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أكاديمية رأس الخيمة الأمريكية

STEAM

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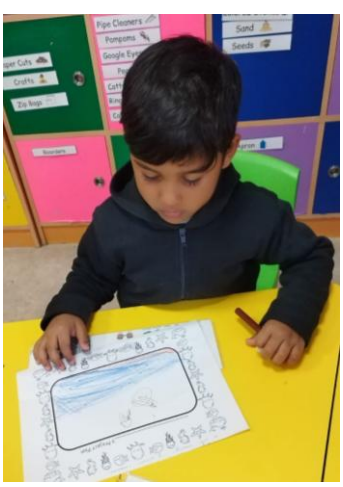
KG 1 : STEAM

Project Title: Exploring Ocean Habitats

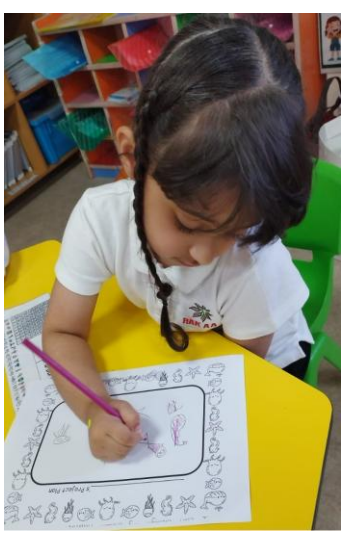
Objective: Students will design and construct models of ocean habitats using various art materials, incorporating representations of marine animals, shells, and other related elements.

Cross-Curricular Connections:

- **Science:** Investigate marine organisms and their ecosystems.
- **Engineering:** Apply principles of design by selecting materials of varying sizes and weights, and devise methods to assemble and stabilize their habitat models.
- **Language Arts:** Expand vocabulary with terms related to marine environments and their inhabitants.
- **Mathematics:** Utilize counting, measuring, and comparative analysis skills when working with marine figures and other project components.
- **UAE Connection:** Explore marine life native to the waters surrounding the United Arab Emirates and discuss commonly observed species along local coastlines.
- **SDG 14: Life Below Water** – Emphasize the importance of conserving and sustainably using oceans, seas, and marine resources.
- **SDG 4: Quality Education** – Foster quality education by integrating environmental awareness and sustainability into the learning experience.



Students planning and putting down their ideas for their projects.



"KG 1 students actively engage in hands-on STEAM learning as they explore ocean habitats through creative model-making, developing skills in science, engineering, and mathematics."

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KG 2 : STEAM

PROJECT TITLE : Habitats

OBJECTIVE: We are learning to identify different types of animal habitats (e.g., forest, ocean, desert) and use various materials to build a simple model of a habitat, demonstrating an understanding of how animals depend on their environment for food, shelter, and survival.

Cross curricular subjects:

Science: Learning about the different habitats animals live in to survive.

Technology: Using presentations and videos to show students real-life examples of the concepts.

Engineering: Using the **engineering process** to **plan, design, construct, and evaluate** our creations, continuously refining them for improvement.

Language Arts : Teaching new vocabulary words to learn and understand the concept better.

Math: We apply math skills such as measuring, counting, and sorting to accurately plan and construct our habitat diorama, ensuring proper scale and balance.

UAE link: Inspired by the UAE's diverse habitats, students made a diorama showcasing environments like the desert, highlighting the unique animals and plants that live there.

SDG : **SDG 14: Life Below Water** – **SDG 4: Quality Education** SDG 15: **Life on Land** – Protect, restore, and promote sustainable use of ecosystems, forests, and biodiversity.

Our KG2 students designed and built animal habitats, exploring how different environments support wildlife.

Our KG2 students showcase their amazing habitat projects, demonstrating their understanding of different environments and the animals that call them home!"

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Grade 1 : STEAM

PROJECT TITLE : Creating a Colorful Sun Catcher

OBJECTIVE : Students will explore how light passes through different materials and how colors mix. They will use this to understand the difference between transparent, translucent, and opaque materials.

Cross curricular subjects :

Science: Investigate how light interacts with materials (transparent, translucent, opaque).

Explore color mixing when light passes through colored materials.

Technology: Use simple tools (scissors, glue, hole puncher) to construct the sun catcher.

Experiment with how placement of colors affects the final design.

Engineering : Design a stable structure for the sun catcher so it can be hung or displayed.

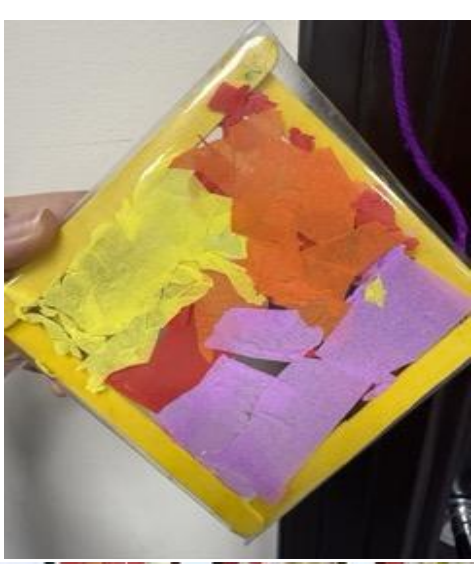
Test different materials to find the best ones for light transmission.

Language Arts : Describe the process of making a sun catcher in simple steps. Use descriptive words to explain how the sun catcher changes with light.

Math : Identify and create shapes in the sun catcher design. Compare sizes and symmetry when arranging materials.

UAE link: Explore how sunlight is important in the UAE's climate and daily life. Discuss how stained-glass windows in mosques and traditional buildings use similar concepts of light and color.

SDG : Affordable and Clean Energy – Understanding the power of sunlight as a natural resource and how it interacts with materials.



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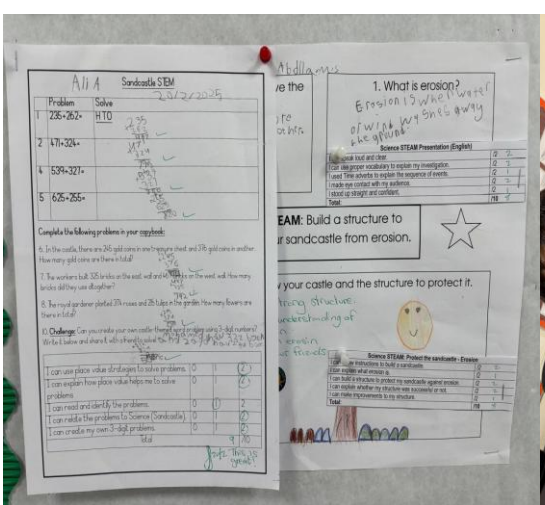
Grade 2 : STEAM

Project Title: Engineering Sandcastle Defenses

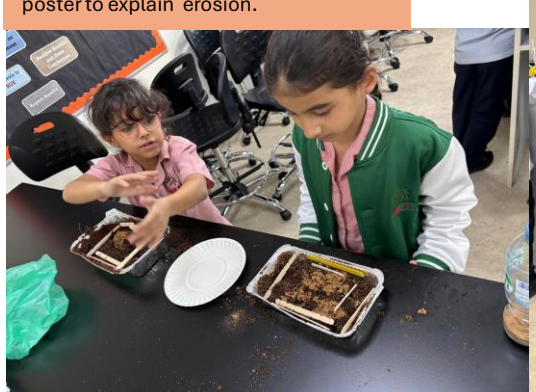
Objective: Students will construct sandcastles and engineer protective structures to shield them from simulated wave erosion.

Cross-Curricular Connections:

- **Science:** Investigate the impact of water on sand to understand erosion processes.
- **Technology:** Utilize digital devices to research additional factors contributing to erosion.
- **Engineering:** Design and build structures aimed at safeguarding sandcastles from erosive forces.
- **Language Arts:** Present models to peers, evaluating the effectiveness of their designs and proposing enhancements.
- **Mathematics:** Plan 3D protective structures, calculate required materials, and solve related word problems.
- **UAE Connection:** Examine wind as the predominant form of erosion affecting the United Arab Emirates.
- SDG : 3 , 4, 6 , 9 , 12, 15



Students completed a differentiated poster to explain erosion.



Students built a sandcastle which they then had to protect against water erosion by building a structure around it. Once their structure was built, we poured water in the container and observed any sand movement or destruction of the castle.

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Grade 3 : STEAM

- **Project Title:** Designing and Testing Flood Barriers
- **Objective:** Students will investigate the water absorption properties of various materials to determine the most effective ones for constructing flood barriers. They will then design and build their own barriers to assess their capability in protecting structures from flood damage.
- **Cross-Curricular Connections:**
- **Science:** Explore the impact of water on different materials to understand erosion and the effectiveness of various flood barrier designs.
- **Technology:** Utilize digital devices for research on materials and methods used in flood prevention.
- **Engineering:** Design and construct flood barriers, applying principles of structural integrity and material science.
- **Language Arts:** Develop and present reports on their designs, using appropriate terminology related to flood prevention and construction.
- **Mathematics:** Calculate material quantities, measure dimensions, and analyse data related to the performance of their flood barriers.
- **UAE Connection:** Investigate regions within the UAE susceptible to flooding and examine the strategies implemented to mitigate flood risks.
- **SDG 11: Sustainable Cities and Communities** – Focus on reducing the adverse effects of natural disasters, such as floods, and prom

Photos of Grade 3 investigating the absorbency of certain materials. Grade 3 were visited by many of the KG classes during our Science Fair and they were able to present their flood barrier designs and explained their investigation of how effective their flood barrier designs would be.

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Grade 4 : STEAM

Project Title: Solar Oven Design Challenge

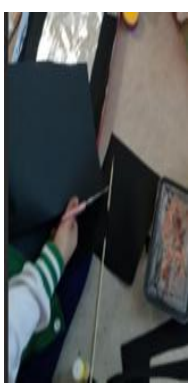
Objective:
Students will design and construct a functional solar oven that harnesses renewable solar energy to cook food efficiently.

Cross-Curricular Connections:

- **Science:** Explore the principles of solar energy, heat transfer, and the greenhouse effect.
- **Technology:** Utilize materials such as reflective surfaces (aluminum foil), insulating layers, and transparent covers to maximize heat absorption.
- **Engineering:** Apply engineering concepts to design and build a working solar oven using basic tools and materials.
- **English:** Develop writing skills through detailed reports documenting the design, construction, and testing process. Students will also maintain a journal to reflect on their progress, challenges, and successes.
- **Math:** Measure dimensions and efficiency, apply geometric principles in the design phase, and analyze temperature data at different times of the day for comparison.
- **UAE Connection:** Encourages students to consider sustainable innovations in the UAE, such as green architecture and advancements in renewable energy, aligning with the country's vision for a sustainable future
- SDG: 1 , 3, 5, 7

Step 1 : Preparing all materials (box, reflector, plastic wrap, black paper, isolation)

Step 2: Prepare the box,



Step 3: cut the black paper to fit inside the box.

Step 4: Attach the Reflector

Step 6: Cook something simple like pizza.

Step 7: Use a Thermometer to check how hot the oven gets.

Step 8: Place oven outside on a sunny day.

Step 9: Checking the oven every 30 minutes and gather data.

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Grade 5 : STEAM

Project Title: Designing Imaginary Animals: Innovations for Environmental Sustainability

Objective: Students will conceptualize and design imaginary animals with unique adaptations tailored for survival in specific habitats. They will analyze how these adaptations address environmental challenges and explore potential benefits for both humans and the planet.

Cross-Curricular Connections:

- **Science:** Investigate real-world animal adaptations and apply this knowledge to conceptualize features that would enable their imaginary animals to thrive in chosen habitats.
- **Technology:** Employ digital tools to create detailed sketches and presentations of their imaginary animals, enhancing design accuracy and presentation skills.
- **Engineering:** Develop models or diagrams that showcase the unique survival features of their animals, integrating principles of structural and functional design.
- **Language Arts:** Compose descriptive narratives explaining the survival strategies of their imaginary animals and their positive impacts on the environment, practicing clear and persuasive writing.
- **Mathematics:** Utilize measurement and comparison techniques to define the size, capabilities, and resource needs of their imaginary animals, applying mathematical reasoning to their designs.
- **UAE Connection:** Relate their imaginary animals to the UAE's diverse environments, considering how these creatures could adapt to desert or marine habitats prevalent in the region.
- SDG : 12, 13, 15

PICTURE :

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Grade 6 : STEAM

PROJECT TITLE : Growing Plants Using Hydroponics

OBJECTIVE : Design and observe a simple hydroponic system to understand how plants can grow without soil and how this method can be beneficial for sustainable agriculture.

Cross curricular subjects :

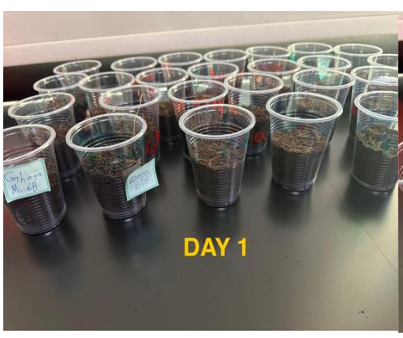
Science: Exploring the principles of nutrient absorption, photosynthesis, and plant growth in a soil-free environment.

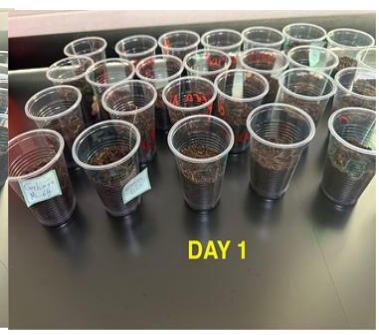
Language Arts : Write the step-by-step procedure for setting up the hydroponic system using clear and structured instructions.

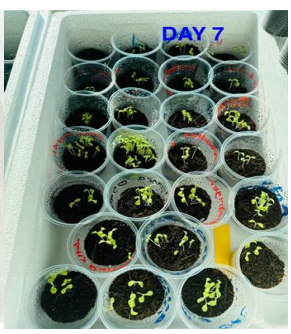
Math : Measure the length, width, and height of the Styrofoam box, then calculate its volume.

UAE link: Hydroponics in the UAE is crucial for sustainable agriculture, as it helps conserve water, maximize crop production in arid conditions, and support food security initiatives in the region.

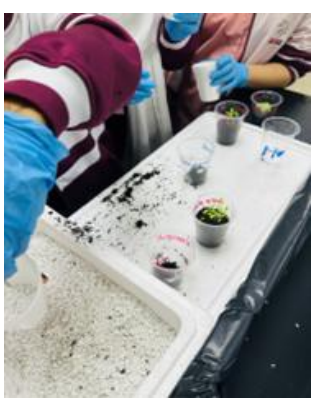
SDG : 2, 6, 9, 11, 12, 13

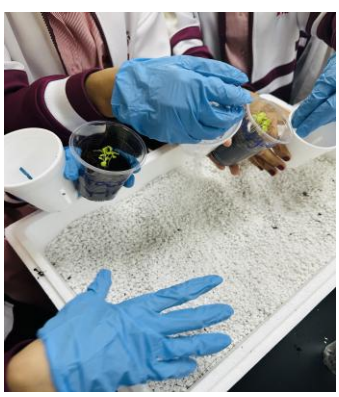






Seeds sown





Transfer the germinated seedlings into the foam cups filled with perlite and filling nutrient solution in the Styrofoam box

Project presentation

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Grade 7 : STEAM

PROJECT TITLE: **Designing an efficient compost bin**

OBJECTIVE : Design and build an efficient compost bin using sustainable materials to accelerate decomposition and reduce waste.

Cross-curricular subjects :

Science: Investigate chemical and physical decomposition of food wastes in a compost bin.

Technology: Use CAD(computer assisted drawing) software to design and print a compost bin model.

Engineering :Create and compare solutions to a problem.

Research and analyze ways individual communities use science ideas to protect the Erath's resources and environment.

Language Arts : Presentation & Public Speaking

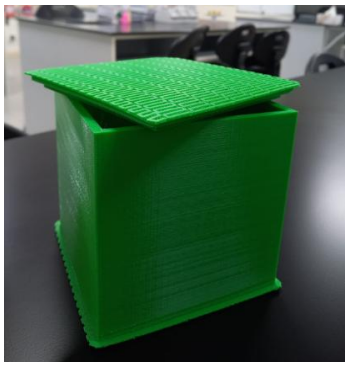
Math: Measuring and calculating the volume of the compost bin to determine how much organic waste it can hold.

UAE link: UAE Vision 2050 and National Waste Management Strategy.

SDG : 2,11,12,13, & 15

PICTURE GALLERY

Turning Scraps into Soil: The Math & Science of Composting



Hands in, hearts united! 💚🌱

Together, we recycle, renew, and reimagine a greener UAE! ♻️

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Grade 8 : STEAM

PROJECT TITLE : Solar Harvest: A biomimicry- Inspired Energy solution

OBJECTIVE :To analyze how biomimicry principles can be applied to renewable energy solutions by investigating the "Solar Harvest" concept, evaluating its efficiency, and comparing it to natural processes that inspire its design.

Cross curricular subjects :

Science: Understanding photosynthesis, solar energy, and how nature-inspired designs enhance energy efficiency.

Technology: Exploring advancements in solar panel technology and bio-inspired materials used in energy solutions.

Engineering :Investigating how biomimicry influences the design of solar energy systems to improve efficiency and sustainability.

Language Arts : Writing an explanatory essay or persuasive argument on the effectiveness of biomimicry in renewable energy solutions.

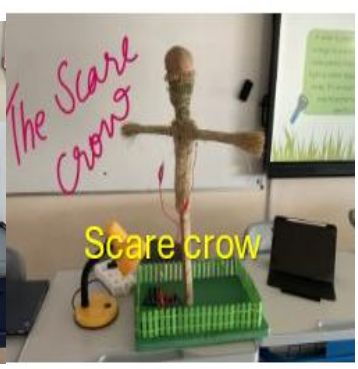
Math :Analyzing efficiency rates, calculating solar energy output, and comparing data from different energy sources.

UAE link: Exploring the UAE's initiatives in solar energy, such as the Mohammed bin Rashid Al Maktoum Solar Park, and how biomimicry-based solutions could enhance the country's sustainability goals.

SDG :7,11,12&13

Exploring photosynthesis: The learning stations

Solar Harvest: Biomimicry-Inspired Energy Innovations"



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Grade 9 : STEAM

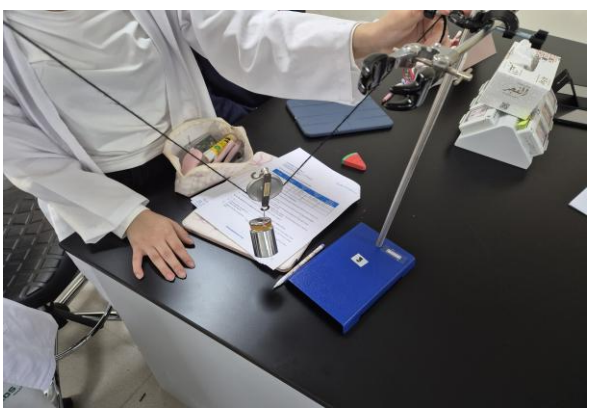
Project Title: Designing and Building a Construction Crane

Objective: Students will design a tower crane incorporating mechanical elements such as pulleys or levers to lift small loads, applying engineering principles to create functional models.

Cross-Curricular Connections:

- **Science:***Physics Concepts:* Explore forces like tension and equilibrium to understand crane mechanics. *Simple Machines:* Learn about pulleys, levers, and gears to grasp mechanical advantages in crane operations.
- **Technology:***CAD Software:* Utilize 3D design tools like Tinkercad or SketchUp to draft and refine crane designs.
- **Engineering:***Design Process:* Follow the engineering cycle—Define, Plan, Create, Test, and Improve—to develop and enhance crane models.*Structural Integrity:* Focus on balance, stability, and load distribution to ensure functional designs.
- **Language Arts:***Technical Writing:* Document the design process, detailing steps and reflections. *Presentation Skills:* Prepare and deliver clear explanations of crane projects, emphasizing design choices and learning outcomes.
- **Math:** *Weight & Load Calculations:* Determine the weight capacity of crane designs and calculate mechanical advantages.
- **UAE Connection:** Study iconic UAE structures like the Burj Khalifa to understand the role of cranes in skyscraper construction, exploring the engineering feats involved.
- **SDG 9: Industry, Innovation, and Infrastructure:** Promote sustainable industrialization and foster innovation through hands-on engineering projects.

Learning Station : Nickel lever



LS: Exploring Pulleys

3d Model of a construction crane

Oral Presentation

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Grade 10 : STEAM

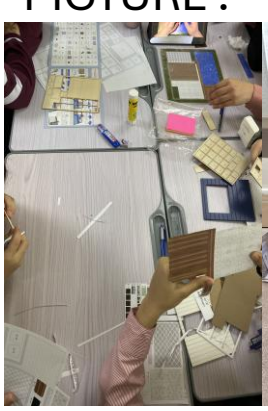
PROJECT TITLE : SMART HOMES

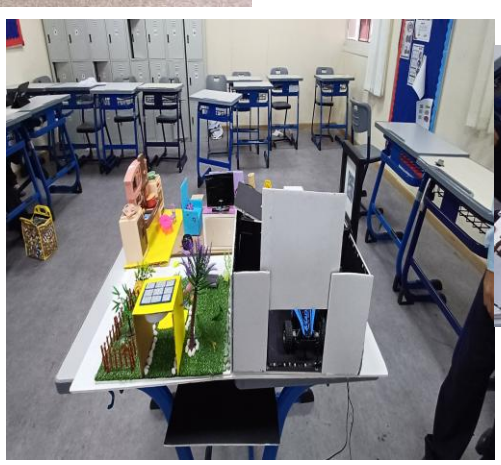
OBJECTIVE : Design and model a **smart home** that integrates **energy-efficient** and **sustainable** technologies.

Cross curricular subjects :

- Science: Understanding energy sources (renewable vs. non-renewable energy).Exploring circuits, electricity, and smart sensors in home automation. Studying environmental impact and sustainable living practices.
- Technology: Incorporating **smart devices** (IoT, motion sensors, automated lighting, smart security).Researching how **AI and automation** contribute to efficient home management.
- Engineering : Constructing mini-models with materials that simulate real-world applications.
- Language Arts : Writing a **project report** explaining their smart home design.Presenting their ideas in a clear, structured way. Creating persuasive arguments on why smart homes are essential for the future.
- Math : Calculating **energy consumption and savings** with smart technology.
- UAE link: Aligning with the **UAE Vision 2050** for **sustainable urban development**.
- Exploring **Masdar City** as an example of a smart, eco-friendly city in the UAE.
- SDG 7,9,11,13:

PICTURE :





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Grade 11 : STEAM

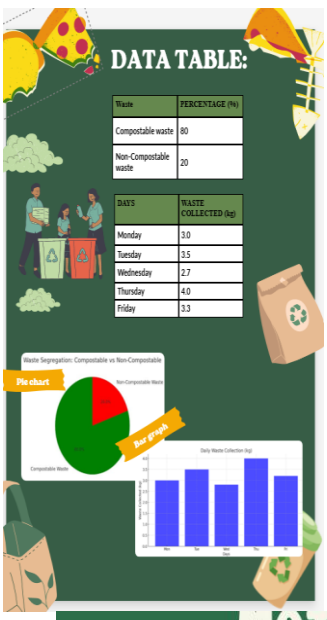
video

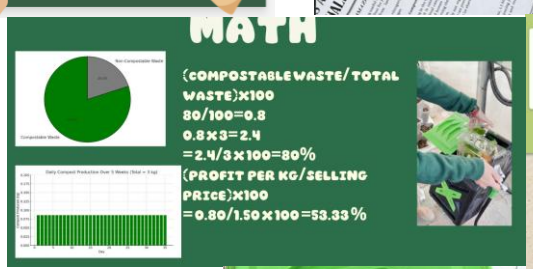
Project Title: Food Waste Management: Implementing Sustainable Practices in Our School

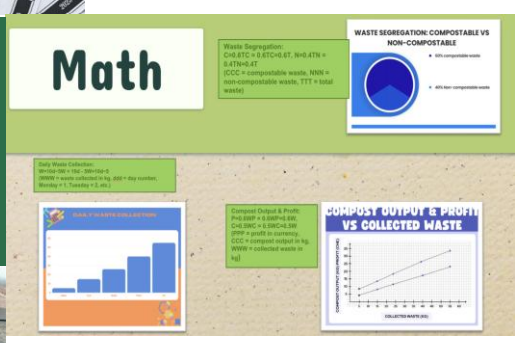
Objective: Develop and execute a comprehensive Food Waste Management Program within our school to minimize food waste, foster environmental responsibility, and educate students and staff on effective waste reduction strategies through composting, recycling, and awareness initiatives.

Cross-Curricular Connections:

- **Science:** Investigate the processes of decomposition and composting, and analyze the environmental impacts of food waste.
- **Technology:** Design and maintain a website dedicated to raising awareness and sharing practical tips on reducing food waste.
- **Engineering:** Develop and construct compost bins or waste collection systems tailored to our school's needs.
- **Language Arts:** Create informative posters, compose articles, and deliver presentations to effectively communicate waste reduction messages.
- **Math:** Collect and analyze data on food waste, calculate reductions, and present findings using charts and graphs.
- **UAE Connection:** This initiative aligns with the UAE's Food Security Strategy, which emphasizes reducing food waste as a key pillar to enhance food security.
- SDG: 2, 12, 13







These photos capture our exciting STEM project, where we tackled the problem of food waste by converting it into nutrient-rich compost. Our team collected organic waste, analyzed data, and calculated compost production efficiency using math skills. We designed eco-friendly packaging, grew healthy plants using our compost, and raised awareness about sustainability. Together, we turned everyday waste into valuable resources—proving that small actions can make a big difference for our planet!

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Grade 12 : STEAM

PROJECT TITLE: Designing a Water Treatment System Model

OBJECTIVE: Design, construct, and test a small-scale wastewater treatment system incorporating physical, chemical, and biological treatment methods.

Cross curricular subjects:

- Science: Understanding the chemical and biological processes of water purification.
- Technology: Create a website and video showcasing the project. Use software tools for data analysis to evaluate and optimize the efficiency of the treatment process.
- Engineering: Constructing an efficient filtration system using cost-effective and sustainable materials.
- Language Arts: English: Project report, Design of the dispenser.
- Math: Calculate the flow rate by varying the amount of charcoal in the multilayer filtration column.
- Islamic: Use of natural resources wisely (Holy Quran & Hadith)
- UAE link: The UAE Water Security Strategy 2036
- SDG: 3,6,11,12, 14 and 15

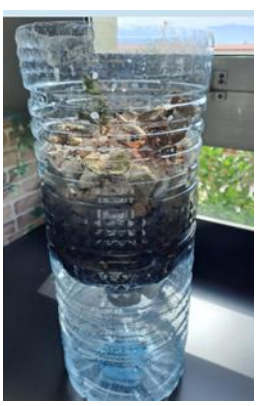
PICTURE GALLERY

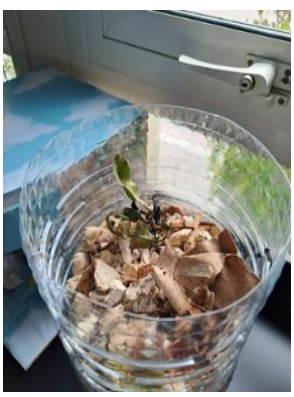
Making Every Drop Count: The Science Behind Water Purification

Step 1 : Simulation of contaminated water sample

Step 2: Chemical analysis of the contaminated water sample.

Step 3: Microbial analysis of the raw water sample.





Step 4: Multi-layer filtration

Step 5: Activated sludge process

Step 6: Coagulation and flocculation

Step 7: Distillation

Step 8: Chlorination

Step 9: pH testing

Step 10: Calculation of flow rate

Step 11: Construction of automatic water dispenser