

STEAM ON!

MAKE A CONVEYOR BELT!

Today we're going to make a conveyor belt using some very simple pulleys.

A pulley is a type of machine that **redirects** force. Here, we're redirecting **rotary motion** (that's the turning of the pencils) into **linear motion** (that's the straight sideways movement of the paper). So we're changing turning pencils into sliding paper.

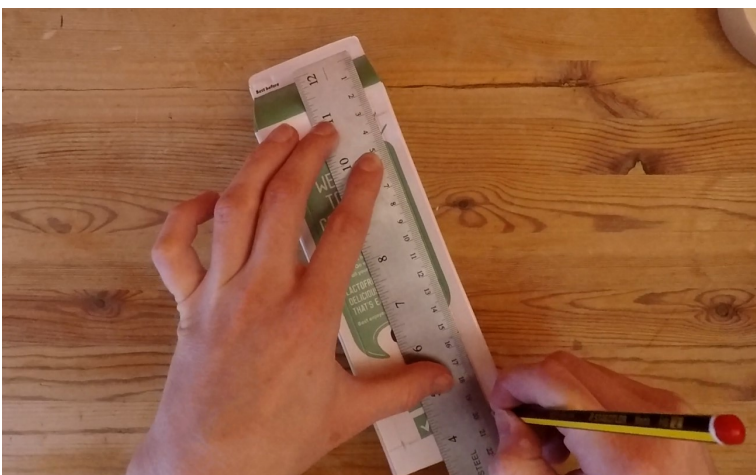
For this project you'll need:

- A box or carton
- Paper
- 2 pencils
- Tape
- 2 rubber bands.



First we're going to cut two windows in the carton. So get your ruler and pencil and carefully mark out some rectangles.

I've measured my big rectangle at 1½ cm from each end and 1cm from the sides. You can work out your own measurements depending on what size of box or carton you're using. My small rectangle measures 3cm from each end, 1cm from the top edge and 2cm from the bottom.



The smaller window will let us see into the side of the machine and make it easier to build.

STEAM ON!

While we've got the ruler out, it's also a good time to mark some holes for our pencils to go through. These want to be in line with the top edge of the small window and to match on the other side so the pencils sit straight. I'm going to measure 1cm from that top edge and 1 ½ cm in from the end and the same on the other side.

It's important to be really accurate with these so take your time.

MAKE A CONVEYOR BELT!



We need to make a hole so our scissors have somewhere to start from and this is a bit tricky so you might want to grab your adult helper.

Very carefully make a hole in the middle of the large window with your pencil, then cut it out.



To make the next hole, put a big lump of sticky tack or plasticine behind the spot and carefully poke through again with the pencil. Cut that out too and then make the four pencil holes, again, use the sticky tack and watch your fingers.



Now we can check if our pencils fit through the holes and if they look straight.

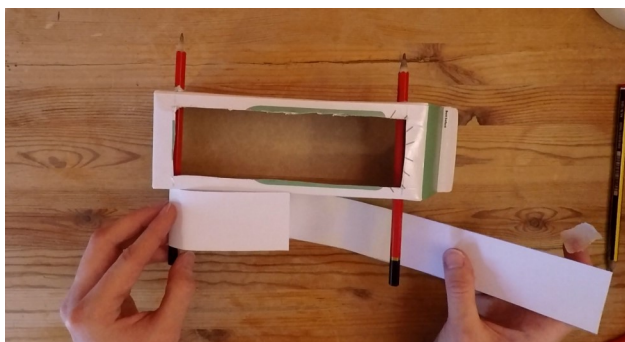
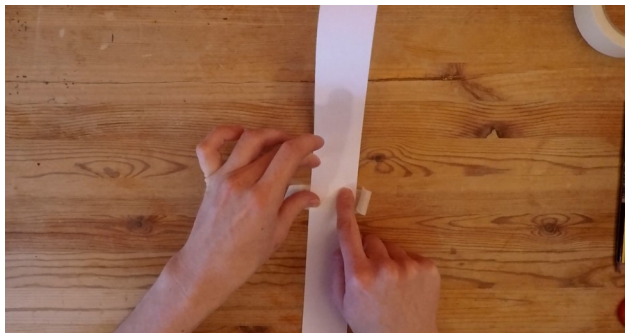
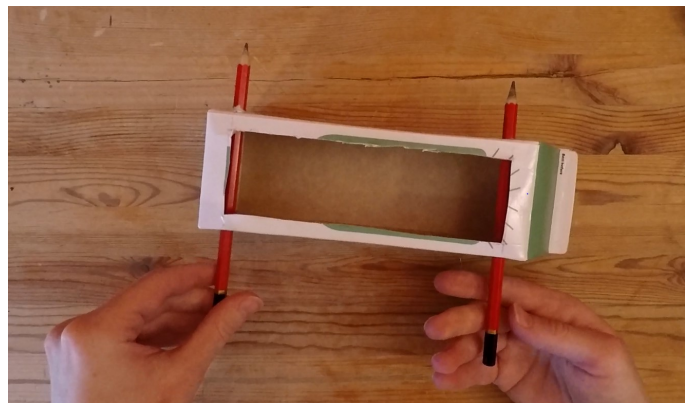
STEAM ON!

MAKE A CONVEYOR BELT!

So we can now make **rotary motion** by turning the pencils, but we can't convert it into anything. To do that we're going to use a **belt**. In this case, the belt is a strip of paper.

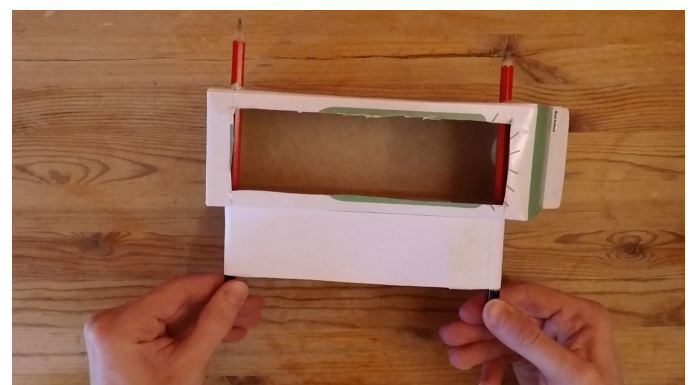
To work out how wide your belt needs to be, Measure how wide your large window is and round down to the nearest $1\frac{1}{2}$ cm.

Mine is just under 5cm so I'm going to round down to $4\frac{1}{2}$ cm. Measure and cut a couple of strips and tape them together end to end.



This strip of paper is going to wrap all the way round the pencils and loop back to itself. To work out how long it needs to be and where to join it, I'm going to run it around the sticky out bits of pencil.

Now get a little bit of tape and have it ready. Wrap the paper tightly around the pencils and tape the join. Then you can carefully slide the paper belt off the side and strengthen both ends of the join with more tape.

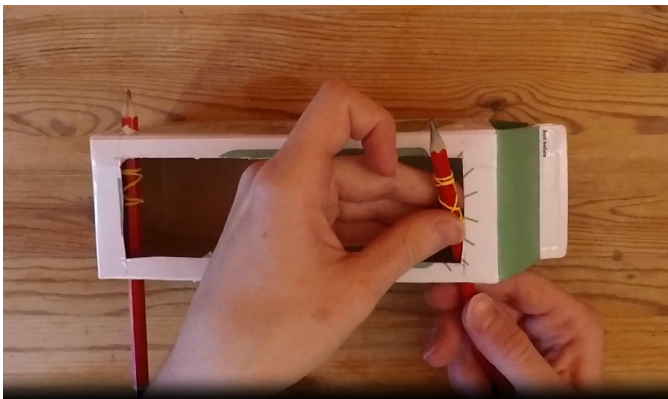
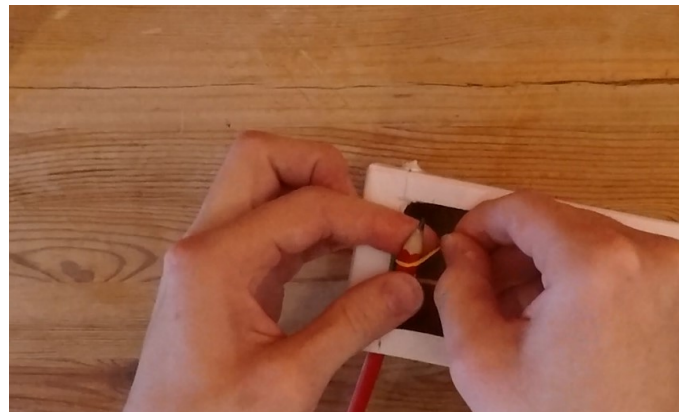


STEAM ON!

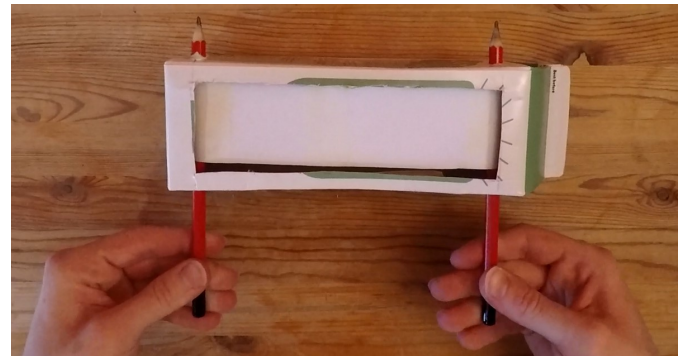
MAKE A CONVEYOR BELT!

When I twist the pencils to make **rotary motion**, the **belt** moves a little bit but it's not really catching. It needs better grip.

That's where the rubber bands come in. wrap a rubber band quite tightly around the end of each pencil and spread it out a little bit. If you don't have rubber bands, stick a tiny piece of sticky tack or plasticine along the pencils instead.



Now you're ready to install your belt. This is a bit fiddly. Thread it over the pencils one at a time and poke them back through their holes. Adjust the belt so it's sitting straight and it's time to test your machine!



When you twist the pencils, their **rotary motion** makes the **belt** move sideways in a **linear motion**. If your belt isn't gripping, you might need to make it tighter or add more rubber bands.

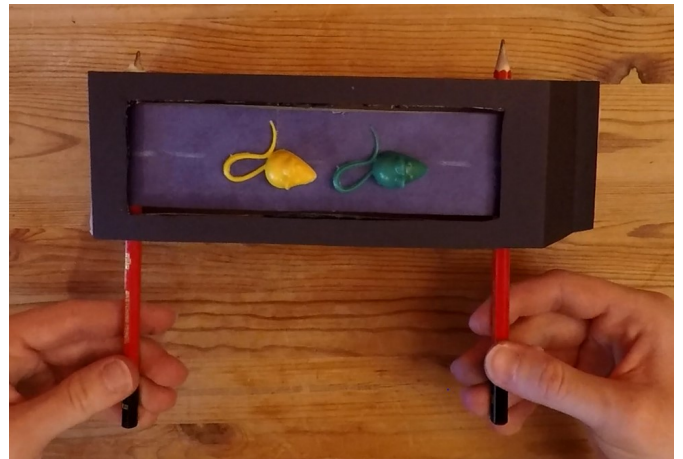
STEAM ON!

MAKE A CONVEYOR BELT!

So your machine is working, fantastic! You leave it as it is, or you can beautify it a bit.

You could decorate your conveyor belt any way you like. Maybe try covering it with paper, painting it or using pens.

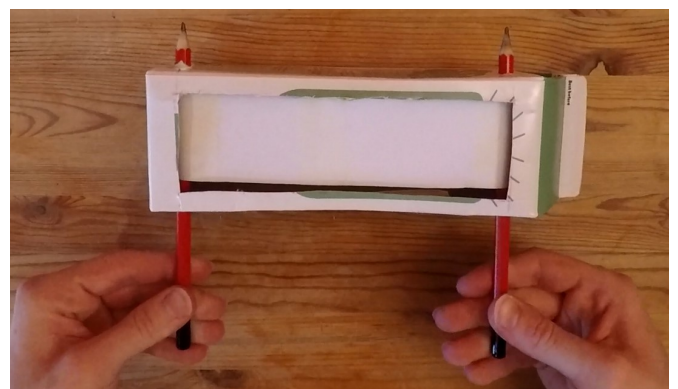
Conveyor belts are usually used for things like moving your shopping along at the supermarket or shifting things around a factory but you can use your machine for all kinds of fun things.



How about making a road that rolls along?



or sending this little friend for a walk in the park?



What ideas can you come up with?

Tomorrow we'll be drawing plans and diagrams and designing some brand new machines so get your drawing things ready. See you then!