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Mars Rovers and Landers

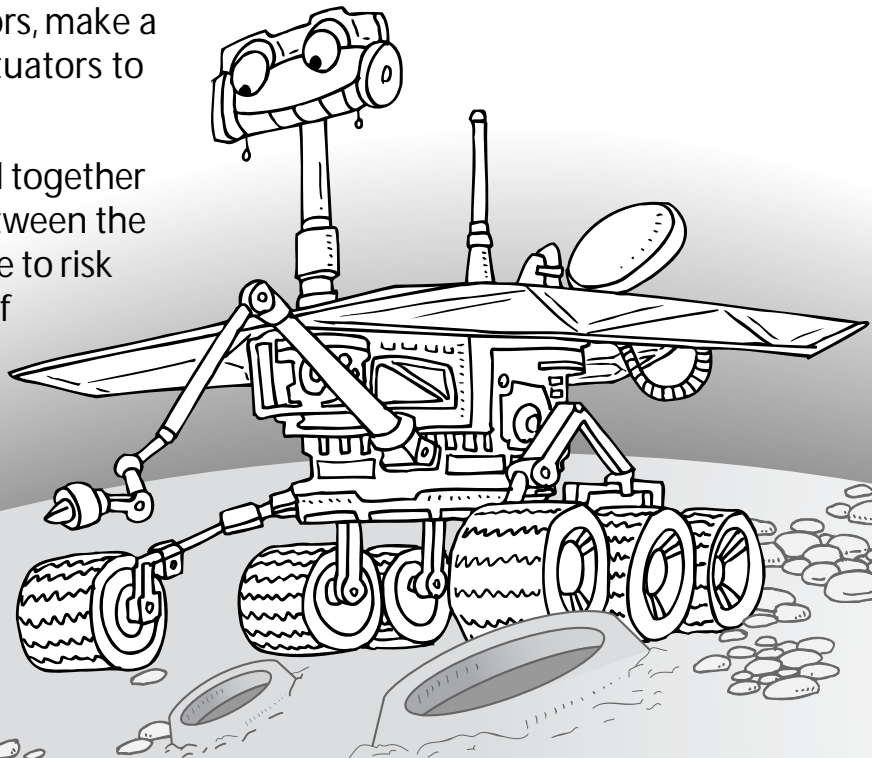
Because of the extreme Martian environment and the difficulty of humans travelling into deep space, it has not yet been possible to send astronauts to Mars. However, sophisticated robots have been programmed to collect samples, process information, and send data back to the Earth. Thanks to numerous robotic missions, we now know that water vapour and ice exist on the Red Planet. New technologies and innovations continue to bring back data to a hungry scientific community.

We often think of robots as mechanical men made of metal that can be programmed to do simple things. Some may think of the Terminator: human-like because it speaks but unlike a human because it is indestructible and possesses phenomenal strength. But none of this describes the Mars rovers and landers.

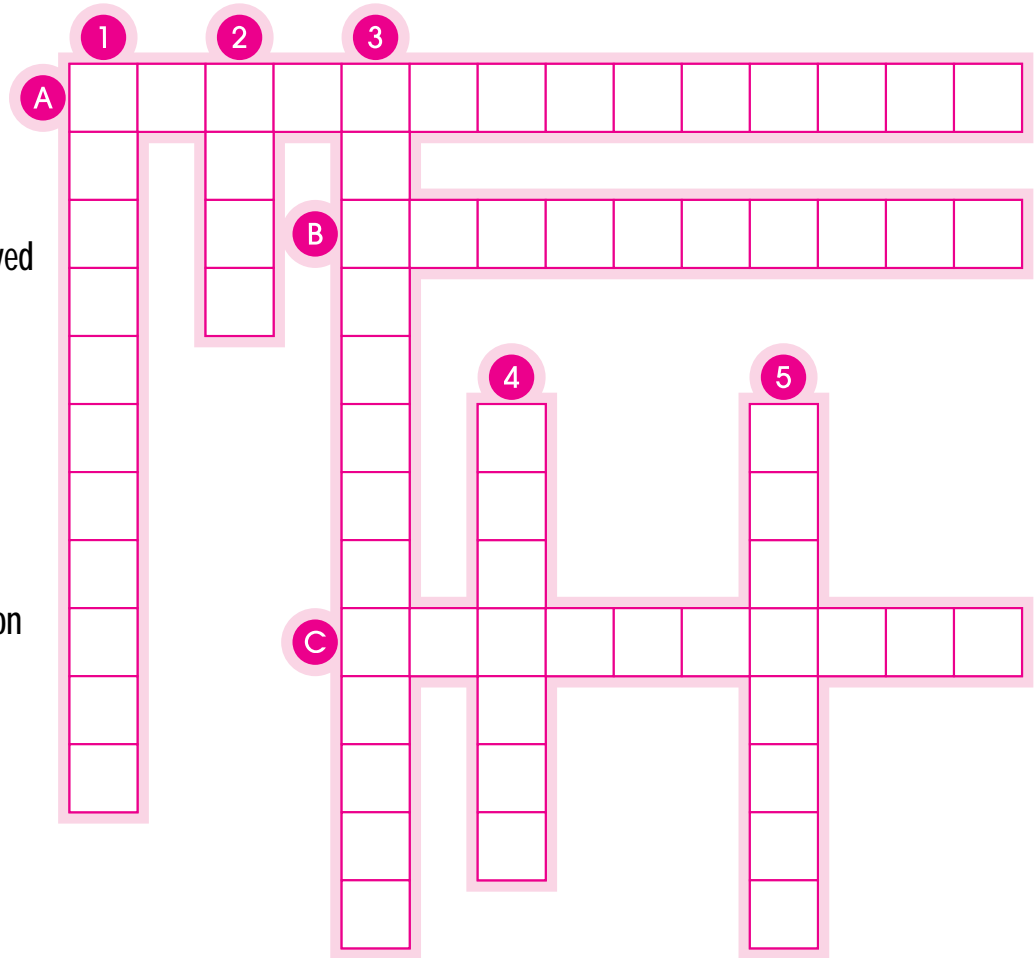
A robot is a complex series of procedures. The Mars rover or lander is a collection of several systems, with three major components: sensors, processors, and actuators.

Sensors are used for determining and gathering data about the environment. Cameras and touch sensors are common examples. Some robots also use temperature and humidity sensors. Opportunity, the rover that explored the surface of Mars, sent back signals whenever it encountered something, such as when it came across a huge, deep crater. The robot's processors then "decided" to examine it. The processors would instruct the actuators to power a robotic arm to collect samples, or wheels to move the whole robot into the crater. You can see how the processors take input from the sensors, make a decision, and then command the actuators to respond.

When all these components work well together from such a great distance as that between the Earth and Mars, astronauts do not have to risk their lives in space for the purpose of research. And until astronauts are able to land on Mars, these rovers and landers will continue to be the next best thing.



A. Read the clues and complete the crossword puzzle with words from the passage.



Across

- A. cannot be destroyed
- B. extraordinary
- C. parts

Down

- 1. inventions
- 2. factual information
- 3. complex
- 4. instruct
- 5. intensive study

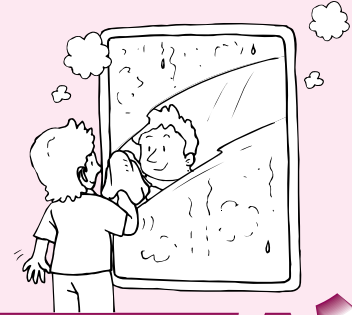
B. Write "T" for the true statements and "F" for the false ones.

- 1. There is vapour and air on Mars. _____
- 2. No astronauts have ever set foot on Mars. _____
- 3. Not all robots are human-like machines. _____
- 4. Sensors, processors, and actuators form the three major parts of the Mars lander. _____
- 5. Opportunity crashed into a deep crater on the Mars surface and was destroyed. _____
- 6. The robotic arm on the Mars lander is controlled by the actuators. _____
- 7. The robotic arm's sole function is to collect rock samples. _____
- 8. The processors send commands to the actuators. _____

Prepositional Phrases

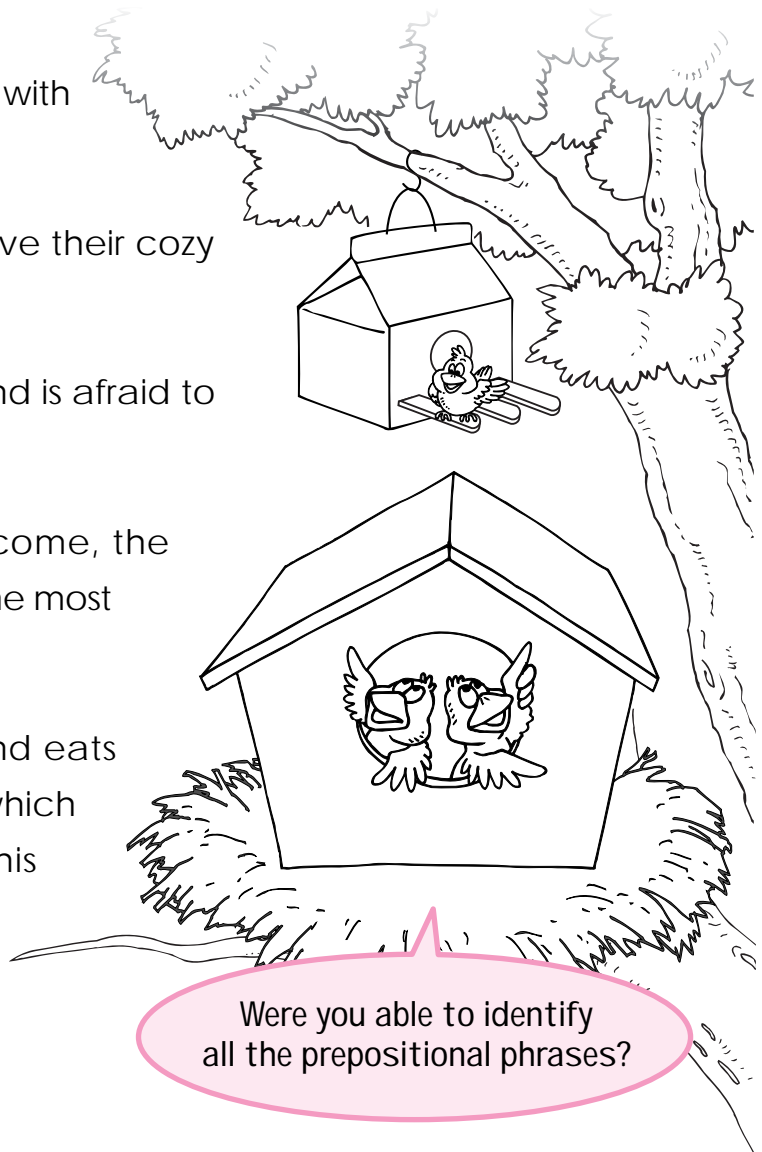
A **prepositional phrase** begins with a preposition, such as “in”, “on”, “with”, and “near”. It functions as either an adjective or an adverb in a sentence – that is, it modifies either a noun or a verb.

Example: Sam has a mirror with sheets of dust, so he cleans it with the utmost zeal!



A. Underline the prepositional phrase that modifies a noun in each of the following sentences.

1. In our backyard live two birds with big wide beaks.
2. Today, they see a visitor above their cozy house.
3. The tiny visitor is a little shy, and is afraid to eat the seeds in the feeder.
4. To make the visitor feel welcome, the bird couple begin a song of the most delightful chirps.
5. The tiny visitor loosens up, and eats those seeds of great taste, which we put in the feeder only this morning.
6. The visitor flies away, but returns later with a baby by her side!



Were you able to identify all the prepositional phrases?

B. Underline the prepositional phrase that modifies a verb in each of the following sentences.

1. There are some birds that have built their home with a lot of twigs.
2. This morning, the mother brought her babies some worms after finishing her morning exercise.
3. Earlier, a scary crow had perched near the baby birds, but it flew away just as the mother returned.
4. The babies miss their father as he is on a trip with other birds, but they know he will return before winter.
5. The mother knows her babies will not be hungry until later in the afternoon, so she perches on a higher branch to keep watch while her babies nap.



C. Underline the prepositional phrase in each of the following sentences. Then determine what it modifies by writing "N" for noun or "V" for verb on the line.

1. My dad thinks red-eared turtles are beautiful because they have shells of green like jade. _____
2. My brother has a few budgies which he looks after with a lot of love. _____
3. Our pet parrot says such hilarious things that we all agree it has the style of a stand-up comedian. _____
4. My cousin has a cat that likes to purr in front of her face when she is asleep. _____
5. My mother likes watching butterflies, especially when they hover above a flower like they have just found the perfect spot. _____