Back to the Basics

Map Reading and Aerial Image Interpretation

Moffett Field, California

A Program of CNL World

WORLD

wetmaap.org

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CNL World

CNL World, founded in 2010, promotes education outreach and professional development for environmental and earth sciences formal and informal educators. CNL offers opportunities for educators and the general public to increase and enhance their knowledge and skills in the use of maps, airborne imagery, and satellite imagery for the classroom, for the workplace, and for everyday situations.

CNL World develops programs and materials, provides spatial data, information, geospatial technology, and application training that support and complement educator's existing curriculum. CNL World serves educators with multiple experiences, including diverse underrepresented, underserved, and minority groups.

We invite you to explore our programs, products, and services.

CNL World is a non-profit group

Providing:

- An education focus with opportunities in geospatial outreach
- A service to a community of practice

Using:

- A gateway to classroom resources with methods and techniques through an innovative approach

For:

- The Geosciences
- Earth Science
- Environmental Science

Back to the Basics

"Back to the Basics" is an extension of the WETMAAP Program (Wetland Education Through Maps and Aerial Photograph) and is an innovation of CNL World. The Back to the Basic materials are packaged for use in a mini-workshop (approximately one to three hours), but are easily adaptable to a 50 minute classroom format.

Our experience with developing content and facilitating workshops and training sessions for over 2,000 teachers suggests a need to step-back and reintroduce basic geography tenants–location, map skills, observation, and comparative analysis through the use of traditional tools—maps and aerial photographs. The materials provide training in basic ecological concepts, technological skills, and methods of interpretation necessary for assessing geography, earth science, and environmental science topics.

The Back to the Basics Program provides an excellent opportunity of "science by inquiry" for the classroom. Exercises follow a standardized format. Student learning outcomes are easily measured through application of the same exercise but for a different location. Such replication allows for concept and skill measurement and assessment of student knowledge attainment. Educators can adapt the materials for classroom station work or group activity, as well as for individual use. The Back to the Basics exercises, while simple, challenge students to make observations, use geographic tools (*i.e.*, a map and an aerial photograph), compare data sets, and draw conclusions.

Back to the Basics Objectives

After completing this workshop, you should be able to:

- Recognize physical and cultural features on topographic maps and on aerial photography
- Determine distance and area measurements
- Calculate scale and scale conversions
- Use traditional technology of map reading skills, distance and scale measurement, and manual GIS (Geographic Information Systems)
- Apply acquired knowledge to other areas of study including geography, mathematics, environmental science, earth sciences, and science
- Introduce inexpensive and traditional mapping and measurement skills and interpretation techniques into your curriculum

Back to the Basics
Moffett Field, California

Data Sources

Aerial Photography

2002 Color Infrared, Moffett Field/Foster City, CA. U.S. Geological Survey

Topographic Map

A portion of the following map was used for site identification, exercise, and analysis:

1997 1:24,000 scale, Mountain View, CA. U.S. Geological Survey Topographic Quadrangle

Materials

1. Back to the Basics exercise: Moffett Field, California
2. Magnifying glass
3. String
4. Pencil
5. Ruler
6. Paper
7. USGS Topographic Symbols Chart

   (Available as a free download on the Back to the Basics website: *basics.cnlworld.org*)

Back to the Basics
Moffett Field, California

OVERVIEW: This introductory activity is used to familiarize learners with information found on aerial photographs and topographic maps. The use of symbols on a topographic map and comparative signatures on an aerial photograph introduces feature identification. Placing an aerial photograph and a topographic map of different time periods side by side introduces recognition of change through comparative analysis.

SUBJECT AREA: Geography

GRADE LEVEL: Middle School

STUDENT LEARNING OUTCOMES:
Students will:

- Recognize representative colors and identify symbols used on topographic maps
- Acquire basic map reading skills including location, distance, area (scale), association, and correlation.
- Identify features on a topographic map and find same features on an aerial photograph.

STANDARDS:

National Geography Standards

Essential Element 1. The World in Spatial Terms

Standard 1: How to use maps and other geographic representations, tools and technologies to acquire, process, and report information from a spatial perspective.

Standard 3: How to analyze the spatial organization of people, places, and environments on Earth's surface.

Essential Element 3. Physical Systems

Standard 1: The physical processes that shape the pattern of Earth's surface.

National Mathematic Standards

Grade Six Mathematics Content Standards

Number Sense

2. Students calculate and solve problems involving addition, subtraction, multiplication, and division.

Mathematical Reasoning

1. Students make decisions about how to approach problems.
2. Students use strategies, skills, and concepts in finding solutions.

Grade Seven Mathematics Content Standards

Measurement and Geometry

1. Students choose appropriate units to measure and use ratios to convert within and between measurement systems to solve problems.

Mathematical Reasoning

1. Students make decisions about how to approach problems.
2. Students use strategies, skills, and concepts in finding solutions.

National Science Standards

6th Grade Science Content Standards

Investigation and Experimentation

7. Scientific progress is made by asking meaningful questions and conducting careful investigations.

7.f Students will read a topographic map and a geologic map for evidence provided on the maps, and construct and interpret a simple scale map.

CROSS CURRICULAR CONNECTIONS:

Mathematics: Comparing scale
Language Arts: Communication
Art: Development of pattern recognition
Earth Science: Identification of surface features and processes
Environmental Sciences: Use of tools and instruments to conduct scientific activities

TIME: Teacher: 30 minutes for preparation of material packets
Class time: one 50 minute class

MATERIALS:

Students: 2002 Aerial Photograph, Moffett Field, California
1997 1:24,000 scale Mountain View, CA. U.S. Geological Survey Topographic Quadrangle
Magnifying glass; ruler; string; pencil; paper
USGS Topographic symbols chart
(Available as a free download on the Back to the Basics website: *basics.cnlworld.org*)

SUGGESTED PROCEDURE:

As students receive the materials, encourage group exploration and quick comparison of the aerial photograph and the topographic map. Use Section 1 for introduction to basic map elements (symbols, color, and scale). Use Section 2 for feature identification and location the topographic map. Use Section 3 to identify features on the aerial image. Use Section 4 to determine time of day on the aerial image.

Section 1: ***Introduction to basic colors, symbols, and scale.***

Ask the students to identify and locate common topographic symbols.

Using the topographic symbols chart and the USGS Topographic Quadrangle:
- Blue colored features represent?
- Green colored features represent?
- Black colored features represent?
- Brown colored features represent?
- Purple colored features represent?

Ask students to identify and locate common features:
- Identify symbol for a marsh.
- Identify a power line.
- Identify symbol for a school.
- Identify symbol for a dual highway with median.

On the 1997 Mountain View, CA, USGS Topographic Quadrangle:
- Locate a power line.
- Locate a benchmark.
- Locate a sand, gravel, or clay pit.

Using the1997 1:24,000 scale Mountain View USGS Topographic Quadrangle
- Find the scale in feet.
- Find "0" on the scale. Why are there 1,000 feet to the left and 1,000 feet to the right of "0"?

Using the edge of a piece of paper, determine the distance in feet from the flag on Bishop School (southeast corner of map) to the flag on Whisman School (southwest quadrant of map).

What is the straight line distance? _____

What is the distance by car following city streets?_____

Section 2: ***Given the following table, first find the object listed on the USGS Topographic Quadrangle map and then locate the identified site on the aerial photograph.***

Object	*Location*
Large airplane hangars	Center of map
Guadalupe Slough	Northeast quadrant of map
Long Point	Northwest quadrant of map
Two golf courses	Center of map

Section 3: ***Identify on the 2002 Aerial Photograph, Moffett Field, California***

a. Runways at Moffett Field.
b. Salt evaporator ponds.
c. A residential area.
d. A mixed area of commercial and light industry buildings.

Section 4: ***On the 2002 Aerial Photograph, Moffett Field, California***

a. What time of day was the aerial photograph taken?
b. Does the sand spit on the shoreline in the center of the map appear to be different than the sand spit on the topographic map?

ASSESSMENT:

1. The instructor will circulate throughout the room questioning each group to establish student mastery of the materials and to troubleshoot and direct student attention to features and objects.
2. If the materials have been laminated, students may label the objects or places in Sections 1 and 2 using a washable or erasable marker.
3. Student journal entries on the objectives of the activity.
4. After completing the search and locate tasks provided in Sections 1- 4, the student or cooperative group may select other objects or sites to develop peer quizzes.

EXPLORATIONS MAY INCLUDE:

- Packets of local topographic maps and aerial photographs for the students to identify known and unknown sites.
- Student construction of a school topographic map completed to scale and properly oriented.

National Standards References:

Geography Education Standards Project. 1994. *Geography for Life: National Geography Standards*. Washington, DC: National Geographic Research and Exploration.

National Council of Teachers of Mathematics. 2000. *Curriculum and Evaluation Standards for School Mathematics.* Reston, Virginia: National Council of Teachers of Mathematics.

National Research Council. 1997. *National Science Education Standards.* Washington, DC: National Academy Press.

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FOSTER CITY
MOUNTAIN VIEW, CA
1997
COYOTE CREEK
Calaveras Point
Gaging Station
BM 12
BM 5
Well
Duck Club
ALVISO
MUD
Long Point
SALT EVAPORATORS
GUADALUPE SLOUGH
Mountain View Slough
AT MOUNTAIN VIEW PARK
BM 1
BM 2
View
Ampitheater
Golf Course
Towers
NAVAL AIR STATION
MOFFETT FIELD
POLLMI
BM 14
BM 15
BM 20
BM 36
BM 35
BM 6
BM 17
BM 11
BM 69
BM 128
BM 29
BM 21
BM 53
BM 90
Crittenden Middle Sch
Theuerkauf Sch
San Veron Park
Substa
Whisman Sch
Fountain Park
Slater Sch
Sunnyvale Municipal Golf Course
Encinal Park
Post Office
Columbia Middle Sch
Bishop Sch
Fairoaks Park
Armory
Martin Murphy Jr Park
Murphy House
Sunnyvale Pa
Fire Sta
Gaging Station
City Hall
Eagle Park
Pioneer Park
Landels Sch
Graham Sch
Bubb Sch
Park
STEVENS CREEK
PASTORIA DE LAS BORREGAS
MAIN VIEW
SUNNYVALE
BAYSHORE FREEWAY
EXPRESSWAY
EL CAMINO REAL
GRANT
ALVISO
MATHILDA AVE
MOFFETT
SCALE 1:24 000
KILOMETERS
METERS
MILES
FEET
CONTOUR INTERVAL 5 FEET