak  
5,184,319 A 2/1993 Kramer  
5,316,249 A 5/1996 Brimball

17 Claims, 2 Drawing Sheets



# MATERIALS

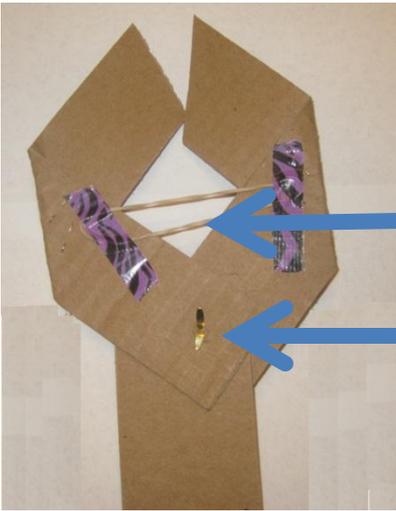


**1 - large strip of corrugated cardboard. Shown actual size.**

**2 - small strips of corrugated cardboard. Shown actual size.**

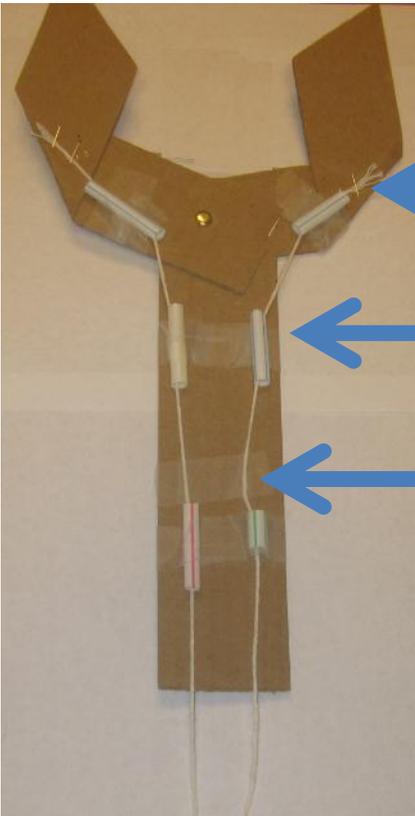
Punch one hole in each strip of corrugated cardboard as shown.

# MATERIALS (continuation)



1 - Rubber band #16

1 - Brass fastener (1/2" or 1")



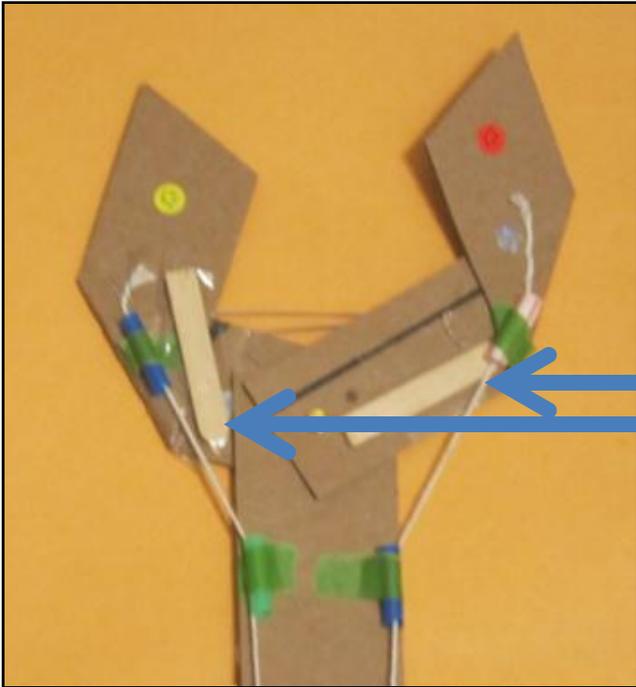
6 - Pieces of straw (approximately 1" each).  
They will serve as guides.

2 - Pieces of smooth string (approximately 18 inches each)

1 - Stapler

1 - Heavy duty tape

# MATERIALS (continuation)



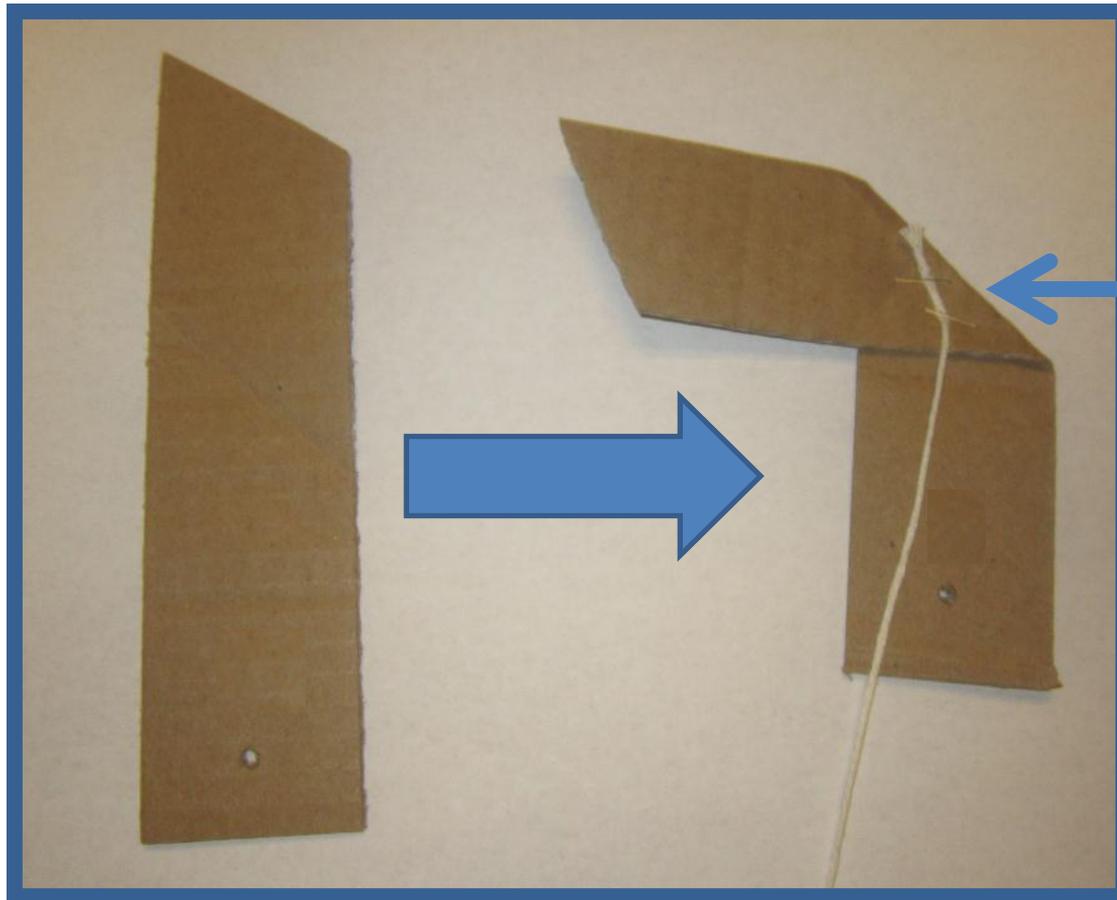
**1 or 2 pieces of ice  
cream sticks  
for reinforcement**



**MECHANICAL  
GRASPER  
BUILDING  
INSTRUCTIONS**

# Step 1

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

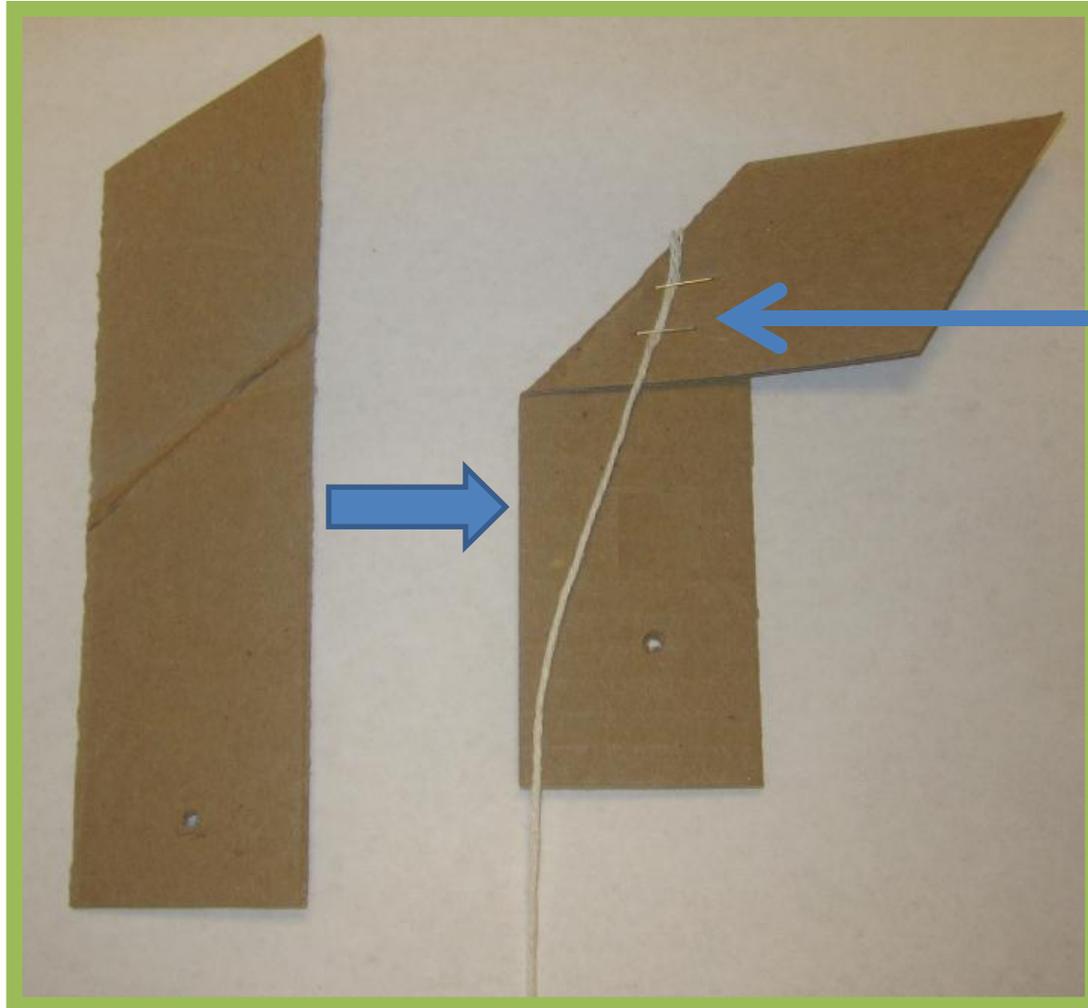


Attach a string using staples.

The staples will hold the string and keep the cardboard folded.

# Step 2

Fold the second strip as shown below.

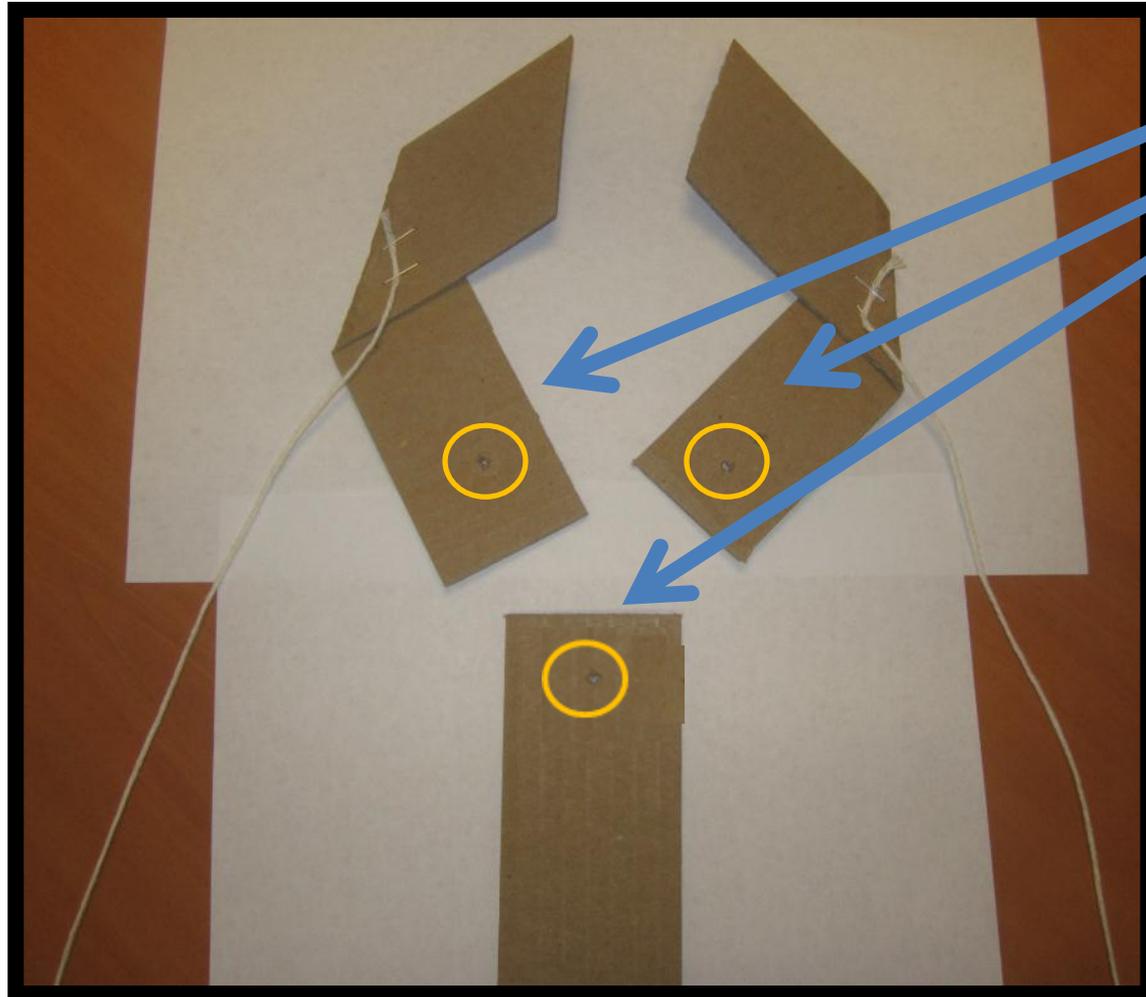


Attach the other string using staples.

The staples will hold the string and keep the cardboard folded.

# Step 3

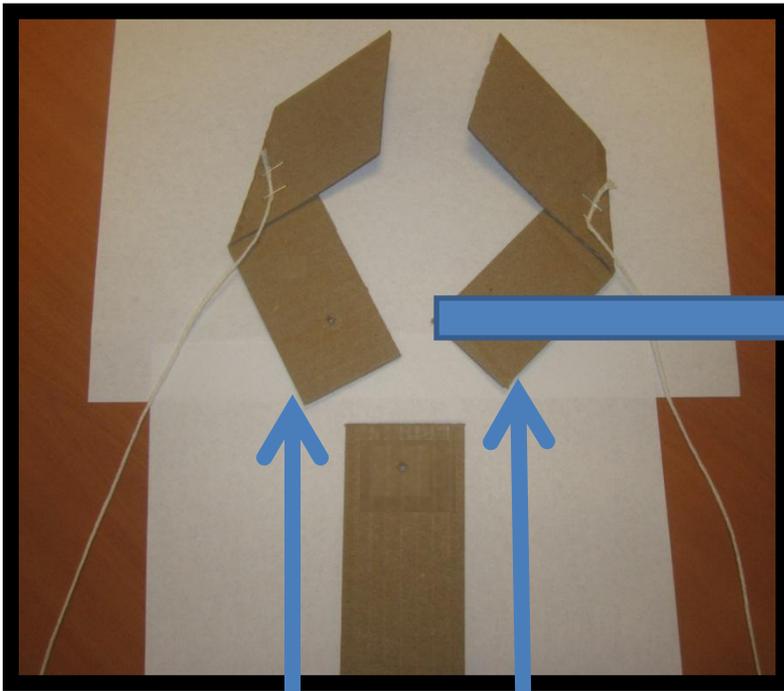
Attach the three cardboard strips using the holes on the template.



See  
template  
for hole  
placement

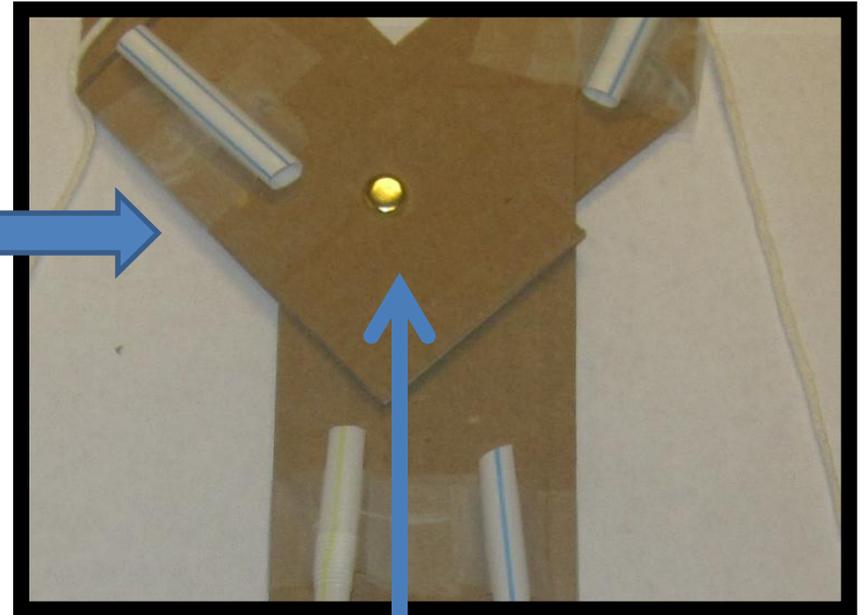
# Step 4

Attach the three strips of cardboard using a fastener.



Strip 2 goes on top.

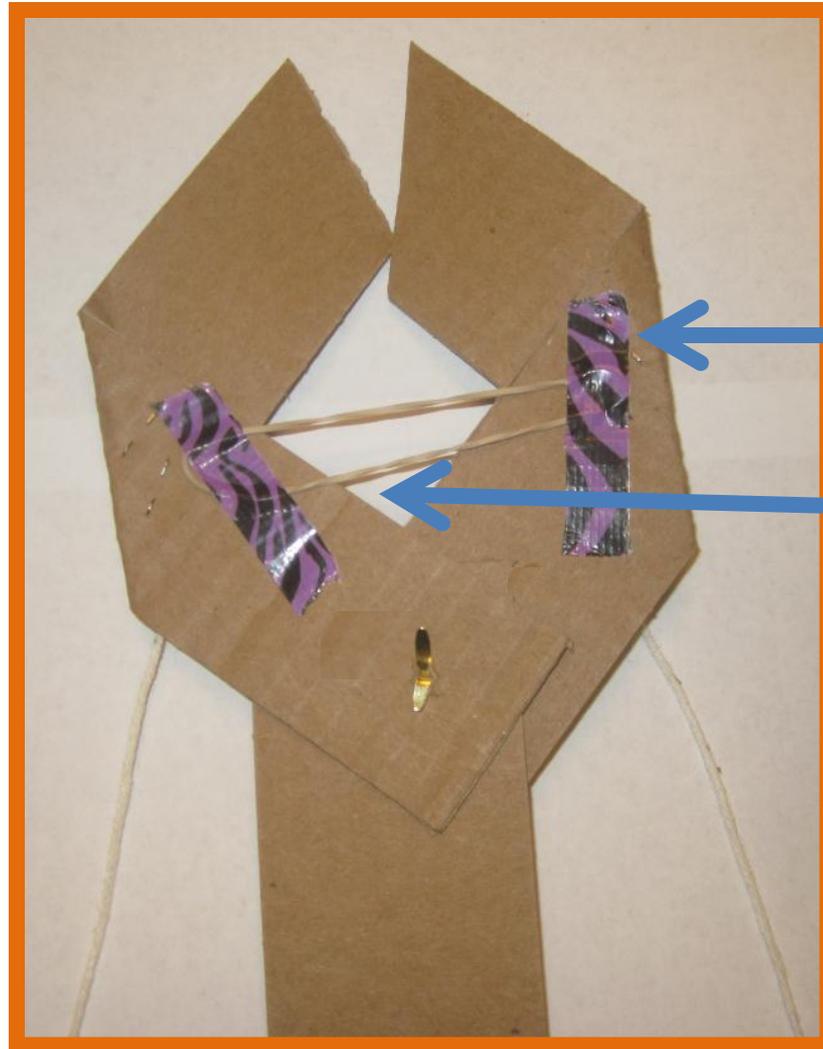
Strip 1 goes on the bottom.



Fastener

# Step 5

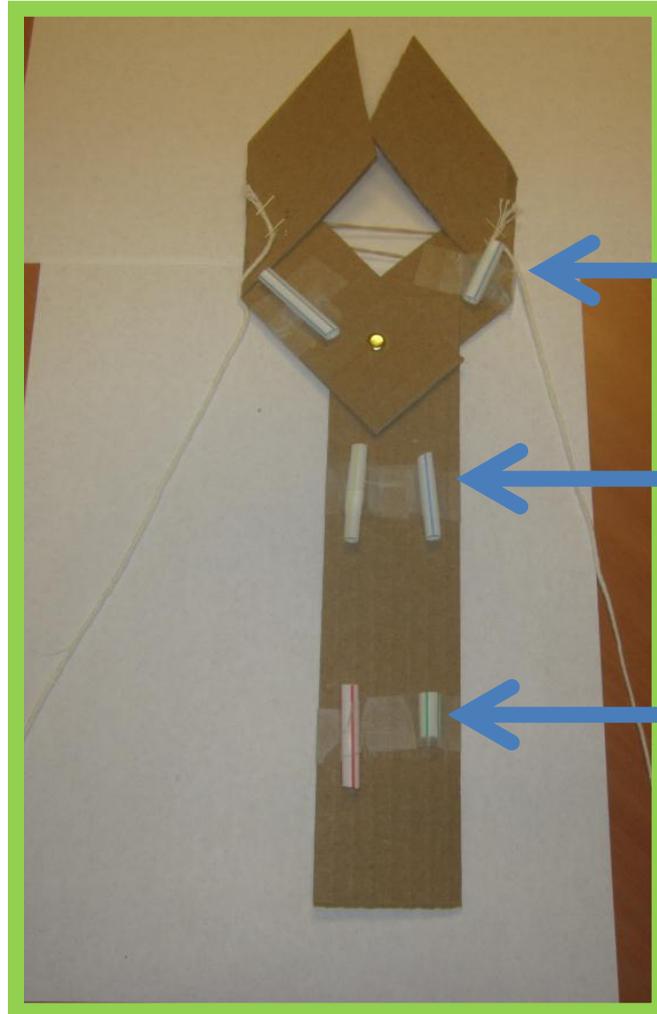
Flip over and use tape to attach rubber band. Reinforce with staples.



Tape

Rubber band

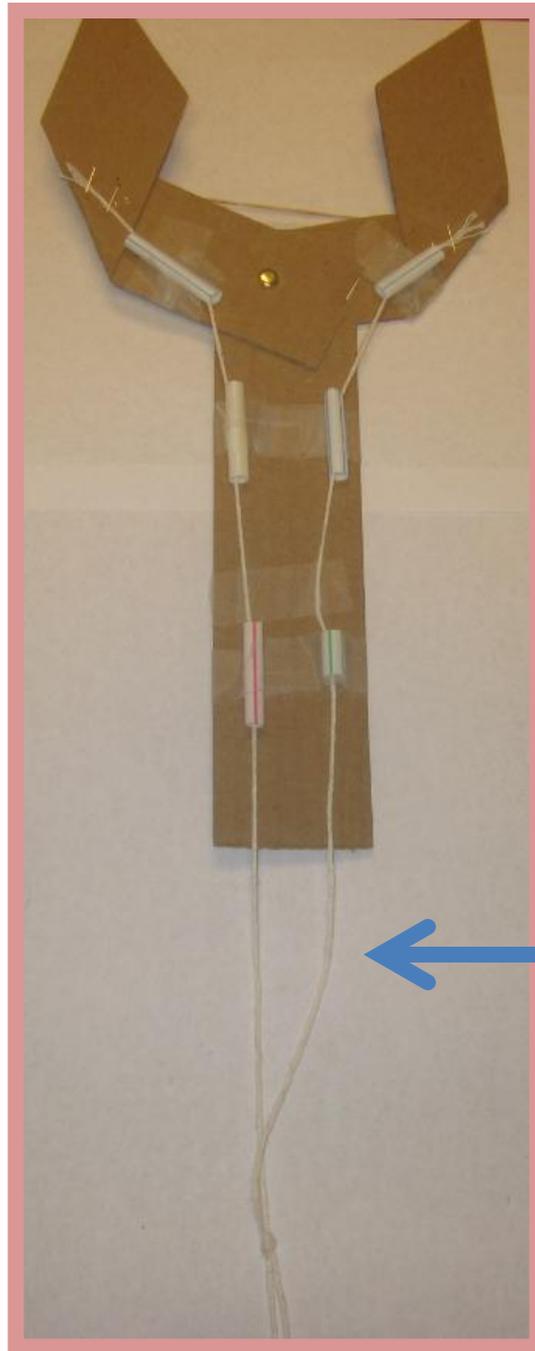
# Step 6



Flip over and  
use tape to  
attach 6  
straw pieces.

# Step 7

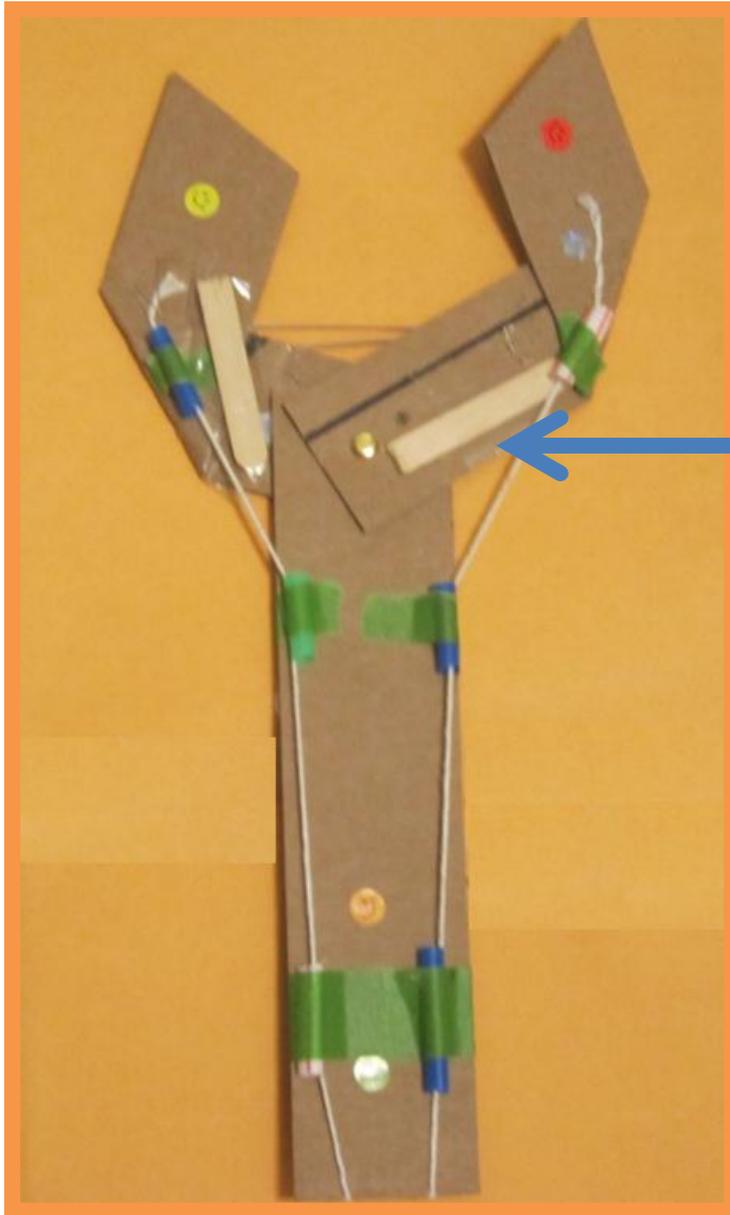
Feed string through straw pieces.



String

# 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!

