EFA Sorties and New Generation Sunshine State Standards

Advanced Sorties

MS Sortie Alpha: Mean Flight II
MA.3.S.7.1; MA.6.S.6.1; MA.6.S.6.2; MA.7.S.6.2; MA.8.S.3.1; MA.8.S.3.2

Students will construct a paper airplane, fly it, generate data, collect data, display the data collected, and use this sortie to understand some selected statistics terms (range, mean, median, mode). Students will also learn how to collect, record, organize, and interpret data collected during an experiment. Students will be required to display the data collected on a histogram, a stem and leaf plot and a line of best fit.

MS Sortie Bravo: Kool Heat
SC.6.E.7.1; SC.6.E.7.4; SC.6.E.7.5

The objective of this sortie is to measure the heat absorption over sand, water, and air. Containers of air, water and sand are heated for timed intervals while digital temperature readings are observed and recorded. Temperature readings are made during a similar cooling interval. After making the temperature measurements and reviewing the data, students should be able to make conclusions about heat absorption over the land and water.

MS Sortie Charlie: Zoom Out II
SC.5.N.1.1; SC.5.N.2.1; SC.5.E.5.2; SC.5.E.5.3; MA.5.G.5.1; MA.5.G.5.2; MA.5.G.5.3

This sortie requires students to select scale-sized planets from a set of Solar System planetary body cards and place the cards in their correct sequence from the Sun. The card set includes the currently known planets and dwarf planets in our system. The second step requires students to predict or place planets in an approximate scale distance from the sun and each other using a meter as an astronomical unit. The last step requires students to use given actual distances to place the cards in the correct order and in a scale distance using scale astronomical units to build a model of the solar system. Although this is designed as an outdoor sortie, an optional method can be used to conduct the sortie indoors.

Sortie Delta: Air Power II
SC.H.1.3.4, SC.C.2.3.1, SC.6.N.1.1, SC.6.N.1.2, SC.6.P.11.1, SC.P.13.1, SC.7.P.10.3, SC.7.P.11.2, SC.7.11.3, MA.6.S.6.2

The objective of this sortie is to compare turbine blade types to determine which blade shape and number will develop the most voltage. A turbine stand, motor, hub and four types of fan blades, and a voltmeter will be provided to student teams. Teams will measure the length and width of sample blade type and calculate the surface area of each blade in the set. Then they will test blades of the same shape by changing the number of blades attached to the turbine hub and the fan speed. Voltage generated by the turbine with the selected blades and blade number and various fan speeds will be observed and recorded on a data collection instrument.

Students will analyze the recorded data and draw conclusions about the area, number, shape of turbine blades and fan speeds that are most efficient at developing the most voltage. An optional step allows students to compare the voltage of a given set of fan blades when used with a turbulent air fan and a laminar air fan.

Sortie Echo: Pace Counter
NGSSS TDB

This sortie requires students to construct a pace counter. A pace counter is a device used to keep a count of the number of steps a person takes to cover a given distance on land. The pace counter may be assembled using the instructions in Part 4 of this sortie. Part 4 of this sortie also explains how to use the pace counter once it has been constructed. The pace counter can be used as an aid to determine the distance to several pre-selected sites. This sortie can be a stand-alone sortie or as a prelude to complete another sortie. The pace counter may be used to complete the sortie entitled *From Here To There* at the USAF Armament Museum or at a teacher substituted location (school) as desired.

Sortie Foxtrot: From Here To There II
Closed End Problem (Solving)
NGSSS TBD

This sortie is designed to help students learn how to estimate ground distances. This sortie requires students to use a student constructed pace counter, their individual 100 meter pace count to determine the distance to several pre-selected locations. Each pre-selected location is a Museum exhibit placard on a stand by the air vehicle it describes. Students and base station stay in communication with the use of two-way transceivers. As this is an outdoor sortie, an alternate sortie should be planned if inclement weather may be a factor.

Sortie Golf: Going Places Soon
NGSSS TBD

This sortie requires students to learn about the global positioning system or GPS and its segments or components. Teachers will provide an overview lesson using the GPS primer material. Teachers will also lead their students to complete the short GPS interactive activity to help students to understand the general GPS concept of operation. Finally, students will get the opportunity to use a handheld GPS device to enter information and use the device displays to locate several pre-selected exhibits at the USAF Armament Museum. As this is an outdoor sortie, an alternate sortie should be planned if inclement weather may be a factor.

Sortie Hotel: Special Delivery
NGSSS TBD

This sortie will require students to **use navigation skills** to locate and fly to delivery destinations. Students will learn **mapping** and **navigation** terminology (**vocabulary**). Students will also need to be able to **find location using latitude and longitude coordinates**. The lines formed from the starting point to the directed deliveries will form

geometric shapes. Students will determine the perimeters and areas of resulting shapes.

This lesson is actually a math lesson designed to focus on number sense, estimation, measuring multiplication, division, geometric identification and measurements, perimeter, area, decimals and fractions.

This sortie is an adaptation of a lesson created by Casey Oliver (Civil Air Patrol Rescue Mission) and is used by permission.

Sortie India: Count Me In
NGSSS TBD

This sortie tasks students to conduct an experiment to attempt to determine the size of the population of a local type of tree lizard. Student researchers will model the method used by researchers in the field. Student researchers will start with a population of tree lizards selected by their teacher but unknown to the researchers. By conducting a number of "capturing" trials, sample tree lizard specimens will be counted and tagged. After tagging (with a rubber band) the specimens will be released into their "habitat".

After the trials are completed, the student researchers will analyze the numbers of tree lizards captured in all the trials, compare the numbers of lizards that were tagged and the numbers of lizards that were untagged and will attempt to determine the size of the population in a specific area. Their estimated population size will be compared to the actual population number. This sortie will help students also learn how to collect, record, organize, and interpret data collected during an experiment.

Sortie Juliet: Tricky Trajectory
NGSSS TBD

Tricky Trajectory This is a straw rocket competition. Student teams will design and construct a straw rocket. Students will design a rocket to be used with a straw rocket (air) launcher. Students will launch the rocket, generate data, collect data, and analyze the data. Data will be used to modify the rocket as needed to successfully launch it and land it inside a 24-inch plastic target circle and a five-gallon container with sides, both 20 feet from the launcher. Just like early rocket pioneer Robert Goddard, they can conduct scientific experiments by varying the trajectory angle and launch energy.

Sortie Kilo: Make it The Widest
Closed End Problem (Solving)
SC.5.N.1.1; SC.5.N.2.1; SC.5.N.2.2; MA.5.G.5.1; MA.5.G.5.2; MA.5.G.5.3

Most engineers agree that their primary role is in figuring out the solutions to problems of one sort or another. Sometimes engineers brainstorm with other engineers or other technical specialists to resolve a problem. This activity is an example of a problem that has a fixed number of pieces and people working on it. The problem is to build the widest freestanding structure that can be built using only imagination, creativity and the wooden construction set provided. **No other items may be added or used.** The challenge is to build the widest freestanding structure with the fewest number of

ground contact points. Scoring will include earning points for the structure with the widest measurement and the least number of ground contact points.

Sortie Lima: NXT Robotics
NGSSS TBD
This sortie is under development.

Teacher Requested Activity Teachers will be encouraged to select a FL DOE Next generation Sunshine State Standard for the EFA team to develop into an activity for use at the Air Force Armament Museum during future class visits.
Teachers may also suggest SSS to be developed into sorties by the EFA Team.
The goal of the EFA Team was to develop a total of 26 sorties. We currently have 27 in operation and two under development. EFA Lead Teachers may use operational sorties either at the Museum or at their respective schools.

EFA TTT Vocabulary

Acceleration
Rate of change in velocity usually expressed in meters per second; involves an increase or decrease in speed and/or a change in direction.

Air resistance
Force of air on moving objects.

Circuit
An interconnection of electrical elements forming a complete path for the flow of current.

Conservation of energy
A fundamental principle stating energy cannot be created nor destroyed but only changed from one form to another.

Dependent variable
Factor being measured or observed in an experiment.

Efficiency
The relative effectiveness of a system or device determined by comparing input and output.

Electromagnetic radiation
The emission and propagation of the entire range of electromagnetic spectrum including: gamma rays, x-rays, ultraviolet radiation, visible light, microwaves, and radio waves.

Independent variable
The factor that is changed in an experiment in order to study changes in the dependent variable.

Inertia
The property of an object, due to its mass, by which it resists change in its position unless overcome by force.

Magnetic field
The region where magnetic force exists around magnets or electric currents.

Mass
The amount of matter an object contains.

Potential energy
Energy stored in an object due to the object's configuration and position.

Pressure
The force exerted per unit area.

Radiation
Emission form of energy in the form of rays or waves.

Screw
A type of simple machine that consists of an inclines plane wrapped around a cylinder.

Speed
Amount of distance traveled divided by the time taken; the time-rate at which any physical process takes place.

Variable
An event, condition, or factor than can be changed or controlled in order to study or test a hypothesis in a scientific experiment.

Velocity
The time-rate at which a body changes its position; defined as displacement divided by the time of travel.

Wedge
A type of simple machine that consists of an inclined plane used to separate two objects.