GIS and Surveying

This module is a great tie-in with our topographical maps lesson on our intro to Ashkelon page!

Standards Covered in this Module

NGSS:

4-PS4-3. Generate and compare multiple solutions that use patterns to transfer information.

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an
ecosystem affect populations.

MS-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

Common Core:

MP.4: Model with mathematics.

6.SP.B.5: Summarize numerical data sets in relation to their context.

7.RP.A.2: Recognize and represent proportional relationships between quantities

SL.8.4: Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation

SL.8.5: Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

MP.2: Reason abstractly and quantitatively

CCSS.MATH.CONTENT.8.G.A.1.A Lines are taken to lines, and line segments to line segments of the same length.
CCSS.MATH.CONTENT.8.G.A.1.B: Angles are taken to angles of the same measure.

CCSS.MATH.CONTENT.8.G.A.1.C: Parallel lines are taken to parallel lines.

CCSS.MATH.CONTENT.8.G.B.6: Explain a proof of the Pythagorean Theorem and its converse.

CCSS.MATH.CONTENT.8.G.B.7: Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

CCSS.MATH.CONTENT.8.G.B.8: Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

CCSS.MATH.CONTENT.8.G.A.5: Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.

Guiding Question

What can scientists learn by studying 3-Demensional maps of an area?

Word wall

GIS – Geographic Information Systems
GPS – Global Positioning System

Procedure

Video 1: Grant-GIS

Photo: 3D Layout of Grid 51 (Hint, in order to see this, you need to right click and drag down until the grid is in the scene. If you want to zoom in, right click and drag up. You can left click to rotate your view)

Video 2: How to use triangulation

Junior Archaeology Assignment #1

Junior Archaeology Assignment #2

Interactive Homework #1

Interactive Homework #2

Junior Archaeologist Assignment #1

To begin with this assignment, you will need to watch the video explaining how scientists use triangulation to determine location of objects. Triangulation is very similar to how archaeologists record the location of objects in the field so they can create maps of the area. The difference is that when using GIS cameras, archaeologists are not only able to read the degrees on a 2D surface, but can look at the degrees in a 360^{o} circle to determine the location and height of an object. You will notice in our video with Grant that he measured the location of the red and white stick-this is so we can tell exactly the height and distance away of the space we are recording rather than just getting a general area.

Next, in your logbook, you will be determining the location of objects that are in the classroom. Once you have the hang of how to measure objects locations with a protractor, you will be creating a map of a room in your house where you can measure the location. Follow the instructions in the logbook link to learn more!

Junior Archaeologist Assignment #2

Based on the map you drew in your home, you will be constructing a 3D model of your area. For every location on your map, you will measure with either a measuring stick or measuring tape the height of the object. When you have all of the measurements, you will create a scale. A very easy scale for you to use could be:

1 foot = 1 cm in my model

This means that if something is 4 feet tall in your room, it would be 4 cm tall in your model. Next, you will be constructing a 3D model of your room using these scaled measurements.

You can choose to do this in one of three ways:

1. Create the 3D forms with Model Magic
2. Make salt dough to form the 3D forms
3. Take one large piece of rectangular Styrofoam and put the map you draw on top of it. Use poster pins to outline the features of your map (kind of like you do on Halloween with pumpkin designs) so that you know where everything goes. Scrape down areas where it is flat and form contours of the 3D forms.

Whichever option you choose should show the difference in height between the ground and your 3D objects. They should be painted to show what your area looks like, and the distances apart/height of the objects should be scaled to fit your area (this means that if the objects are 3 feet apart in your room, they should be 3 cm apart in your model).

Interactive Homework #1

Geocaching and Earthcaching is a great way to use another form of positioning, GPS. Geocaching allows you to use GPS to go to millions of different sites around the world using GPS coordinates to find a special prize that people before you have left. Earthcaching is similar, but you search for different landforms instead of small prizes.

To sign up, just create a Geocache or Earthcache account for free (make sure you have your parents permission before using the internet) and use and free GPS app on your phone (an example would be Commander Compass Light, it also tells you elevation) or a handheld GPS system to start your game of digital hide and seek!

Interactive Homework #2

Visit the US Geological Survey's page on GIS (link here). Look through the ways that GIS is used in the United States. Discuss with your parent how the use of GIS in America is different and similar to how we used GIS to record sites in Ashkelon. For the differences, why do you think they are different? Why is not all GIS data used the same?