Drexel-SDP GK-12 ACTIVITY

Subject Areas: Physical Science, Variables, Cryptography, Technology and Society

Activity Title: Cryptography and Coding

Grade Level: 5 (5–8)

Time Required: 1 week, 2 classes/week & 1hr per class

Group Size: 1 student

Expendable Cost per Group: $0 USD

Summary:

Students will learn the basics of how information is encoded and decoded. This activity can be used to augment curricular lessons, particularly those involving position and direction as well as understanding the effect of a single part to the whole. The students by the end should become familiar with the basics of airplane parts and the ability to identify the different forces acting on a plane and the manipulation of the airplanes parts to get a better design.

Keywords:

Cryptography, code, computers, primer, binary language

Educational Standards:
3.1.7a, 3.1.7e, 3.2.7b, 3.4.7c

Learning Objectives:
After this lesson, students should be able to:
- Learn the different parts of the airplane and the forces acting on the airplane.
- Learn to adjust parts of the airplane to maximize flight distance.
- Using scale models in experiments

Materials List:

Each student needs:
- Lab notebook
- Pen or pencil

Procedure:

Secrets, Secrets are no fun unless they're shared with everyone!!

We all have secrets that we don't want people to see. So we produce codes that hide our secrets. Nothing stays a secret for long and many people have worked on making and breaking codes, this discipline of mathematics is called cryptography, which is the practice and study of hiding information.

Cryptography is the shadowy part of science that has been important in so much of the spying and today's society that we take it for granted. Let's uncover their secrets and see if we can develop some of our own codes.

The first step to uncovering a secret is finding a primer. A primer translates the code from gibberish to our language so that we can understand it. An example of a primer is shown below. This called Morse code. Morse code uses two digits (dots and dashes) to represent the alphabet. Take a look at Morse code below.

A	.-	N	-.
B	-...	O	---
C	-.-.	P	.--.
D	-..	Q	--.-
E	.	R	.-.
F	..-.	S	...
G	--.	T	-
H	....	U	..-
I	..	V	...-
J	.---	W	.--
K	-.-	X	-..-
L	.-..	Y	-.--
M	--	Z	--..

Using the primer, we can send and translate messages that otherwise we would not be able to understand. Try and send a message to your partner across the table in Morse code. Then let them decipher your message.

Modern computers, also exchange and process information, in a code called Binary. The nice part of binary is in its simplicity. You only have two values that make up the whole language. The combination of ones and zeros compose the entire language rather than the more cumbersome ten-digit decimal system, the idea isn't a new one. Australia's aboriginal peoples counted by two and many tribes of the African bush sent complex messages using drum signals at high and low pitches.

Even computers with their binary language are encrypted. Much of the 21st century computer science field deals with developing codes that hackers can not break. These more complex codes have been developed to deter people from finding out our secrets.

Do you have a secret? Develop a code and write your secret down in code in the space below. Then see if you partner can decipher your message.

Assessment:

Grades for this project can be composed of the journal entry.

Activity Extensions: None

Other:

FOSS Variables Unit
http://lhsfoss.org/scope/5-6.html

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