Garfield School District

December 2022

TRIMESTER 1 NEWSLETTER

The Many Branches of Engineering

GIFTED & TALENTED PROGRAM

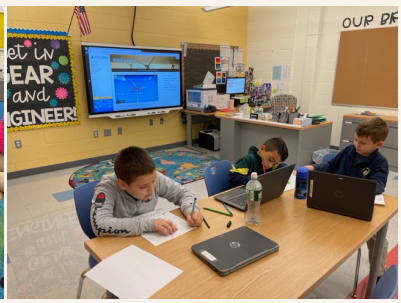
INSTRUCTOR: MS. JENNIFFER DEWITT

Gifted instruction for the 2022-2023 school year will bring the wonder of the various branches of engineering to the Gifted & Talented Classroom! All students enrolled in the G&T program will experience the extensive branches of engineering through various media and STEAM-based learning experiences.

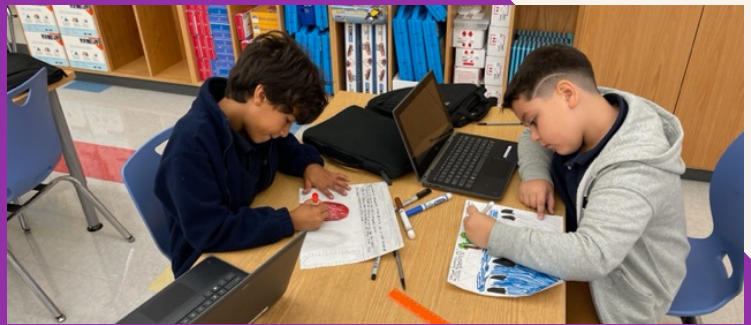
Our students can change the world!! Imagine what life would be like without pollution, controls to preserve the environment, lifesaving medical equipment, or low-cost building materials for fighting global poverty. All of these require engineers. In very real and concrete ways, engineers save lives, prevent disease, reduce poverty, and protect our planet.

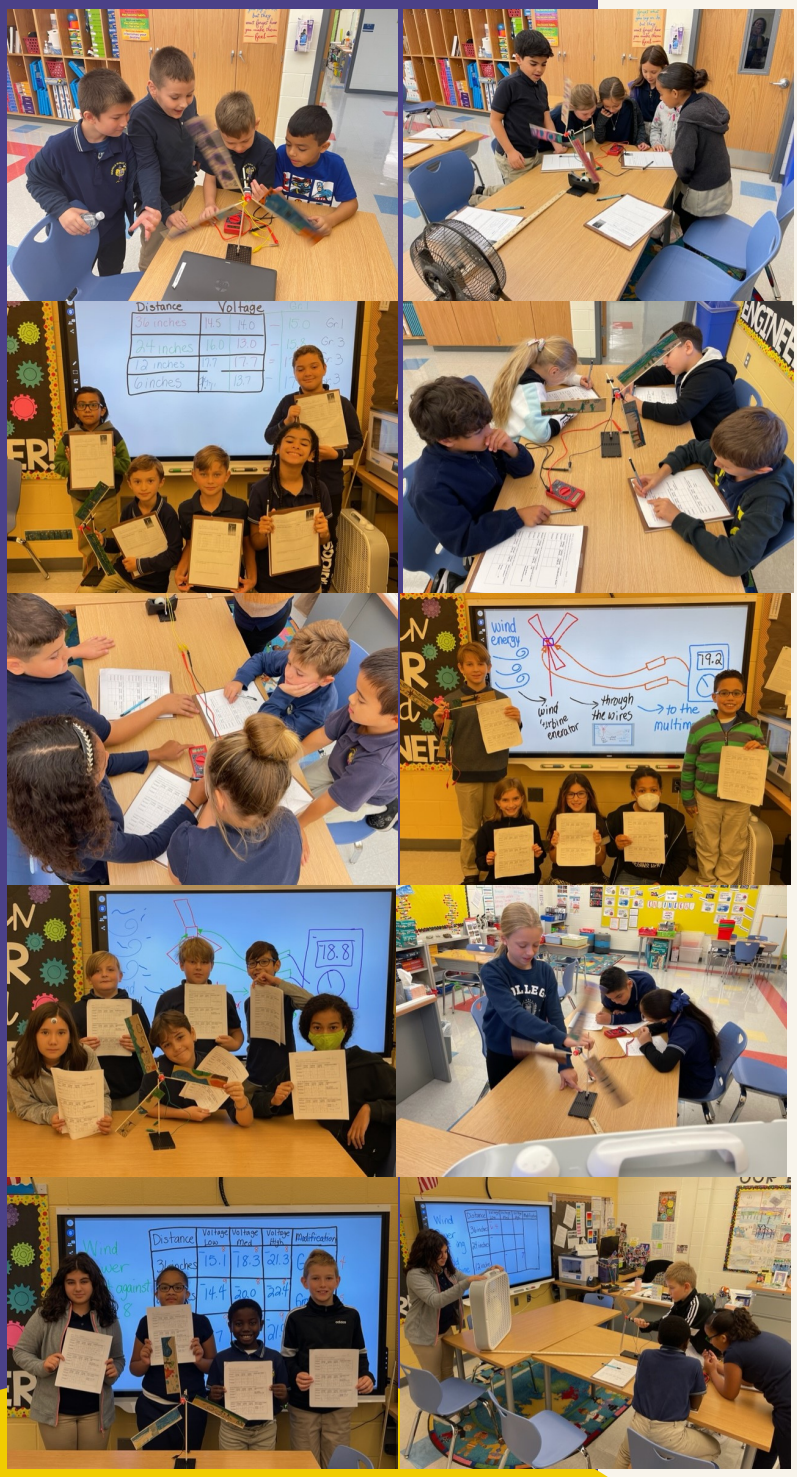
An engineering degree offers our students a lot of freedom in possibly finding their dream job. It can be a launching pad for jobs in business, design, medicine, law, and government. To employers or graduate schools, an engineering degree reflects a well-educated individual who has been taught ways of analyzing and solving problems that can lead to success in a wide range of fields.

RENEWABLE ENERGY



The students explored the different roles engineers have that work in renewable energy fields. They work to create a sustainable environment – which is an environment that contributes to the greater health, happiness, and safety of all. They participated in group and individual S.T.E.A.M. activities having them work as "Engineers" to recreate and design sources of renewable energy to improve our world and way of life. Engineers can use sun, wind, and water power to create electricity to run our homes, cars, and everything else. Wow! What incredible engineering creativity!

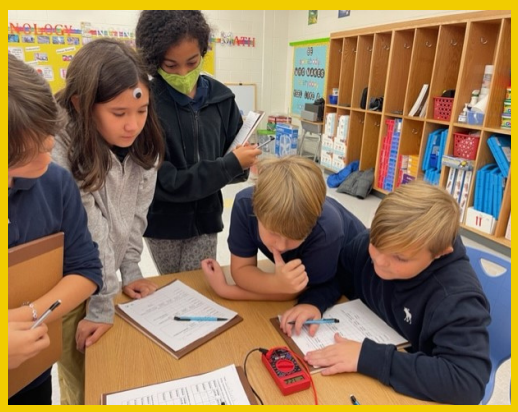




WIND ENERGY
BUILDING A WIND TURBINE PROTOTYPE

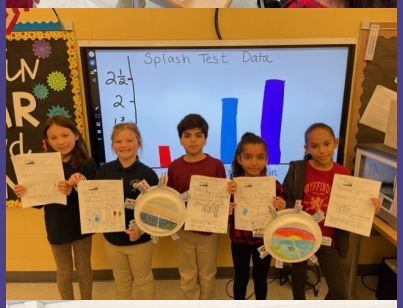
Engineers design wind turbines that turn the kinetic energy of the wind (the movement) into mechanical or electrical power. Engineers must design turbines and generators that work under all weather conditions from severe weather to typical windy days. If the wind turbine is improperly designed, it might fall apart in a severe windstorm. Electrical engineers find ways to ensure that extra energy generated during windy periods can be stored for use during calmer times.

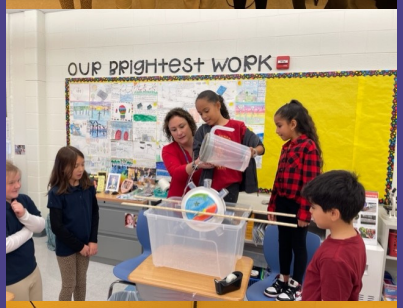
Engineers have also designed wind farms to protect wildlife. They are involved in research projects to address and reduce bird deaths from wind plants in a variety of settings. The students became "engineers" and created small-scale wind turbines that convert wind energy connected to a motor into electrical energy (voltage). Then, they measured how the wind speed affected our little wind turbines. This helped us understand what engineers need to know when designing and placing wind turbines in the best locations to generate the most clean energy.

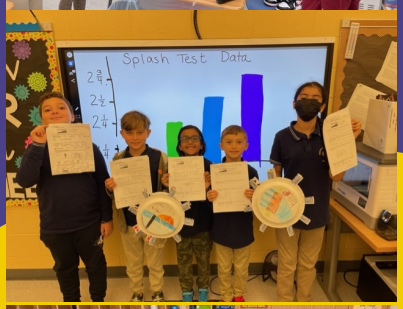


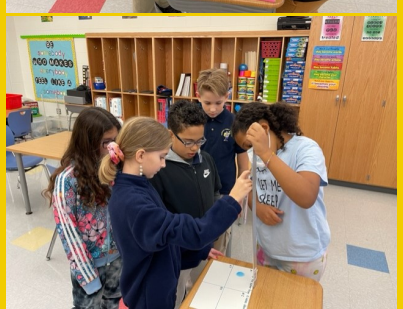
HYDROELECTRICITY & ENGINEERING
CLEAN ENERGY FROM
THE POWER OF WATER

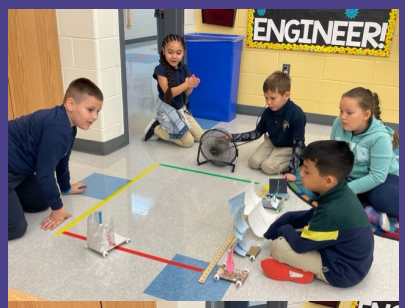
Engineers design hydroelectric dams to take advantage of the conversion of water's potential energy to kinetic energy, and then mechanical energy to electrical energy. Since the force of kinetic energy is dependent on the height and mass of the falling water, civil engineers take this into consideration when designing dam turbines. Civil, structural, mechanical, electrical, software and environmental engineers work together to make this happen. The students learned the history of the water wheel and common uses for water turbines today. They explored kinetic energy by creating their own experimental waterwheel from regular household items. They also experimented with how the weight of water affects the rotational rate of the waterwheel. In this lab, the students dropped water from different heights to demonstrate the conversion of water's potential energy to kinetic energy. They saw how varying the height from which water is dropped affects the splash size. They followed good experiment protocol, took measurements, calculated averages and graphed results. In seeing how falling water can be used to do work, they also learned how this energy transformation figures into the engineering design and construction of hydroelectric power plants, dams and reservoirs.

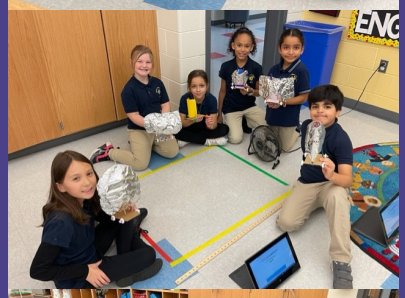


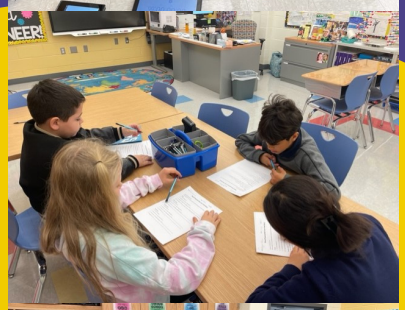












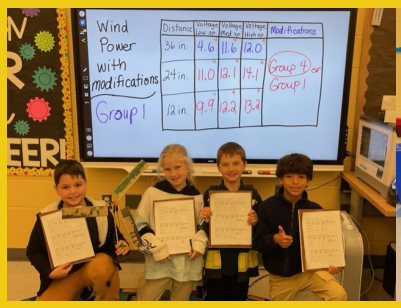
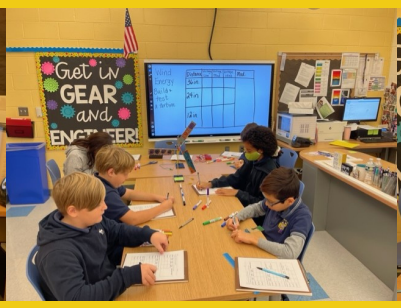
TRIMESTER 1 HOME PROJECT
ENGINEERING WIND POWERED SAIL CARS

A typical car uses gasoline to make it go. Gas is the energy source that powers the car. The wind is the energy source that powers a sail car. Sails were the first devices used to capture and harness wind energy which traces back to ancient Egyptian times. There are artifacts that show sailboats and some evidence indicating that sailing was in use thousands of years before the Egyptians. Today we use wind turbines to generate clean, inexpensive electricity that can, in turn, be used for many purposes.

When we see the wind pushing a sail car, we can think of that process as a transfer of energy. The kinetic energy in the wind is transferred to kinetic energy in the sail car. The students designed and constructed small, wind-powered sail cars using limited quantities of drinking straws, masking tape, paper, and beads. Then we held an Engineering Field Day and they competed within their groups against themselves to see if they could beat their fastest time recorded when pushed by the wind (simulated by the use of an electric fan). Students learned about wind, kinetic, and renewable energy and followed the seven steps of the engineering design process to ask, research, imagine, plan, create, test, and improve their sail cars. This activity was part of a unit in which multiple activities were brought together and connected.



Get in
GEAR
and



Wind Power with modifications
Group 1

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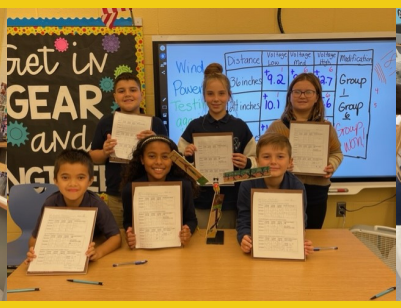
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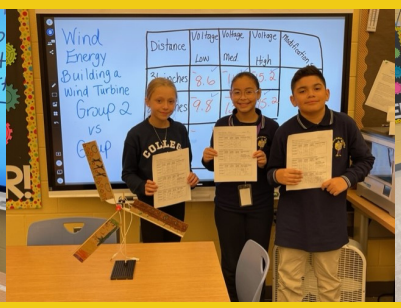
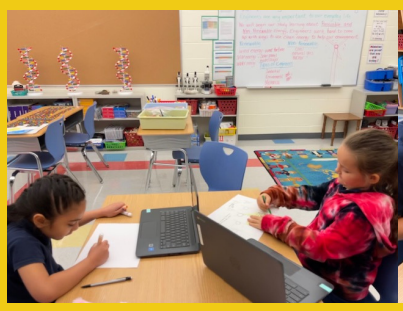
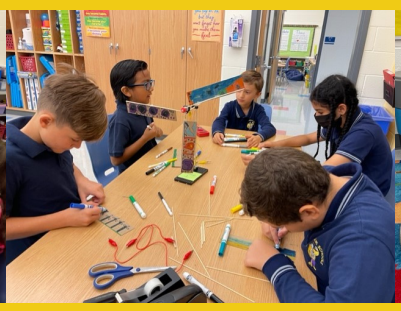

Wind Energy
Building a Wind Turbine
Group 2
vs







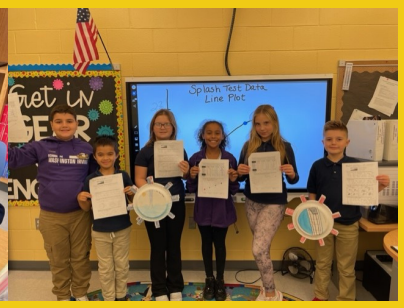

ENGINEER!




brightest WORK


GEAR and ENGINEER

brightest WORK


Splash Test Data
Line Plot

Splash Test

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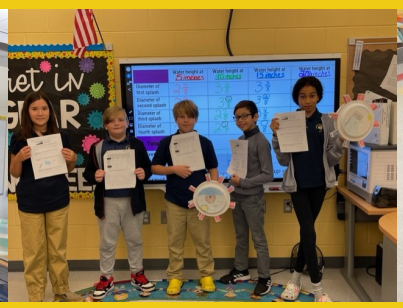


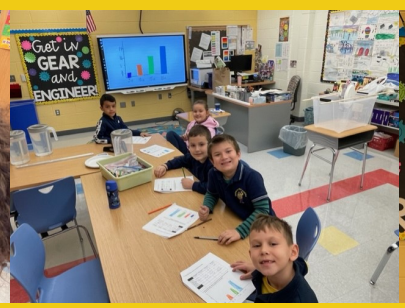
GEAR and ENGINEER


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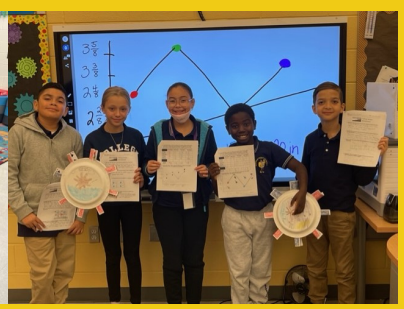

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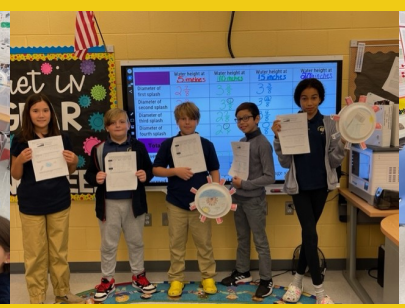
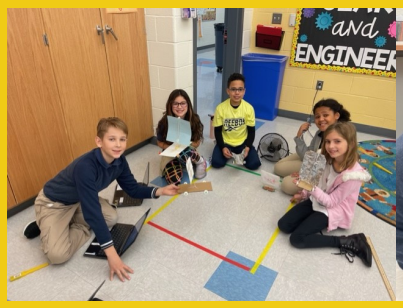






our brightest work

and
ENGINEER



Sail Car Projects
Let's talk about
Potential Energy: energy stored by an object because of its position.
Kinetic Energy: energy of motion; does the work.
Mechanical Energy: energy that can be used to do work.
It is the combination of kinetic + potential energy through a machine.
NICE to be important
IMPORTANT to be NICE
Mistakes are proof that you are trying!

and
ENGINEER!

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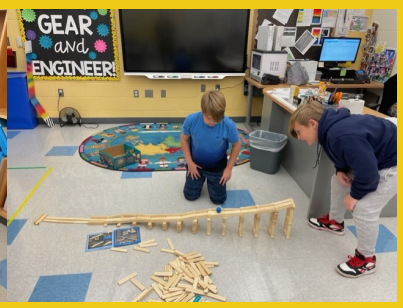
GEAR
and
ENGINEER!


Get in
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