

Working in pairs you are going to build a catapult.

To build your catapult you will need:

- Tape
- Scissors
- A flat elastic band
- A bottle cap
- A small ball (it needs to fit inside the cap)
- Pencil
- Stapler
- 6 x 15cm wooden craft sticks

Follow these steps in order:

1. Prepare your craft sticks as shown in the picture below.

To do this:

- a. put one of the sticks to the side without cutting it
- b. cut one of the sticks in half
- c. cut the rounded ends from the remaining 4 sticks
- d. take 2 of the sticks you have just cut and cut them in half



2. Label your sticks as shown in the image below.



3. One person take the following: 2 x S and 1 x B and tape them together so that you begin to form the base. It should look like this:



4. Whilst this is being done, the second person should take: 2 x F and 1 x P (without a rounded edge). Make a sandwich with P at right angles to F.
5. Once steps 3 and 4 are complete, the first person should take both pieces and attach them together to complete the base. It should look like this:



6. Meanwhile, the second person should take the 2 x P that are remaining and the elastic band. Cut the elastic band and fix one end to the rounded side of one of the P pieces. This should be taped securely in place. Fix the elastic band using staples over the tape. It is important that the elastic band is held firmly in place. Next, make a sandwich with the remaining P piece and fix securely using tape. It should look like this:



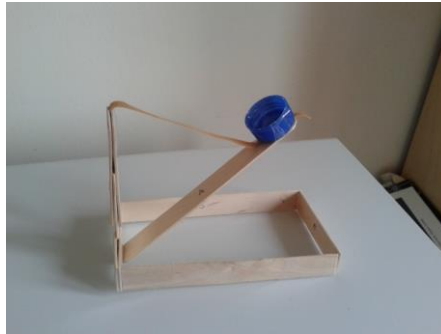
7. Once steps 5 and 6 are complete you can attach piece 6 onto the base. Slot it over the P that has been secured to the base. Try and keep height as this will be attached to your throwing arm. You also want the front section to be strong and not bend when pulled. Secure with plenty of tape.
8. Now you are ready to attach the throwing arm, A. This should be fixed to the base at the same point as P, using just one piece of tape. This creates a hinge and will allow the throwing arm to move freely up and down.



9. Take the end of the elastic band and secure it to the throwing arm so that the arm sits at a 45 degree angle to P. Secure with tape and staples.



10. Take your bottle cap and fix it to the end of the throwing arm, on top of the elastic band. Your catapult should now look like this:



11. If everything is fixed well with tape you are ready to test! Take your ball and target sheet and move to an area your teacher has designated as the launch zone. Your catapult range will depend on various things, including the tension of your elastic band.
- Record how far back you pull the arm to hit the different target areas.
 - What can you do to increase the range of the catapult?