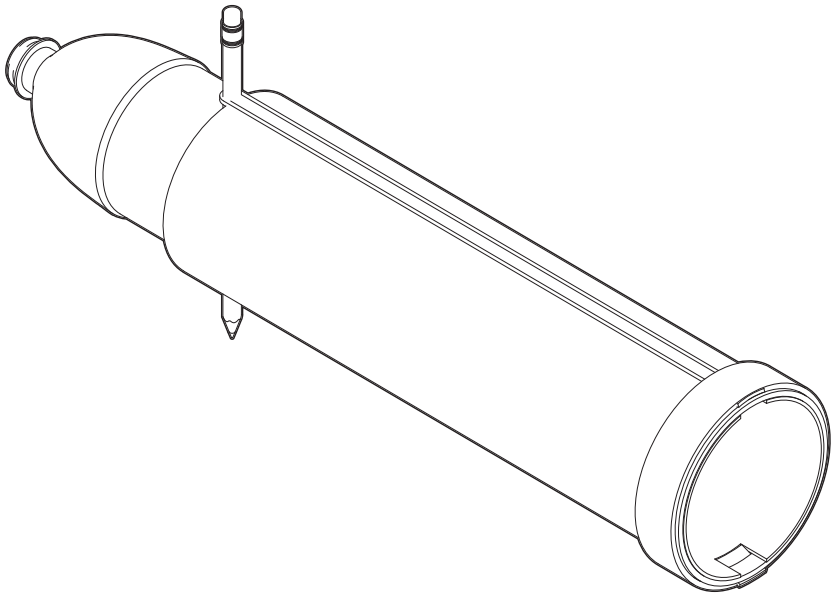


CORK LAUNCHER WORKSHEET

GETTING STARTED

5-10m

For this project, we are going to make a cork launcher that will allow us to make a new game, similar to ten pin bowling, recycling materials that can be found around the home.

Understanding the science of projectile motion and how objects fly through the air is important for lots of things, from aerospace engineering to sports. This project will introduce you to some of the concepts that surround this science, whilst also challenging your creativity.

We will be taking a look at forces and motion by building a simple device that can be used to launch a projectile. In addition to this, you will be tasked with creating your own unique game and scoring system.

VOCABULARY

Potential Energy - Energy that is stored in an object, either by lifting it up or, if the object is elastic, due to it being stretched or compressed.

Energy Conversion/Energy Transformation - The process of changing one form of energy to another.

Momentum - The force that keeps an object with mass moving in the direction it is already travelling.

Force - A push or pull that acts on an object.

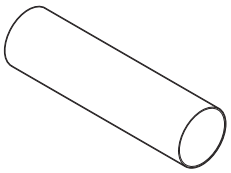
Motion - The action or process of moving or being moved.

Projectile - Any object moving freely under gravity is called a projectile.

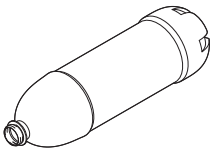
Parabolic Path - A path that follows the shape of a parabola, which is the symmetrical, U-shaped curve on a graph that follows the equation $y=x^2$.

Velocity - The speed at which something moves in one direction.

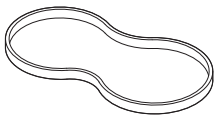
YOU WILL NEED



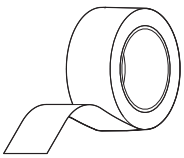
Cardboard Tube
1



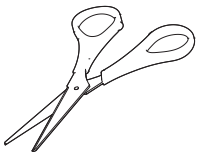
500ml Bottle
1



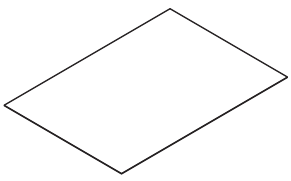
Elastic Band
2



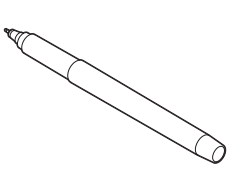
Masking Tape
1



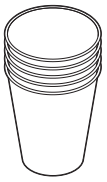
Scissors
1



Paper
1



Pen
1



Paper Cups
(Optional)
10

WARM-UP ACTIVITIES

A

5-10m

Think about the different things you can use in your launcher. How will a ball of paper fly compared to your cork?

Factors that will impact the path of your projectile are:

1. Gravity
2. Air resistance
3. Speed of release
4. The angle of the launcher
5. The height of release
6. If the cork or ball is spinning

Experiment with different materials and think about how their properties will impact the above points.

B

10-15m

We are going to use the launcher to create our own game, based on ten-pin bowling. Standard rules are that there are ten pins and you get one point for each pin you knock down. Each player gets two attempts per round.

Get creative and think about possible variations on the rules.

Here are some points to consider:

- The points system and how you will keep score
- How many turn each player gets
- The number of players

We have provided a suggestion in the build stages, but we encourage you to be as creative as you can.

MAIN CHALLENGE

30-40m

In today's modern age, we spend a large amount of our day looking at a screen for entertainment.

This project will challenge you to step away from your screens and create your own fun!

In teams or individually, you are going to construct a cork launcher to use in your game.

Before you start construction make sure you have all the materials that you'll need to complete your launcher and game.

Don't forget that you can substitute any of these materials by re-purposing items found at home. We have used a crisp tube and 500ml bottle, but you can use any tube and bottle.

Top Tip - Make sure the bottle fits inside the tube before starting construction.

Once you have finished, you can complete a quick quiz to test your knowledge. Good luck!

DID YOU KNOW?

With enough velocity, a projectile will fly so far that its trajectory misses earth entirely.

If the trajectory of an object takes it round and round the earth, then it is in orbit. Satellites are projectiles, whose trajectory matches the curvature of the earth.

The International Space Station is travelling at 7.66 km/s!

BUILDING THE CORK LAUNCHER

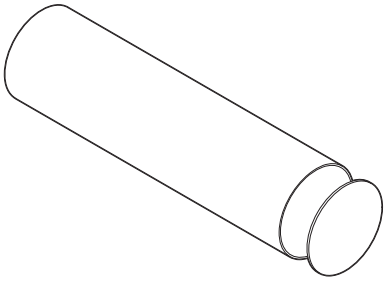
Follow these simples steps to create your projectile launcher:

A

If your cardboard tube has a metal base, take a pair of scissors and remove the base.

WARNING - Be careful with the scissors as they will be sharp. If you are unsure, ask a grown-up to help you with this part.

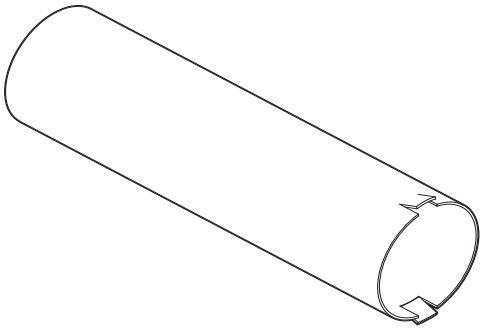
If your cardboard tube doesn't have a metal base you can skip this step.



B

Next, using your scissors cut two 1-2cm slits on either side of the tube. Make sure these are opposite each other.

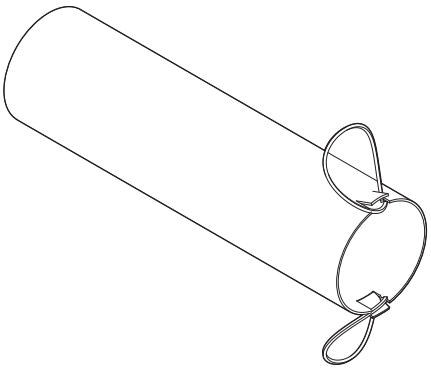
These are going to provide the attachment point for the elastic band.



C

Take your elastic band and slot it into the slits that you have just made on either side of the tube.

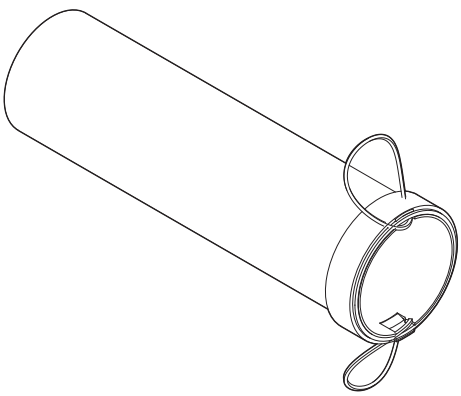
You should now have something that looks like the image below.



D

To help secure the elastic band in place, wrap masking tape around the top of the tube.

This will also provide added support to the top of the structure.



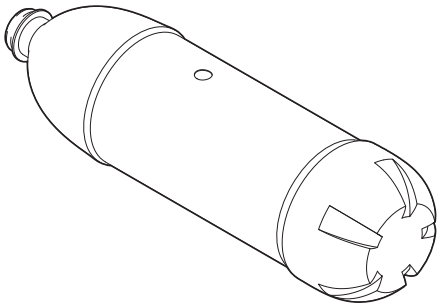
E

Next, you need to make two holes on either side of the plastic bottle.

Using a ruler and pen, make a mark about a third of the way down the bottle from the neck.

Using a skewer or scissors, carefully push a hole through the bottle.

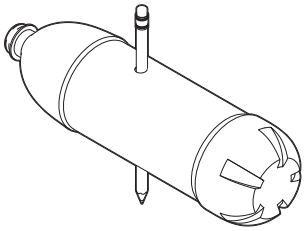
WARNING - Be careful with the scissors as they will be sharp. If you are unsure, ask a grown-up to help you with this part.



F

Push a pencil through both holes on your bottle.

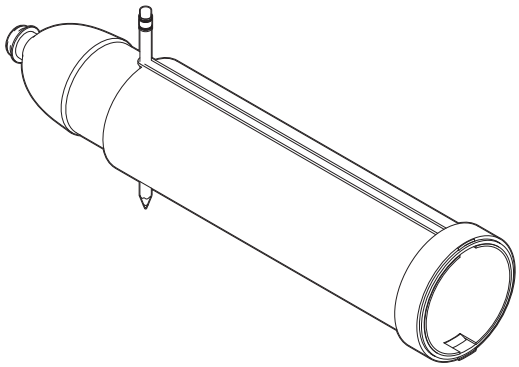
Your build should now look like the image below.



G

In the final step, we need to assemble your projectile launcher.

Place the wide end of the bottle into the tube, and hook the bands onto the pencil.



BUILDING THE PINS

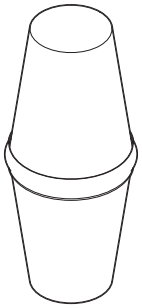
Our game is based on ten-pin bowling. If you decide that you want to incorporate these pins into your game you can follow these simple steps to create your own:

A

To create a pin, you'll need two paper cups.

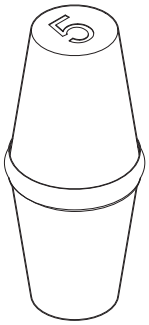
Using tape, secure the paper cups together around the widest part.

You'll have something that looks like the image below.



B

If you like, create your own points system by writing a different number on the bottom of each pin. Then when you are counting the scores at the end, knocking over the biggest point pins will produce the winner!



C

Finally, set up your pins on a flat surface in your preferred location and you're ready to get started!