SCIED 411 Clinic 1 Lesson Plan  
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Grade Level and Topic
7th Grade  
Topographic Maps – Understanding Scale and Contour Lines

Standards
PA Academic Standards for Science and Technology (7th Grade)
3.1.7-D. Explain scale as a way of relating concepts and ideas to one another by some measure.
• Apply various applications of size and dimensions of scale to scientific, mathematical, and technological applications.
• Describe scale as a form of ratio and apply to a life situation.

Instructional Objectives
- Understand the abstract concept of a scale as a ratio and recognize it on a map
- Understand contour lines as a ratio indicating slope and recognize them on a topographic map
- Use the ratios of scale and contour lines to draw a profile of Mount Nittany

Content Explanation
Ratios are a difficult concept to initially learn, yet becomes an integral part of thinking throughout schooling. We will present ratios to the students through a topographic map’s scale and contour lines. After locating the scale on topographic maps of the State College area, the students will use rulers to measure the scale and relate it to various places around their school’s location on the map. Once this horizontal ratio is understood, the students will be introduced to a vertical ratio through contour lines. On the maps used, one contour line represents twenty feet (20 ft.) in elevation. Every one hundred feet (100 ft.) in elevation is indicated by a contour index line, which is bolder than the common contour lines. Students will identify on the provided maps steep areas, flat areas, valleys and hills. The lesson will end with the students using their understanding of both scale and contour lines to draw the profile of Mount Nittany.

Administrative Considerations
- Students not understanding how to use a ruler
- Maps may not photocopy well
- Broken rulers

Materials and Equipment
- Photocopies of maps so that students can write on paper
- 7 rulers with millimeter markings
- 2 original topographic quadrangle maps of State College area
- Paper for students to draw Mount Nittany profile
Lesson

Elicit (1 minute)
- Ask students if they’ve seen a map before – what kind?

Explore (1-2 minutes)
- Have students estimate distances on map without scale
- Water tower & reservoir, two town halls
- How much further is one distance greater than another?

Engage (1 minute)
- Have students identify parts of map by pointing to it
  - Scale
  - Legend

Explain (2-4 minutes)
- Confirm that map is accurate representation of real world
- Introduce scale with rulers (mm side is more accurate)
  “In order to keep the smaller map proportional, a ratio of scale must be used.”

Explore (1-2 minutes)
- Have students measure distances using rulers and scale
- Compare distances and confirm observation made without scale
- Now that we understand the horizontal scale, let’s learn the vertical scale
  (Where is the highest point on the map? Lowest? Steepest? Flattest?)

Explain (3-4 minutes)
- Identify map showing that contour lines represent ratio of slope
- Lines close together show steepness while farther apart indicates flat
- Introduce contour index lines for very steep slopes – bolder, less frequent

Explore (1-2 minutes)
- Have students identify the highest, lowest, steepest and flattest parts of map
- **How** steep/flat/high/low?
- Are these the same areas pointed to before understanding contour lines?

Evaluate (3-5 minutes)
- Have students draw a profile of Mount Nittany to show understanding in both scale and contour lines

Extend (1-2 minutes)
- Invite students to apply lesson on ride home and around school
- Let them take home their copies of the maps of their school’s quadrangle

**Elaborate (SPONGE)**
- Have students minimize error by correcting scale on their profile
- one cm equaling fifty feet is more accurate than one cm equaling 100 ft