Classroom Activity: Creating a Sustainable and Self-Sufficient Space Colony

Introduction (10 minutes)

Welcome to our exciting journey to create a sustainable and self-sufficient space colony! In this lesson, we will explore the fascinating world of space exploration and learn about the importance of resource management and recycling systems.

By the end of this lesson, you will be able to explain the basic principles of sustainability, describe the challenges of resource management in space, and design a simple model of a sustainable space colony.

Section 1: Understanding Sustainability (20 minutes)

Foundation: What is sustainability? Sustainability means using resources in a way that doesn't harm the environment.

Core:

Why is sustainability important in space exploration? Sustainability is important in space exploration because resources are limited and we need to make sure we have enough for the long term.

Extension: Research and write about the importance of sustainability in space exploration, including examples and case studies.

Section 2: Resource Management (25 minutes)

Foundation: What are the basic needs of humans in space? Humans need food, water, air, and shelter to survive in space.

Core:

How can we manage resources in a space colony? We can manage resources by recycling, conserving, and using renewable energy sources.

Extension: Design a system for managing resources in a space colony, including calculations and justifications for your design choices.

Resource	Quantity	Source

Section 3: Recycling Systems (20 minutes)

Foundation: What is recycling? Recycling is the process of converting waste materials into new products to prevent waste and conserve resources.

Core:

How can recycling help in a space colony? Recycling can help by reducing waste, conserving resources, and minimizing the need for new materials.

Extension: Design a recycling system for a space colony, including calculations and justifications for your design choices.

Section 4: Sustainable Design (30 minutes)

Foundation: Design a simple space colony using recycled materials, considering the basic needs of humans in space.

Core:

Design a more complex space colony, including calculations and justifications for your design choices.

Extension: Research and propose innovative designs for sustainable space colonies, including calculations and justifications for your design choices.

[Space for design work]

Conclusion (10 minutes)

Individual Reflection:

1. What was the most surprising thing you learned today?
2. How will this learning change your actions in the future?

3. What questions do you still have about environmental impact?

Assessment (20 minutes)

Foundation: Complete a quiz to assess understanding of basic concepts.

Core:

Complete a design project to assess understanding of resource management and recycling systems.

Extension: Complete a research project to assess understanding of sustainable design and innovation.

Extension Activities (30 minutes)

Design a Closed-Loop Life Support System: Research and propose a system for recycling air, water, and waste in a space colony.

Core:

Create a 3D Model of a Sustainable Space Colony: Design and build a model of a space colony, including recycling systems and renewable energy sources.

Extension: Write a Science Fiction Story: Write a story about a sustainable space colony, including details about the colony's resource management and recycling systems.

[Space for extension work]