

Marsbound!

Let's go to Mars! This activity is adapted from the [JPL Marsbound](#) game.

Goals

Choose 1 of the Mars Exploration goals and build your mission, staying within your budget and keeping track of how much mass and energy you are using.

NASA's four Mars Exploration Program goals

- i. Determine if life ever arose on Mars.**
- ii. Characterize the climate of Mars.**
- iii. Characterize the geology of Mars.**
- iv. Prepare for human exploration.**

Your chosen goal, circle one: **i.** **ii.** **iii.** **iv.**

Science Focus

Develop 3 or 4 science questions that use your chosen goal above as the foundation for your set of questions. Here are some sample science questions from NASA:

- What kinds of craters are on Mars, how old are they and how were they formed?
- How are Martian craters different from craters on the Moon?
- Does Mars have moving continental plates?
- When and how often did the Martian volcanoes erupt?
- Why is the northern hemisphere of Mars so smooth and flat, while the southern hemisphere is so cratered and rugged? What are the ice caps on Mars made of?
- How do the ice caps change throughout the Martian year?
- What are the dark lanes and other features seen on the Martian ice caps?
- What formed the canyon systems on Mars?
- Have the canyons been eroded by wind or water?
- What formed the channels we see on Mars?
- What evidence is there of water flowing through the channels?
- How long ago did water flow on Mars and for how long did it flow?
- Why do the clouds we see in the atmosphere of Mars form?
- What do the cloud patterns tell us about the winds on Mars?
- What do the patterns of sand dunes tell us about the winds on Mars?
- How are global dust storms created and how long do they last?
- What is the dust on Mars made of?
- How does the dust move around the planet throughout the Martian year?
- Where is it dusty and where is it rocky on Mars?
- Are there microscopic lifeforms living in the soil on Mars?
- Did Mars ever have a planetary magnetic field? If so, what happened to it?
- Are there any rocks on Mars that still have a magnetic field?
- How much radiation reaches the surface of Mars?
- Do the landforms on Mars provide any protection from radiation?

Your chosen science goals – write them out below. They should not be exactly the same as the ones above.

Logistics

Budget: \$300 Million

Choose: Red card (mass limit), Orange (power), Purple (CS), Aqua (Comm), Blue (science instruments) and Yellow (science instruments)

Your lander must have both a descent and mobility system.

LAST CARD: Green, must choose from deck

Top icon (large/ton mass) = mass

Middle icon (lightning) = power

Bottom icon (\$) = cost

Read the text to understand what the item does and whether or not it is used in conjunction with another item, or if it has any science return.

Final Assessment

Total cost = _____

Total mass = _____

Total power = _____

Total science return = _____

For each mission, calculate the money to science return ratio by dividing the total cost by the total science return.

Money to science return ratio = _____

Launch!

An online die will be rolled to determine if their mission launched successfully. The type of rocket you chose will determine your success rate. For example, the Heavy-Lift Rocket is high risk, only lifting off successfully 3 out of 6 times.

If you roll a 1, 2, or 3, that's a successful launch! But if you roll a 4, 5, or 6, then your launch fails. ☹️

Your launcher (circle or highlight what you chose)

Light-Lift Booster 5/6

Upgraded Light-Lift Booster 4/6

Medium Lift Booster (\$100) 4/6

Medium Lift Booster (more expensive, red, \$120) 5/6

Heavy Lift Booster 3/6

Space Launched Booster 5/6

Your roll _____

