

Route Finding in the Land of Hoodoos, Slot Canyons, and Colored Cliffs

Teacher Guide



Grand Staircase-Escalante National Monument



Route Finding in the Land of Hoodoos, Slot Canyons, and Colored Cliffs

Grade Level

9-12

Duration

45 Minutes

90 Minutes with *Reading a Topographic Map* review activity

Description

Students will learn about the Geographic Information System.

Goals

- Identify the different types of data that are synthesized in the Geographic Information System and determine how it is being applied locally.
- Use historic data, topographic maps, aerial and satellite photos to explore and route find in the landscape of Grand Staircase-Escalante National Monument.

Academic Content Standards

The following standards are drawn from *Content Knowledge*¹.

Geography Standard 1

Understands the characteristics and uses of maps, globes, and other geographic tools and technologies.

Level IV (Grade 9-12)

Benchmark 2

Knows the characteristics and uses of geographic technologies [geographic information systems (GIS) and satellite-produced imagery]

Geography Standard 4

Understands physical and human characteristics of place.

Level IV (Grades 9-12)

Benchmark 1

Knows how social, cultural, and economic processes shape the features of places (e.g., resource use, belief systems, modes of transportation and communication; major technological changes – the agricultural and industrial revolutions; population growth and urbanization)

Geography Standard 6

Understands that culture and experience influence people's perceptions of places and regions.

¹ *Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education: 4th Edition*, Mid-Continent Research for Education and Learning in Aurora, Colorado. <http://www.mcrel.org/standards-benchmarks/>

Level IV (Grades 9-12)Benchmark 6

Understands why places and regions are important to individual human identity and as symbols for unifying or fragmenting society (e.g., sense of belonging, attachment, or rootedness; symbolic meaning of Jerusalem as a holy city for Muslims, Christians, and Jews.)

Material

- *Route Finding in the Land of Hoodoos, Slot Canyons, and Colored Cliffs – Student Activity*
- Computer with internet access
- **OPTIONAL** – USGS Maps: King Bench, UT, 7.5-Minute Series topo map (1:24,000 scale) **or** the Escalante, Utah, 30x60 Minute topo map (1:100,000 scale)
- *Traces in Time*, the 20-minute video/DVD produced by GSENM.
- *Reading a Topographic Map* (review exercise – optional).

Objectives

1. Research the Geographic Information System (GIS) online and explain how this technology is being used.
2. Explore routes in Grand Staircase-Escalante National Monument using historic data, topographic maps, aerial and satellite images.

Procedures

1. Watch the 20-minute video, *Traces of Time*, produced by Grand Staircase National Monument, to introduce this activity.
2. Step 1 – *Global Information System* (pages 1-2), is an internet-based introduction to the Geographic Information System (GIS). Students can work individually or in groups.
3. Step 2 – *A Short History of Routes in the Grand Staircase-Escalante Area* (pages 2-8), begins with a narrative and a series of images that students compare to evaluate the differences inherent in using topographic maps, satellite and aerial photographs. They should become aware that using satellite imagery is sometimes deceiving.
4. *Step 1* requires the student to go online to locate and print a topographic map, then do a little route-finding off line before going back online to check out satellite images. This is a good team or group activity. If your class has not used topographic maps before, the worksheet *Reading Topographic Maps* is included at the end of the student activity.

NOTE: If students cannot print directly from computers you will need to go online before class and print topo maps for them to use. Directions are given in *Step 2* in the Student Activity.

5. Students may get frustrated in *Step 1, part II*, as they try to match the routes they've located on the topographic maps using satellite images. We've put a time limit of 10 minutes on this part of the activity for that reason. The photos taken from an over-flight of the area are only meant to give the overall visual impression of the landscape. It isn't possible to actually trace routes, unless they choose to travel down The Gulch.

6. The assessment asks students to determine whether or not GPS and GIS are reliable for use in the GSENM area. In reality these systems work sometimes, if there is a clear view of the sky and a handheld GPS device available. It's good to make the point that even when EMS and search and rescue know the location of stranded travelers, rescue can take quite some time, even with the aid of a helicopter.

Adaptations:

For younger students or students who are a little rusty on topo maps, *Reading a Topographic Map* is a four page exercise that walks students through the legend, sections/township/range, contour lines, and elevations of a topo map. To use this review you will need one of these USGS Topo Maps: *King Bench Utah 7.5-Minute Series* topo map (1:24,000 scale) or the *Escalante, Utah 30x60 Minute* topo map (1:100,000 scale)

Extensions

Students can use handheld GPS units to plot their routes and route-find locally. Most GPS units use UTM coordinates and this activity could be expanded to explain this system of mapping in more detail.

References

Books/Periodicals

- Chesher, Greer. *Heart of the Desert Wild: Grand Staircase-Escalante National Monument*. Bryce Canyon Natural History Association, 2000. Bryce Canyon National Park, Bryce Canyon, Utah 84714. ISBN 1-882054-06-7.
- Fleischner, Thomas L. *Singing Stone: A Natural History of the Escalante Canyons*. The University of Utah Press. Salt Lake City, UT, 1999.
- Powell, John Wesley. *The Exploration of the Colorado River and its Canyons*. Penguin Books. New York, NY, 1987.
- Prince, Stephen L. *Gathering in Harmony*. The Arthur H. Clark Co. Spokane, WA, 2004. (This one is about the Mormon Pioneers.)
- Probasco, Christian. *Highway 12*. Utah State University Press. Logan, UT, 2005
- Robinson, Adomis F. *History of Kane County*. The Utah Printing Co. Salt Lake City, UT, 1970.

Websites

GIS.com

<http://www.gis.com/index.cfm>

National Atlas.gov

www.nationalatlas.gov

USGS – Geographic Information Systems

http://erg.usgs.gov/isb/pubs/gis_poster/

Assessment

At the end of this activity students should be able to explain how topographic maps, satellite image, the Global Positioning System (GPS) and the Geographic Information System (GIS) are all interrelated. After the route-finding exercise they should also recognize that there are limitations to these systems in terrain like that found in GSENM.

Answer Key**Question 1**

Identify five ways that GIS could, or does, play a part in your life and the data that would have to be put into the system for GIS to work.

- EMS – Identify exact location, notify EMS personnel available, determine travel time and possibly what type vehicle to use (helicopter? ambulance?)
- 911-from mobile phone – GPS location, travel time to location
- Marketing
- UPS – Deliveries tagged and can be located geographically.
- Natural Resources – water resources, location of noxious plants, wildlife habitat.

Question 2

If you were really going to route find in GSENM, what method would you choose?

Answers will vary

Question 3

Would a GPS handheld device be reliable in this terrain? Explain your reasoning.

Answers will vary

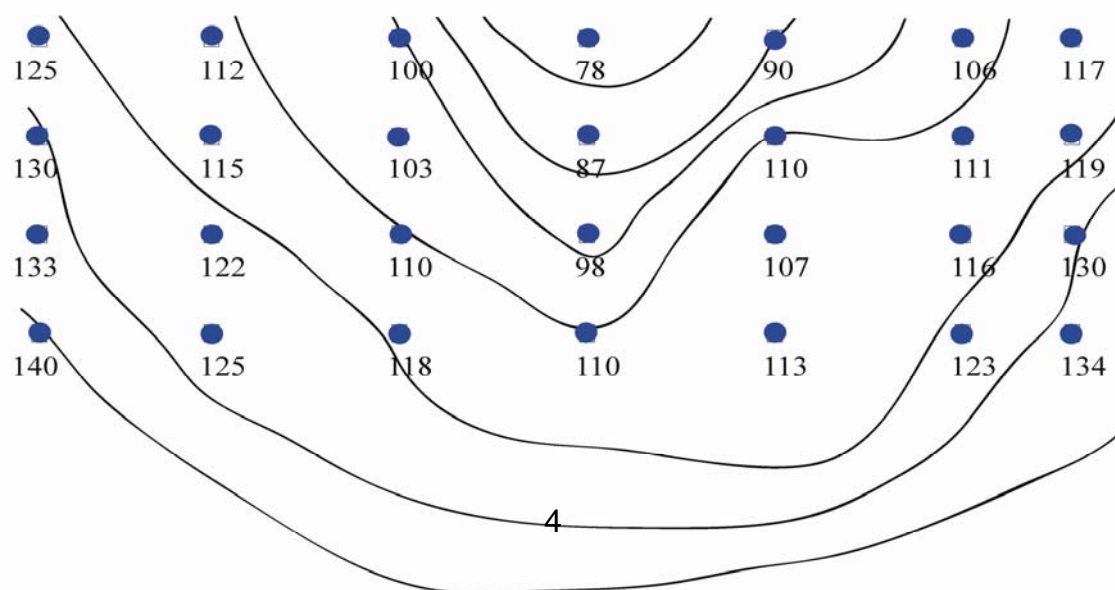
Question 4

Would dialing 911 be an option if you had a cell phone? Why or why not?

Answers will vary

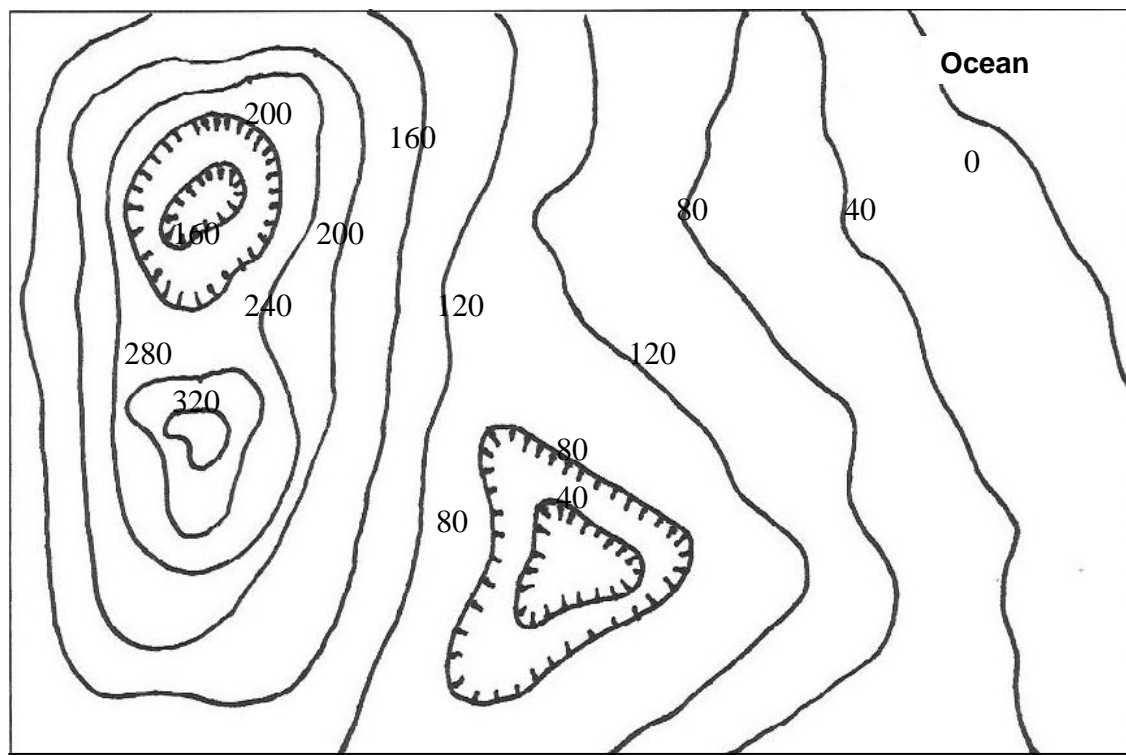
Human Landscape Unit 2a**Answer Key****Question 1**

The dots below are measured elevations in feet. Draw contour lines on the map using a contour interval of 10 feet. You'll need to estimate elevations between some of the dots.



Question 2

On the map below mark each contour line with its proper elevation, using contour intervals of 40 feet. Label features you can describe.



King Bench Spring #1

Start: You and three friends are driving down the Burr Trail and you decide to park where the road meets Deer Creek in Section 16, Township 34 South, Range 5 East, and go for a little hike.

Find: You are looking for the most direct route to the spring in Section 2, T35S, R5E.

Figure: If you're traveling light and making about three miles an hour, how long will it take you to get to the spring?

About 1 3/4 hour

Question 4

King Bench Spring #2

Start: You are at the spring in S2, T35S, R5E, and two of your friends decide to return to the car by retracing their path. You and your other friend decide to take a different route to the road where you can be picked up.

Find: Find the most direct route from the spring to the corral in S13, T34S, R5E.

