

Team Name \_\_\_\_\_ Team Number \_\_\_\_\_

Students' Names \_\_\_\_\_

## *Road Scholar*

### RS Agent Training Manual

Welcome to Road Scholar!

Materials you will need:

- Pen/Pencil
- Ruler
- Protractor
- Calculator
- AAA Kentucky-Tennessee Highway Map
- Little Hickman Quadrangle Topographic Map
- This Test (hopefully you have this)
- Your Answer Sheet

Materials you may use if you brought them:

- Reference materials/notes
- USGS Map Symbol Sheet
- Other measuring devices

Materials you may NOT use:

- Computers
- Other teams' notes or tests

A few things to keep in mind:

Please, please, PLEASE do NOT write on the maps. If you do make a stray mark, please try to erase it. If you do accidentally mark it and it doesn't come out please let the supervisor know when you turn your test in.

You may, however, write on this booklet. That is perfectly fine. Draw all over it if you want, although I would not suggest it as you have a limited amount of time to take this test. However, make sure that ALL of your final answers are on the answer sheet. Also, make sure your answers on the answer sheet correspond with the right numbers. If your answers get mixed up, we will be forced to mark them as incorrect.

Any measurements must have units, and town and county names must have state abbreviations or names. If you say "Springfield", we have no idea if you mean the capital of Illinois, the site of the Basketball Hall of Fame, or the city the Simpsons live in. A state identifier such as "IL" or "Illinois" is required for full credit.

If something is confusing to you, you may raise your hand and ask a supervisor to clarify it for you. However, don't ask the supervisor for the answer. They will not take the test for you.

Good luck, and have fun!

## I. Kentucky-Tennessee Highway Map

Greetings, new recruits. You have been assigned to a training session before you can begin your time as a full Road Scholar (RS) agent. This is an assignment you must not take lightly, as life as an RS agent is full of dangerous pitfalls and harrowing quests. With one false step, you may find yourself miles from your destination in unfriendly land, and if this happens to you, good luck finding your way back.

Because life as an agent is so difficult, this training session is designed to put your skills to the test. A few of you will pass this test with flying colors. However, I predict that most of you will struggle and will fall behind or even become lost as the test progresses. I hope you will prove me wrong.

In order to begin your training, we must travel to our training site. This is the first test; if you make it to the training site in one piece, you may continue. We are currently stationed in Nashville, Tennessee, in Nashville International Airport.

1. A star inside a circle can be found in Nashville. What does this mean?
2. What is the grid number of Nashville International Airport **in the inset**?
3. What is the airport code for Nashville International Airport?
4. According to this map, how many airports are there in Tennessee?
5. What interstate highway is closest to the airport?
6. True or false: this interstate highway has a terminus in Tennessee.

As we leave the airport, we take this interstate highway west to a highway labeled 155. We decide to head north on this highway.

7. What kind of highway is this?
  - a. County
  - b. State
  - c. Federal
  - d. Interstate
8. How can you tell?

9. As we follow this highway, we intersect several other highways. Which of these other highways should we take if we want to go towards Bowling Green, KY?
10. When we take the exit that leads us to this highway, what exit number might we see?
- a. 16A
  - b. 18A
  - c. 43
  - d. 90A
11. According to this map, what waterway(s) does Route 155 cross between the two highways you chose as your answers to questions 5 and 9?
12. Approximately how long does it take to drive from Nashville to Bowling Green?

We are now leaving Nashville and headed towards Bowling Green.

13. As we cross from Tennessee to Kentucky, we see two question marks on the map next to the highway we are on. What do these question marks represent?
14. What does the  symbol represent?
15. Why are there no  symbols on this map?
16. In which of the following states might you find a  symbol?
- a. Colorado
  - b. Massachusetts
  - c. Pennsylvania
  - d. Washington

We pass by Bowling Green and come to an interchange with Louis B. Nunn Cumberland Parkway.

17. What is the closest town to this interchange?
18. What is the grid number of this town?
19. We decide to take this exit and drive along the Parkway. As we go along, a line of red "T"s passes over our road on the map. What does this line of red "T"s represent?

We take this parkway to the intersection with Federal Route 27. We then take Route 27 north to Camp Nelson National Cemetery, which is where we will begin the second part of your training.

20. What is the approximate mileage between the start of the Parkway and Federal Route 27?
21. Our vehicle gets 16 miles per gallon (not very efficient is it?). If our tank can hold a total of 20 gallons and it is filled 30% of the way at the start of the Parkway, will we make it to Route 27 before needing to get gas? If not, at what exit will we need to stop? There are no gas stations at exit 78.
22. What is the grid number for Camp Nelson National Cemetery?
23. In what county is Camp Nelson National Cemetery?
24. What is the closest military facility to Camp Nelson National Cemetery?

## II. Little Hickman Quadrangle Topographic Map

Congratulations! Since you are still with us, we can assume that you have made it through the first part of training successfully. Well done. However, your celebrations must be short, because now you will embark on another strenuous mission. Are you up to the task? We'll see.

First, it is time for you to acquaint yourself with this new map.

25. One inch on this map equals how many **feet**?
26. What is the basic contour interval for this map?
27. This map spans 7.5 minutes latitude and 7.5 minutes longitude. However, the map is not shaped like a square. Explain why 7.5 minutes longitude is not the same length as 7.5 minutes latitude.
28. What is the magnetic declination of this map? Be sure to give both amount (in degrees) and direction.
29. Is Kentucky included in the Public Land Survey System? If not, why not? If yes, what township numbers does this quadrangle span?

30. What is the name of the quadrangle found just south of the Little Hickman Quadrangle?

Now that you've got that covered, we'll start off in Camp Nelson National Cemetery where we stopped.

31. We stopped in Camp Nelson National Cemetery when we arrived. What map sector is the cemetery in?

32. Find the structure on the entrance road in the western part of the cemetery. Estimate the elevation at this structure.

33. There is a large depression about 2000 feet above the cemetery. Give a possible value for the lowest elevation in this depression.

34. About two miles north of the cemetery there is an intersection between Routes 27 and 1268. What is the spot elevation at this intersection?

35. Follow Route 1268 down to Little Hickman. How many centers of worship does the road pass within 500 feet of?

36. In what general direction does Little Hickman Creek flow?

It appears that you're still keeping up. Let's step it up a notch, shall we? We have found a secure storage location for important RS Agency documents. Your job is to find the location and then input its coordinates into this GPS we have provided you.

37. Keep following Route 1268 until it ends or leaves the map. What is the spot elevation at this point?

38. What are the geographic coordinates at this point?

39. Now, we need you to deliver this GPS to a nearby RS station. We have stations at Camp Nelson National Cemetery, Roberts Chapel, the landing strip in Nicholasville, and Sulphur Well School. Which of these stations is the most convenient place to deliver the GPS?

40. What is the least amount of turns possible to go from the storage location to the most convenient station?

An important part of being an RS Agent is having an awareness of your surroundings, and this includes having possible escape routes. Here we will have you scout out areas you can use when you need to make a quick escape.

41. There is a bypass around Nicholasville. What is a bypass?
42. This bypass opened one of the following years. Which one?
  - a. 1951
  - b. 1988
  - c. 1994
  - d. 2006
43. A road labeled B.R. 27 heads directly into Nicholasville. What does B.R. stand for?
44. What is the bearing for B.R. 27 from the intersection of B.R. 27 and the bypass into Nicholasville?
45. How are B.R. 27 and the bypass related?
46. What type of duty does Route 39 handle throughout this map?
47. Is it possible to take Route 39 all the way through the map? If not, why not?

When thinking about escape routes, you have to think about terrain, not just distance. Roads with steep inclines and/or declines are hard to drive fast on, so they should be avoided if you need to make a quick getaway.

48. Find the two spot elevations along Route 39 that read 929 and 568. What is the slope of Route 39 between these two spots?
49. Find the stream that runs alongside Route 39 until it flows into the Kentucky River. What is the stream gradient for this stream during its entire length? If it has any tributaries, choose the one that gives the stream its longest possible length.
50. Do these slope and stream gradient values mean the incline is steep or gradual? Would it make a good escape route?

51. Would you expect the stream gradient along the Kentucky River to be higher or lower than the gradient you found in question 48? Why?

In a secret agency such as ours, we need creative ways to maintain security. One of our most recent ideas is to use pictures as keys to get into our most important bases. In order for you to complete your training and begin your service as a full-time RS Agent, you must first find the key and then get into the base.

52. The key is a profile along a line connecting Elm Fork Church and Mt. Beulah Church. Use the graph provided on your answer sheet to draw this profile. Make sure you label both of your axes with units. In addition, label the two churches on the profile. For bonus points, also label points where roads and/or streams cross your profile.

53. The entrance to the secret base is found right between the two churches. What are the UTM coordinates of the base?

54. What is the linear distance between the base and either one of the churches in feet?

### III. Student-Created Map

Congratulations! You have successfully made it into the base. You have now been promoted to an official agent. It's good timing, because we already have a job for you. We have gotten verbal instructions from a source in another state about how to create a map of the area that surrounds their base. It is written in a language that only true RS Agents can understand, but I am sure that you have the ability to decode it.

Once you are done, we will send it to another division of our agency which will be able to scan satellite images and find the location of the base. We call this the Remote Sensing Division, or the RSD. Only the elite make it into the RSD, but with your skills, I would say that you have very good chances at reaching that level in a few years.

Here are your instructions for creating the map:

1. The square represents section 13. Write this section number on your map.
2. This section is in Township 17 North and Range 24 East. Write the correct Township and Range labels for the map.
3. A secondary highway enters the section at the NW corner and starts off at an azimuth of 142 degrees. When the highway is 31680" from the southern edge of the section, it curves until it has an azimuth of 107 degrees. It then crosses the rest of the section at this angle. The curve should be such that the highway never enters the SW  $\frac{1}{4}$  / SE  $\frac{1}{4}$  / 13.
4. A light duty road begins where the secondary highway crosses from the SW  $\frac{1}{4}$  / NW  $\frac{1}{4}$  / 13 to the SE  $\frac{1}{4}$  / NW  $\frac{1}{4}$  / 13. This road has an azimuth of 222 degrees. Draw in this road.
5. Draw a county boundary so that it enters the section on the NE corner of the NW  $\frac{1}{4}$  / 13 and exits the section on the SW corner of the SE  $\frac{1}{4}$  / SW  $\frac{1}{4}$  / 13.
6. There is a little town called Happyville at the junction of the two roads. Happyville has one church at the intersection of the two roads in the SW  $\frac{1}{4}$  / NW  $\frac{1}{4}$  / 13. Draw this church so that its entrance faces the secondary highway.
7. Draw a small cemetery on the northwest side of the church so that it is also alongside the secondary highway.

8. There are seven houses in the SE  $\frac{1}{4}$  / NW  $\frac{1}{4}$  / 13. Three of these are on the west side of the secondary highway and four of these are on the east side. Draw the houses. (instructions are continued on the next page)
9. The terrain around Happyville is mainly flat except for one circular hill in the SW  $\frac{1}{4}$  / NE  $\frac{1}{4}$  / 13. This hill rises 50 feet above the rest of the map and has a spot elevation of 748 feet at the top. Using a contour interval of 20 feet and an index contour interval of 100 feet, draw the contours for the hill.
10. The main industry in Happyville is underground mining in the E  $\frac{1}{2}$  / NE  $\frac{1}{4}$  / 13. Draw three mine shafts in the NE  $\frac{1}{4}$  / NE  $\frac{1}{4}$  / 13 and two mine shafts in the SE  $\frac{1}{4}$  / NE  $\frac{1}{4}$  / 13.
11. The state government has created a state park in part of this area. Because of this, the area south of the secondary highway and east of the county border is woodland. Shade in this woodland. (Note: do not spend a lot of time on this step. The shading does not have to be perfect.)

**IV. Tiebreakers:** these questions will be used to break ties. If the tie still exists after these tiebreakers, the questions in reverse order will be the next tiebreakers.

1. How many states use PLSS?
2. Who is the current director of the USGS?
3. On what date was the USGS established? Give month, day, and year.