

Mars: Scene 1

Marc and Margarite are preparing to watch a movie when . . .

[*Knock, knock, knock...*]

Margarite's mom yelled from the kitchen, "Margarite, can you get the door?"

Margarite yelled back, "Mom, we're watching a movie."

Margarite's mom retorted, "So pause it!"

Margarite got up, grumbling to Marc, "I'd better get that. Can you pause it?"

Marc replied, "Sure."

Margarite walked down to the hall to the door. She gasped as she opened the door. Standing in front of her were an official-looking man and woman dressed in black suits and sunglasses. The woman was holding a badge that identified the two as officials from NASA.

The woman asked, "Are you Margarite Wilson?"

Margarite answered, "Maybe. Who are you?"

The woman replied, "I'm Dr. Ramirez, and this is Dr. Kirkpatrick. We are scientists with the National Aeronautics and Space Administration, or NASA. We would like to congratulate you and Mr. Marc Johnson on the successful launch of your rocket prototype this past February and talk with you about another project. We understand Mr. Johnson lives next door to you."

Margarite replied, "Oh, well in that case, you're in luck. Marc is here right now. We were just about to start watching *Taxi*. Come on in."

"Margarite, dear, who is...?" Margarite's mom stopped in mid-question as she entered the hall and saw the two scientists.

Margarite said, "Mom, this is Dr. Ramirez and Dr. Kirkpatrick. They're from NASA and want to talk to Marc and me."

Ms. Wilson replied, "Well, please come into the living room and have a seat."

Marc stood up when the scientists entered the living room and Margarite repeated the introductions. Marc offered the scientists the sofa. Margarite's mom sat in the recliner while Marc and Margarite sat cross-legged on the floor.

Dr. Kirkpatrick began, "What we are about to tell you is highly classified..."

Mars: Scene 2

15 minutes later . . .

Marc whistled between his teeth. “I didn’t realize that global warming was so bad.”

Dr. Kirkpatrick replied, “It’s not that things are ‘so bad.’ The point is that if we ever want to make Mars livable for humans, then we have to begin preparations at least 100 years in advance. We have to develop energy sources, housing developments, life support systems, an atmosphere . . . These things take a long time.”

Hesitantly, Margarite’s mom asked, “But do you think that in a hundred years global warming will have messed up the planet enough to leave it?”

Dr. Kirkpatrick answered, “We can’t say for sure what the next hundred years will bring. But, the Pentagon wants us to be prepared in case we can’t prevent catastrophic climate change.”

Margarite asked, “So what do Marc and I have to do with all of this?”

Dr. Ramirez replied, “Well, the main reason we want to include you is that you’re young. We want to recruit young people who can be involved for a very long time -- long after we scientists have retired. We only have about 20-30 years left to work on this, but if you choose to participate, you could continue for 50 or 60 more years. Long term involvement is important to the success of a project like this. You’ve proven that you are capable of this kind of work with your rocket prototype. With that in mind, we would like for you and some other students your age to help us design, and later build, a station on Mars that can support humans.

Dr. Ramirez continued, “We have identified a reservoir of ice deep underground. We will be setting up the station on top of this reservoir in order to access the ice to make water. We will have access to limited battery power for a while and we will not have access to fossil fuels, but we will need energy to access and use the water and to build the station. We will need to come up with renewable ways to make electricity and run machines and ways to conserve that energy. Our first task, therefore, is to identify energy sources available to us on the Red Planet, how to capture that energy and turn it into electricity for the station, and how to conserve that energy so we aren’t wasting it. Once we have that figured out, then we can begin with other projects.”

Mars: Scene 3

Two months later...

The NASA team commander said, “So, we’ve identified some excellent renewable energy resources that we can tap into once we arrive on Mars. Also, we’ve mapped out how we can capture and use them for electricity. Our next task is to design the living and working quarters of the initial team of Mars workers. In the first 25 years of the project, there will be 500 people living and working at the station, trying to create an environment that is hospitable to humans.”

Marc and Margarite listened as the commander of the design team continued briefing the group. They still couldn’t believe that they were involved in all of this. It seemed like just yesterday that they were cleaning up after the tornado in their neighborhood and getting to know each other. Now they were part of a massive effort to transform Mars into a place where humans could eventually live.

The team commander continued, “We are going to ask each team to create a prototype home for our Mars workers complete with an electrical wiring plan. You will receive your planning packet tomorrow on your desks. You will have one week to complete your prototype. Meeting adjourned.”

Mars

Molly Embree, Kevin McMahon, Carly Price, and Amy Webb

Mars: Scene 4

One month later...

The team commander exclaimed, “Congratulations. Our preliminary design work is completed. We can now begin to prepare for the assembly of the station on Mars. Good work. You have all been valuable to this project and we hope that some of you will agree to go with us when we begin building on Mars.”

Marc and Margarite looked at each other.

Marc said, “That was really cool. Who knows, maybe one of us will be doing some of the building on Mars. But more than anything, I hope we can fix things here on Earth so that we won’t have to go to Mars.”

Margarite replied, “Yeah, me too.”

Mars Dream Home Project Packet

NASA: DESTINATION MARS **DESIGN YOUR DREAM HOME**

Thank you for participating in NASA's program to design homes for future life on Mars. In this packet, you will find guidelines for the design of your prototype home. Remember, you have until Friday to complete your prototype home. Use your time wisely. Please review these instructions completely before you begin.

Step A. *REVIEW.* Make sure you have all your materials.

1. One building (shoe box)
2. Alligator clips
3. Light bulbs
4. Light bulb holders
5. Light switches
6. Electrical supply (you will use batteries that you brought from Earth until you switch to other alternative energy sources on your new planet).

If you are missing materials, call our toll-free number at 1-800 888-8888 and we will send you any missing materials as soon as possible. Current wait time is approximately three months.

Step B. *BUILDING.* Create your dream home with the materials supplied plus any materials that you can provide from home.

Building Requirements

- Your dream home must have 3 working lights or appliances.
- If one light (or appliance) turns off, the other lights and appliances must remain on.
- Draw a diagram of the wiring of your home and paste it on the back of your home.
- Your home must include two posters on the walls.
 - Display a list of at least FIVE electric safety tips to insure the safety of any visitors to your dream home.
 - Display a list of THREE ways to conserve energy. Remember, you only have one battery to power your entire house.
- You must display excellent workmanship this project. It is your home, not a pig pen.
- Creativity is encouraged.

Step C. COMPLETE PAPERWORK

This information packet includes several forms that must be completed before the NASA home inspectors arrive. Make sure you complete ALL the pages in this packet before Friday.

Step D. HOME INSPECTION. Ask another group to inspect your dream home to make sure you met all the requirements. At the same time, your group should inspect their dream home to make sure they met all requirements.

NASA home inspectors will arrive on Friday to examine your prototype home. Be prepared to demonstrate your house's electrical wiring and explain the circuits you used in the design of your house.

EXTRA CREDIT

(Complete this step AFTER your house has been seen by the NASA home inspector).

Combine your house with another group's house to build a condominium complex. Follow these guidelines to receive full credit.

BUILD A CONDOMINIUM.

1. Disconnect the batteries.
2. Stack one home on top of, or next to, another home.
3. Connect all the batteries in a series.
4. Rewire both homes. Make certain that when one light (or appliance) turns off in ANY HOME, the other lights and appliances IN THAT HOME AND THE OTHER HOME stay on.

NASA: DESTINATION MARS

TERMINOLOGY FOR WIRING YOUR DREAM HOME

Directions: The entire group needs to know these terms by Friday for the Dream Home Electricity Inspection

1. ELECTRICITY –
2. CURRENT –
3. CIRCUITS –
4. DRY CELL –
5. SERIES CIRCUIT –
6. PARALLEL CIRCUIT –
7. INSULATOR –
8. CONDUCTOR –
9. CIRCUIT BREAKER –
10. FUSE –
11. ALTERNATING CURRENT –
12. DIRECT CURRENT –
13. BATTERY –
14. GENERATOR –
15. VOLTAGE –
16. VOLTS –
17. OHMS –
18. AMPERES –
19. LOAD –
20. RESISTANCE –

NASA: DESTINATION MARS ALTERNATIVE ENERGY SOURCES

Directions: Fill in the table below to compare the different energy sources.

Energy Source	Definition	How can we capture it?	Pros	Cons
Solar Power				
Wind Power				
Hydroelectric Power				
Hydrogen Fuel Cells				
Nuclear Power				
Geothermal				

NASA: DESTINATION MARS
ELECTRICITY SYMBOLS

Directions: Draw the symbol for each of the electricity terms listed below

1. Circuit:
2. Battery (Power Supply):
3. Resistor:
4. Lightbulb (Load):
5. Switch:

Mars Grading Rubric

Prototype Home Inspection Checklist *(to be completed by a certified NASA home inspector)*

- _____ Home has at least three working lights or appliances.
- _____ When one light is unscrewed, the other lights and appliances remain on.
- _____ Wiring diagram is attached to the back of the house.
- _____ House includes a poster with at least five electric safety tips.
- _____ House includes poster explaining three ways to conserve energy.
- _____ Prototype displays excellent workmanship.
- _____ Layout and design of house exhibits creativity.
- _____ Pages in information folder are complete

Ask the following questions of the home builders. Encourage each student to contribute to answering the questions. Rate their answers with the following scale: 5=excellent answer; 4=answer exhibits deep understanding of the subject; 3=answer exhibits satisfactory understanding; 2=answer exhibits fair understanding; 1=answer exhibits poor understanding; 0=no understanding

1. Point to one symbol on the wiring diagram. Ask builder what that symbol is for.

5 4 3 2 1 0

2. Explain to me how the electric current runs through your house.

5 4 3 2 1 0

3. Explain the difference between alternating current and direct current.

5 4 3 2 1 0

4. How could you use circuit breakers or fuses in your house?

5 4 3 2 1 0

5. What alternative energy source do you plan to use once your battery supply is depleted? Explain how that energy supply can be used to create electricity.

5 4 3 2 1 0

Home Builder Signature

Home Builder Signature

NASA Home Inspector

Mars: Self-Evaluation

Read each statement and circle the number that best describes your own response.

<u>General Observations</u>	<u>Disagree</u>	<u>Neutral</u>	<u>Agree</u>		
1. Our group worked well together to create our boxcharts and research learning issues.	1	2	3	4	5
2. This case was interesting to me.	1	2	3	4	5
3. I felt we had enough time to do learning issue research and to do the project.	1	2	3	4	5
4. I was able to locate and use different resources for researching my learning issue research.	1	2	3	4	5
5. Our group was able to come up with several hypotheses to explain what was happening in the case.	1	2	3	4	5
6. I learned a great deal about specific physical science concepts with this case.	1	2	3	4	5
7. I feel I understood the main issues of the case.	1	2	3	4	5
8. We were able to identify learning issues to be investigated further.	1	2	3	4	5
<u>My Behavior</u>					
9. I was very stubborn about my opinions	1	2	3	4	5
10. I communicated my ideas well	1	2	3	4	5
11. I didn't participate often enough	1	2	3	4	5
12. I accepted other's opinions without questioning them	1	2	3	4	5
13. I felt free to express my opinion	1	2	3	4	5
14. I did my learning issue research to the best of my ability	1	2	3	4	5
15. I was off task and a distraction to the group	1	2	3	4	5
16. I contributed to the group as much as other members did	1	2	3	4	5
17. I listened alertly and with understanding to what others were saying	1	2	3	4	5
<u>Physical Science Concepts</u>					
18. I can diagram and explain open and closed circuits	1	2	3	4	5
19. I can name at least 3 alternative energy sources and discuss their advantages and disadvantages	1	2	3	4	5
20. I can name the fossil fuels and describe how fossil fuels were formed	1	2	3	4	5
21. I know the difference between renewable and nonrenewable energy resources and can give examples of each	1	2	3	4	5
22. I can describe to another person at least 4 ways to conserve energy in their home	1	2	3	4	5
23. I can name at least 4 electrical safety rules	1	2	3	4	5