**Design Thinking Challenges for each of the 17 Sustainable Development Goals (SDGs): Project-Based Learning**

Design Thinking Challenge for SDG 1: No Poverty

Scenario 1: Design a sustainable business model to empower unemployed individuals in an urban community and lift them out of poverty.

Scenario 2: Imagine you are working with a rural community that faces high levels of poverty and unemployment. Design a sustainable microenterprise model that provides income-generating opportunities for community members and helps alleviate poverty.

STEM Career Connection: Social Entrepreneur - Apply entrepreneurial skills and STEM knowledge to create sustainable business models that address poverty and provide economic opportunities.

* Whiteboards or flip charts: Used for brainstorming ideas, organizing thoughts, and visualizing solutions.
* Markers: Used for writing and drawing on whiteboards or flip charts.
* Sticky notes: Used for capturing ideas and organizing them during brainstorming sessions.
* Prototyping materials: Used to create physical prototypes of solutions, such as using paper, cardboard, and craft supplies.
* Presentation materials: Used for presenting and sharing the developed solutions with the group.

Design Thinking Challenge for SDG 2: Zero Hunger

Scenario 1: Develop an innovative solution to address food insecurity in a rural community by utilizing local resources and promoting sustainable farming practices.

Scenario 2: You are tasked with addressing food insecurity in an urban neighborhood with limited access to fresh produce. Design a community garden program that promotes urban agriculture, improves food security, and educates residents about sustainable farming practices.

Scenario 3; Design and create vertical gardens that maximize space and optimize food production, addressing issues of food security and sustainable agriculture.

STEM Career Connection: Agricultural Engineer - Apply scientific and technological principles to improve agricultural practices, develop efficient farming systems, and promote sustainable food production.

* Seeds, soil, gardening tools: Used for hands-on activities related to sustainable agriculture, such as planting seeds and tending to a small garden.
* Prototyping materials: Used to create models or visual representations of innovative solutions to address food insecurity.

Design Thinking Challenge for SDG 3: Good Health and Well-being

Scenario 1: Design a mobile health application that provides accessible and personalized healthcare information to remote communities with limited healthcare services.

Scenario 2: In a remote region with limited access to healthcare services, design a mobile health clinic that provides essential medical services, health education, and preventive care to underserved communities.

Scenario 3: Research and develop innovative health solutions, such as apps, wearable devices, or educational materials, to promote good health and well-being.

STEM Career Connection: Biomedical Engineer - Combine engineering principles with medical and biological sciences to develop innovative medical devices, technologies, and healthcare solutions.

* Post-it notes: Used for capturing ideas, observations, or research findings during discussions and brainstorming sessions.
* Markers: Used for writing and drawing on post-it notes or other surfaces.
* Research materials (laptops or tablets): Used to gather information and research on healthcare practices or innovative health solutions.
* Prototyping materials: Used to create visual representations or mock-ups of proposed health innovations.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 4: Quality Education

Scenario 1: Create an engaging and inclusive learning environment for a school in a low-income neighborhood to ensure quality education for all students.

Scenario 2: A disadvantaged school lacks resources and struggles to engage students effectively. Design an interactive learning platform that promotes student engagement, personalized learning, and access to quality educational content.

STEM Career Connection: STEM Educator - Specialize in teaching science, technology, engineering, and mathematics subjects, integrating innovative teaching methods and technologies to enhance quality education.

* Whiteboards or flip charts: Used for brainstorming ideas, organizing thoughts, and visualizing innovative approaches to quality education.
* Markers: Used for writing and drawing on whiteboards or flip charts.
* Post-it notes: Used for capturing ideas, observations, or specific needs in the education context.
* Art supplies: Used for creative activities or visual representations of engaging learning environments.
* Prototyping materials: Used to create physical prototypes or models of innovative teaching tools or learning resources.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 5: Gender Equality

Scenario 1: Develop a mentorship program that promotes equal opportunities and supports the career development of young women in male-dominated STEM fields.

Scenario 2: In a male-dominated industry, develop strategies to increase female representation and gender equality in leadership positions, promoting diversity and equal opportunities.

STEM Career Connection: Computer Scientist - Specialize in computer science and use technology to address gender biases, develop inclusive software, and promote gender equality in the tech industry.

* Whiteboards or flip charts: Used for group discussions, idea generation, and visualizing gender equality challenges and solutions.
* Markers: Used for writing and drawing on whiteboards or flip charts.
* Post-it notes: Used for capturing ideas, insights, and actions related to promoting gender equality.
* Art supplies: Used for creative activities or visual representations that explore gender biases and promote inclusivity.
* Prototyping materials: Used to create physical prototypes or mock-ups of initiatives promoting gender equality.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 6: Clean Water and Sanitation

Scenario: Design a portable water purification system that can be easily deployed in disaster-stricken areas to provide clean drinking water.

STEM Career Connection: Environmental Engineer - Apply engineering principles to design and implement innovative solutions for clean water and sanitation systems.

* Water filtration systems (if available): Used for hands-on activities to understand water filtration concepts and explore innovative solutions.
* Water samples: Used for testing and evaluating the effectiveness of filtration prototypes.
* Testing kits: Used to analyze water quality and assess the success of filtration methods.
* Prototyping materials: Used to build and test different filtration system designs.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 7: Affordable and Clean Energy

Scenario 1: Create an energy-efficient and affordable housing solution that incorporates renewable energy technologies to reduce energy consumption.

Scenario 2: You are tasked with designing an off-grid renewable energy solution for a remote village with limited access to electricity. Develop an affordable and sustainable energy system that meets the community's needs.

Scenario 3: Design and prototype solar-powered devices, such as solar cookers or solar chargers, to promote affordable and clean energy solutions.

STEM Career Connection: Renewable Energy Engineer - Develop and implement sustainable energy solutions, such as solar or wind power systems, to promote affordable and clean energy access.

* Solar panels or solar-powered devices (if available): Used for exploring solar energy concepts and incorporating them into innovative solutions.
* Batteries: Used to store and demonstrate the usage of solar energy.
* Electronics components: Used for building and testing prototype devices.
* Prototyping materials: Used to create physical representations or models of solar-powered devices.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 8: Decent Work and Economic Growth

Scenario 1: Design a social entrepreneurship initiative that promotes sustainable economic growth and creates employment opportunities for marginalized communities.

Scenario 2: Address youth unemployment in an urban area by creating an entrepreneurship program that provides mentorship, training, and access to resources for young aspiring entrepreneurs.

STEM Career Connection: Data Analyst - Analyze and interpret large datasets to inform decision-making and promote economic growth and job creation.

* Whiteboards or flip charts: Used for brainstorming ideas, organizing thoughts, and visualizing solutions.
* Markers: Used for writing and drawing on whiteboards or flip charts.
* Post-it notes: Used for capturing ideas and organizing them during discussions.
* Prototyping materials: Used to create physical prototypes or mock-ups of sustainable business models or employment initiatives.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 9: Industry, Innovation, and Infrastructure

Scenario 1: Develop a smart transportation system that improves connectivity and accessibility while minimizing environmental impact in a growing urban area.

Scenario 2: You have been assigned to design an innovative transportation system that improves connectivity in a congested city, reduces carbon emissions, and enhances overall urban mobility.

Scenario 3: Collaborate to design sustainable cities and communities, considering aspects such as transportation systems, renewable energy integration, and resilient infrastructure.

STEM Career Connection: Industrial Engineer - Optimize systems and processes in industries, promoting innovation and efficient infrastructure development.

* Whiteboards or flip charts: Used for brainstorming ideas, organizing thoughts, and visualizing solutions.
* Markers: Used for writing and drawing on whiteboards or flip charts.
* Post-it notes: Used for capturing ideas and organizing them during discussions.
* Prototyping materials: Used to create physical prototypes or mock-ups of innovative technologies or infrastructure solutions.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 10: Reduced Inequalities

Scenario: Create an inclusive community center that provides equal access to essential services, resources, and support for marginalized groups.

STEM Career Connection: Social Scientist - Conduct research and implement initiatives to address social inequalities and promote inclusive societies.

* Whiteboards or flip charts: Used for group discussions, idea generation, and visualizing solutions.
* Markers: Used for writing and drawing on whiteboards or flip charts.
* Post-it notes: Used for capturing ideas, observations, or specific needs related to reducing inequalities.
* Art supplies: Used for creative activities or visual representations that address and promote inclusivity.
* Prototyping materials: Used to create physical prototypes or models of initiatives promoting equality and reducing inequalities.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 11: Sustainable Cities and Communities

Scenario 1: Redesign a city neighborhood to prioritize green spaces, sustainable transportation, and affordable housing, creating a resilient and livable community.

Scenario 2: Imagine you are redesigning a neighborhood to make it more sustainable and livable. Develop a plan that integrates green spaces, promotes walkability, and enhances the overall quality of life for residents.

STEM Career Connection: Urban Planner - Design and plan sustainable cities and communities, considering environmental, social, and economic factors.

* Whiteboards or flip charts: Used for brainstorming ideas, organizing thoughts, and visualizing sustainable city solutions.
* Markers: Used for writing and drawing on whiteboards or flip charts.
* Post-it notes: Used for capturing ideas, observations, or specific needs related to sustainable cities and communities.
* Art supplies: Used for creative activities or visual representations of sustainable urban design ideas.
* Prototyping materials: Used to create physical prototypes or models of sustainable infrastructure or community projects.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 12: Responsible Consumption and Production

Scenario 1: Develop a sustainable packaging solution for a consumer product that minimizes waste, uses eco-friendly materials, and encourages recycling.

Scenario 2: Design a waste management system that encourages recycling, reduces waste generation, and promotes sustainable consumption patterns in a large urban area.

Scenario 3: Repurpose discarded materials to create new products, promoting responsible consumption and production patterns.

STEM Career Connection: Environmental Scientist - Study and develop strategies for responsible resource consumption and sustainable production methods.

* Whiteboards or flip charts: Used for brainstorming ideas, organizing thoughts, and visualizing solutions.
* Markers: Used for writing and drawing on whiteboards or flip charts.
* Post-it notes: Used for capturing ideas, observations, or specific needs related to responsible consumption and production.
* Recyclable materials: Used for hands-on activities or prototyping sustainable product designs.
* Prototyping materials: Used to create physical prototypes or models of eco-friendly packaging or sustainable products.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 13: Climate Action

Scenario: Create an awareness campaign that inspires individuals and communities to take climate action and adopt sustainable practices in their daily lives.

STEM Career Connection: Climate Scientist - Research and develop solutions to mitigate climate change impacts and promote climate resilience.

* Whiteboards or flip charts: Used for brainstorming ideas, organizing thoughts, and visualizing solutions.
* Markers: Used for writing and drawing on whiteboards or flip charts.
* Post-it notes: Used for capturing ideas, observations, or specific needs related to climate action.
* Research materials (laptops or tablets): Used to gather information and research on climate change mitigation and adaptation strategies.
* Prototyping materials: Used to create physical prototypes or models of climate-friendly innovations or awareness campaigns.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 14: Life Below Water

Scenario 1: Design a marine conservation initiative that protects endangered species and promotes sustainable fishing practices in a coastal community.

Scenario 2: Create a marine conservation program that protects vulnerable coastal ecosystems, preserves biodiversity, and raises awareness about the importance of marine conservation among local communities.

STEM Career Connection: Marine Biologist - Study and protect marine ecosystems, working towards the conservation and sustainable use of ocean resources.

* Whiteboards or flip charts: Used for group discussions, idea generation, and visualizing solutions.
* Markers: Used for writing and drawing on whiteboards or flip charts.
* Post-it notes: Used for capturing ideas, observations, or specific needs related to preserving marine life and ecosystems.
* Art supplies: Used for creative activities or visual representations that promote marine conservation.
* Prototyping materials: Used to create physical prototypes or models of sustainable fishing practices or marine protection initiatives.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 15: Life on Land

Scenario 1: Develop a reforestation program that restores degraded land, preserves biodiversity, and supports the livelihoods of local communities.

Scenario 2: Address deforestation and habitat loss in a specific region by designing a reforestation program that involves local communities, ensures sustainable land use, and restores biodiversity.

Scenario 3: Explore local ecosystems, identify plant and animal species, and propose conservation strategies to protect biodiversity and promote sustainable land use.

STEM Career Connection: Conservation Scientist - Work towards the preservation and sustainable management of terrestrial ecosystems and biodiversity.

* Whiteboards or flip charts: Used for brainstorming ideas, organizing thoughts, and visualizing solutions.
* Markers: Used for writing and drawing on whiteboards or flip charts.
* Post-it notes: Used for capturing ideas, observations, or specific needs related to land conservation and biodiversity preservation.
* Art supplies: Used for creative activities or visual representations that highlight the importance of land conservation.
* Prototyping materials: Used to create physical prototypes or models of reforestation initiatives or sustainable land management practices.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 16: Peace, Justice, and Strong Institutions

Scenario 1: Design a conflict resolution platform that facilitates dialogue and mediation to resolve disputes and promote peace in a divided community.

Scenario 2: Develop an initiative that promotes peacebuilding and conflict resolution in a post-conflict community, fostering social cohesion and ensuring access to justice for all community members.

STEM Career Connection: Forensic Scientist - Apply scientific methods to investigate and provide evidence for legal cases, supporting justice and strong institutions.

* Whiteboards or flip charts: Used for group discussions, idea generation, and visualizing solutions.
* Markers: Used for writing and drawing on whiteboards or flip charts.
* Post-it notes: Used for capturing ideas, observations, or specific needs related to peacebuilding and justice.
* Prototyping materials: Used to create physical prototypes or models of initiatives promoting peace, conflict resolution, or access to justice.
* Presentation materials: Used for sharing and presenting the developed solutions.

Design Thinking Challenge for SDG 17: Partnerships for the Goals

Scenario: Create a collaborative platform that connects businesses, NGOs, and government agencies to promote sustainable development projects and partnerships.

STEM Career Connection: Project Manager - Coordinate and lead interdisciplinary teams, fostering partnerships and collaboration for sustainable development initiatives.

* Whiteboards or flip charts: Used for group discussions, idea generation, and visualizing solutions.
* Markers: Used for writing and drawing on whiteboards or flip charts.
* Post-it notes: Used for capturing ideas, observations, or specific needs related to fostering partnerships and collaboration.
* Prototyping materials: Used to create physical prototypes or models of initiatives that encourage partnerships for sustainable development.
* Presentation materials: Used for sharing and presenting the developed solutions.