



Bay Area Regional Science Olympiad

Road Scholar

March 12, 2016

Instructions: [Supervisor should cover all this before the exam.]

- **DO NOT** put any marks in any of the maps.
- There are 3 parts to the exam. Part 1 is about topographic map, part 2 about road map, part 3 about theoretical questions plus hand-drawn map.
- Each of the part will have their own corresponding stations organized as 3 rows of tables. Front row will have part 1, middle row part 2, back row part 3.
- The allotted time for each station is 15 minutes. There will be announcements at remaining 5 minutes and 30 seconds.
- You must fold back the road map at the end of your turn. **Not folding back the road map will incur in a penalty of 1 point.**
- At the end of a turn, move to the next station. First row moves to middle, middle to back, back to front.
- Write the team name and team number, on the top of **all** the answer sheets. You won't get the points if I don't know who you are.
- Only the answers provided in the answer sheet will be considered.
- Your answers **must** be complete - measurements must have units; town names must include state.
- There is no need to color the hand-drawn map. There is no credit for coloring the map, but you may color it if you want
- The number of points for each question is indicated between parenthesis.
- Tiebreaker questions are indicated with a [T#] in which the number indicates the order of consultation in the event of a tie. Tiebreaker questions count toward the overall raw score, and are only used as tiebreakers when there is a tie. In such cases, [T1] will be examined first, then [T2], and so on until the tie is broken.

BARSO 2016 Road Scholar Exam

Part 1: USGS Topographic Map (52 points)

1. (1) From which state is the map?
2. (1) What is the prominent cultural or physical feature that the quadrangle is named after?
3. (1) In which sector is the feature of the previous question located?
4. (1) What series is the map?
5. (1) Which quadrangle adjoins its northern boundary?
6. (1) What are the counties represented in this map?
7. (1) What is the map's magnetic declination in degrees?
8. (1) What is the scale of the map?
9. (1) What is the contour interval in feet?
10. (1) In the map, all elevations are measured with respect to what?
11. (1) Does the Eldorado Springs quadrangle comply with the National Map Accuracy standards?
12. (1) What is the elevation of Gross Reservoir in meters?
13. (1) What is the elevation of Eldorado Mountain in feet?
14. (1) What is the distance in meters between the peaks of Eldorado Mountain and Scar Top Mountain?
15. (1) What is the distance of previous question in miles to two decimal places?
16. (1) What is the Map Accuracy standard for vertical accuracy?
17. (2) [T1] What is the azimuth of the power transmission line in sector 6?
18. (2) What is the bearing of the power transmission line of question 17?
19. (2) In which ordinal direction does the Keystone Gulch flow at the point it meets an aqueduct in this map?
20. (4) [T2] What is the stream gradient for the entire Keystone Gulch visible in this map?
21. (4) [T3] What is the latitude and longitude of the Coal Creek School?
22. (4) [T4] What is the UTM coordinate of the Coal Creek School?
23. (1) What is the man-made feature in Sec 4, T 1 S, R 71 W?
24. (1) How many buildings are there in Sec 10, T 2 S, R 71 W?
25. (1) What is the name of the principal meridian of this region of Colorado?
26. (4) [T5] What is the slope gradient from Coal Creek Peak to the benchmark in Sec 13, T 2 S, R 71 W which does NOT have a tablet?
27. (1) What is the type of the railroad in sector S?
 - a. Standard gauge railroad, single track
 - b. Standard gauge railroad, multiple track
 - c. Narrow gauge railroad, single track
 - d. Narrow gauge railroad, multiple track
 - e. Abandoned
28. (1) What are the state routes in this map?
29. (1) What is the US route in this map?

BARSO 2016 Road Scholar Exam

30. (8) Draw the profile between Chapel in the Hills and Scar Top Mountain.

Part 2A: Road Map, Colorado (32 points)

31. (1) What is the state capital of Colorado?
32. (1) What is the number-letter combination of the University of Colorado at Boulder?
33. (1) What is the number-letter combination of the University of Colorado at Denver?
34. (1) Which highway(s) should you take to get from University of Colorado at Boulder to University of Colorado at Denver?
35. (1) Which exit should you take?
36. (2) [T6] What is the linear distance in miles between the University of Colorado at Boulder to the University of Colorado at Denver?
37. (1) What is the distance by highway in miles between the cities of Denver and Walsenburg?
38. (1) How long would it approximately take in hours and minutes to drive from Denver to Walsenburg?
39. (1) What is the number-letter combination where the Mesa Verde National Park is located in the Colorado state map?
40. (1) [T7] In which county is the Mesa Verde National Park located?
41. (2) [T8] The Mesa Verde National Park is featured in an inset. What is the total area of the inset in square miles?
42. (1) [T9] What is the distance by highway in miles from Cortez, CO to Durango, CO?
43. (1) The Four Corners Monument is the only place in the country where four states meet. Which highway can be used to get to it from Cortez, Colorado?
44. (2) [T10] What is the distance between the Four Corners Monument and Cortez, Colorado?
45. (1) Does this path cross any divided road?
46. (2) The three highest summits in the State of Colorado are all in the same region on the Continental Divide. Which is the highest one?
47. (1) [T11] Which is the elevation in feet of the summit of the previous question?
48. (1) Are the roads that give access to Shaw paved?
49. (1) The Dinosaur National Monument is known for its fossils. What is the number-letter combination for its location?
50. (1) What is the code for the airport of the city of Hayden?
51. (1) In what timezone is Colorado in?
52. (1) Which interstate highway connects Kansas and Colorado?
53. (1) What is the minimum toll on Northwest Parkway?
54. (2) How many historic sites are there in Mesa Verde National Park?
55. (2) Name all Indian Reservations in Colorado.
56. (1) What number would you call to talk to the Colorado State Patrol?

BARSO 2016 Road Scholar Exam

Part 2B: Road Map, Wyoming (16 points)

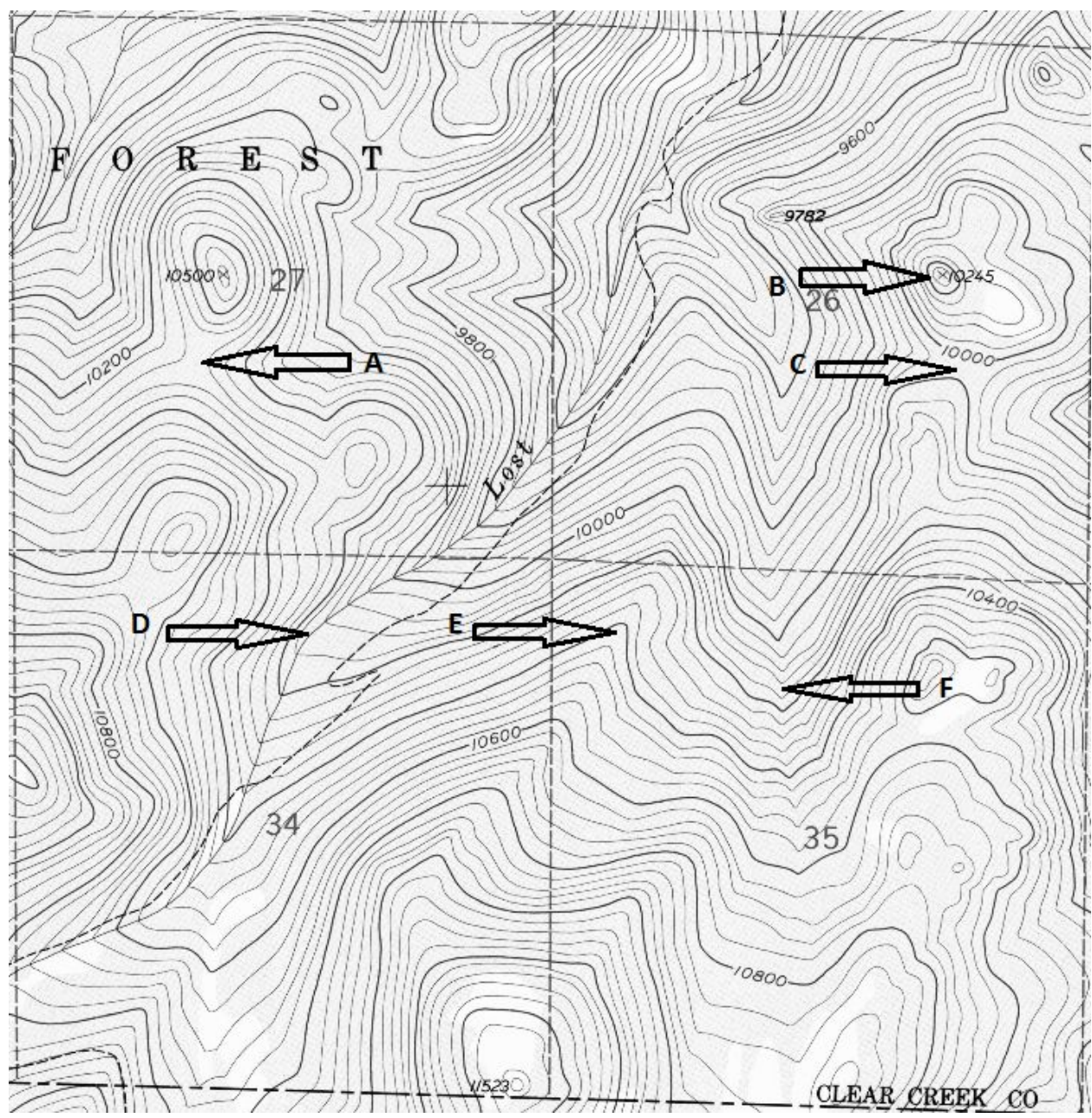
57. (1) What is the State Capital of Wyoming?
58. (1) What is the number-letter combination for the Yellowstone National Park in the state map?
59. (1) What is the number-letter combination for the Yellowstone National Park in the inset?
60. (1) What is the number-letter combination for the Fossil Butte National Monument?
61. (1) Give the mileage of the shortest path from Shoshoni to Old Faithful.
62. (1) Give drive time of the quickest path from Shoshoni to Old Faithful.
63. (2) What is the highest summit in the State of Wyoming?
64. (1) [T12] What is the elevation in feet of the highest summit in the State of Wyoming?
65. (1) [T13] How many airports are there in the State of Wyoming?
66. (1) What kind of difficulty may you face trying to reach Old Faithful by road during winter?
67. (2) How many counties are there in Wyoming?
68. (1) In what two counties is Renner Wildlife Habitat Management Area?
69. (2) What projection is this map based off of?

BARSO 2016 Road Scholar Exam

Part 3A: Theoretical questions (49 points)

70. (1) What scale gives the best resolution?
- 1:125,000
 - 1:24,000
 - 1:65,500
 - 1:20,000
 - 1:63,360
71. (1) What is the area of a PLSS section in square miles?
72. (2) What is the area of a PLSS section in acres?
73. (2) [T14] What is the area of a PLSS township in acres?
74. (2) [T15] Which of these states do not use PLSS?
- Florida
 - Louisiana
 - Washington
 - Hawaii
 - Alaska
75. (1) Order these terms from least to most accuracy, with respect to elevation:
- Spot Elevation
 - Vertical Control Station Mark
 - Contour Line
76. (1) Does the US route 94 goes from west to east or from north to south? Why?
77. (2) What range of UTM longitude zones does the continental United States occupy?
78. (2) How many degrees does one UTM longitude zone occupy?
79. (2) What is the false northing of the equator in UTM?
80. (1) What government organization created the UTM coordinate system?
81. (2) [T16] What map projection does the UTM grid use?
82. (2) What is the starting point of the North American Datum of 1927?
83. (2) How many UTM latitude zones are there?
84. (2) How many degrees are there in UTM latitude zone M?
85. (2) How many degrees are there in UTM latitude zone B?
86. (6) Give the names of the topographic features identified below.

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Part 3B: Hand-Drawn Map

87. (16) Hand-Drawn Map:

- a. In this map, there are four PLSS sections. They are part of four different townships, which are divided by two lines:
 - i. a township line dividing T 3 S and T 4 S
 - ii. a range line dividing R 36 W and R 37 W.
- b. The township line which divides T 3 and T 4 also separates two counties:
 - i. ABC in the north
 - ii. XYZ in the south
- c. A power transmission line enters this map 264 feet above the southwest corner.
 - i. This power transmission line passes through the center of NE $\frac{1}{4}$, Sec 6, T 4 S, R 36 W.
- d. A multiple track, narrow gauge railroad follows this power transmission line along its immediate north.
 - i. When starting from the west, after crossing 1.4 miles in the map, the railroad turns left and for the remainder of the map, travels at an azimuth of 27° .
 - ii. This railroad passes through a tunnel 0.3 miles long. The trains leave the tunnel 0.2 miles before the railroad exits the map.
- e. The entire region displayed on this map is at an elevation of 4580 feet above sea level. There is, however, one exception: a hill, which the tunnel cuts through.
 - i. The peak of this hill is 1320 feet to the west from the northern terminus of the tunnel.
 1. It contains a horizontal control station mark which indicates an elevation of 4723 feet.
 2. The hill is steeper on the west slope than on the east slope.
 3. When drawing the contour lines for the hill, keep in mind that the contour interval is 40 feet.
- f. At the northwest corner of the map there is a 40 acre orchard, shaped like a square.
- g. At a point 0.7 miles along the railroad, past the western border of the map, there is a small school exactly 1 mile north.
 - i. 528 feet to the east of the school, there is a church.
 - ii. Along the northern border of the church, there is a cemetery.
- h. From the church, there is a windmill half a mile away in the S 47° E direction.