Maths Australian Upper Level Primary - Years 3-6 Curriculum For Sustainability Complementing the Australian Framework

General Capabilities (Integrated across all areas):

- **Literacy**: Reading, writing, speaking, and listening skills across subjects.
- **Numeracy**: Application of mathematical concepts and problem-solving.
- **ICT Capability**: Use of technology in learning and problem-solving.
- **Critical and Creative Thinking**: Ability to analyze, reason, and create solutions.
- **Personal and Social Capability**: Self-management, social awareness, and interpersonal skills.
- **Ethical Understanding**: Ability to make decisions based on ethics and social responsibility.
- **Intercultural Understanding**: Awareness of and respect for cultural differences.

Cross-Curriculum Priorities:

- **Aboriginal and Torres Strait Islander Histories and Cultures**: Recognizing the cultural significance and history of Australia's Indigenous peoples.
- **Asia and Australia's Engagement with Asia**: Exploring Asia's history, cultures, and connections with Australia.
- **Sustainability**: Encouraging responsible stewardship of resources and environmental awareness.

English and Langauages	Mathematics	Science	Humanities and Social Sciences (HASS)	Health and Physical Education (HPE)	The Arts	Technologies

English	Mathematics	Science	Humanities and Social Sciences (HASS)	Health and Physical Education (HPE)	The Arts	Technologies
Content Areas: **Language**: Focus on the structure of language, including grammar, spelling, punctuation, and vocabulary. **Literature**: Students explore a range of texts, including stories, poems, and plays. They analyze characters, themes, and context. **Literacy**: Focus on reading and writing skills, listening, speaking, and viewing. Students are encouraged	**Content Areas:** **Number and Algebra**: Students work with whole numbers, fractions, decimals, percentages, and introduce simple algebraic concepts. **Measurement and Geometry**: Understanding units of measurement, time, volume, angles, and basic geometry. **Statistics and Probability**: Collecting data, understanding chance and	**Content Areas:** **Biological Sciences**: Study of living things, including plants, animals, ecosystems, and human biology. **Chemical Sciences**: Understanding the properties of materials and the reactions that occur between different substances. **Physical Sciences**: Introduction to concepts of energy, force, motion, and simple machines. **Earth and Space Sciences**:	**Content Areas:** **History**: Focus on historical events, time periods, and the development of societies. **Geography**: Study of places and spaces, understanding human-environment interactions, and geographical features.	**Content Areas:** **Personal, Social, and Community Health**: Topics include healthy lifestyle choices, mental health, safety, and personal well-being. **Movement and Physical Activity**: Physical exercise, sports,	**Content Areas:** **Dance**: Creating and performing dances, exploring movement, rhythm, and expression. **Drama**: Acting, storytelling, and performing to express ideas, feelings, and stories. **Music**: Understanding musical concepts, playing instruments,	**Content Areas:** **Design and Technologies**: Introduction to designing and making products using digital and non-digital materials. This includes developing solutions for problems and understanding processes of designing, planning, and production. **Digital Technologies**: Focus on computational thinking, understanding

to communicate effectively in various situations. **Key Goals**: Develop comprehension skills (listening, reading, viewing). Increase fluency in writing. Build vocabulary and grammar proficiency. Understand and analyze literary and non-literary texts. **Languages** **Content Areas:** Focus on the study of languages other than	probability, interpreting and analyzing statistical information. **Key Goals**: Improve numeracy and problem-solving skills. Apply mathematical understanding in practical and real-world contexts. Develop logical thinking and reasoning in mathematical contexts.	Understanding the Earth's systems, weather, climate, and the solar system. **Key Goals**: Develop scientific inquiry skills. Understand natural systems and the environment. Encourage curiosity and exploration through experiments and observations.	**Civics and Citizenship**: Understanding the rights and responsibilities of citizens in society, the function of governments, and the democratic process. **Economics and Business**: Introduction to economic concepts such as needs, wants, resources, and the economy. **Key Goals**: Develop critical thinking about	fitness, and developing motor skills. **Key Goals**: Promote physical fitness and health. Teach teamwork, collaboration, and social skills through physical activity. Encourage well-being and the development of healthy habits.	singing, and composing. **Visual Arts**: Exploring various forms of art such as drawing, painting, sculpture, and digital media. **Key Goals**: Foster creativity and self-expression. Develop appreciation and skills in different forms of art. Enhance cultural understanding through	algorithms, coding, and digital systems. **Key Goals**: Foster problem-solving skills and innovation. Encourage students to use technology creatively. Develop practical skills in digital and non-digital fields.

English (e.g., French, Japanese, Mandarin, etc.). Learn about language structure, vocabulary, and grammar, as well as cultural understanding related to the language studied. **Key Goals**: Develop communication skills in a second language. Enhance cultural awareness and understanding.			the past and present. Build an understanding of geography, social studies, and citizenship. Encourage decision-making based on historical knowledge and current events.		artistic exploration.	

Build confidence in speaking, listening, reading, and writing in a new language.						

The Sustainability Curriculum Headings

Understanding Sustainability (SUS1)	Environmental Awareness (SUS2)	Environmental Stewardship (SUS3)	Waste Management (SUS4)	Energy Conservation (SUS5)	Biodiversity and Ecosystems (SUS6)
Climate Change and Adaptation (SUS7)	Food and Agriculture (SUS8)	Water Conservation (SUS9)	Sustainable Transport and Urban Planning (SUS10)	Citizenship / Global Responsibility and Sustainable Development (SUS11)	Outdoor Learning and Connection to Nature (SUS12)

Understanding Sustainability (SUS1)

1. Number and Algebra

Content Area: Whole Numbers, Fractions, Decimals, Percentages, and Algebra

- **Objective 1.1**: Students will apply whole numbers and fractions to calculate resource consumption and waste generation in different sectors (e.g., households, schools, businesses), helping to identify opportunities for sustainable practices aligned with SDG 12 (Responsible Consumption and Production) and SDG 6 (Clean Water and Sanitation).
  Example: A family uses 500 liters of water per day. If 1/4 of that water is used for cooking, how many liters of water are used for cooking each day?
- **Objective 1.2**: Students will use percentages to determine the reduction in energy consumption or waste generation resulting from the adoption of sustainability initiatives, supporting SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action).
  Example: A school reduces its energy consumption by 20%. If the school initially used 1000 kWh of electricity per month, how much energy is saved after the reduction?
- **Objective 1.3**: Students will use decimals to calculate the proportion of renewable energy used in a sustainable energy system, supporting SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action).
  Example: A community uses 75% renewable energy and 25% non-renewable energy. If the community consumes 1200 kWh of energy per month, how much of that energy is renewable?
- **Objective 1.4**: Students will introduce simple algebraic concepts to model sustainable practices, such as calculating the reduction in carbon emissions based on resource use or conservation actions, contributing to SDG 13 (Climate Action).
  Example: If each person in a city reduces their carbon footprint by yy tons of CO_2 per year, and there are xxpeople in the city, the total reduction in carbon emissions is modeled by the equation $y=0.5xy=0.5x$. If there are 2000 people, calculate the total carbon savings.

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2. Measurement and Geometry

Content Area: Units of Measurement, Time, Volume, Angles, and Basic Geometry

- **Objective 2.1**: Students will calculate the volume of water used for irrigation, domestic consumption, or industrial purposes,

and explore how water-saving practices contribute to sustainability, supporting SDG 6 (Clean Water and Sanitation).
Example: A farm uses 400 liters of water per hour for irrigation. How much water is used over 5 hours of irrigation?

- **Objective 2.2**: Students will measure and calculate the area of green spaces, parks, or urban gardens and understand how these areas contribute to biodiversity and sustainability efforts, supporting SDG 15 (Life on Land).
  Example: A community garden is 50 meters long and 20 meters wide. What is the total area of the garden in square meters?
- **Objective 2.3**: Students will apply geometric concepts to calculate the efficiency of solar panel installations or wind turbines in generating renewable energy, supporting SDG 7 (Affordable and Clean Energy).
  Example: A solar panel has an area of 2 square meters and can generate 500 watts per square meter. How much power does the solar panel generate in total?
- **Objective 2.4**: Students will calculate the time required to achieve sustainability goals, such as reducing carbon emissions or increasing energy efficiency, based on current rates of progress, contributing to SDG 13 (Climate Action).
  Example: If a school reduces its electricity usage by 50 kWh per week, how many weeks will it take for the school to save 1000 kWh?

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3. Statistics and Probability

Content Area: Collecting Data, Understanding Chance and Probability, Interpreting and Analyzing Statistical Information

- **Objective 3.1**: Students will collect and analyze data on waste reduction, energy consumption, or water usage in different sectors (e.g., homes, schools, businesses), using statistical methods to assess sustainability progress, supporting SDG 12 (Responsible Consumption and Production).
  Example: Collect data on the energy consumption of three different households over a month. Create a bar graph to compare the energy usage and analyze which household has the lowest energy consumption.
- **Objective 3.2**: Students will use probability to assess the likelihood of achieving sustainability goals, such as reducing waste or conserving energy, based on current actions and efforts, supporting SDG 13 (Climate Action).
  Example: If there is a 70% chance that a community will meet its recycling target this year, what is the probability that it will not meet the target?
- **Objective 3.3**: Students will use statistical analysis to evaluate the success of sustainability programs, such as renewable energy adoption or waste management systems, interpreting data to suggest improvements or modifications, contributing to SDG 7 (Affordable and Clean Energy) and SDG 12 (Responsible Consumption and Production).
  Example: After implementing a recycling program, a community reduces waste by 15%. Calculate the amount of waste reduced if the community initially produced 2000 kg of waste per month.
- **Objective 3.4**: Students will create and interpret statistical data on biodiversity in local ecosystems, such as the number of plant and animal species, and analyze trends in biodiversity based on environmental factors, supporting SDG 15 (Life on

Land).
Example: In a forest ecosystem, the number of species recorded over five years is as follows: 80, 85, 90, 95, 100 species. Calculate the average increase in species each year.

Key Goals for All Objectives:

- **Improve Numeracy and Problem-Solving Skills**: Develop students' ability to apply mathematical concepts to real-world sustainability scenarios, such as calculating resource use, energy savings, waste reduction, and biodiversity conservation.
- **Apply Mathematical Understanding in Practical and Real-World Contexts**: Encourage students to use mathematics to evaluate the impact of sustainability practices, assess environmental changes, and track progress toward achieving global sustainability goals (SDGs).
- **Develop Logical Thinking and Reasoning**: Promote logical reasoning by engaging students in analyzing environmental data, identifying trends, and making evidence-based decisions about sustainability practices.

Environmental Awareness

(SUS2)

1. Number and Algebra

Content Area: Whole Numbers, Fractions, Decimals, Percentages, and Algebra

- **Objective 1.1**: Students will apply whole numbers and fractions to calculate the environmental impact of daily activities, such as water consumption, waste production, or energy use, supporting SDG 12 (Responsible Consumption and Production) and SDG 6 (Clean Water and Sanitation).
  Example: If a household uses 250 liters of water per day, and 1/5 of that water is used for washing clothes, how much water is used for washing clothes each day?

- **Objective 1.2**: Students will use percentages to calculate how much energy can be saved through different environmental initiatives, such as reducing electricity usage or switching to energy-efficient appliances, contributing to SDG 7 (Affordable and Clean Energy).
  Example: A household reduces its energy use by 25%. If they initially used 400 kWh per month, how much energy do they save after the reduction?
- **Objective 1.3**: Students will use decimals and percentages to determine the amount of waste that can be diverted from landfills through recycling and composting, supporting SDG 12 and SDG 13 (Climate Action).
  Example: If 40% of the waste produced by a school is recyclable and the school generates 1500 kg of waste per month, how much waste is recyclable?
- **Objective 1.4**: Students will introduce simple algebraic concepts to model the relationship between environmental actions and their impact, such as calculating the reduction in carbon emissions based on recycling efforts or transportation choices.
  Example: The equation $y=0.25xy=0.25x$ models the reduction in CO_2 emissions (in tons) if 25% of a community's waste is recycled. If xx is the total amount of waste (in tons), calculate the CO_2 emissions saved if the community recycles 400 tons of waste.

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2. Measurement and Geometry

Content Area: Units of Measurement, Time, Volume, Angles, and Basic Geometry

- **Objective 2.1**: Students will calculate the volume of water required for irrigation or the amount of energy needed to power homes and schools using renewable energy, understanding its impact on water conservation and energy efficiency. This links to SDG 6 (Clean Water and Sanitation) and SDG 7 (Affordable and Clean Energy).
  Example: A rainwater tank holds 3 cubic meters of water. How many liters does it hold? (1 cubic meter = 1000 liters)
- **Objective 2.2**: Students will measure the energy savings achieved by using energy-efficient appliances in a home or school, calculating the reduction in energy consumption over time, contributing to SDG 7 and SDG 12.
  Example: If an LED bulb uses 8 watts and an incandescent bulb uses 60 watts, calculate how much energy is saved by replacing 10 incandescent bulbs with LED bulbs over 6 hours of use per day.
- **Objective 2.3**: Students will apply basic geometry concepts to calculate the size of green spaces, parks, or biodiversity reserves that are essential for preserving ecosystems, supporting SDG 15 (Life on Land) and SDG 13 (Climate Action).
  Example: A park is rectangular, measuring 100 meters by 200 meters. What is the total area of the park in square meters?
- **Objective 2.4**: Students will calculate the area of land required for planting trees or creating wildlife corridors to support biodiversity, using appropriate units of measurement, contributing to SDG 15 (Life on Land).
  Example: If each tree requires 3 square meters of land for planting, how many trees can be planted in a park with an area of

600 square meters?

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3. Statistics and Probability

Content Area: Collecting Data, Understanding Chance and Probability, Interpreting and Analyzing Statistical Information

- **Objective 3.1**: Students will collect data on environmental factors, such as temperature changes, air quality, or species diversity, and use statistical methods to analyze the data and determine trends, helping to promote environmental awareness, linked to SDG 13 (Climate Action) and SDG 15 (Life on Land).
  Example: Collect data on the number of species in a local park over a month and create a line graph to analyze trends in species population over time. What do the data trends suggest about the health of the ecosystem?
- **Objective 3.2**: Students will use probability to assess the likelihood of certain environmental events occurring, such as the chance of rain or extreme weather events affecting biodiversity, supporting SDG 13 (Climate Action).
  Example: If there is a 60% chance of a storm on a given day, what is the probability that a storm will not occur?
- **Objective 3.3**: Students will calculate the effectiveness of conservation efforts in a community or region, analyzing the success rate of different programs based on collected data, supporting SDG 15 (Life on Land).
  Example: If a reforestation program plants 500 trees and 80% of them survive, how many trees remain after 1 year?
- **Objective 3.4**: Students will create and interpret data on waste reduction or resource conservation efforts, using statistical analysis to evaluate the impact of these actions on the environment, supporting SDG 12 (Responsible Consumption and Production).
  Example: Survey a class to gather data on how many people participate in recycling. Display the data in a pie chart to show what percentage of students participate in recycling.

Key Goals for All Objectives:

- **Improve Numeracy and Problem-Solving Skills**: Enhance students' ability to apply mathematical concepts to environmental problems, such as calculating resource consumption, waste reduction, or energy efficiency in real-world contexts.
- **Apply Mathematical Understanding in Practical and Real-World Contexts**: Help students understand how mathematics can be used to address global environmental challenges, such as climate change, biodiversity conservation, and sustainable resource management.
- **Develop Logical Thinking and Reasoning**: Foster logical reasoning by analyzing data, interpreting trends, and making

informed decisions related to environmental awareness and sustainability.

Environmental Stewardship

(SUS3)

1. Number and Algebra

Content Area: Whole Numbers, Fractions, Decimals, Percentages, and Algebra

- **Objective 1.1**: Students will apply whole numbers and fractions to calculate the amount of waste or resources saved through sustainable practices like recycling or reducing water consumption, supporting SDG 12 (Responsible Consumption and Production) and SDG 6 (Clean Water and Sanitation).
  Example: A family reduces its weekly water usage by 1/4. If they used 800 liters of water per week, how much water do they save each week?
- **Objective 1.2**: Students will use percentages to determine the effectiveness of environmental stewardship programs in reducing carbon emissions, waste, or energy usage, contributing to SDG 13 (Climate Action).
  Example: A community reduces its carbon emissions by 15%. If the original emissions were 5000 kg, how many kilograms of carbon emissions are saved?
- **Objective 1.3**: Students will calculate the total amount of biodiversity saved through sustainable agriculture or forestry practices, using decimals and percentages to show how conservation efforts can restore ecosystems, aligning with SDG 15 (Life on Land).
  Example: A forest reserve implements a conservation program that restores 30% of its biodiversity. If the reserve initially contained 200 species, how many species are restored?
- **Objective 1.4**: Students will introduce basic algebraic concepts to model how environmental conservation efforts (e.g., tree planting, water conservation) can impact long-term sustainability, using variables to represent different conservation actions.
  Example: If a conservation program restores biodiversity at a rate of 3 species per year, and the program is planned to run

for xx years, create an equation to model the total number of species restored after xx years.

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2. Measurement and Geometry

Content Area: Units of Measurement, Time, Volume, Angles, and Basic Geometry

- **Objective 2.1**: Students will measure and calculate the area of land used for environmental projects like tree planting, conservation zones, or wetlands, relating this to SDG 15 (Life on Land) and SDG 6 (Clean Water and Sanitation).
  Example: A conservation project is planting trees in an area of 2.5 hectares. If each tree requires 2 square meters of space, how many trees can be planted in the area?
- **Objective 2.2**: Students will calculate the volume of water used for irrigation or water conservation in an agricultural setting, using units of measurement to assess the impact of water-saving devices, supporting SDG 6 (Clean Water and Sanitation).
  Example: A drip irrigation system delivers 15 liters of water per hour. How much water is used over a 10-hour period?
- **Objective 2.3**: Students will apply basic geometry concepts to determine the efficiency of energy-efficient buildings or solar panel installations in urban planning, helping to promote SDG 11 (Sustainable Cities and Communities).
  Example: Calculate the optimal angle for solar panels in a city located at a latitude of 30° to maximize energy capture. How does this relate to urban sustainability?
- **Objective 2.4**: Students will calculate the time needed to restore ecosystems through environmental stewardship projects, such as reforestation, by assessing growth rates of trees or other vegetation, aligned with SDG 15.
  Example: If a tree species grows 2 meters per year and the target is to plant trees to cover 500 meters of land, how many years will it take for the trees to reach the desired height?

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3. Statistics and Probability

Content Area: Collecting Data, Understanding Chance and Probability, Interpreting and Analyzing Statistical Information

- **Objective 3.1**: Students will collect and analyze data on environmental stewardship programs, such as the number of trees planted, species saved, or water conserved, and use statistical methods to assess their effectiveness in promoting sustainability, contributing to SDG 15 and SDG 6.
  Example: Collect data on the number of trees planted in a local park over the past 5 years. Create a bar graph to visualize the yearly increase in trees and analyze the trend.
- **Objective 3.2**: Students will calculate the probability of successful environmental actions, such as the likelihood of plant survival or the effectiveness of pollution reduction, using data to predict the success of future stewardship efforts,

supporting SDG 13 (Climate Action).
Example: If a local conservation project has a 75% success rate in restoring wetlands, what is the probability of successfully restoring 3 out of 4 wetlands?

- **Objective 3.3**: Students will create and interpret graphs and tables to display environmental data, such as changes in air quality, water levels, or biodiversity, and use this data to propose solutions for future conservation actions, aligned with SDG 13 and SDG 6.
  Example: After collecting data on the air quality index over the past month, create a line graph to show trends and interpret whether pollution levels are increasing or decreasing.
- **Objective 3.4**: Students will analyze statistical data to assess the impact of environmental stewardship on biodiversity, using statistical methods to compare biodiversity before and after conservation programs, supporting SDG 15.
  Example: Using data on the number of species in a forest ecosystem before and after reforestation efforts, calculate the average increase in species diversity.

Key Goals for All Objectives:

- **Improve Numeracy and Problem-Solving Skills**: Strengthen students' ability to use mathematical concepts to analyze environmental data, calculate resource usage, and assess the effectiveness of stewardship efforts in real-world contexts.
- **Apply Mathematical Understanding in Practical and Real-World Contexts**: Encourage students to apply their mathematical knowledge to solve environmental problems, such as measuring the impact of conservation programs, calculating water or energy savings, and understanding the effect of sustainable practices.
- **Develop Logical Thinking and Reasoning**: Promote logical reasoning by encouraging students to analyze environmental data, recognize trends, and make informed decisions about environmental stewardship strategies based on mathematical analysis.

Waste Management

(SUS4)

1. Number and Algebra

Content Area: Whole Numbers, Fractions, Decimals, Percentages, and Algebra

- **Objective 1.1**: Students will apply whole numbers and fractions to calculate the amount of waste generated by a household or school, determining how much waste can be recycled or composted, supporting SDG 12 (Responsible Consumption and Production).
  Example: A household generates 40 kg of waste per week, and 1/4 of it can be recycled. How much of the weekly waste is recyclable?
- **Objective 1.2**: Students will use percentages to calculate the reduction in waste when recycling programs or waste reduction strategies are implemented, helping to meet SDG 12 (Responsible Consumption and Production).
  Example: A community reduces waste by 30% through recycling initiatives. If the original waste production was 2000 kg per month, how much waste is saved after the reduction?
- **Objective 1.3**: Students will use decimals to calculate the amount of landfill waste produced over time, comparing it to waste diverted through recycling or composting, aligning with SDG 13 (Climate Action) and SDG 12.
  Example: If a school produces 0.5 kg of landfill waste per student per day and has 300 students, how much landfill waste is produced per month?
- **Objective 1.4**: Students will introduce basic algebraic concepts to model how waste reduction efforts (e.g., recycling programs, composting) can decrease overall waste over time, linking this to SDG 12 and UNCRC.
  Example: The total amount of waste produced by a city is modeled by the equation $y=0.8x+1000y=0.8x+1000$, where xx represents the number of weeks and yy is the total waste produced in kilograms. If the city implements a new recycling initiative, calculate the expected waste production after 10 weeks.

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2. Measurement and Geometry

Content Area: Units of Measurement, Time, Volume, Angles, and Basic Geometry

- **Objective 2.1**: Students will measure and calculate the volume of waste generated in different units (e.g., liters, cubic meters), understanding how large amounts of waste can be managed in terms of recycling and landfill, supporting SDG 12 (Responsible Consumption and Production).
  Example: A recycling bin has a volume of 100 liters. If each family recycles 25 liters of waste per week, how many weeks will it take to fill the bin?
- **Objective 2.2**: Students will calculate the area of land required for a landfill and explore alternative waste management strategies like composting or waste-to-energy technologies, linking this to SDG 13 (Climate Action) and SDG 15 (Life on Land).

Example: A landfill has a total area of 5000 square meters, and each year, it takes up an additional 100 square meters. After 3 years, how much of the landfill area will have been used?

- **Objective 2.3**: Students will measure the volume of recycled materials such as paper, plastic, and glass, and calculate how much waste is diverted from landfills through recycling efforts, aligned with SDG 12.
  Example: If a recycling center processes 200 liters of plastic per day, how much plastic will be recycled in 2 weeks?
- **Objective 2.4**: Students will apply geometry concepts to understand how waste management systems, such as bins or recycling containers, can be optimized for efficiency, ensuring that space is used effectively and minimizing waste overflow.
  Example: If a recycling bin is in the shape of a rectangular prism with dimensions of 2 meters by 1.5 meters by 1 meter, calculate the volume of the bin in cubic meters. How many bins are needed for a school with 500 students?

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3. Statistics and Probability

Content Area: Collecting Data, Understanding Chance and Probability, Interpreting and Analyzing Statistical Information

- **Objective 3.1**: Students will collect data on waste production (e.g., amount of waste generated, types of waste) and create bar graphs, pie charts, or line graphs to interpret and analyze waste management strategies, supporting SDG 12 (Responsible Consumption and Production).
  Example: Collect data on the amount of paper, plastic, and food waste generated by a class in one week. Create a pie chart to represent the percentage of each waste type and identify which type of waste could be reduced the most through recycling.
- **Objective 3.2**: Students will use probability to estimate the chances of reducing waste in a community based on recycling participation rates, linking this to SDG 12 (Responsible Consumption and Production).
  Example: If 60% of people in a neighborhood recycle and 40% do not, what is the probability that a randomly selected individual recycles?
- **Objective 3.3**: Students will calculate the average amount of waste produced in different regions (e.g., residential vs. commercial areas) and compare waste management effectiveness, linking this to SDG 11 (Sustainable Cities and Communities).
  Example: A residential area produces 1500 kg of waste each week, and a commercial area produces 3000 kg per week. What is the average weekly waste produced per area, and which area has the higher waste production?
- **Objective 3.4**: Students will analyze statistical data on the environmental impact of waste, such as carbon emissions from landfill sites, and calculate how much waste reduction could improve the environment, aligning with SDG 13 (Climate Action).
  Example: If reducing waste sent to landfills by 10% reduces carbon emissions by 200 kg per week, how much carbon will be saved in a year (52 weeks)?

Key Goals for All Objectives:

- **Improve Numeracy and Problem-Solving Skills**: Develop students' ability to apply mathematical concepts to real-world waste management scenarios, such as calculating waste production, reduction, and recycling efficiency.
- **Apply Mathematical Understanding in Practical and Real-World Contexts**: Encourage students to use their mathematical knowledge to assess and solve environmental problems related to waste management, promoting sustainable practices in their school or community.
- **Develop Logical Thinking and Reasoning**: Enhance students' logical reasoning abilities by analyzing waste data, understanding patterns, and using mathematical models to evaluate the effectiveness of waste reduction strategies.

Energy Conservation **(SUS5)**

1. Number and Algebra

Content Area: Whole Numbers, Fractions, Decimals, Percentages, and Algebra

- **Objective 1.1**: Students will apply whole numbers and fractions to calculate energy usage in households and schools, and determine how much energy can be saved through energy-efficient devices, supporting SDG 7 (Affordable and Clean Energy).
  Example: A household uses 1000 kWh of electricity each month. If switching to LED bulbs saves 1/5 of the electricity used, how many kilowatt-hours (kWh) are saved per month?
- **Objective 1.2**: Students will use percentages to calculate energy savings from different conservation actions, such as switching off lights, using appliances more efficiently, or reducing heating or cooling, contributing to SDG 13 (Climate Action).
  Example: A school reduces its energy use by 15% through energy conservation measures. If the school's monthly energy consumption is 5000 kWh, how much energy is saved each month?
- **Objective 1.3**: Students will use decimals and percentages to calculate the reduction in carbon emissions resulting from

energy-saving practices, helping to reduce environmental impact, as part of SDG 13 (Climate Action).
Example: If using a solar panel reduces energy use by 30%, and the household uses 2000 kWh per month, how many kilowatt-hours of electricity will be saved by using solar power each month?

- **Objective 1.4**: Students will introduce algebraic concepts to model energy usage and savings, such as calculating the total energy saved by an entire community or country after implementing large-scale energy efficiency measures.
  Example: If the number of households in a neighborhood is represented by xx and each household saves 5 kWh per day by using energy-efficient appliances, create an equation that represents the total energy saved in the neighborhood over 30 days.

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2. Measurement and Geometry

Content Area: Units of Measurement, Time, Volume, Angles, and Basic Geometry

- **Objective 2.1**: Students will measure the amount of energy used by different appliances and compare energy consumption to identify the most efficient appliances, supporting SDG 7 (Affordable and Clean Energy).
  Example: A refrigerator uses 200 kWh per month, while a fan uses 50 kWh per month. How much more energy does the refrigerator consume than the fan over a month?
- **Objective 2.2**: Students will measure and calculate the energy required to heat or cool spaces of various sizes using heating systems or air conditioning units, and calculate energy savings achieved through insulation or energy-efficient appliances, aligned with SDG 7 (Affordable and Clean Energy).
  Example: A house has a 100 square meter living area. If each square meter requires 0.5 kWh of energy for heating, how much energy is required to heat the house for one day? How much energy could be saved if the house was insulated and saved 10% of heating costs?
- **Objective 2.3**: Students will calculate the time required for different energy-saving actions, such as turning off lights for specific durations or using power-saving modes on devices, and apply this to measure energy savings over time, relating to SDG 13 (Climate Action).
  Example: If turning off the lights for 2 hours a day saves 0.5 kWh per day, how much energy is saved in a week?
- **Objective 2.4**: Students will apply geometry concepts to understand how the placement and angle of solar panels affect their efficiency in capturing sunlight, contributing to SDG 7 (Affordable and Clean Energy).
  Example: If a solar panel is placed at an angle of 30 degrees to maximize sunlight exposure, calculate the optimal angle for a different location where the sun's angle is 15 degrees different.

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3. Statistics and Probability

Content Area: Collecting Data, Understanding Chance and Probability, Interpreting and Analyzing Statistical Information

- **Objective 3.1**: Students will collect data on the energy consumption of various devices (e.g., light bulbs, appliances, heating/cooling systems) and analyze the data to determine which devices are the most energy-efficient, linked to SDG 7 (Affordable and Clean Energy).
  Example: Record the energy consumption of three types of light bulbs (incandescent, fluorescent, LED) over a week. Create a bar graph to compare the energy used by each type of bulb.
- **Objective 3.2**: Students will use probability to assess the likelihood of energy savings occurring when specific energy conservation strategies are applied, such as reducing electricity use during peak hours, supporting SDG 13 (Climate Action).
  Example: If there is a 40% chance that using energy-efficient appliances will reduce electricity bills by more than 20%, what is the probability that a household will save more than 20% on its electricity bill?
- **Objective 3.3**: Students will create and interpret graphs or pie charts to visualize the effectiveness of different energy conservation strategies, such as turning off lights, using solar energy, or reducing water heating usage, aligning with SDG 12 (Responsible Consumption and Production).
  Example: Use a pie chart to represent the percentage of energy saved by different conservation measures in a school (e.g., 30% by turning off lights, 40% by using energy-efficient appliances, 30% by reducing heating).
- **Objective 3.4**: Students will analyze historical data on energy consumption in their school or community and use statistical methods (mean, median, mode) to predict future energy savings if conservation measures are implemented, relating to SDG 13 (Climate Action).
  Example: If the average monthly energy consumption in a school is 2000 kWh, and energy-saving measures reduce consumption by 10%, calculate the new predicted monthly consumption and the potential savings over a year.

Key Goals for All Objectives:

- **Improve Numeracy and Problem-Solving Skills**: Strengthen students' ability to apply mathematical concepts to practical energy conservation scenarios, such as calculating energy savings, understanding the relationship between energy consumption and cost, and predicting the effects of conservation measures.
- **Apply Mathematical Understanding in Practical and Real-World Contexts**: Encourage students to use their mathematical knowledge to assess energy usage and savings in real-world contexts, such as households, schools, and communities, supporting SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action).
- **Develop Logical Thinking and Reasoning**: Promote logical thinking by encouraging students to analyze and interpret

energy data, make predictions about energy usage, and apply mathematical models to evaluate the effectiveness of various energy conservation strategies.

Biodiversity and Ecosystems **(SUS6)**

1. Number and Algebra

Content Area: Whole Numbers, Fractions, Decimals, Percentages, and Algebra

- **Objective 1.1**: Students will apply whole number and fraction concepts to calculate the population of different species within ecosystems, assessing biodiversity levels and how they contribute to ecosystem health, aligned with SDG 15 (Life on Land).
  Example: A forest ecosystem contains 400 trees, with 1/5 of them being native species. How many native trees are in the forest?
- **Objective 1.2**: Students will use percentages to calculate the proportion of endangered species in different ecosystems, comparing ecosystems to determine which is most in need of conservation, supporting SDG 15 (Life on Land) and UNCRC.
  Example: In a rainforest, 12% of the species are endangered. If there are 200 species in total, how many species are endangered?
- **Objective 1.3**: Students will use decimals and percentages to calculate changes in population size over time due to environmental changes or conservation efforts, applying this to understand biodiversity trends and their relationship to SDG 15.
  Example: If the population of a species in a coastal ecosystem increases by 15% from 1,000 to 1,150 over a year, how much did the population grow?
- **Objective 1.4**: Students will use algebraic concepts to model changes in biodiversity in ecosystems, such as calculating how the introduction of new species can affect an ecosystem's balance.
  Example: In a wildlife reserve, a new species is introduced every year. If the population of the first species introduced was 5 and it doubled each year, calculate how many individuals of that species will be in the reserve after 4 years.

2. Measurement and Geometry

Content Area: Units of Measurement, Time, Volume, Angles, and Basic Geometry

- **Objective 2.1**: Students will measure and calculate the area of different ecosystems (e.g., forests, coral reefs, wetlands) and assess how land use changes affect biodiversity, supporting SDG 15 and SDG 13 (Climate Action).
  Example: If a forest is 5 km long and 2 km wide, calculate its area in square kilometers. How does this relate to the size of habitat for different species?
- **Objective 2.2**: Students will use volume measurements to calculate the amount of water in aquatic ecosystems, such as lakes or rivers, and how this impacts biodiversity and species survival, linked to SDG 6 (Clean Water and Sanitation).
  Example: A lake has a volume of 3,000 cubic meters of water. If the water level rises by 0.5 meters, what is the new volume of water in the lake?
- **Objective 2.3**: Students will apply geometry concepts to study the layout and structure of ecosystems, such as calculating the distance between habitats or the area of a biodiversity hotspot to understand the spread of species and their interactions.
  Example: If a species of birds inhabits a rectangular area of a forest that measures 500 meters by 300 meters, what is the total area of their habitat?
- **Objective 2.4**: Students will calculate the time it takes for environmental changes (e.g., deforestation, pollution) to significantly affect ecosystems, estimating when certain species may become endangered based on habitat size or resources available.
  Example: If deforestation occurs at a rate of 100 hectares per year, calculate how long it will take to reduce a forest's area by 30% if the total forest area is 2,000 hectares.

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3. Statistics and Probability

Content Area: Collecting Data, Understanding Chance and Probability, Interpreting and Analyzing Statistical Information

- **Objective 3.1**: Students will collect data on biodiversity in local ecosystems (e.g., species counts, biodiversity indexes) and use statistical methods to analyze biodiversity health, helping to inform conservation decisions aligned with SDG 15 (Life on Land).
  Example: Students conduct a survey of species diversity in their school's garden. They find 15 species of plants and 10 species of insects. Calculate the biodiversity index for the garden.
- **Objective 3.2**: Students will calculate the probability of certain environmental events occurring, such as the likelihood of a species thriving in a specific ecosystem based on environmental factors like climate or food availability, linking to SDG 13

(Climate Action).
Example: If the probability of a species surviving in a given habitat is 0.7, calculate the probability of it surviving for 3 consecutive years.

- **Objective 3.3**: Students will use statistical analysis to compare biodiversity across different ecosystems (e.g., forests vs wetlands), calculating the average number of species or individuals in each ecosystem and interpreting the results.
  Example: The total number of species in a forest ecosystem is 120, and in a wetland ecosystem is 80. Calculate the average number of species per ecosystem and compare them.
- **Objective 3.4**: Students will analyze environmental data related to the impact of human activity (e.g., pollution, urbanization) on biodiversity, using statistics to suggest ways to improve biodiversity conservation, supporting SDG 11 (Sustainable Cities and Communities).
  Example: Use data on water pollution in a river system to calculate the reduction in fish population over time. What is the percentage decrease in fish numbers after 5 years of pollution?

Key Goals for All Objectives:

- **Improve Numeracy and Problem-Solving Skills**: Strengthen students' ability to apply mathematical concepts to real-world environmental challenges, such as calculating species populations, analyzing biodiversity health, and interpreting the effects of environmental change on ecosystems.
- **Apply Mathematical Understanding in Practical and Real-World Contexts**: Help students develop mathematical skills to analyze and solve problems related to biodiversity and ecosystem health, such as calculating the area of habitats or assessing the impact of environmental changes on species survival.
- **Develop Logical Thinking and Reasoning**: Encourage students to use logical reasoning to analyze environmental data, interpret trends in biodiversity, and make informed decisions about conservation strategies, supporting SDG 15 and global biodiversity targets.

Climate Change and Adaptation

(SUS7)

1. Number and Algebra

Content Area: Whole Numbers, Fractions, Decimals, Percentages, and Algebra

- **Objective 1.1**: Students will use whole numbers and fractions to calculate the impact of climate change on environmental resources, such as estimating the reduction in crop yields due to droughts or floods, aligning with SDG 13 (Climate Action) and SDG 2 (Zero Hunger).
  Example: If a drought reduces crop yield by 1/3, and the farm typically produces 300 kilograms of wheat per year, how much wheat is lost due to the drought?
- **Objective 1.2**: Students will apply percentages to calculate reductions in carbon emissions from various activities, such as using renewable energy or adopting energy-efficient transportation, helping to support SDG 13 (Climate Action).
  Example: If a community reduces its carbon emissions by 25%, and the community previously emitted 800 tonnes of CO2 per year, how many tonnes of CO2 are saved?
- **Objective 1.3**: Students will use decimal and percentage concepts to calculate the proportion of renewable energy in a given energy mix, supporting SDG 7 (Affordable and Clean Energy).
  Example: If a country uses 30% renewable energy, how much of its total energy consumption comes from renewable sources if the country uses 1000 GWh of energy annually?
- **Objective 1.4**: Students will introduce algebraic concepts to model the relationship between carbon emissions and temperature rise, predicting how small changes in emissions can affect global temperatures, and linking this to SDG 13.
  Example: Using the equation y=0.5x+1y=0.5x+1, where xx represents the reduction in carbon emissions and yyrepresents the temperature rise, calculate the temperature rise if carbon emissions are reduced by 4 units.

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2. Measurement and Geometry

Content Area: Units of Measurement, Time, Volume, Angles, and Basic Geometry

- **Objective 2.1**: Students will measure and calculate the amount of water used during extreme weather events, such as floods or droughts, and calculate the total water savings from climate adaptation strategies like rainwater harvesting or efficient irrigation, relating to SDG 6 (Clean Water and Sanitation).

Example: If a rainwater harvesting system collects 1000 liters of water during a storm, and a family uses 150 liters per day, how many days can they use the collected water?

- **Objective 2.2**: Students will measure the areas affected by climate change, such as areas impacted by rising sea levels or deforestation, using appropriate units of measurement (square kilometers or hectares), linking this to SDG 15 (Life on Land) and SDG 14 (Life Below Water).
  Example: If sea levels rise by 2 meters, how much land area (in hectares) is lost from a coastal community if the coastline is 5 kilometers long and the land behind the coastline is 2 kilometers deep?
- **Objective 2.3**: Students will use volume measurements to estimate the amount of carbon stored in forests, calculating how much carbon is absorbed by trees based on forest size and tree density, contributing to SDG 13 (Climate Action) and SDG 15 (Life on Land).
  Example: If a forest has 1000 trees per hectare, and each tree absorbs 0.5 tons of CO2 per year, how much CO2 does the forest absorb annually in 10 hectares?
- **Objective 2.4**: Students will explore angles by calculating the optimal angle of solar panels to maximize energy capture, supporting SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action).
  Example: If the optimal angle for solar panels in a region is 30 degrees and the panels are installed at that angle, calculate how much energy could be saved compared to panels installed at a less efficient angle of 15 degrees.

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3. Statistics and Probability

Content Area: Collecting Data, Understanding Chance and Probability, Interpreting and Analyzing Statistical Information

- **Objective 3.1**: Students will collect data on temperature changes over time and use statistical methods (mean, median, mode) to analyze the rate of temperature rise, relating this to SDG 13 (Climate Action) and biodiversity targets.
  Example: Collect the average temperature for each year over a 10-year period and calculate the mean temperature increase per year. What does this data tell us about climate trends?
- **Objective 3.2**: Students will calculate the probability of extreme weather events occurring, such as hurricanes or floods, based on historical data, helping to assess risk and plan for climate adaptation, connected to SDG 13 (Climate Action).
  Example: If a city has experienced 3 floods in the last 5 years, what is the probability of a flood occurring in the next year?
- **Objective 3.3**: Students will use statistical analysis to assess the effectiveness of climate adaptation measures, such as the implementation of green roofs or energy-efficient buildings, in reducing carbon footprints and resource consumption, linked to SDG 11 (Sustainable Cities and Communities).
  Example: If a city installs 500 green roofs, and each roof reduces CO2 emissions by 200 kg annually, calculate the total reduction in emissions for the city after 1 year.

- **Objective 3.4**: Students will collect and interpret data on the impact of climate change on biodiversity, such as species migration or population decline, using statistical methods to analyze trends and support conservation efforts (SDG 15: Life on Land).
  Example: Collect data on the population of a species in two different regions over the past 10 years and calculate the rate of decline in each region to determine which area has been more affected by climate change.

Key Goals for All Objectives:

- **Improve Numeracy and Problem-Solving Skills**: Strengthen students' ability to use mathematical concepts and problem-solving strategies to analyze and address climate change and adaptation challenges, such as calculating the impact of environmental policies or predicting future climate trends.
- **Apply Mathematical Understanding in Practical and Real-World Contexts**: Help students apply their mathematical knowledge to real-world problems, such as measuring the effects of climate change, evaluating the success of adaptation measures, and promoting sustainable practices that support the SDGs.
- **Develop Logical Thinking and Reasoning**: Encourage students to develop logical reasoning skills by interpreting environmental data, recognizing patterns, and applying mathematical models to understand and predict climate change impacts.

Food and Agriculture

(SUS8)

1. Number and Algebra

Content Area: Whole Numbers, Fractions, Decimals, Percentages, and Algebra

- **Objective 1.1**: Students will apply whole numbers and fractions to calculate the amount of food produced in different

farming systems (e.g., traditional farming, sustainable agriculture, aquaculture) and determine how much food can be sustainably produced in a given area. This supports SDG 2 (Zero Hunger).
Example: A farm produces 3/4 of its crops using organic methods and the rest using conventional methods. If the farm produces 1000 kilograms of crops, how many kilograms are grown using organic methods?

- **Objective 1.2**: Students will calculate the percentage of land used for various agricultural purposes, such as growing food crops, agroforestry, and livestock farming, and identify opportunities for more sustainable land use practices that support biodiversity (SDG 15: Life on Land).
  Example: If 60% of a farm's land is used for crops, 30% for agroforestry, and 10% for livestock, how much land is used for agroforestry if the total land area is 200 hectares?
- **Objective 1.3**: Students will use decimals and percentages to calculate the difference in water consumption between traditional farming and aquaculture-based systems. This links to SDG 6 (Clean Water and Sanitation).
  Example: A traditional farm uses 500 liters of water per day, while an aquaculture farm uses 75% less water. How much water does the aquaculture farm use per day?
- **Objective 1.4**: Students will introduce basic algebraic concepts to calculate the growth rate of crops or fish in aquaculture systems, analyzing how changes in environmental factors (e.g., water temperature, nutrients) affect growth rates.
  Example: If the growth rate of fish is represented by the formula $y=0.5x+2y=0.5x+2$, where xx is the number of weeks and yy is the weight of the fish in kilograms, calculate the weight of the fish after 6 weeks.

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2. Measurement and Geometry

Content Area: Units of Measurement, Time, Volume, Angles, and Basic Geometry

- **Objective 2.1**: Students will measure the area and volume of different agricultural systems (e.g., crop fields, aquaculture tanks) to assess land use efficiency and sustainability. This supports SDG 2 and SDG 12 (Responsible Consumption and Production).
  Example: If a farm has a rectangular field that is 50 meters long and 30 meters wide, calculate its area. Then, if the field produces 10 tons of crops per hectare, how much will the farm produce?
- **Objective 2.2**: Students will measure the amount of water required for sustainable agriculture or aquaculture practices, such as irrigation or fish tank volume, using appropriate units of measurement (e.g., liters, cubic meters). This links to SDG 6 (Clean Water and Sanitation).
  Example: If an aquaculture tank has a volume of 10 cubic meters, how many liters of water does the tank hold (1 cubic meter = 1000 liters)?
- **Objective 2.3**: Students will explore angles in agriculture and aquaculture (e.g., the angle of a solar panel used for

energy-efficient farming or the slope of land for aquaponics systems) to ensure optimal use of space and resources. This supports SDG 7 (Affordable and Clean Energy).
Example: If the angle of a solar panel is 30 degrees to maximize sunlight absorption, calculate the optimal angle for different latitudes to ensure energy efficiency for a sustainable farm.

- **Objective 2.4**: Students will calculate the volume of harvested crops or fish in aquaculture using geometric formulas and apply this information to assess the efficiency and productivity of farming systems.
  Example: A fish farm has 5 cylindrical tanks, each with a diameter of 3 meters and a height of 4 meters. What is the total volume of water in the tanks?

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3. Statistics and Probability

Content Area: Collecting Data, Understanding Chance and Probability, Interpreting and Analyzing Statistical Information

- **Objective 3.1**: Students will collect data on agricultural productivity (e.g., crop yields, fish growth) and analyze statistical trends to assess the effectiveness of different farming methods, relating it to SDG 2 (Zero Hunger) and SDG 15 (Life on Land).
  Example: Collect data on the yield of different crops in a farming system over the past 5 years. Create a graph to display the average yield and analyze which farming method results in the highest yield.
- **Objective 3.2**: Students will calculate the probability of successful crop harvests or fish production in different environmental conditions, using data on climate, soil quality, and water availability. This links to SDG 13 (Climate Action).
  Example: If there is an 80% chance of rainfall during the growing season and a 50% chance that the temperature will remain stable, what is the probability that crops will thrive under these conditions?
- **Objective 3.3**: Students will use statistical methods (mean, median, mode) to analyze the success rates of different aquaculture or agroforestry methods, comparing data on fish survival rates or plant growth, and propose improvements based on these findings.
  Example: Calculate the average growth rate of fish in an aquaculture farm over a year, given monthly data. What factors contribute to the highest and lowest growth rates?
- **Objective 3.4**: Students will interpret data on food production systems (e.g., crop yields, fish production) and use statistical analysis to determine the environmental impact (e.g., water usage, carbon footprint), supporting SDG 12 (Responsible Consumption and Production).
  Example: Analyze data on water usage in two farming systems: traditional farming vs. aquaponics. Use this data to calculate the water savings achieved by the aquaponics system and the environmental benefits.

Key Goals for All Objectives:

- **Improve Numeracy and Problem-Solving Skills**: Enhance students' ability to apply mathematical concepts to real-world challenges in food, agriculture, and aquaculture, such as calculating resource use, productivity, and efficiency in sustainable farming systems.
- **Apply Mathematical Understanding in Practical and Real-World Contexts**: Encourage students to use mathematics to analyze and solve environmental problems related to agriculture and aquaculture, supporting sustainable development and global food security.
- **Develop Logical Thinking and Reasoning**: Strengthen students' critical thinking and reasoning abilities by analyzing agricultural and aquaculture data, making informed decisions about sustainability and resource management in farming systems.

Water Conservation

(SUS9)

1. Number and Algebra

Content Area: Whole Numbers, Fractions, Decimals, Percentages, and Algebra

- **Objective 1.1**: Students will apply whole number concepts to calculate water usage in different sectors (e.g., domestic, agricultural, industrial), and work out how much water can be saved through conservation efforts, supporting SDG 6 (Clean Water and Sanitation).
  Example: If a household uses 120 liters of water per day and reduces usage by 25%, how much water is saved in a week? (Linking to SDG 6)
- **Objective 1.2**: Students will use fractions and decimals to calculate the proportion of water used in various household activities, such as washing dishes or taking a shower, and identify areas where conservation could make the most

impact.
Example: If 3/4 of the water used in a home is for showering, and a home uses 200 liters per day, how much water is used for showering each day? (Relating to SDG 6 and UNCRC principles for future generations)

- **Objective 1.3**: Students will use percentages to calculate the water savings from specific actions, such as replacing old faucets with water-saving models or switching to low-flow showerheads, and express these savings as percentages.
  Example: If switching to a low-flow showerhead reduces water usage by 20% and a family uses 500 liters of water per week, how much water will they save in a month?
- **Objective 1.4**: Students will use algebraic concepts to model the relationship between water conservation efforts and overall water usage reductions. For instance, calculating how changes in individual water-saving behaviors can affect overall community water consumption.
  Example: Let x represent the percentage reduction in water usage for each household, and use an equation to calculate the total reduction in water usage for a neighborhood if 100 households adopt a 10% water-saving initiative.

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2. Measurement and Geometry

Content Area: Units of Measurement, Time, Volume, Angles, and Basic Geometry

- **Objective 2.1**: Students will calculate the volume of water required for different household and outdoor activities (e.g., watering plants, filling swimming pools, or washing a car), using appropriate units of measurement such as liters or milliliters.
  Example: Calculate how many liters of water are needed to fill a garden pond with a volume of 2 cubic meters, knowing that 1 cubic meter equals 1000 liters.
- **Objective 2.2**: Students will measure the amount of water collected in rainwater tanks over a specific period of time, understanding how much water can be harvested in various locations and seasons, which is related to SDG 6 (Clean Water and Sanitation).
  Example: If a rainwater tank collects 50 liters of water per hour of rainfall, how much water will it collect in 3 days if it rains for 4 hours each day?
- **Objective 2.3**: Students will use time and volume measurements to estimate how much water is used in various daily tasks (e.g., taking a shower, doing laundry, washing dishes), and identify opportunities to reduce water usage, supporting SDG 12 (Responsible Consumption and Production).
  Example: A shower uses 10 liters of water per minute. If a person takes a 15-minute shower, how much water is used? How much water could be saved by reducing the shower time by 5 minutes?
- **Objective 2.4**: Students will calculate the efficiency of water-saving devices (e.g., low-flow toilets, water-efficient faucets) in terms of water saved per day or year, using volume measurements and understanding the impact of these devices

on overall water consumption.
Example: If a water-efficient faucet saves 5 liters of water per minute and is used for 10 minutes a day, how much water will be saved in a month? (Linking to SDG 6 and UNCRC)

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3. Statistics and Probability

Content Area: Collecting Data, Understanding Chance and Probability, Interpreting and Analyzing Statistical Information

- **Objective 3.1**: Students will collect and analyze data on water usage in different areas of their community or home, using bar graphs, line graphs, and pie charts to identify patterns and trends in water consumption.
  Example: Create a bar graph to show the amount of water used in various household activities (e.g., showering, cooking, cleaning) over a week, and analyze which activity uses the most water.
- **Objective 3.2**: Students will use probability to estimate the likelihood of water shortages in their local area based on past usage and rainfall data, applying statistical methods to assess risk and inform conservation strategies.
  Example: If a region has a 60% chance of receiving enough rainfall to meet its water needs in a given month, what is the probability that water usage will exceed supply during dry months?
- **Objective 3.3**: Students will collect data on local water conservation programs (e.g., rainwater harvesting, water-efficient appliances) and analyze how effective these programs are at reducing overall water usage, supporting SDG 6 and SDG 13 (Climate Action).
  Example: Survey a group of students to collect data on how many of them use water-saving devices at home. Use this data to calculate the percentage of students who are actively participating in water conservation efforts.
- **Objective 3.4**: Students will create and interpret statistical data on the relationship between water usage and environmental impact, calculating reductions in water waste and relating these reductions to global sustainability targets.
  Example: Collect data on water usage from two schools—one that practices water conservation and one that does not—and calculate the difference in water usage, then use this data to discuss the potential environmental benefits of conservation.

Key Goals for All Objectives:

- **Improve Numeracy and Problem-Solving Skills**: Enhance students' ability to apply mathematical concepts to practical water conservation problems, such as calculating water usage, identifying ways to reduce consumption, and analyzing

statistical data related to water management.

- **Apply Mathematical Understanding in Practical and Real-World Contexts**: Encourage students to use mathematical reasoning to address environmental issues related to water conservation, including practical applications such as reducing household water consumption, designing sustainable water systems, and analyzing local water usage data.
- **Develop Logical Thinking and Reasoning**: Strengthen students' ability to critically assess environmental data and make decisions that contribute to more efficient and sustainable water use in their communities, supporting SDG 6 and biodiversity goals.

Sustainable Transport and Urban Planning

(SUS10)

1. Number and Algebra

Content Area: Whole Numbers, Fractions, Decimals, Percentages, and Algebra

- **Objective 1.1**: Students will calculate the number of vehicles needed for a sustainable public transport system in a city, using whole numbers and fractions. For example, if 80% of a city's population uses public transport, how many vehicles are required to meet their needs based on population estimates? This connects to SDG 11 (Sustainable Cities and Communities).
  Example: A city has a population of 500,000 people, and 80% use public transport. If each bus can carry 50 passengers, how many buses are needed for the city?
- **Objective 1.2**: Students will use percentages to calculate the reduction in traffic congestion or pollution from the introduction of sustainable transport systems, such as electric vehicles or bike-sharing programs, linking their calculations to SDG 13 (Climate Action) and SDG 11.
  Example: If a city reduces car traffic by 25%, and there are 100,000 cars on the road, how many cars are now off the road?
- **Objective 1.3**: Students will apply basic algebraic concepts to solve problems involving transportation costs and energy savings. For example, if an electric vehicle costs 10% less to run than a petrol vehicle, how much will a fleet of 100 electric vehicles save per year in fuel costs?

Example: A petrol car costs $500 per year to run, while an electric vehicle costs $450. Calculate the total savings for a fleet of 100 electric vehicles over one year.

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2. Measurement and Geometry

Content Area: Units of Measurement, Time, Volume, Angles, and Basic Geometry

- **Objective 2.1**: Students will calculate the dimensions of green spaces, pedestrian walkways, or cycle lanes in urban planning projects, using appropriate units of measurement such as meters and square meters. This is aligned with SDG 11 (Sustainable Cities and Communities).
  Example: If a pedestrian walkway is 3 meters wide and 500 meters long, calculate its total area in square meters to understand how much space is allocated for walking.
- **Objective 2.2**: Students will calculate the area of urban green spaces (e.g., parks, forests) and determine how much space should be allocated per person in the community to enhance urban biodiversity and promote sustainability. This links to SDG 15 (Life on Land) and biodiversity targets.
  Example: A city has 10 parks, each 2 hectares in size. How many square meters of parkland are available per person if the city's population is 100,000?
- **Objective 2.3**: Students will measure angles in transportation routes (e.g., roadways, bike lanes, pedestrian paths) and calculate the optimal angle for efficiency and safety. This could be applied to the design of eco-friendly transport routes or urban planning projects.
  Example: If a road has a curve with an angle of 30 degrees, and a cyclist is traveling at 20 km/h, students can calculate the time taken to travel through the curve safely.

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3. Statistics and Probability

Content Area: Collecting Data, Understanding Chance and Probability, Interpreting and Analyzing Statistical Information

- **Objective 3.1**: Students will collect data on different modes of transportation (e.g., number of cyclists, pedestrians, bus passengers) and use statistical methods to analyze the most sustainable transport option in their local area. This helps to support SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action).
  Example: Collect data on the number of buses, bikes, and cars used by students over a week. Then, calculate the percentage of students using sustainable transport (e.g., biking or walking) and compare the results.
- **Objective 3.2**: Students will calculate the probability of certain events occurring in transportation, such as the

likelihood of traffic jams or public transport delays during peak hours. This connects to SDG 11 by improving urban mobility and transportation systems.
Example: If, on average, 10% of buses are late during rush hour, calculate the probability of a bus being late if 5 buses arrive during the peak period.

- **Objective 3.3**: Students will create and interpret bar graphs or pie charts to represent transportation data, such as the number of people using sustainable modes of transport (bikes, buses, or electric vehicles). This reinforces SDG 12 (Responsible Consumption and Production) and SDG 13.
  Example: Create a pie chart showing the percentage of people using cars, buses, bikes, and walking for transport. Based on the data, analyze which mode is the most sustainable and make suggestions for improvement.
- **Objective 3.4**: Students will analyze and interpret environmental data (e.g., air quality, carbon emissions) to assess the effectiveness of sustainable transport systems, using mean, median, and mode to summarize results. This links to SDG 13 (Climate Action).
  Example: After measuring the air quality of an area before and after implementing a public transport system, students can calculate the average reduction in CO2 emissions.

Key Goals for All Objectives:

- **Improve Numeracy and Problem-Solving Skills**: Enhance students' ability to apply mathematical concepts to practical environmental challenges such as sustainable transport, urban planning, and environmental conservation.
- **Apply Mathematical Understanding in Practical and Real-World Contexts**: Help students develop skills to analyze and solve real-world problems, such as calculating transportation emissions or determining how much green space should be allocated to a city to support biodiversity.
- **Develop Logical Thinking and Reasoning**: Encourage students to apply logical thinking to assess the effectiveness of different transportation systems and urban planning strategies, and to make reasoned decisions on improving sustainability.

Citizenship / Global Responsibility and Sustainable Development **(SUS11)**

1. Number and Algebra

Content Area: Whole Numbers, Fractions, Decimals, Percentages, and Algebra

- **Objective 1.1**: Students will apply whole number concepts to calculate the impact of human activities (e.g., carbon emissions, waste production) on the environment, supporting SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action).
- **Objective 1.2**: Students will use fractions and decimals to calculate the percentage of natural resources (e.g., water usage, forest area) consumed in different regions, connecting the data to biodiversity conservation and global sustainability goals.
- **Objective 1.3**: Students will use algebraic concepts to model environmental situations, such as predicting the growth of a population of endangered species or calculating the reduction in waste through recycling programs, linking these activities to SDG 15 (Life on Land).
- **Objective 1.4**: Students will solve practical problems involving sustainable development, such as calculating energy usage in sustainable urban planning or the percentage of renewable energy in a country's total energy consumption (related to SDG 7 - Affordable and Clean Energy).

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2. Measurement and Geometry

Content Area: Units of Measurement, Time, Volume, Angles, and Basic Geometry

- **Objective 2.1**: Students will measure and calculate the volume of natural resources (e.g., water tanks, forests, or oceans), applying appropriate units of measurement to real-world scenarios related to water conservation and biodiversity protection (linking to SDG 6 - Clean Water and Sanitation).
- **Objective 2.2**: Students will use geometric concepts such as angles and areas to design eco-friendly cities, such as calculating the area of green spaces or the angle for solar panel placement, promoting SDG 11 (Sustainable Cities and Communities).
- **Objective 2.3**: Students will calculate distances in nature (e.g., from one ecosystem to another) and determine the area of conservation zones or biodiversity hotspots, applying these measurements to sustainable land management practices that contribute to global environmental goals.
- **Objective 2.4**: Students will explore time and scheduling by calculating how long it would take to implement sustainable transport systems or other eco-friendly infrastructure in urban areas, linking to SDG 11 and SDG 13 (Climate Action).

3. Statistics and Probability

Content Area: Collecting Data, Understanding Chance and Probability, Interpreting and Analyzing Statistical Information

- **Objective 3.1**: Students will collect and analyze data on biodiversity (e.g., species population sizes, habitat loss) to calculate trends and predict future changes, connecting this analysis to SDG 15 (Life on Land) and SDG 14 (Life Below Water).
- **Objective 3.2**: Students will use probability to understand the likelihood of environmental events, such as extreme weather patterns or the likelihood of biodiversity loss, and analyze how these events relate to global goals such as climate action and disaster preparedness (SDG 13).
- **Objective 3.3**: Students will interpret and represent statistical data on topics such as recycling rates or water consumption in different countries, using graphs, tables, and charts to analyze trends and communicate findings on sustainable practices related to SDG 12 (Responsible Consumption and Production).
- **Objective 3.4**: Students will create surveys and collect data on local environmental issues (e.g., waste management, recycling participation), analyzing the data to propose solutions that support sustainability and global responsibility, linking to the UNCRC and the SDGs.

Key Goals for All Objectives:

- **Improve Numeracy and Problem-Solving Skills**: Enhance students' ability to apply mathematical concepts to real-world issues related to sustainability, such as calculating energy usage, understanding resource conservation, or modeling population growth in ecosystems.
- **Apply Mathematical Understanding in Practical and Real-World Contexts**: Encourage students to use mathematics to solve practical problems associated with global responsibility, including understanding and addressing environmental challenges like water scarcity, waste reduction, and biodiversity loss.
- **Develop Logical Thinking and Reasoning**: Strengthen students' critical thinking and reasoning abilities by analyzing data, interpreting environmental trends, and applying mathematical models to support sustainable development and global responsibility.
- **Promote Global Awareness and Responsibility**: Through practical mathematical applications, help students understand the global interconnectedness of sustainability issues and foster their sense of responsibility as global citizens working toward the achievement of the SDGs.

Outdoor Learning and Connection to Nature **(SUS12)**

1. Number and Algebra

Content Area: Whole Numbers, Fractions, Decimals, Percentages, and Algebra

- **Objective 1.1**: Students will apply whole number concepts to count, organize, and represent objects found in nature (e.g., counting tree species, estimating population sizes of animals) to support biodiversity conservation efforts, linking these activities to SDG 15 (Life on Land).
- **Objective 1.2**: Students will use fractions and decimals to measure and record aspects of outdoor environments, such as the proportion of native plant species in an area or the percentage of land covered by forests, relating this to biodiversity targets.
- **Objective 1.3**: Students will solve real-world problems involving addition, subtraction, multiplication, and division using outdoor data, such as measuring areas for planting trees or calculating the amount of water used for irrigation, supporting SDG 6 (Clean Water and Sanitation).
- **Objective 1.4**: Students will introduce basic algebraic concepts by organizing outdoor data (e.g., number of plants, animals, or types of weather) into patterns or equations, promoting understanding of environmental trends and their relation to climate change and sustainability.

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2. Measurement and Geometry

Content Area: Units of Measurement, Time, Volume, Angles, and Basic Geometry

- **Objective 2.1**: Students will measure the perimeter, area, and volume of outdoor spaces (e.g., a garden, park, or nature reserve) using appropriate units of measurement, supporting sustainable urban planning and the creation of green spaces as part of SDG 11 (Sustainable Cities and Communities).
- **Objective 2.2**: Students will explore angles by measuring the tilt of tree branches, the slope of hills, or the position of

solar panels in outdoor environments, helping them understand concepts such as sunlight exposure and energy conservation (linking to SDG 7 - Affordable and Clean Energy).
- **Objective 2.3**: Students will use tools such as rulers, compasses, and protractors to measure and create simple geometric shapes from objects in nature (e.g., leaves, rocks), applying geometric concepts to real-world problems related to environmental sustainability.
- **Objective 2.4**: Students will calculate the volume of containers (e.g., water tanks, compost bins) used in outdoor activities like irrigation or waste management, applying this to sustainable water usage and waste reduction efforts aligned with SDG 12 (Responsible Consumption and Production).

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3. Statistics and Probability

Content Area: Collecting Data, Understanding Chance and Probability, Interpreting and Analyzing Statistical Information

- **Objective 3.1**: Students will collect data from outdoor observations, such as the number of animals in a habitat, plant diversity, or weather patterns, and use statistics to summarize and analyze this data to inform decisions about biodiversity conservation and sustainability practices (connected to SDG 15).
- **Objective 3.2**: Students will explore probability by calculating the likelihood of certain environmental events occurring (e.g., the chance of rainfall, the likelihood of different species being present in an ecosystem), linking their findings to climate change impacts and resilience.
- **Objective 3.3**: Students will create and interpret graphs, charts, and tables from outdoor data to analyze trends in biodiversity, weather, or water usage, applying their findings to inform sustainable practices such as water conservation and ecosystem management (aligning with SDGs 6 and 13).
- **Objective 3.4**: Students will use data from outdoor experiments (e.g., measuring plant growth or temperature changes in different environments) to understand patterns and apply statistical reasoning to propose solutions for improving the environment, linking their work to UNCRC principles for the rights of future generations.

Key Goals for All Objectives:

- **Improve Numeracy and Problem-Solving Skills**: Develop students' ability to apply mathematical concepts to real-world environmental scenarios, such as measuring natural resources or analysing biodiversity data, enhancing their problem-solving skills in outdoor settings.
- **Apply Mathematical Understanding in Practical and Real-World Contexts**: Encourage students to use mathematics to

support sustainability practices, such as calculating water usage for irrigation, analyzing species populations, or designing eco-friendly urban spaces, fostering a deeper understanding of the interconnections between mathematics and environmental stewardship.

- **Develop Logical Thinking and Reasoning**: Strengthen students' ability to analyze data, recognize patterns, and apply mathematical reasoning to environmental issues, such as predicting weather patterns or calculating the effectiveness of different conservation strategies.
- **Promote Global Awareness and Responsibility**: Through the use of outdoor learning experiences, students will engage with global goals like the SDGs, UNCRC, and biodiversity targets, applying mathematical concepts to real-world problems in a way that emphasizes their responsibility as global citizens to care for the environment.