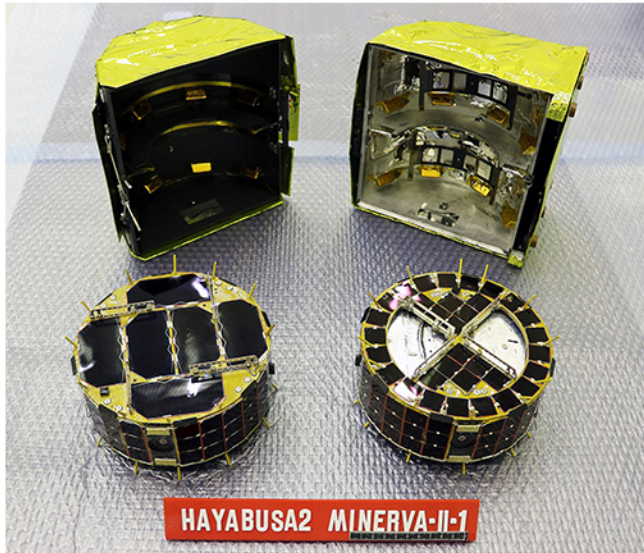


MINERVA II-1 Rover



he MINERVA-II (standing for the "Micro Nano Experimental Robot Vehicle for Asteroid, the second generation").

After a three-and-a-half-year journey of 2 billion miles (launched in December 2014), a Japanese space probe (Hayabusa 2) dropped a pair of hopping, grapefruit-size rovers on an asteroid called Ryugu and began beaming back snapshots from the surface and measure its temperature.

The feat marked a trio of historic firsts: First soft landing on an asteroid, first deployment of rovers in a low-gravity setting, and first close-up look at the sort of celestial object that might have helped seed life on Earth billions of years ago.

The images coming in from the Hayabusa 2 probe also afforded another, more personal first: a glimpse of an alien landscape unlike any humans have ever seen. All this took place on September 21, 2018.



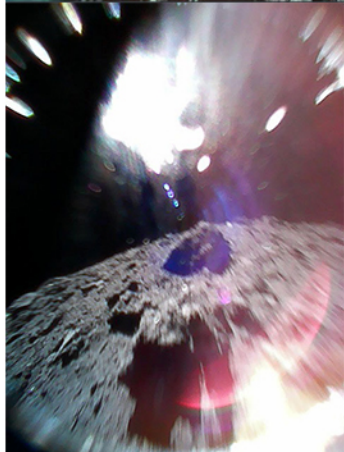
The two MINERVA-II1 rovers (Rover-1A, 1B) are circular in shape with a diameter of 18cm, height of 7cm and weight of about 1.1 kg each. The pair were developed at the JAXA Institute of Space and Astronautical Sciences in collaboration with other manufacturers, universities and organizations.

The rovers communicate with Hayabusa2 using the repeater (OME-E) installed on the main spacecraft. The maximum communication speed is 32 kbps. Data received by Hayabusa is then transferred to the Earth. The OME-E will also be used for communication with the German/French lander, MASCOT, scheduled for deployment in October.

The main feature of MINERVA-II1 is the ability for the rovers to move on the surface of Ryugu by utilizing a hopping mechanism. Within the rover is a motor that rotates and causes the rover to "hop" (jump up) during the rebound. This will allow the rovers to move across the asteroid surface and explore multiple areas. On Ryugu, MINERVA-II1 will move autonomously, determining what should be done for the exploration by itself.

Gravity on the surface of Ryugu is very weak, so a rover propelled by normal wheels or crawlers would float upwards as soon as it started to move. Therefore this hopping mechanism was adopted for moving across the surface of such small celestial bodies. The rover is expected to remain in the air for up to 15 minutes after a single hop before landing, and to move up to 15 m horizontally.

Ryugu is named for a magical palace at the bottom of the sea where a fisherman is given a mysterious box in a popular Japanese folk tale.

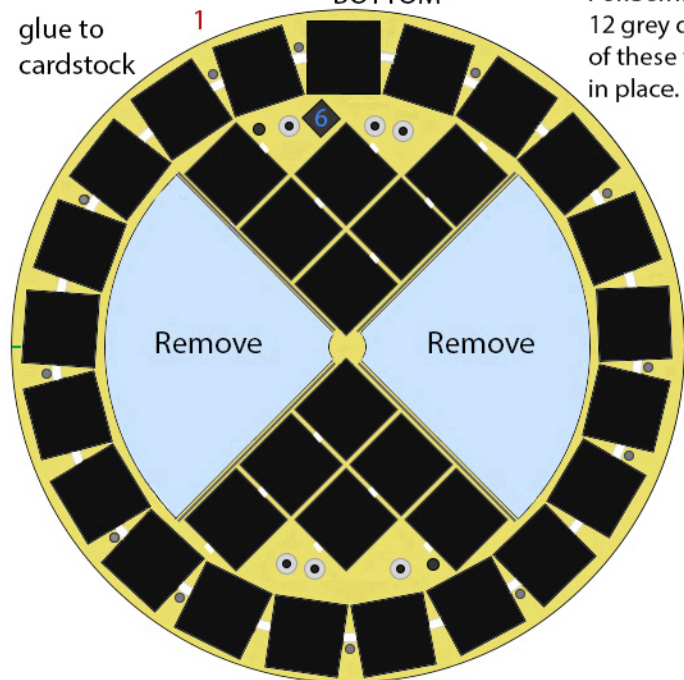


MINERVA II-1B Rover

glue to cardstock

1

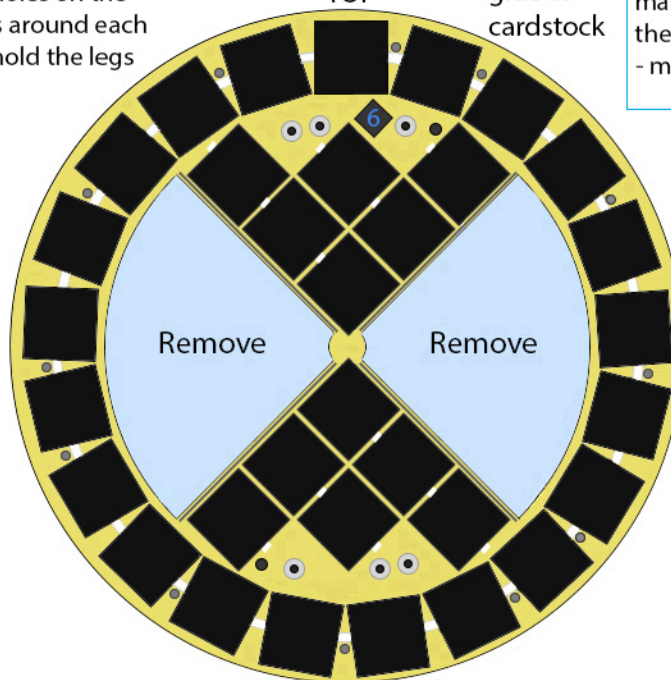
BOTTOM



Poke small holes on the 12 grey dots around each of these to hold the legs in place.

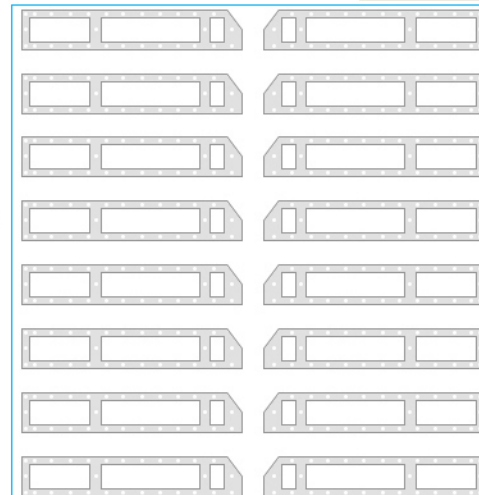
2 TOP

glue to cardstock



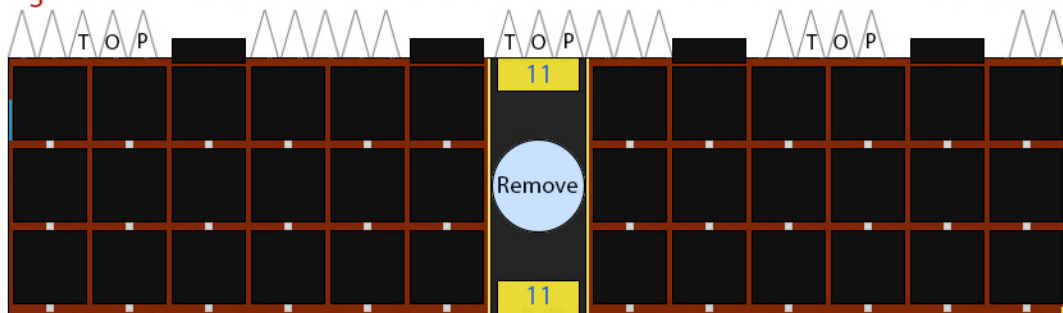
Need plastic broom straws or like material cut at the same length as the line below, colored yellow - make 24 of these.

6
Glue to two layers of cardstock

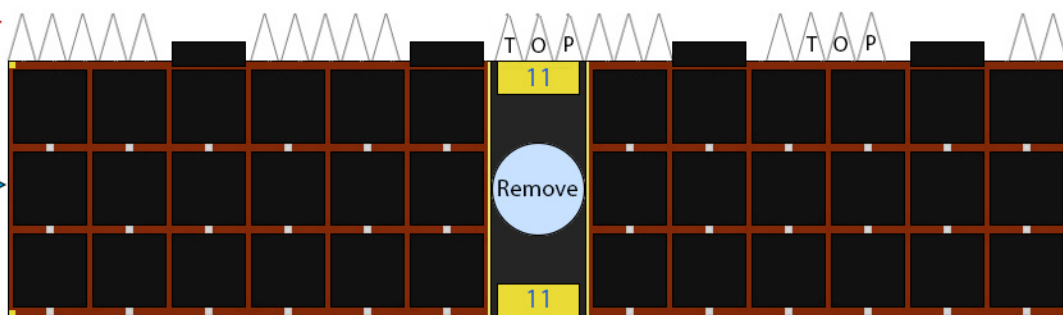


7 Remove the white areas (if desired), then glue each pair back-to-back.

3

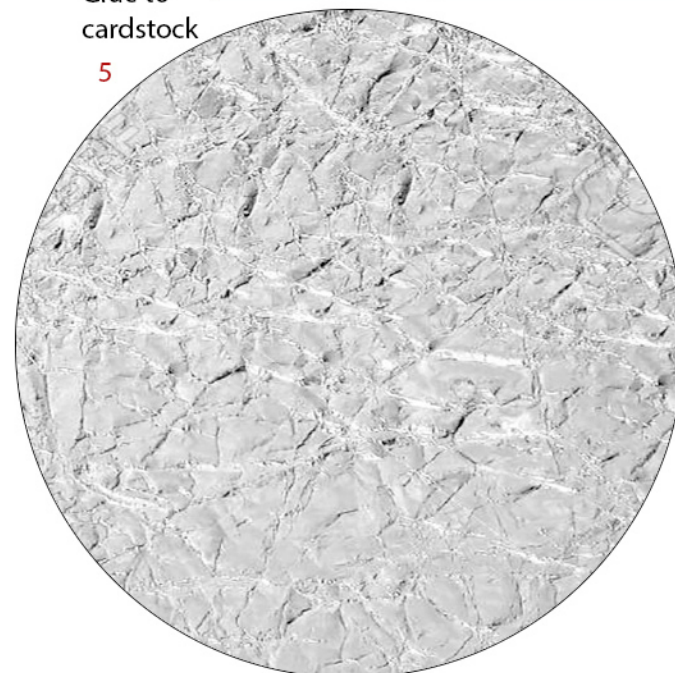


4



Glue to cardstock

5



Zach's



PaperSat Designs
Spacecraft Paper Models



Color back BLACK

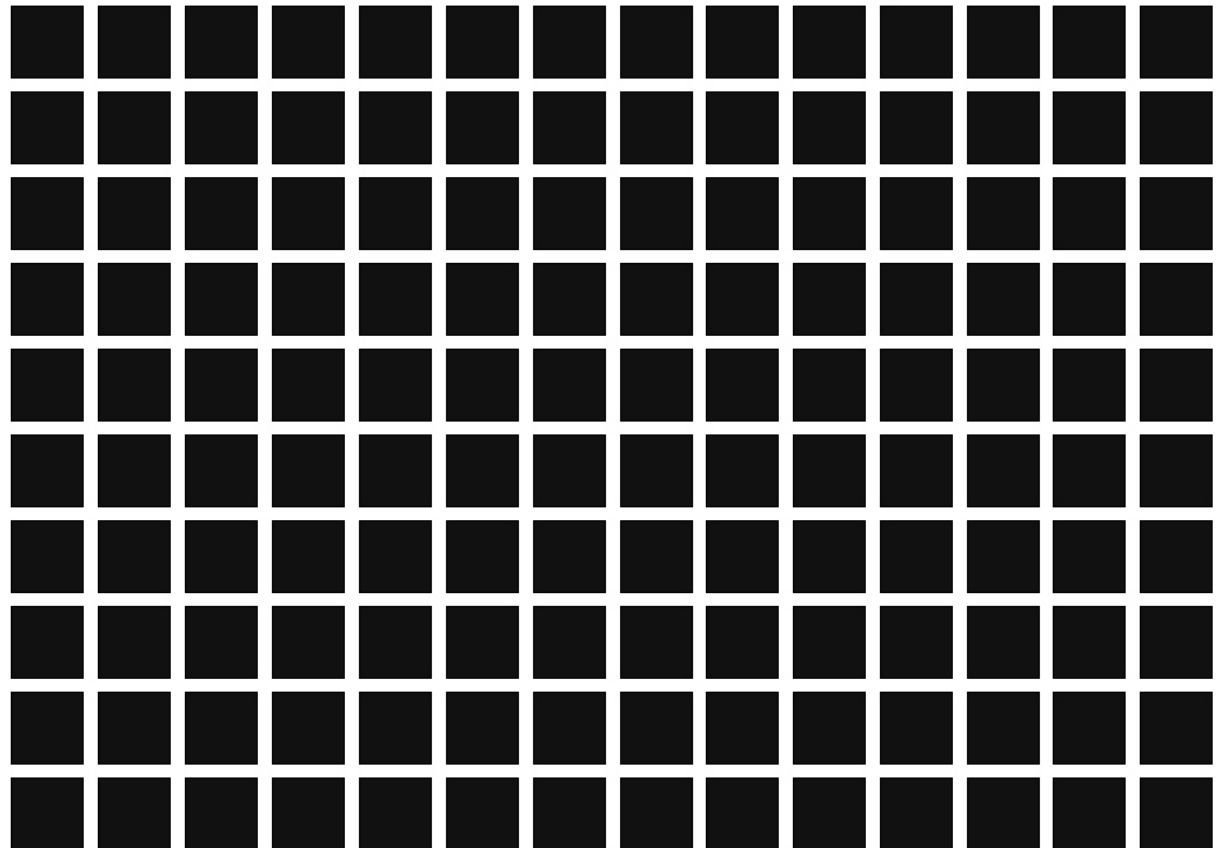
Color back BLACK

13

14



Optional detail parts
Glue to the matching solar cell graphics on the model before assembly - includes two spares.



Glue to two layers of cardstock

12