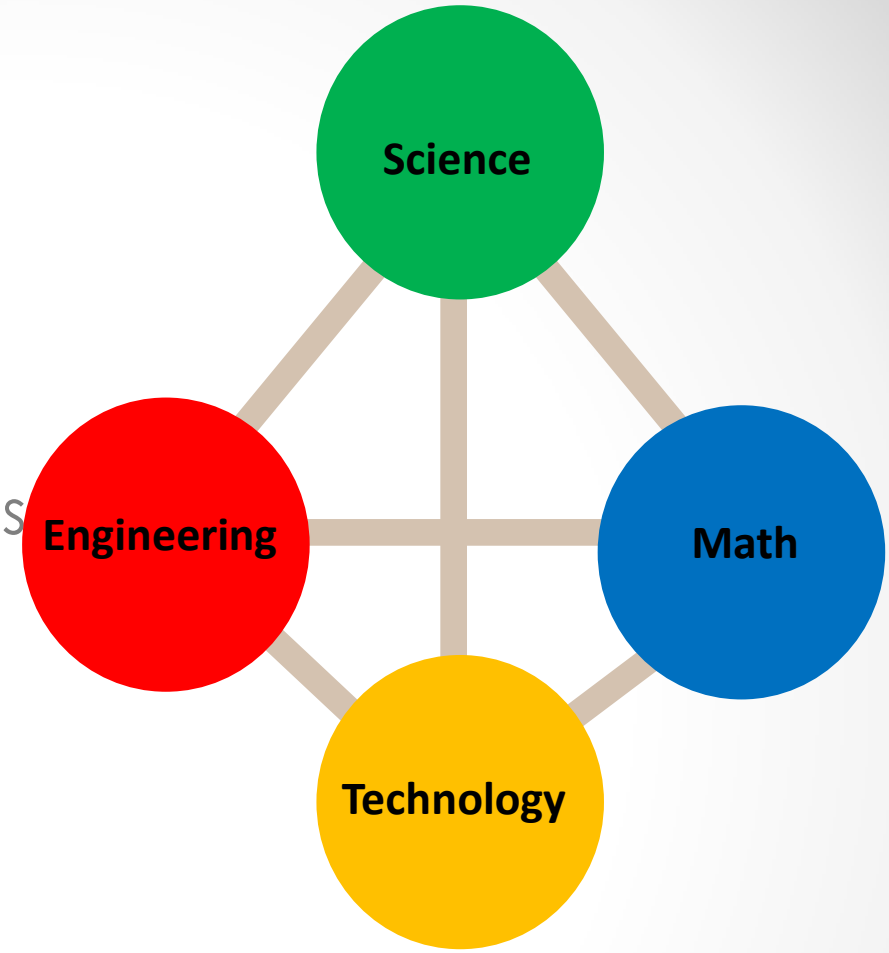
Stem/STEAM Education

Why is STEM education Important?

- **Integrates** the study of Science, Technology, Engineering & Mathematics
- Uses **Scientific Inquiry** & **Engineering Design** as unifying templates or themes



STEM Education

STEM Education

- Emphasizes **21st-Century Skills (4 C's)**
  --**Critical thinking & problem solving**
  --**Communication**
  --**Collaboration**
  --**Creativity & innovation**

- **Rigorous** & **relevant** learning

What is STEM?

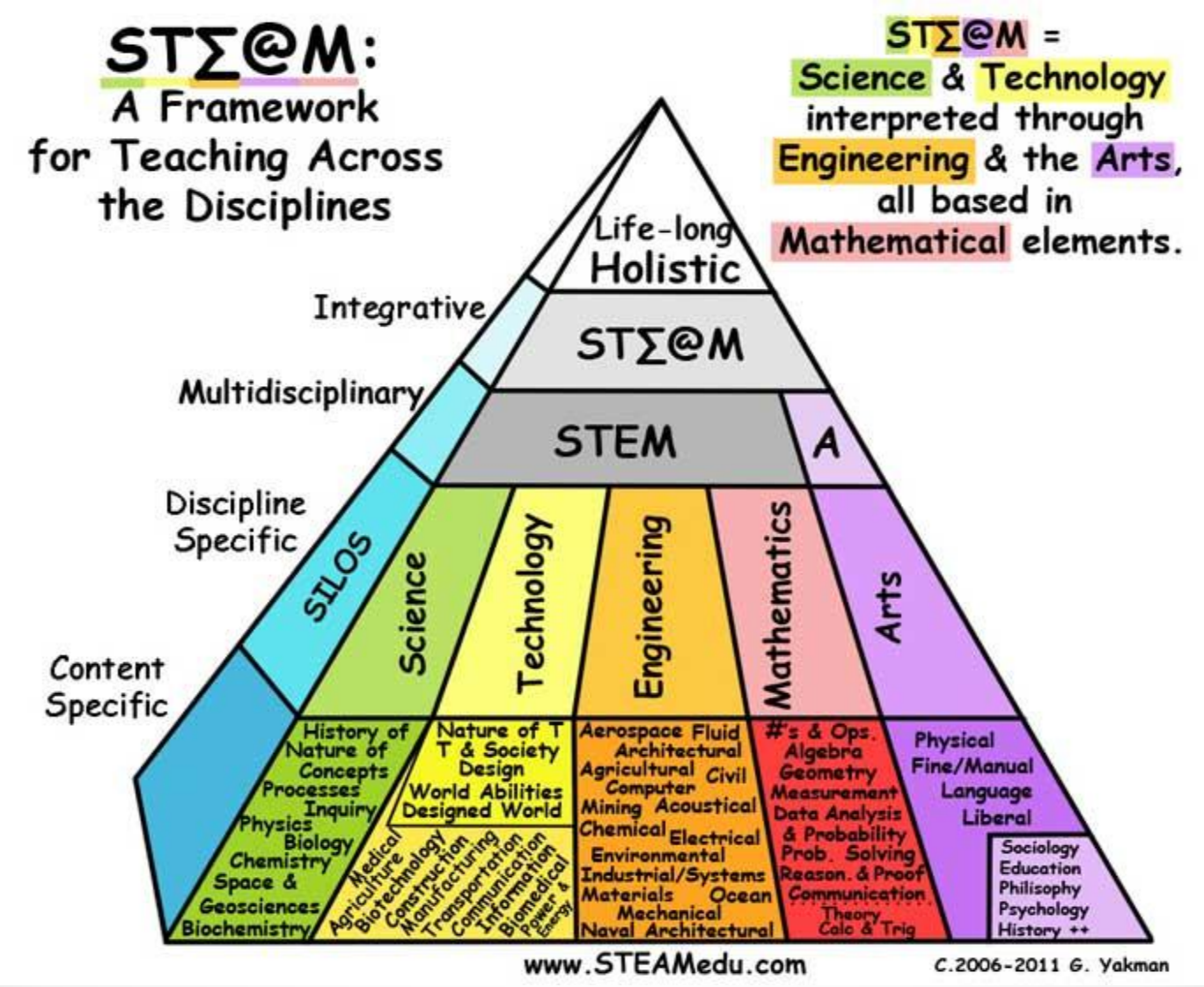
STEM

- Student-centered
- Inquiry-based
- Integrates Science, Technology, Engineering, and Math
- Emphasizes innovation, problem-solving, critical thinking, and collaboration
- Rigorous, relevant, and authentic learning

Not STEM

- Teacher-centered
- Robotics only
- Subjects taught in isolation
- Highly specialized for an elite group of students
- Only for those interested in Science, Engineering, Technology, or Math

http://www.topeducationdegrees.org/stem/

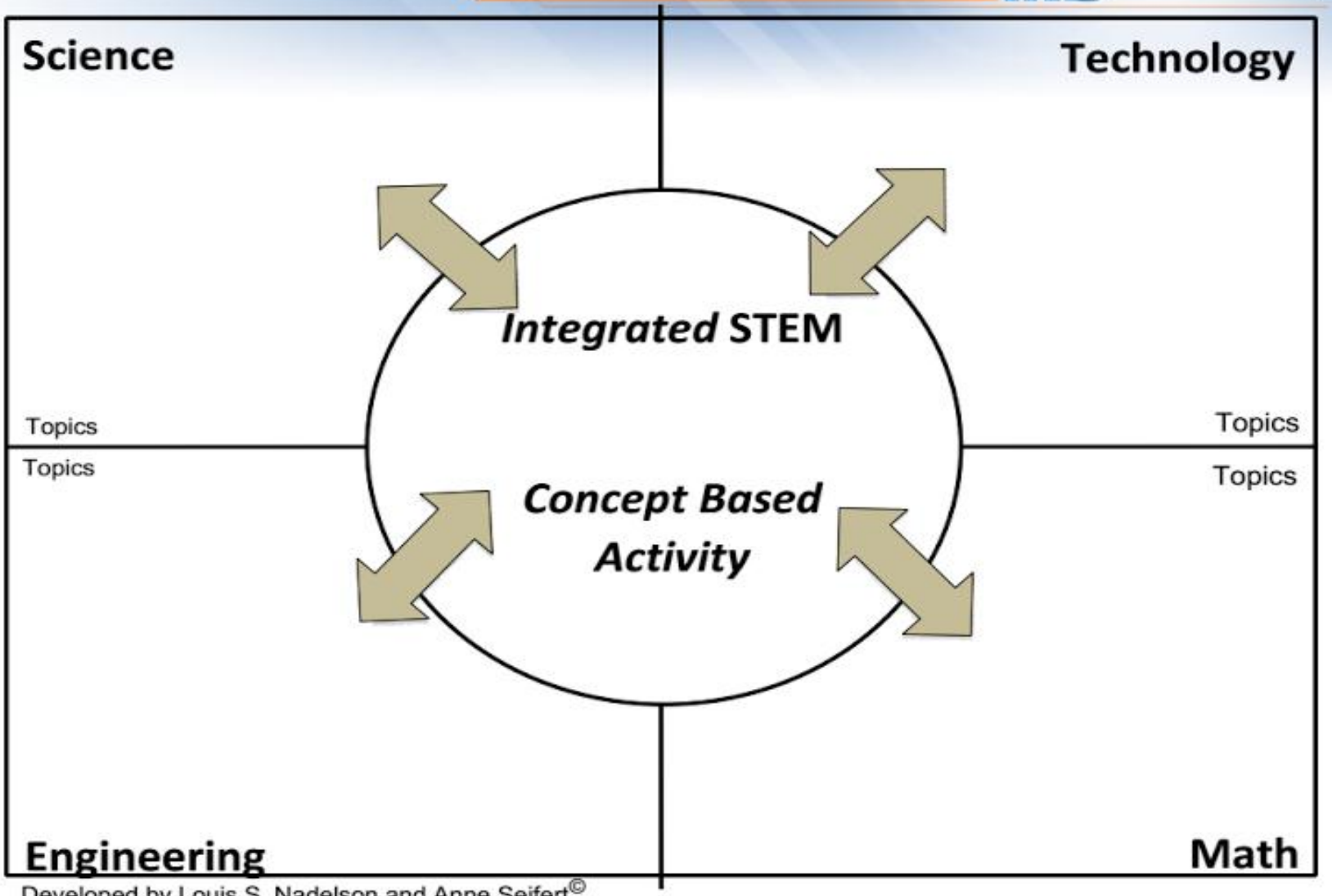


How do I Integrate STEM/STEAM into my lessons?

. . .

STEM/STEAM Lessons: Characteristics

- Rigorous
- Standards-based
- Integrated: STEM (especially T and E)
- Project-based
- Collaborative
- Problem-Solving
- Authentic and "Real World"


Science
Technology
Integrated STEM
Topics
Topics
Topics
Topics
Concept Based Activity
Engineering
Math
Developed by Louis S. Nadelson and Anne Seifert©

The Difference Between Projects And Project-Based Learning

Projects

can represent a range of tasks that can be done at home or in the classroom, by parents or groups of students, quickly or over time.

Project Based Learning

the focus is more on the process of learning and learner-peer-content interaction than the end-product itself.

What are the important factors for Project-based Learning Experiences?

S - Student Choice

A - Authenticity

G - Global Significance

E - Exhibition

(Asia Society)

https://www.teachingchannel.org/videos/pbl-sage-framework-asis

Create a PBL in a STEM/STEAM world?

- What standard(s) do you need to teach?
- What real-world problem or situation can you use to capture students' interest?
- What real-world scientist/career can be attributed - ecologist? engineer?
- Introduce problem; get feedback from students
- Teacher-student create rubric (what are your must-haves; what would your students add?)

Marvel Wants You!

Your team has been chosen to create new superheroes for a series based on weather events and vocabulary. Each week you will learn about a weather event/vocabulary term and design a superhero for each with powers he/she would have being that weather event. You will also need to identify what tools the superheroes need to measure this power; your superhero's allies and enemies; and his/her weaknesses.

As a fifth- grade class, we will select from the designs and detailed descriptions each team creates, and send them to Marvel with a formal letter requesting a new educational series for kids.

Jet Stream - SMARTmarks

S - schema (What do you think you know about the jet stream?)

M - misconceptions/ misinformation
(standard itself led to a misconception)

A - art/visual representation
http://marvel.com/games/play/31/create_your_own_superhero

R - reflection/revision

T - testing framework/examples

Common Core & Essential Standards

5.E.1.1 Students know that weather can change from day to day, and that many factors are measured to describe and predict weather conditions. (EG: wind speed and direction, precipitation, temperature and air pressure). Students know that in different latitudes and hemispheres there are different (and sometimes opposite) seasonal weather patterns.

5.E.1.2 Students know that one can collect and compare weather data in order to predict the likelihood of a particular weather condition occurring. Students know how to read basic weather instruments: thermometer, barometer, anemometer, wind vane, and rain gauge. Students also can identify atmospheric conditions (presence and type of clouds [stratus, cirrus, cumulous], fronts) that are associated with predictable weather patterns. Students can make basic weather predictions using these skills.

5.E.1.3 Students know that local weather conditions are influenced by global factors such as air and water currents. The jet stream is an air current in the upper atmosphere, located over North America that has a powerful influence on the weather conditions there. The jet stream flows from the west to the east and changes location depending on global conditions. The Gulf stream is a warm water surface current in the Atlantic ocean that moves from south of Florida up the eastern seaboard and then across the Atlantic. The Gulf stream moderates weather along the eastern seaboard, warming the air and land there during the cooler months. In the Pacific, there is an oscillation of water temperatures known as El Nino/La Nina. This oscillation impacts the climate of North and South America for long periods of time. form over warm ocean water and are caused by global weather patterns.

Resources for developing BK:

What is the jet stream and how does it work?

https://www.youtube.com/watch?v=huweohlh_Bw

Weather Wiz Kids weather:

http://www.weatherwizkids.com/weather-wind.htm

What is a Jet Stream?

http://wonderopolis.org/wonder/what-is-a-jet-stream/

Hands-on: styrofoam ball with drawing of continents; blue and red ribbon; pins

US map; red and blue crayons; temperatures across US for a day; red ribbon; tape

Other PBL Examples:

- Let's Go Fly a Kite (2nd)
- Fairytale Rollercoaster (3rd)
- Underground Railroad Quilt Codes (4th)
- How the Frog Got Its Hop (5th)

Let’s Go Fly A Kite!

Continent of Asia

International Kite Festival in India

Held every year on January 14th to celebrate the end of winter!

video

Weifang International Kite Festival in China

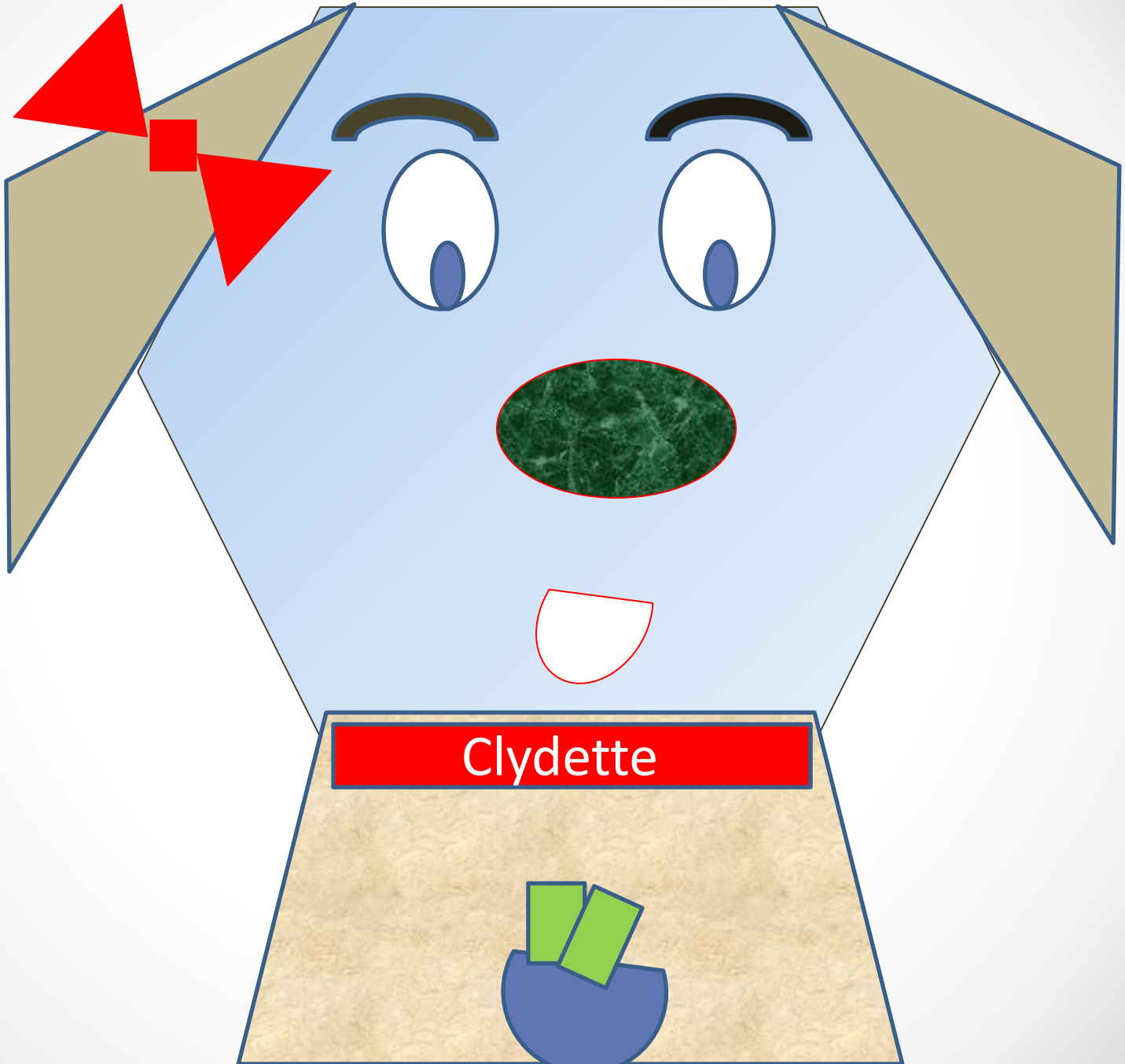
This festival is held every year between April 20 – 25th. Most people consider Weifang the birthplace of kites.

Hamamatsu Kite Festival in Japan

This kite festival occurs May 3rd – 5th. On May 5th, kites are flown to celebrate boys being born to the family.

Clyde Erwin IB Kite Festival!

Your team has been asked to create the very first kites for the Clyde Erwin IB Kite Festival –celebrating all things IB. Your kite will be made from at least 3 different shapes. Each shape will represent a part of IB – an attitude; a learner profile; and a student action you have participated in during this school year. You will create your prototype on PPT and then use that to create a real kite. You will have choices of materials to choose from but will have to purchase them and stay on budget. When the kite is done, we will use our weather skills to test wind speed and our estimation skills to see how high the kite flies!


Clydette

Attributes Questions to Answer

- Is it **2D** or **3D**?
- How many **sides** does it have? (2D)
- How many **edges** does it have? (3D)
- How many **angles** does it have?
- How many **vertices** does it have?
- Is it an **open** shape or a **closed** shape?

Lessons and Activities that have been STEAMED Up

- *Force and Motion*
- *Digestive System*
- *Parachute Drop*
- http://academicinnovation.weebly.com/steam-is-elementary.html
- http://www.ncartmuseum.org/educators/

Questions and Next Steps