

Speaking Notes

Lunar Mining Diorama Exploring Sustainable Resource Extraction

Slide 1: Introducing the Theme

Who's ready to embark on an exciting mission to the Moon? Today, we are going to explore the fascinating world of lunar mining and how we can do it sustainably. This project is all about understanding how we can extract resources from the Moon while protecting its environment.

Before we get started, what is M4M3? It stands for Moonshot 4 Mining, Minerals and Manufacturing and it's an initiative that explores innovation using the resources on the moon!

Slide 2: Sustainable Development Goals

Another important consideration for this project is the 17 Sustainable Development Goals (SDGs). These are international goals aimed at improving the quality of life, preserving the environment, and promoting sustainable development for 2030 proposed by the United Nations in 2015.

This project will connect to several the Sustainable Development Goals:

- SDG 9: Industry, Innovation, and Infrastructure
 - o Goal 9 is all about building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation.
- SDG 11: Sustainable Cities and Communities
 - o Goal 11 is about making cities and human settlements inclusive, safe, resilient, and sustainable.
- SDG 12: Responsible Consumption and Production
 - o Goal 12 is ensuring sustainable consumption and production patterns.
- SDG 13: Climate Action
 - o Goal 13 is about taking urgent action to combat climate change and its impact.
- SDG 17: Partnerships for the Goals
 - o Goal 17 is strengthening the means of implementation and revitalizing the Global Partnership for Sustainable Development.

Now we're ready to go to the moon! 3...2...1... Lift off!

Slide 3: Project Objective

Our mission for this project is to create a diorama that shows how we can mine on the Moon sustainably. We'll learn about mining on Earth, its challenges, and how these ideas translate to space. Understanding these concepts will help us appreciate the importance of sustainability in resource extraction. Imagine creating a tiny world where humans and the moon live in harmony! Sounds cool right? Let's get started!

Slide 3: Learning Outcomes

By the end of this project, you'll be lunar mining experts! You will gain a deeper understanding of how we can mine on the moon, develop your research skills, and showcase your creativity in building a diorama. We'll also think critically about the environmental impacts of resource extraction and learn about sustainable development goals. Let's explore each of these outcomes together.

Slide 4: Materials Needed

For this cosmic creation, you'll need some materials. We will need access to research materials like books or the internet, a small container for your diorama, and lots of craft supplies. If you have small figurines, toy vehicles, modeling clay, or LED lights, those can add great details to your diorama. Let's gather our gear, make a list of everything we need, and begin building our lunar landscapes.

Slide 5: Project Outline

Our project will be divided into four main parts, this is our mission roadmap:

1. Class Discussion: Share ideas and get inspired
2. Lunar Mining Research: Deep dive into your chosen topic
3. Diorama Design: Create your lunar masterpiece
4. Showcase and Reflection: Present your diorama and reflect on all we've learned

Each part has its own activities and goals. I'll guide you through each step, so don't worry if it seems like a lot right now!

Slide 6: Let's Get Started! (Part 1: Discussion)

Let's kick things off with a discussion. I want to hear your thoughts and ideas about what we'll be exploring. You will get the chance to share what you know and ask questions. Any question is a good question! Ready? Let's begin!

Slide 7: What is Resource Extraction or Mining? (Discussion Question)

Who can tell me what resource extraction or mining means? Think about where we get metals, minerals, and other materials we use every day. For example, we get metals from places like deep underground mines, mountains, and even under the ocean floor!

PAUSE - ASK STUDENTS TO ANSWER

Why is this process important, and what does it involve? Let's break it down together.

Awesome answers everyone! Now let's watch a quick video that explains Mining in Canada. <https://www.youtube.com/watch?v=N3GeBZq8AJU>



Slide 8: What are some challenges involved in mining resources on Earth? (Discussion Question)

Alright, now let's talk about what kinds of resources we mine on Earth. Does anyone have an example of a resource we can mine?

PAUSE - ASK STUDENTS TO ANSWER

Awesome! On Earth, we also mine resources like gold, coal, copper, and iron.

What are the challenges we face when mining resources on Earth? What do you think are the big issues? Consider environmental impacts, health and safety concerns, economic and social issues, legal challenges, and ethical considerations. Let's brainstorm together, there is a lot to unpack here!

PAUSE - ASK STUDENTS TO ANSWER

Slide 9: Why is Sustainability Crucial in Resource Extraction? (*Discussion Question*)

Our next discussion question is, why do you think sustainability is so important when it comes to mining? Imagine if we kept taking without giving back, what would happen?

PAUSE - ASK STUDENTS TO ANSWER

How would unsustainable practices affect our environment, health, and economy?

PAUSE - ASK STUDENTS TO ANSWER

Let's watch another video that describes what is at stake for our economy, health, and climate when mining is done with unsustainable practices.

<https://www.youtube.com/watch?v=ynN39sfqT8w>



If unsustainable practices negatively affect us and the Earth, how can we reduce our environmental footprint and promote sustainability?

PAUSE - ASK STUDENTS TO ANSWER

Slide 10: What comes to mind when you hear the term 'Lunar Mining'?
(Discussion Question)

Let's think outside the box now and try to apply the knowledge we have about mining on Earth to mining on the moon! When you hear 'Lunar Mining,' what do you think of? What images or ideas come to mind? Let's paint a picture together of what this might look like.

PAUSE - ASK STUDENTS TO ANSWER

Slide 11: How do you think lunar mining operations differ from mining practices on Earth? *(Discussion Question)*

How do you think mining on the Moon would be different from mining on Earth?

PAUSE - ASK STUDENTS TO ANSWER

What unique challenges might we face because of the Moon's environment? Let's get creative and think about the unique hurdles and opportunities the Moon presents.

PAUSE - ASK STUDENTS TO ANSWER

Slide 12: How can we preserve the lunar environment while mining for resources? (*Discussion Question*)

How can we ensure that we protect the Moon's environment while extracting resources? What innovative technologies or gadgets could we use? Could AI or robots help us?

PAUSE - ASK STUDENTS TO ANSWER

How about any guidelines, rules or laws we should use to make sure we aren't destroying the moon? Let's brainstorm ways to make lunar mining sustainable.

PAUSE - ASK STUDENTS TO ANSWER

Slide 13: What ethical considerations are there when planning lunar mining activities? (*Discussion Question*)

Ethical issues involve questions about what is right and wrong, and making sure our actions do not harm others or the environment.

What ethical issues should we consider when planning lunar mining? Think about environmental stewardship, social justice, and responsible governance. (Stewardship means taking care of something responsibly, like being a guardian for the environment.)

PAUSE - ASK STUDENTS TO ANSWER

How can we make sure our actions are ethical and responsible?

PAUSE - ASK STUDENTS TO ANSWER

Slide 14: How could lunar mining contribute to advancements in technology and sustainability efforts? (*Discussion Question*)

How can lunar mining drive technological advancements and support sustainability both on the Moon and Earth? Let's discuss how overcoming the challenges of lunar mining could lead to new technologies and solutions! This is some exciting stuff!

PAUSE - ASK STUDENTS TO ANSWER

Awesome job everyone! Before we start jump into part 2 of our mission, let's watch this video that discusses what space mining is! If there is anything that interests you while watching, write it down - It may be a great topic for your research!

<https://www.youtube.com/watch?v=HZPy8hH86LY>



Slide 15: Part 2: Research

Now it's time for Part 2 of our project! Part 2 is the research phase. You'll become experts on a specific aspect of lunar mining. Let's talk about how to choose your topic and start gathering information.

Slide 16: Research Options

You can choose a lunar mining research topic that interests you from our list or come up with your own idea. Think about what excites you most about space exploration and lunar mining.

Slide 17/18: Lunar Mining Research Topics

Here are some possible research topics related to space exploration and lunar mining. Take a look and choose one that you want to explore further. As you can see, the list is huge! Some options to research are: the types of lunar resources, mining methods, sustainable mining practices, mining technology, or creating settlements on the moon!

If you have your own idea on what you'd like to research, that's great too!

Slide 19: What existing information on your topic is there? What needs to be further explored? (Guiding Research Question)

As you start your research, consider what information already exists on your topic and what areas need more exploration. Some topics may have lots of information, while others may be more speculative. If that's the case, you may need to put on our Youth Innovator thinking caps to find as much information as you can!

Slide 20: Provide an overview of key concepts, theories, or past research relevant to your topic. (Guiding Research Question)

Here are some guiding questions to keep in mind to help you in this part 2 of your cosmic mission!

In your research, make sure to cover key concepts, theories, and past research related to your topic. This will be important when you start designing your diorama and presenting your findings.

Slide 21: Are there key concepts that are new to you? (Guiding Research Question)

Reflect on any new concepts you come across in your research. Let me know what these concepts are, because they might be areas we need to explore further in future projects or lessons!

Slide 22: What conclusions can you draw from your research? (*Guiding Research Question*)

Once you've gathered your information, think about the conclusions you can draw. Make sure you complete your research before moving on to the design phase of the mission.

Slide 23: Part 3: Diorama Design

Alright, Youth Innovators! It's time to get hands-on and design your very own lunar diorama. Imagine you're creating a miniature Moon base! Your mission is to use all the cool research you've done to build a realistic and super creative model of lunar mining. Ready to turn your ideas into a 3D masterpiece? Let's do this!

Slide 24/25: Diorama Design: Step 1 Choose a Focus

Step one: pick your lunar adventure! What part of lunar mining excites you the most? Do you want to show a bustling mining operation with robots and drills? Or maybe a futuristic lunar habitat where astronauts live and work? How about the Moon's geology, with all its craters and hidden treasures? Or showcase some cutting-edge technologies that could change the game. Decide what you want to spotlight and get ready to make it shine!

Slide 26/27/28: Diorama Design: Step 2 Planning

Next up, it's time to plan your epic diorama! Gather all the images, videos, and articles you can find to inspire your design. Think about how you can weave in sustainable features—maybe solar panels, recycling systems, or eco-friendly habitats. Make a list of all the materials you'll need. Remember, the more detailed your plan, the cooler your diorama will be. Let's get those creative juices flowing!

Slide 29/30: Diorama Design: Step 3 Build!

Now for the fun part—building your lunar world! Grab your materials and start creating. Imagine the lunar landscape with craters, rocks, and dusty soil. Think about the mining equipment and habitats you need to add. Unleash your creativity! Ready, set, build!

Slide 31: Diorama Design: Step 3 Build!

Don't forget the details! Tiny craters, bumpy rocks, and even lunar soil—make your Moon scene come to life. Add miniature mining equipment, vehicles, and buildings to show how a sustainable lunar mining operation would work. Let's see those mini-Moon bases come together!

Slide 32: Diorama Design: Step 3 Build!

Keep up the great work! Add any final touches to your diorama. Think about the sustainable features we've talked about—how can you make them stand out? This is your chance to showcase your vision of a sustainable, innovative lunar future. Almost there!

Slide 33: Part 4: Showcase and Reflection

Fantastic job, everyone! Now it's time to share your amazing creations with the class. We'll showcase our dioramas and reflect on what we've learned about sustainable lunar mining. Let's see those masterpieces and hear about your journeys!

Slide 34: Showcase and Reflection (What to highlight in your showcase)

When it's your turn to present, tell us what aspect of lunar mining you focused on. Give us an overview of your design—what inspired you, and what story does your diorama tell? We can't wait to see your lunar visions!

Slide 35: Showcase and Reflection (What to highlight in your showcase)

Describe the cool structures and features you included. What materials did you use? How does each element fit into your sustainable lunar mining theme? Walk us through your creative process!

Slide 36: Showcase and Reflection (What to highlight in your showcase)

Highlight the sustainability features you incorporated. Did you include solar panels, recycling systems, or eco-friendly habitats? Show us how your diorama represents the best practices for a green future on the Moon. Sustainability rocks!

Slide 37: Showcase and Reflection (What to highlight in your showcase)

Did you come up with any innovative technologies in your diorama? Tell us about the gadgets and gizmos that could make lunar mining more efficient and eco-friendly. Let's see those futuristic ideas in action!

Slide 38: Showcase and Reflection (What to highlight in your showcase)

Finally, share your vision for the future of lunar exploration and mining. How do you think our efforts on the Moon could lead to new tech and sustainability breakthroughs on Earth? Let's dream big and discuss how we can turn these challenges into opportunities for a better future!

Bravo, space explorers! Your creativity and hard work have brought the concept of sustainable lunar mining to life. Let's keep thinking about how we can innovate and protect our planet, both here on Earth and beyond. Great job, everyone!

Additional YouTube Resources:

Canadian Mining:

<https://www.youtube.com/watch?v=N3GeBZq8AJU>

Coal Mining's Environmental Impact:

<https://www.youtube.com/watch?v=ynN39sfqT8w>

What happened to Space Mining?:

<https://www.youtube.com/watch?v=HZPy8hH86LY>

How Space Factories are Becoming a Reality:

https://www.youtube.com/watch?v=OZJv_YGpjeI

How Space Manufacturing will Change Everything!:

https://www.youtube.com/watch?v=yp_Xz6r2Aso

How Tourism will Change Space Travel:

<https://www.youtube.com/watch?v=JVhJcXBTI3Y>

Building in Space:

https://www.youtube.com/watch?v=xP4_Q7illb0