

Magnetic robot

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Indicator: Recognises magnetic and non-magnetic materials

Materials

- 16 plastic cups, string, 4 strong bar magnets, barbecue skewer (safety first!), sticky tape, selection of materials; include metals and non-metals, magnetic metals and non-magnetic metals

▼ Motivate

- Ask students to list which materials they think are attracted to magnets?
- Ask: 'How can we test which materials are magnetic?'
- Ask: 'Are all metals magnetic?'

▼ Experience

- Students follow the procedure to make their plastic cup robots. They may find attaching the pots with string challenging. Knotting the string will prevent the pots sliding into each other. Separate lengths of string will be required for the head and torso, the arms and each leg. Magnets can be secured to the string with tape to prevent them from slipping from their ties.

▼ Explain

- The robot will pick up magnetic materials but not non-magnetic materials. The samples can then be classified into the appropriate group.

When magnets are placed near one another, they will either attract or repel. When magnets are placed near a magnetic material, they will attract that material but not repel it.

Materials that are not metal are not magnetic. Not all metals are magnetic.

Only iron and some iron alloys (steel, cobalt and nickel) are magnetic. Some stainless steels are not magnetic. Some coins are magnetic as they have a thin coating of copper over a steel core.

Aluminium cans—those that crush easily—are not magnetic. Drink cans are generally made from aluminium.

Tins used for food products are mostly made from iron and, therefore, are magnetic.

▼ Apply

- Students could use their robots to identify magnetic objects around the classroom and school environment. Having established which objects are magnetic, these could be further classified into different types of metal.

▼ Review and reflect

- Students write a report describing how they used the robot to classify different materials; including suggestions for how the robot may be used in a rubbish recycling project.

▼ Answers

What happened?

1. The recycling robot picked up magnetic materials.
2. The recycling robot did not pick up non-magnetic materials.

What I've learned

1. magnetic
2. attracted
3. not
4. metals

Magnetic robot



Task: To make a recycling robot.

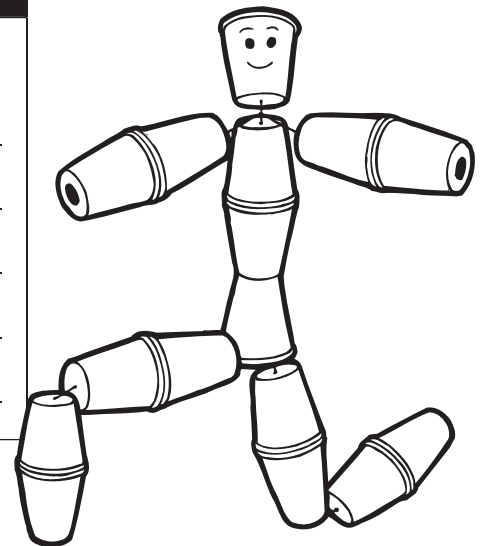
You will need

- 16 plastic cups
- string
- 4 strong bar magnets
- barbecue skewer
(Safety first!)
- sticky tape
- selection of materials
to test

► What to do:

1. Using string, knotted at intervals, make a 'robot' by connecting the plastic cups as shown below.
2. Stick a magnet to the feet and hands of the robot.
3. Allow the robot to bend over each sample so that its hands and feet are all touching the sample.
4. Lift the robot.
5. Identify the magnetic and non-magnetic materials and list them in the appropriate place in the table below.

Magnetic	Non-magnetic
The robot picked up:	The robot did not pick up:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____



► What happened?

Complete the sentences.

- (a) The recycling robot picked up _____
_____.
- (b) The recycling robot did not pick up _____
_____.

► What I've learned

Fill the gaps using words from the box.

not magnetic metals attracted

Some materials are _____¹. This means that magnets are _____² to them. Non-metals are _____³ magnetic.

Not all _____⁴ are magnetic.