

STEM September/October 2023 Summary

Grade 2

Grade 2 was introduced to STEM by learning the STEM stands for Science, Technology, Engineering and, Math. Students watched a video of Ormie the pig, who tries various ways to get the cookie jar down from on top of the refrigerator. Ormie demonstrates perseverance and determination which are needed when trying new things in



STEM Class. Students then were given an engineering challenge to build the tallest structure as a group with the I Can Build It Construction Planks.



Students were then introduced to Google Drawing where they learned to type their names, change the font size and color, add shapes and also change the size and color.

Finally student's learned about traveling safely when they are online. Students learned they should:

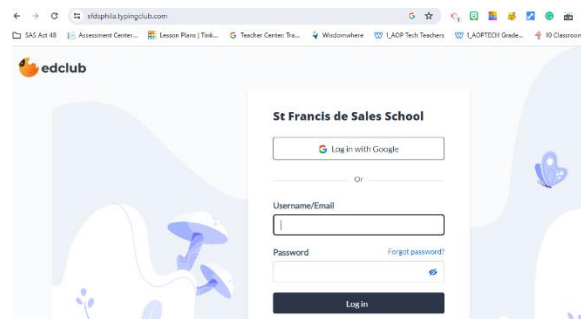
1. Always ask their parents first before going online
2. Only talk to people online that you know
3. Stay on sites that are just right for them

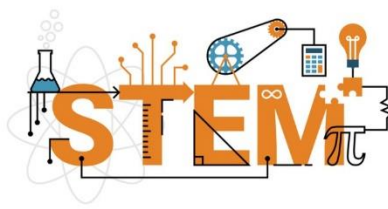
Grade 3

Grade 3 was introduced to the Engineering Design Process: Ask, Imagine, Plan, Create and Test. Students were challenged to build the tallest structure using Magna Tiles.

Students, in the next class, were introduced to Google DOCS. Students typed their names, change the font style color and size and then added an image to their document.

Students moved on to practice their typing skills using account online via the Typing Club. Students began with hand placement on the keyboard and then practiced typing keys from the home row.





Grade 4

Grade 4 was challenged to build the tallest structure using the Young Architects Design Blocks. Students used the Engineering Design Process as



a group to come up with a design that could stand on its own. Next students practiced formatting in a Google Doc. Students were given a Color poem by Christina Rossetti, where they had to change any word of color to that

color, Bold any word beginning with a capital “W”, italicize all “?”, and add some pictures of things in the poem. Finally students were asked to use Google Docs to create a poster for the Virtue of the month,

which was “studiousness”.



Grade 5

Grade 5 was challenged to creatively build the tallest structure with 50 paper cups.

Students then learned the parts of a Friendly Letter (Heading, Greeting, Body, Closing, and Signature) and were asked to create their own friendly letter based on what they learned. During Digital Citizenship week students learned about how to keep online games fun and friendly.



Finally student were assigned one U.S. State that they needed to research online. Students will use this information in November to create their own state brochure.

Grade 6

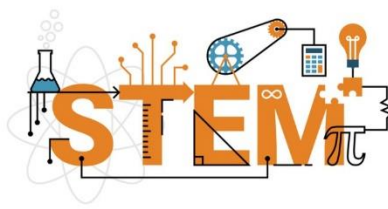


Grade 6 was challenged to build the tallest structure that would stand on its own using 12 sheets of paper and 2 feet of masking tape.



Students then created their own October 2023 calendar using tables in Google Docs. Students added three National Holidays of their chice and three saint feast days and ecorated the calendar. Now students are learning to use Tinkercad, a

computer aided drawing program. Students will work on creating mazes in Tinkercad and printing them with a 3d Printer.



Grade 7

Students were challenged to build the tallest structure possible with 250 toothpicks and a bag of marshmallows. Students then learned how to use Google Slides to create their own 60 second stop motion animation film. Students used pictures and words to create the stop motion animation films.

Grade 8

Grade 8 began the year with an Engineering Design challenge to build the tallest structure with a deck of cards



Artificial Intelligence

Using Code.org Students learned how to help A.I. (Artificial Intelligence) clean the oceans by training it to detect trash. Students also learned about training data and bias, and how AI can address world problems. Students also learned about two types of machine learning: supervised and unsupervised and were asked to compare how machine learning can be similar or different to how humans learn.

Engineering Hard Hat

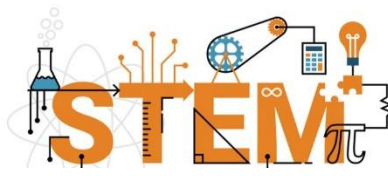
A group of eighth graders met with the construction workers that have been working on the St Francis de Sales Church. They discussed several topics related to the construction and answered students questions.

Safety

The Safety Consultant spoke to students about construction site safety. For safety reasons certain clothes are required on a construction site including a hard hat that should be worn around scaffolding in case anything is dropped from above, a high visibility vest, safety glasses in case of flying objects, hoodie, long pants, and steel toed boots.

Students were each given a hard hat and then divide into 2 groups and listened to a presentation from the architect and another from the builder.

Architect



Father Banecker introduced students to the session by informing them that the building of the church began in 1907 and was completed in 1910-1911. The architectural style of the building is Byzantine. Byzantine architecture is known for soaring spaces, sumptuous decoration, marble columns and inlay, mosaics on the vaults, inlaid-stone pavements, and sometimes gold coffered ceilings.

Annabelle the architect told students she was hired back in 2007 to begin work on the preservation of the St Francis de Sales Church. They began with the roofs and are now working on stone and mortar around building.

Annabelle mentioned that the structure is Agostino with a 62 feet wide dome. The inside of the dome is 4 inches thick including four 1 inch tiles all around.

The architects use enterprise grade drones with thermal, wide zoom and regular cameras to get pictures of building façade so that they can identify voids behind the outermost stone. These pictures also identify temperature. Water retains moisture which makes the building warmer. When architects see pictures of moisture they focus on areas containing moisture.

Architects also use ground penetrating radar, which is radar used to take pictures to see holes and gaps behind the stone. Behind the outward facing stone is rubble packed tightly with mortar. Over time this mortar gets washed out or voided and expands due to freezing. This eventually pushes the stone outward causing the building to possibly become unstable.

After the areas with issues are identified the builders pull the old stone out, pack it with mortar and anchors and then place it back in the building with mortar. The face of the stones are tied into wall with anchors attached to masonry. Builders repoint the stone with mortar while smoothing it out to match the other parts of the building.

Architects also use a mallet to sound the stone. They tap for sounds such as a loud thud which indicates hollow voids.

Rovers with 3d camera are also used by architects to get in low tight spaces. The rover's wheels enable it to move forward, backward, and side to side. Rovers can also be coded to move.

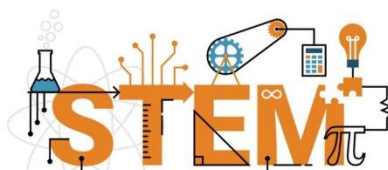
Builders

The builder, Chuck, who was a former Biology teacher that did masonry work in the summers, stated that St Francis de Sales Church is made up of three types of stone: white marble, granite, and limestone.

Marble is a softer rock and the type used at St Francis de Sales Church does not have a smooth face. New marble stones are brighter in color than those that have aged. Fresh marble stone is a lot softer when gotten out of ground. If white marble is placed in the ground it will absorb colors from the ground.

The granite used is hard Belgium block and can be found near the bottom of the building and the steps. The granite does not absorb water and will not get damaged if salt is thrown on it to melt ice.

All stone is cut to size using a saw with diamond blades. As the blades are used they wear out and blades get smaller. The builder showed students an example of each blade. Water is used while cutting to reduce the amount of dust from the stone.



The mortar for joints (most expensive part of job due to the time involved) is comprised of all different mixtures, but the mortar mixture ratio is a 1-1-6

- 1 part white cement (which must be used with white marble)
- 1 part lime, which has high water retention making it stickier
- 6 parts brown sand

Scientists can analyze sand to determine its components.

SJU Chemistry presentation for 7th and 8th grade

Demonstrations for Solids/Liquids/Gases

THE REFILLING VASE:

Action: Exaggerate pouring water from a silver vase into a beaker *repeatedly*

Question to Class: What is the water? What are some of the properties of water?

Students' Answers: H₂O liquid, it has flow, It is clear. etc.

Discussion:

Water is H₂O

It exists in 3 phases: solid with its own shape, liquid taking the shape of the container and gas taking the shape of the container and you cannot see it.

POLYMER IN A CUP

Action: Drink water from a bottle. Stop. Apologize and tell the class you are pouring it into a cup to demonstrate good manners.

Question to class: What are some of the uses of water?

Students' answers: Water plants, shower in it, do laundry, cook with it, drink it

Discussion: Focus on "drink it" answer by performing the above action

Water as a liquid has flow and therefore if I turn this cup over the water should spill out

Demonstrate over student's head. Water does not spill out.

Question to class: Why did this happen? Why didn't the water spill out?

Students Answers: Vary

Discussion: Earlier I placed a small amount of polymer in the cup

Pass it around and let student touch it.

Polymers are small units repeated many times

They get hooked together when water is added to form long chains

Question to class: Now think like a business person not like a scientist. What are some uses for this?

Students Answers: Vary

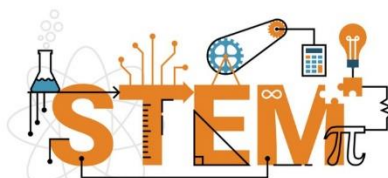
Discussion: Diapers and water retainer in soil

Side note: Extraction of Polymers from Diapers Experiment/Handout



THE WATER GLOVE

Action: Place an object in a beaker of water



Question to class: Help me think of a way to retrieve the paper clip from the bottom of this beaker without getting my hand wet. I cannot use a tool. I cannot add heat and I cannot move the beaker.

Students' answers: Wait for it to evaporate---too long.

Use a hanger---no tools

Pour out the water---cannot move it.

Discussion: The scientist is going to use a chemical to form a “water glove”

The molecules in the center of the beaker are surrounded by like molecules and are happy.

The molecules on the top of the beaker are not surrounded by each other and they are also in contact in air.

These water molecules therefore bond closer together and form surface tension.

The lycopodium plays with or utilizes the surface tension idea to form a water glove.

Voice Changing from Helium

Action: Inhale helium from a balloon and notice that your voice goes up.

Question to class: Why does a balloon float?

Discussion: Helium in the balloon is less dense than air.

Question: What happens if I inhale the helium? In a squeaky voice?

Answer: My voice will get higher.

Question to class: Why?

Discussion: The vocal chords vibrate at a certain frequency when surrounded by air.

When I inhale helium I am changing the density of the air around my vocal chords. Helium is less dense than air.

They now vibrate more quickly because the less dense helium allows them to move more quickly and my voice goes up. If I inhale dense gas my voice would go deeper but the gas would have a difficult time leaving my lungs.

Student then used liquid nitrogen (nitrogen oxide) to make ice cream with milk, vanilla, sugar, strawberry or chocolate syrup and cones.

