

# NASA's Lunar Exploration Missions

*NASA's lunar exploration missions will collect scientific data to help scientists and engineers better understand the Moon's features and environment. These missions will ultimately help NASA determine the best locations for future human exploration and lunar bases.*

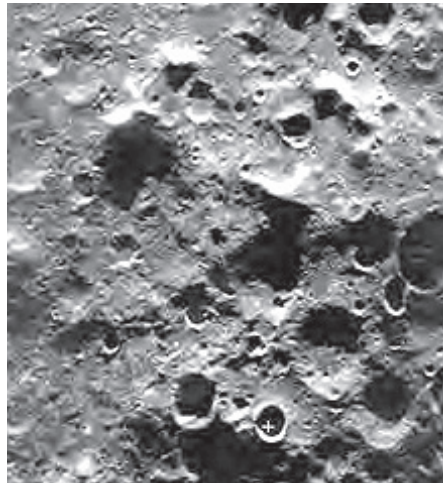




## SATELLITE INSTRUMENTS

The information gathered by lunar exploration missions will add to information collected during earlier missions.

Some of these missions gathered data that caused scientists to have more questions — questions they hope to solve with new instruments on new satellites. For example, NASA has recently sent a satellite to look for water ice on the Moon. Thus, that satellite carried instruments (sometimes called “detectors” or “sensors”) to look for the ice. Other instruments will help collect data to make exact maps of the Moon’s surface and make careful measurements of the radiation falling on the lunar surface for the safety of future lunar explorers.



## DESIGN challenge

*To design and build a satellite that will orbit the moon. It must carry a combination of cameras, gravity probes, and heat sensors to investigate the Moon’s surface. The satellite will need to pass a 1-meter Drop Test without any parts falling off of it.*

## TEAMWORK IS IMPORTANT

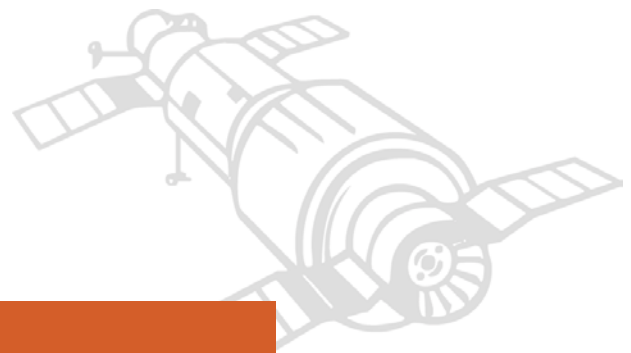
The different instruments are designed, tested, and assembled by different teams of engineers and scientists. The separate teams must work together to ensure instruments are the right mass, fit correctly, and make proper measurements. Working together is an important skill for *everyone* to practice.



Build a Satellite  
**Student page**

## ***THE CHALLENGE:***

*Your mission is to build a model of a lunar exploration satellite with the general building supplies available. Use different shape and sizes of buttons or beads to represent the various instruments. Your team must:*



## **DESIGN** challenge

*To design and build a satellite that will orbit the moon. It must carry a combination of cameras, gravity probes, and heat sensors to investigate the Moon's surface. The satellite will need to pass a 1-meter Drop Test without any parts falling off of it.*

1. Use a combination of instruments that cannot go above four (4) solar cells to power your satellite.
2. The satellite must withstand a drop from above your head without any pieces falling off.

Design a Satellite  
**Student page**

satellite

# ASK IMAGINE & PLAN

For this activity, you must design your own satellite. These are the instruments you may choose to put on your satellite:



**Camera**  
Takes Pictures



**Gravity Probe**  
Measures Gravity



**Heat Sensor**  
Measures Temperature

Each of these instruments requires a certain number of solar cells to operate on your satellite. A solar cell  collects energy from the sun to power the instruments.

needs



needs



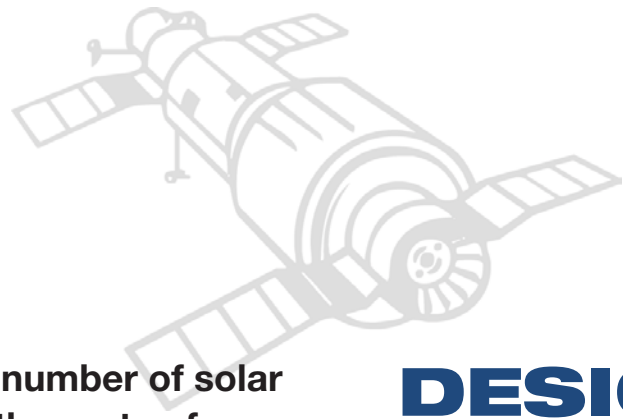
needs



If you were to build a satellite with one (1) camera and one (1) heat sensor, how many solar cells would you need? Complete the number sentence below:

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

(camera)                      (heat sensor)                      (total solar cells)



**Draw your satellite. Include the correct number of solar cells it will need. Make sure to label all the parts of your satellite.**

## **DESIGN** challenge

*To design and build a satellite that will orbit the moon. It must carry a combination of cameras, gravity probes, and heat sensors to investigate the Moon's surface. The satellite will need to pass a 1-meter Drop Test without any parts falling off of it.*

Build a Satellite  
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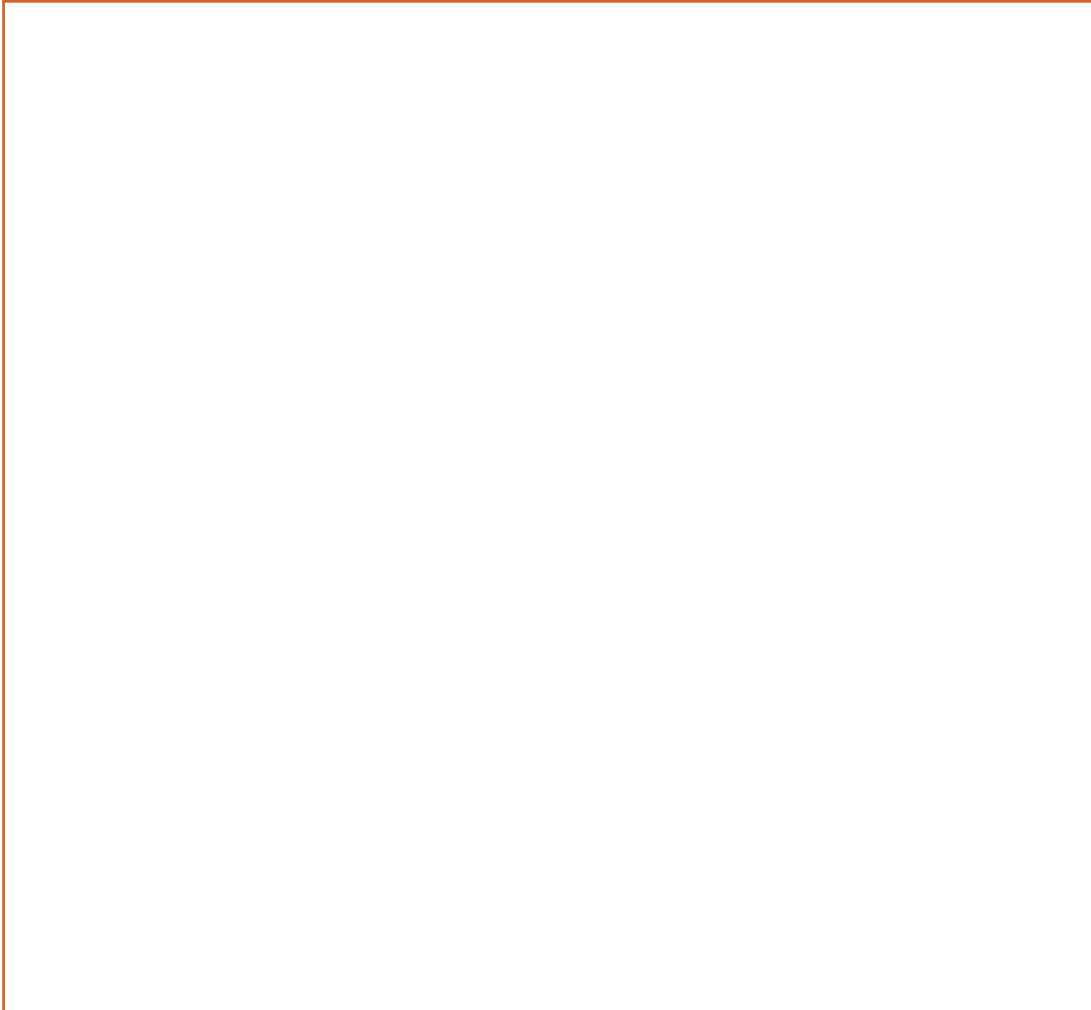
satellite

Approved by: \_\_\_\_\_



# ***Experiment & Record***

**Drop your satellite from above your head. Describe to your teacher what happened during your satellite's drop or make a drawing.**



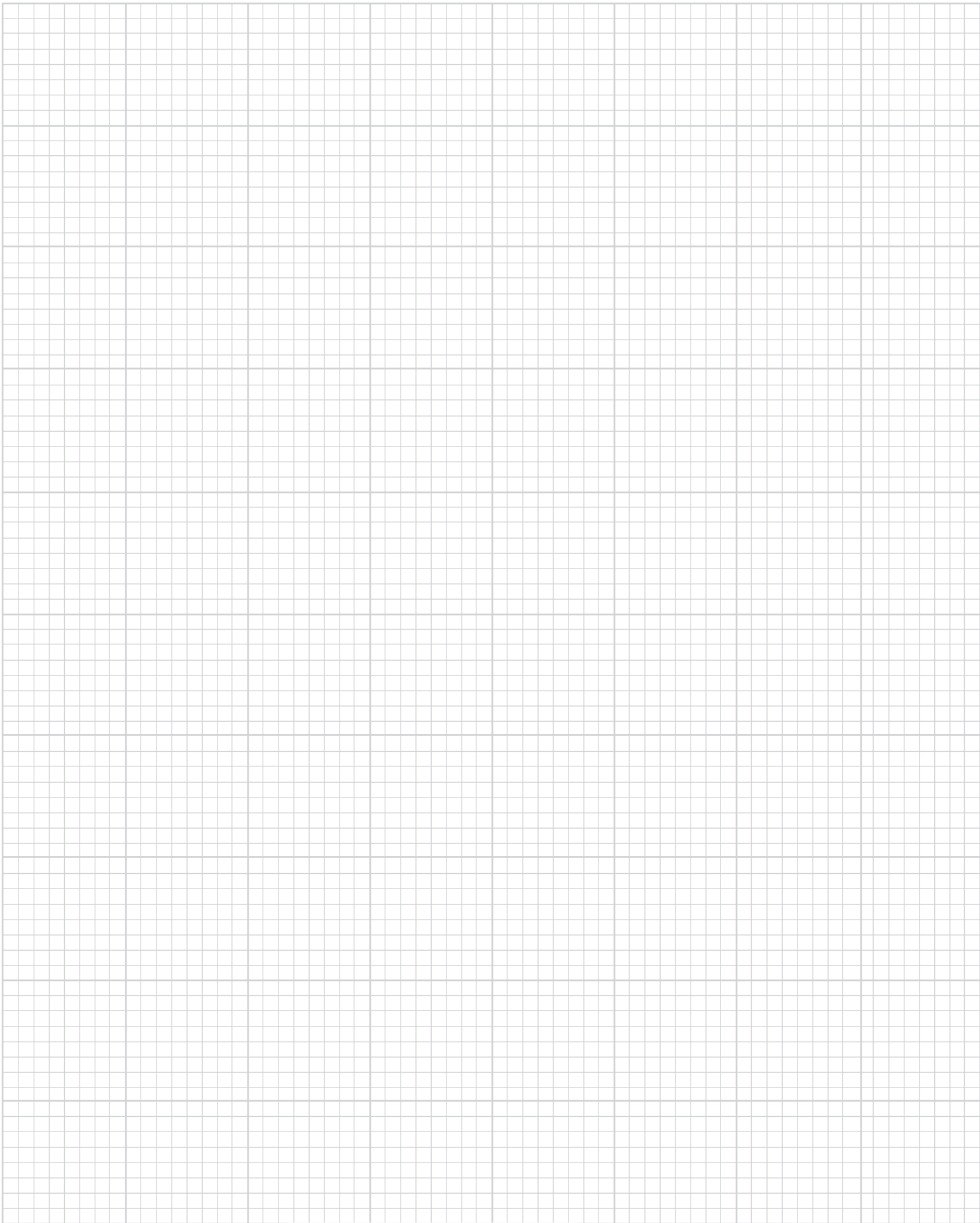
**Did any instruments fall off the satellite?    Yes    No**

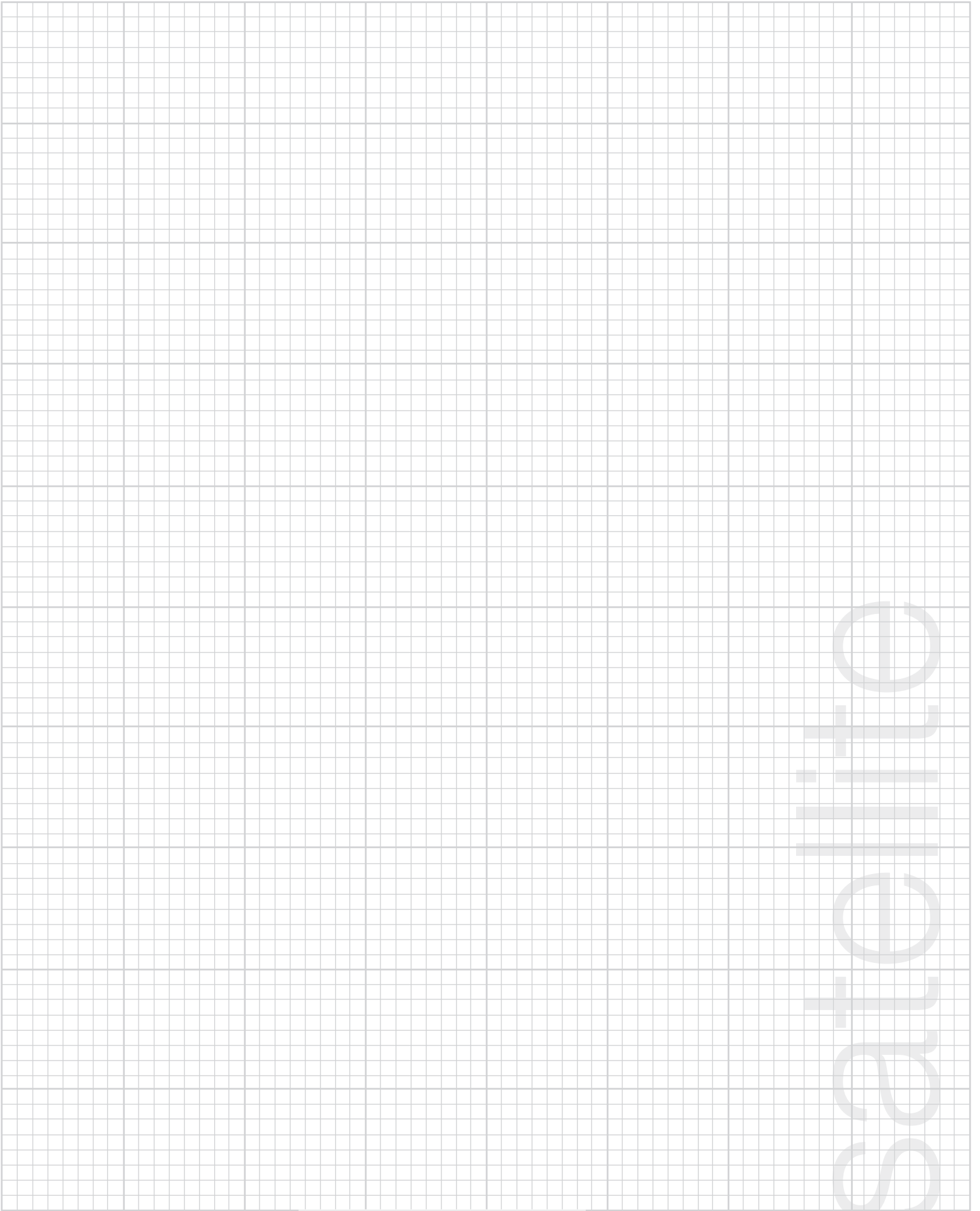
**Was the satellite damaged during the fall?    Yes    No**

**If you answered yes to either question above, discuss with your team how you should design your satellite differently. If there is time, make changes in your drawing and add those changes to your satellite.**

Build a Satellite  
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satellite

