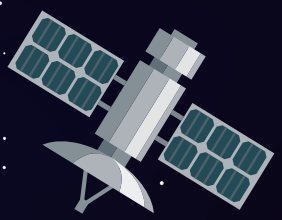
Communication Satellites



Keeping us connected

Have you ever talked with someone who lives very far away, maybe even in another country? If you have, chances are that a special kind of satellite helped you make that connection. They're called communication satellites.

There are around 2000 communication satellites in orbit. It's their job to pick up radio signals sent from one part of Earth (usually called the ground station) and redirect it so it is picked up elsewhere by a receiver. The radio signals sent out may be for phone calls, television shows, or even homework!

The orbit of most communication satellites keeps pace with Earth's rotation so they don't miss any signals. In this experiment you will see what that looks like.

You will need

- A science buddy (to act as a satellite)
- A pair of scissors
- A ball of string
- A marker to stand on

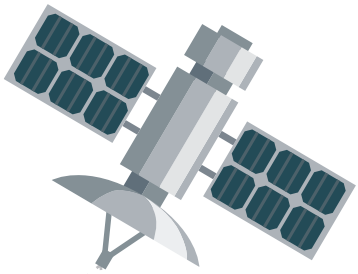
Experiment 1

1. Use scissors to cut a piece of string 1.5 metres in length
2. Hold one end of the string and stand on the marker, imagining that you're a planet
3. Have your buddy hold the other end of the string and stand facing you, far enough away so that there's no slack in the string
4. Slowly spin in a circle and have your buddy follow so they continue to face you. Congratulations! Your satellite is orbiting at the same rate as your rotation. This is called geostationary orbit

Questions to think about

- Who has to move more quickly? Who moves more slowly?
- Can you do this experiment with three people? One person orbits you while you orbit someone else. This would be like a satellite orbiting Earth while Earth orbits the Sun.

The most important part of a satellite's job is to redirect the signals sent out from the ground station correctly, so they reach the right receiver. In this experiment you will set up a ground station, a satellite, and a receiver to send out and redirect signals.



You will need

- A pair of scissors
- A piece of dark blue or black card (this will act as your receiver)
- A tin can
- Sticky tape
- A ruler
- A small mirror (this will be your satellite)
- Blu Tack
- A torch (this will act as your ground station)

Experiment 2

1. Measure out a 10 cm by 10 cm square on the cardboard and cut it out
2. Stick the card onto the can's side using sticky tape and place the can upright on a flat surface
3. Place the mirror 75 cm away from the can (use the ruler to help you measure the length)
4. Make sure the mirror is facing the can and fix it in place using the Blu Tack
5. Darken the room, then place the torch about 30 cm away from the can and switch it on. The light should be reflecting off the mirror
6. Move the mirror back and forth until the light reflecting off the mirror hits the card. Congratulations! Your satellite has successfully redirected the signal to the receiver!

Questions to think about

- How far away is the mirror from the can? How far away is it from the torch?
- Does the strength of the torch affect how well the experiment works? Why or why not?

Some more information

So why do we need satellites in the first place? Can't we just send the signals directly to the receivers? Well, that can work over short distances, but because radio signals travel in straight lines and Earth is round, the signals don't get very far. Also, the signals can get blocked by large objects such as hills and buildings. By sending the signals out into space then redirecting them back, they can travel a lot further without being disrupted.

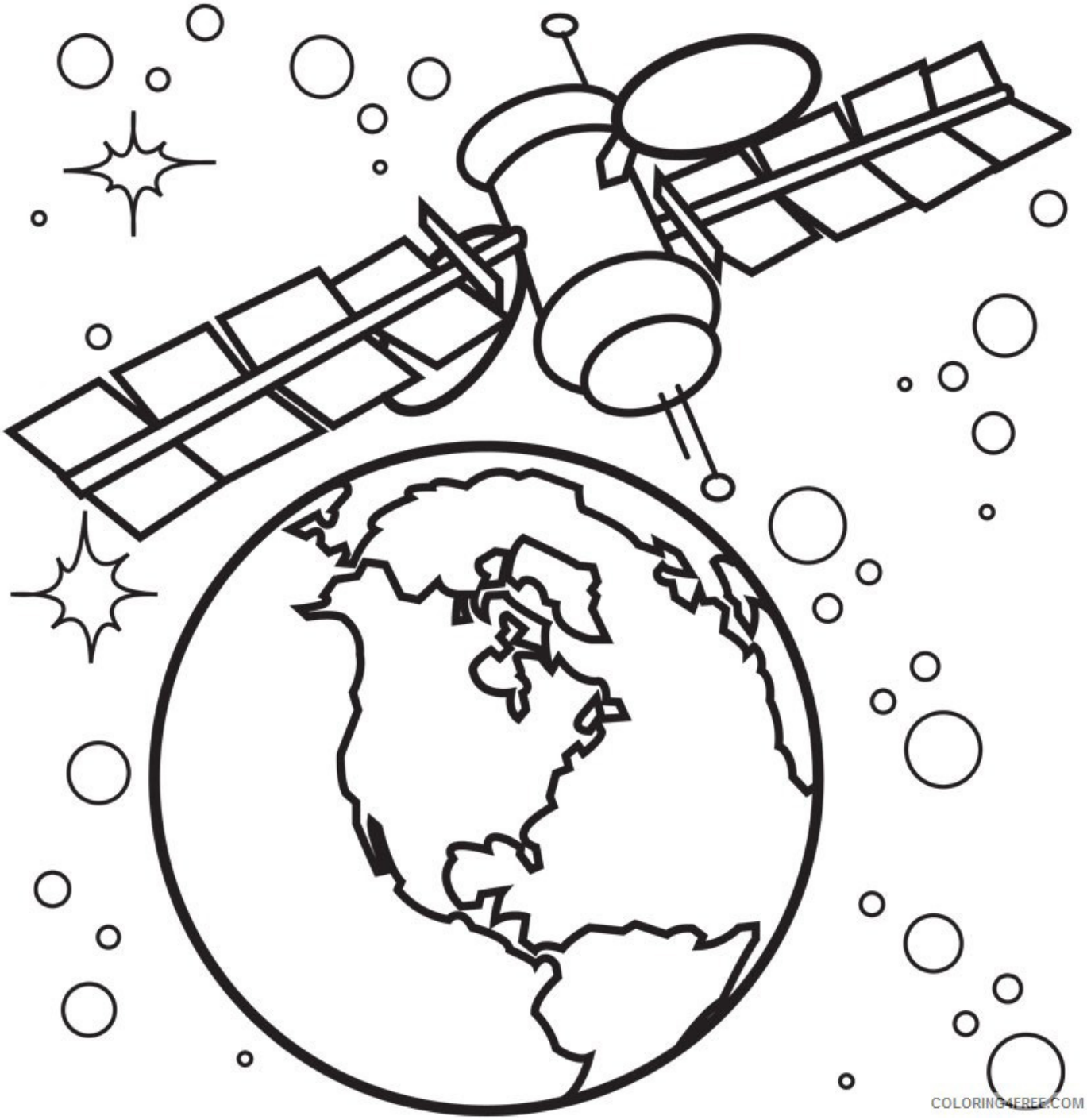
Because Australia is far away from other countries, satellites were seen as a useful way to keep the country globally connected. In 1967, Australia became the third country in the world to launch a satellite, after Russia and the United States. Today, there are over twenty Australian satellites in space. The newest one, M2 Pathfinder, was launched in June this year after being designed, assembled, and tested in Canberra.

Australia also played a very important role in connecting the world during the Apollo 11 Moon landing in 1969. Because it was such an important event, NASA wanted as many people as possible to see history being made. So they mounted a camera on the side of the spacecraft that started recording when they reached the Moon. A few stations in Australia were in the best position to receive the signal and broadcast it to the rest of the world. Those stations were Honeysuckle Creek Tracking Station, near Canberra, and Parkes Observatory, which is in the middle of New South Wales. Honeysuckle Creek broadcast the first eight minutes of footage from the Moon landing and after that it was switched to Parkes.

Honeysuckle Creek is now closed, but people can still visit Parkes and learn about Australia's role in the Moon landing.

Where to find out more

- Behind the News: Sky Muster
- Fun Kids: Satellites and Cables
- Australia and Apollo
- ESA Kids: Satellite Television
- Australia in Space



What do you think the satellite is doing?