



Revolving Crane

Here's how you can pick up objects from the floor using little more than a tin can and a ruler.

It's not magic! It's just good design, using some simple mechanical principles.

Let's see what is needed...



Equipment

1. One empty tin can. The type of cans with ringpull lids are best, because they don't have any sharp edges. (And make sure you wash the can out before using it!)
2. A wooden ruler at least 30cm long.
3. An empty matchbox, with the inside drawer removed.
4. Two paper-clips and two spent matches.
5. A small piece of plasticine or modelling clay.
6. Some strong thread.
7. A piece of wood.
8. A hammer and a small nail.
9. Some sticky tape and some paper glue.

Safety Stuff

Check with an adult before you begin any of these projects. You'll probably need their help at some stage and it's best if they know that in advance. Working with items such as scissors can be dangerous, so be very careful when you use them. Make sure that you never leave them open or lying around where smaller children can reach them.

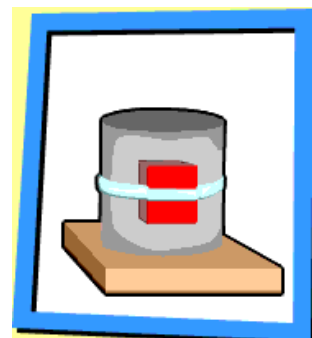
Before starting, cover the work surface you're going to use with some newspaper or an old cloth, and make sure that you are wearing an apron or some old clothes. Gather together all the items you will need before you begin. That way everything stays organised!

When you have finished, don't forget to tidy up afterwards!

Steps

Step One

Start by making a hole in each side of the matchbox, just less than 1cm from the end.



Ask an adult to help you nail the tin can to the piece of wood. It needs to be held quite securely, but you should still be able to turn the tin around smoothly on the block of wood.

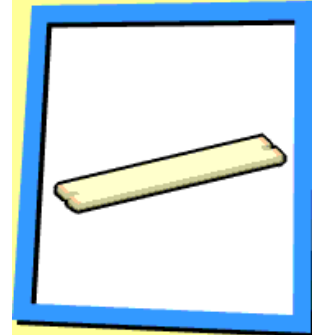
Next, tape the upright matchbox to the side of the tin can.

Step Two

Open out one of the paper-clips so it is straight. Then bend it to form the shape of a handle with a long shaft. Push the shaft through the two holes in the matchbox.

Carefully cut a small notch in the middle of each spent match, and tape a match to each end of the ruler with the notch facing out.

Tape the ruler over the top of the tin, making sure that one end of it sticks out about 2.5cm over the top of the matchbox.



Step Three

Tie one end of the thread to the shaft of the paper-clip inside the matchbox. Make sure that it's pulled tight, and then add a dab of glue to secure it.

Straighten the second paper-clip and bend it to form a hook shape. Tie the hook to the loose end of the thread.

Attach a small piece of plasticine just above the hook. This will act as a weight and help the crane run smoothly.



Step Four

Now pass the thread along the ruler, making sure that it sits in the notches in the matchsticks at each end of the ruler.

Your crane is now finished, and ready to pick up small objects. You can swivel it around to extend its reach, and then wind up the hook using the paper-clip handle.

See what different objects your crane can pick up.



Step Five

Could you make any changes to make your crane stronger?

What parts of the crane stop it from picking up much heavier objects? Is the handle too difficult to turn if the object is heavy? If so, how could you make it easier to turn? Does the crane tip over if the object it's lifting is too heavy? Does the crane need a heavier or a wider base? Is the thread strong enough?

Think about all the ways you could make your crane pick up heavier objects. Then try to improve your design. What's the heaviest object you can get the crane can pick up?

Now have fun experimenting as a crane driver!