Marsbound – Student Worksheet

Now it is time to plan our rover or lander mission! NASA scientists work with engineers to design missions, like the Perseverance Rover on Mars right now. In this activity you will use equipment cards to design your own mission.

Our Science Objectives:

1. _____

2. _____

3. _____

The type of mission we chose is a (*circle*): Flyby ◯ Orbiter ◯ Lander ◯ Rover ◯

Card Symbols Key:

$ - Cost

 - Energy Required

 - Mass

 - Science Return

Booster Cards (Red Cards 1-6)

Shows the mass limit (how much it can lift)
Risk: “x times out of 6”

Power Cards (Orange Cards 7-12)

Shows power provided by that component
Only need the battery if you choose solar panels as your power source.

Tips for building your mission:

1. Start with your objectives and choose instruments needed to meet those goals (dark blue cards 13-25, yellow cards 28-30).
2. Select rover & lander components, *if needed* (pink cards 26-27, gray cards 31-34).
3. Card 35 can be added to any mission if you choose!
4. Select the required components (purple cards 36-38, light blue cards 39-41), note there are only 1 or 2 options for most of these components.
5. Now start working with the constraints, add up the power requirements for your spacecraft and select a power supply (orange cards 7-12). *You only need a battery if you choose to use solar panels.*
6. Add up the mass of your spacecraft and select a rocket (red cards 1-6).
7. Now add up the cost of your spacecraft, are you under budget? What can you change? What sacrifices do you need to make?
8. Make modifications, check mass, power, & budget until you meet all constraints.

Record your FINAL spacecraft design here:

Chosen Rocket: _____, works ___ times out of ___.

Component	**Cost**	**Mass**	**Power**
Rocket:			
Nose Cone:			
Power System:			
Battery (if needed):			
Microprocessor:			
Main Bus:			
Main Antenna:			
Backup Antenna (optional):			
Main Memory Card:			
Mobility System (rover only):			
Heat Shield (rover/lander only)			
Parachute (rover/lander only)			
Landing system (rover/lander only)			
Impact Probe (optional)			
Mechanical Systems (List):			
Science Instruments (List):			
TOTALS:			

NASA Teams have to present their Missions to a board to earn permission and funding for their mission. You will also be presenting your mission. Use the space below to plan your presentation. Some things to consider:

What were your goals?

What kind of mission did you choose? Why?

Were you able to meet all of your goals? What sacrifices did you have to make?

What is your science return?

Any other thoughts or things you would like to share?
