

Maps and quads used in this event:

MS Highway Map (HM); Carterville Quad (C); Ellisville Quad (E); Greenville Quad (G)
In this story, US Routes are designated "US"; Interstate Highways are designated "I".

The Rescue of HySol

Professor DeLorean was sitting at his desk in a conference room in the Engineering Building on the University of Southern Mississippi campus. Laid out on the table before him were a copy of the Carterville Quadrangle and a sheet of paper. On it, Jim had sketched a 4" x 4" square and five objects using USGS map symbols.

Having consulted the Carterville Quad on numerous occasions, Jim was aware that the map was in the **1 C** minute series, its scale was **2 C**, and its contour interval was **3 C** feet. The map included numerous purple-colored features because it had been photo-revised in the year **4 C** using aerial photos taken in 1981, but it had not yet been field checked by the USGS. A rather rare feature of the Carterville Quad is inclusion of an entire township, T4N-R12W, and portions of **5 C** (A. 2; B. 4; C. 6; D. 8) several others. This is due to the map area having two township and two range lines. At the center of the bottom margin were three diagrammatic scales. One indicated measurements in miles, a second in feet, and a third in **6 C**.

The door to the conference room opened as Hank Hemi and Tina Turbo entered.

"It's great to see you two again," Jim said as he rose from his chair to welcome them. "How was your trip? When did you arrive in Hattiesburg?"

"The trip was quick and smooth," Tina replied. "It's fabulous having access to the company jet for these jaunts."

"We landed at the Hattiesburg Municipal Airport about an hour ago, rented a Jeep, checked into the Comfort Inn, and then headed straight to the campus to see you," Hank added.

"How's everything in Warren, Michigan, home to Modern Marvel Motors, Incorporated?" Jim asked.

"We just received a large order to manufacture trucks for the U.S. Army. There should be sufficient funds to permit us to finish the HySol project," Hank responded.

"HySol! What a fantastic name for a car that uses **solar** energy during the day and **hydrogen** fuel at night! Tina, as project engineer, did you come up with that name?"

"Yes, Jim, I did. But first it had to be approved by Hank Hemi, that slave-driving Vice President of Research and Development."

Jim and Hank chuckled heartily. Then Hank inquired, "Professor, how long has it been since we first started working on this project?"

"I came up with the idea several years ago, but didn't introduce it to Modern Marvels until about two years ago. They liked the proposal, and gave it a high priority. As you may recall, you two were brought on board last fall. You're here because HySol is finally ready for testing. By the way, where is HySol now?"

“Grease Pit Charley is transporting HySol down inside a semi truck. When I spoke to him earlier today, he said that he should be arriving in Hattiesburg early this evening,” Hank replied.

“Jim,” Tina remarked as she glanced down at the topographic map spread out in front of him, “Is the area where we will be testing HySol located on this quad?”

“No. This is the Carterville Quad. I’ve chosen a location on a different quad for the actual testing. I was reviewing this quad prior to your arrival. The forestry, agriculture and engineering departments are constructing new facilities within the confines of this quad. The Dean has requested my input on how to best develop this parcel of land.”

“Section 3 / T4N-R12W on the Carterville Quad are ninety percent **7 C** (A. orchard; B. woods; C. marsh; D. vineyards). You’ll most likely have to obtain special clearance from agriculture and engineering,” Tina remarked.

“The agricultural department plans to develop the area in Section 3 shown in white. Forestry has indicated that very little clearing of wooded area will be necessary for their part of the project. The engineering department plans to clear a portion of the land for construction of a research building, a test track, and a road. All three departments will jointly construct an artificial lake for use as a water storage facility.”

Tina, picking up the paper on which Section 3 had been drawn, said, “It appears as if you’ve already sketched in a building, a lake, a road, an underground pipeline, and a water tank.”

“Yes, it’s simply a start!” (You are to draw features 8 through 12 in the square provided on the second page of the response sheet.)

- The square represents Section 3 / T4N-R12W.
- I have drawn the engineering building, **_8_**, in the SW ¼ / NE ¼.
- The road, **_9_**, will be designated for light-duty traffic only. It will connect the medium-duty road on the eastern section line of 3 / T4N-R12W due west (azimuth 270°) to the building.
- The lake, **_10_**, will be constructed in SW ¼ / SE ¼. It will cover about 40 acres, and will be fed by the intermittent stream (shade the proposed area for the lake). (FYI: 1 Section = 640 acres)
- The water tank, **_11_**, will be located adjacent to the south side of the engineering building.
- The underground pipeline, **_12_**, will run from the lake to the water tank.

We’ll also need a water purification plant, but I have yet to decide whether it will be constructed by the lake or adjacent to the water tank.”

Tina, examining the Carterville Quad carefully, mused, “Jim, I’d bet the **13 C** pits in the N ½ / 19 / T4N-R12W provide employment for many residents within this area.”

“You’re right! Residents from Hattiesburg, Petal and Carterville work there.”

“And, here in the NW ¼ / 32 / T4N-R12W is **14 C** Lake. It’s an oxbow lake – a cut-off meander of the **15 C** River, located SW of the lake,” Tina continued.

“Yes, the river is an important source of water for Hattiesburg. On the Carterville Quad, you can see that the river is flowing in a **16 C** (A. NW; B. NE; C. SE; D. SW) direction away from Hattiesburg.”

Jim and Hank chose to discuss the financial details of the HySol project while Tina continued to examine the Carterville Quad. Using a protractor and a ruler, which she had removed from her briefcase, Tina measured the azimuth of the Hattiesburg Municipal Airport's runways (sector 7). Observing that the western neat line of the quad was a longitude with a value of **17 C** (record in degrees and minutes); she placed the protractor on the neat line to determine the azimuth of the runways. She found the azimuth to be 130 degrees. She repeated this task by determining the azimuth of the Illinois Central Gulf railroad track (about 0.3 miles NE of the runways) as measured from a NW to SE direction and calculated it to be **18* C** degrees.

Tina then spied Annie Carter Lake in the SW corner of sector 8. The lake had an island at its center which she at first thought might be an ideal location for a home. After further contemplation, she realized that the surface of the water was only **19 C** feet above sea level. The enclosed **20 C** (A. intermediate; B. index; C. supplementary; D. depression) contour on the island had a value of **21 C** feet above sea level. The island could easily flood during an even moderate rainfall. This explained why no one had chosen to construct a residence on the island.

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Hank's and Jim's discussion culminated when they decided to go to the motel to meet Grease Pit Charley for dinner. Following their meal, they chose to retire early so they would be well rested for HySol's test in the morning.

In the morning, Hank, Tina and Grease Pit Charley were standing near the semi when Jim drove into the parking lot. In a few moments, HySol was out of the semi's trailer. Grease Pit Charley loaded some equipment into the Jeep while Jim clarified the more intricate details of the pending test.

Hank and Jim climbed into HySol, with Jim at the wheel. Tina and Grease Pit Charley climbed into the Jeep and followed Hank out of the Comfort Inn parking lot. They turned north onto U.S. 49.

Spotting a sign indicating the direction to Petal, Hank commented that he hadn't realized just how close Petal was to their present location.

"Petal (K17) and Hattiesburg (K17) are found within a yellow square. What is the function of that square?" **22 HM**

Petal, with a population of **23 HM**, was much larger than Hank had anticipated.

As they approached I-59, Jim directed Hank to turn northward. After driving nearly a mile, they parted Hattiesburg and crossed the **24 HM** (Hattiesburg Inset) River.

"Jim, where are we going?" Hank asked.

"We're heading toward a small town named Ellisville. The HM City and County Index indicates that Ellisville is located within grid **25 HM** (A. B7; B. K16; C. J8; D. H7). The **26 HM** National Forest is located about eight miles east of Ellisville. I had requested that we be permitted to test HySol in the forest, but the park rangers informed me that it would be next to impossible to obtain permission to do so."

"So, where are you planning to test HySol's capability of traveling cross-country?" asked Hank.

"We're going to begin the test at Oak Grove Church in Sector 3 on the Ellisville Quad. You can grab the map from the back seat to check exactly where that is if you wish," Jim suggested.

“Nah, I’ll just wait until we get there.”

Upon approaching Oak Grove Church, Hank pulled into the parking lot and stopped. Grease Pit Charley pulled in next to him. Everyone clambered out of their vehicles to stretch their legs.

“Jim, how was your first ride in HySol?” Tina asked.

“The ride was fantastic!” replied Jim excitedly. “HySol has great acceleration, cruises effortlessly at 70 mph, and runs very quietly. Not a sound. But now for the real test; we’ll soon know exactly how well HySol performs under extreme conditions.”

“So, how are we going to find out?” Tina asked anxiously. “Where will we take her?”

Jim unfolded and spread out the Ellisville Quad on a picnic table. Placing his finger on the location of Oak Grove Church, he said, “We’ll start here at the church and drive straight as an arrow to Pecan Grove Church.” With his finger, Jim traced the route from Oak Grove Church to Pecan Grove Church (E, sector 3).

“Why did you pick that particular route?” Hank asked.

“It’ll let us determine how well HySol can do on rough terrain and, just as importantly, we have obtained the landowner’s permission. I’ve even drawn a profile from Oak Grove Church to Pecan Grove Church.”

“I had no idea that you knew how to draw a profile!” Tina exclaimed.

“Actually, I don’t. A colleague in the Geology Department sketched the profile for me on condition that I take him for a ride in HySol.”

Tina, Hank and Grease Pit Charley peered at the profile (On page 2 of the response sheet, draw a profile similar to the one that Hank showed his colleagues – questions **27 – 29.**)

“We’ll make certain that we miss the buildings,” Jim assured him.

“I know it looks easy,” said Tina. “To be on the safe side, however, I’m going to record the coordinates of Oak Grove Church. I want to be able to return to the exact spot where we left the Jeep.” Tina removed a GPS unit from her pocket. Reading the GPS device, she recorded the coordinates as **30° E** N. latitude and **31° E** W. longitude.

They then climbed into HySol, with Grease Pit Charley opting to drive. The trip to Pecan Grove Church proved short and without incident. HySol easily negotiated every obstacle in its path, including the crossings of the two intermittent streams. Grease Pit Charley even managed to miss the two buildings.

As they approached Pecan Grove Church, they were elated with the manner in which HySol had performed on her first ever off-road experience.

“That was an outstanding performance!” Jim exclaimed, “But it was much too short. Let’s drive through the fields. We have the owner’s permission to travel anywhere we wish as long as we stay clear of houses.”

“Let’s continue the test,” Hank said to the group. “Jim, you drive. If anyone deserves to get behind the wheel of this baby, it’s the man who developed the concept.”

“What if we get lost?” Tina asked.

“We won’t get lost,” Jim replied. “I’ve not only brought along the Ellisville Quad, but others as well. If we travel off the Ellisville Quad to the north, I have brought the Laurel

West quad. Should we choose to travel off the Ellisville Quad while traveling east, I have also brought the **32 E** Quad, the one located to the east of the Ellisville Quad.”

So, off they drove! As they were passing a large cornfield, they heard a buzzing noise in the distance. Jim stopped HySol to investigate.

“Look! It’s a plane!” Hank shouted excitedly.

“Yeah, an old biplane,” Tina added.

“Why is it flying so low?” Grease Pit Charley asked.

The plane turned and was now headed straight toward them.

“Oh, no,” Jim shouted. “It’s a crop duster. Quick, hit the ground!”

The plane passed directly overhead. The dust it was spraying seemed to be everywhere. Coughing, the four adventurers stood up and began brushing the dust off their hair and clothing. The dust even covered their faces. They resembled a group of insane zombies.

“Let’s get out of here!” Hank shouted as he started running toward HySol, his friends close behind.

Back in HySol, they watched as the plane made yet another pass over the cornfield. They rolled up the windows to prevent a second cloud of dust from smothering them. The plane did not return for another pass, but continued westward over a thick forest. As it disappeared from sight, they heard a loud boom and saw several puffs of smoke rising above the treetops.

“It’s crashed!” Tina shouted. “We have to help the pilot.”

Hank, now in the driver’s seat, pressed on the accelerator. HySol refused to move.

“The dust has covered the solar panels,” Jim said. “Convert to hydrogen power!”

Hank switched HySol from solar to hydrogen power. The vehicle responded immediately. Upon approaching the woods, they found the greenery to be so dense that they were certain that HySol could not penetrate it. Hank stopped HySol and climbed out. Having no alternative, they chose to enter the forest on foot.

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Jimmy Bob Allison and Lester Luster were running south along the eastern bank of the **33 E** Creek (NW ¼ / 35 / T8N-R12W). Jimmy Bob, now in the lead, suddenly turned eastward, away from the river, to fight his way through the thick underbrush. Lester followed. Soon they broke out of the forest and onto a rather large area presently under cultivation.

Lester, accidentally stumbled onto the ground, shouted out, “Jimmy Bob!”

Jimmy Bob stopped running and turned to see his friend lying on the ground. He quickly backtracked to Lester’s position and crouched next to him.

“What’s wrong? You got a cramp?” Jimmy asked.

“No cramp. I’m just exhausted,” Lester replied. “I need a breather. We’ve been on the run ever since we broke out of that jail in Laurel.”

“I know, Lester. We had no choice other than to break out of jail so we could find Luther Washburn. He’s the one person who can help prove our innocence.”

"I understand that, Jimmy Bob. I just don't think I'll be able to run all the way to Greenville."

"You'd better come up with some other plan very quickly. Hear those hounds? The sheriff must be right behind us."

"Hey, Jimmy Bob, look over there between the cornfield and the woods. It looks like a car, or a truck, or something. I've never in my life seen anything quite like that before!"

"It could be our way out of here!"

The two fugitives scurried to HySol and climbed in. The instrument panel looked really strange.

"Jimmy Bob, do you think you can drive this thing?"

"If it's got four wheels, I can drive it." Jimmy Bob replied. "Take a look at this! Someone left the key in the ignition."

Jimmy Bob turned the key, and both heard a soft, purr-like sound.

"Is it running?" Lester asked.

"Let's find out," Jimmy Bob replied as he shifted HySol into drive. HySol began to move.

"Look! Someone's left a bunch of maps on the back seat. The top one is the Ellisville Quad. Might we be close to Ellisville?"

Jimmy Bob stopped HySol and grabbed the Ellisville Quad. He located the town of Ellisville in sector **34 E**. "I think we're quite close. Lester, we don't need these maps. All we need is the vehicle."

Lester quickly opened the door and tossed the maps onto the ground. They then headed south along the edge of the cornfield.



As Tina, Hank, Jim and Grease Pit Charlie approached the river, they heard an even louder boom and spotted even more smoke. Peering across the water, they spied what appeared to be a couple of hundred men. Some were clad in blue uniforms, while others were in gray. The uniforms were similar to those worn during the nineteenth century.

"I forgot. Today is Ellisville's reenactment of a famous Civil War battle," Jim remarked.

"It wasn't a crashing plane after all. What we've been hearing is cannon fire," Jim announced.

After washing the crop dust off their hands and faces with water from the creek, they returned to where they thought they'd abandoned HySol.

"Where's HySol!" Hank exclaimed in alarm. "I'm certain we left her right here."

"The flattened grass indicates that someone has taken her and driven her southward."

"What'll we do now?" Grease Pit Charley exclaimed, disappointedly. "All our maps are in HySol."

"Look! The maps are over there. Whomever took HySol must have tossed the maps out of the vehicle!" shouted Tina in a tone of relief. "Let's fetch the maps, and I'll attempt to locate exactly where we are."

Using her GPS unit, the Ellisville Quad, a ruler and masking tape, Tina pointed to a red section number 35 on the Ellisville Quad (Sector 8). It was Section 35 / T8N-R12W. "We are here," she said as she drew an "X" on the upper right hand side of the numeral 5.

"Do you always carry a ruler, masking tape and a marker with you?" Jim inquired.

"Yes, I do. It's a standard part of my survival gear."

"Well, it's really great that you have all that stuff."

"Question," Grease Pit Charlie said to Tina. "How do you know that we're at the '5' in this red 35?"

"Easy. GPS provided the coordinates. All I had to do was determine where those coordinates are located on the Ellisville Quad. The NW graticule was very helpful. The map told me that the coordinates of the NW graticule are 35 E N. latitude and 36 E W. longitude. That provided the only reference points I need."

"What does the red 35 stand for?" Grease Pit asked quizzically.

"It's an essential part of the Public Land Survey system, or PLSS. PLSS is used to describe locations. It provides the section or square mile in a township. Bankers, builders, surveyors, and many other professionals use this system on a daily basis," Tina responded. She then proceeded to briefly explain how the system works.

"So, the description of the SE graticule would be 37 E." (Use PLSS to determine the location.)

"Correct. I think th..."

"Okay, already. What are we going to do now that we know where we are?" Hank interrupted.

"I'll use my protractor and ruler to determine the azimuth from the northeastern most point on the five, as in Section 35, to Oak Grove Church. I'll then determine the distance between here and the church," Tina replied as she laid the Ellisville Quad on the ground and began to work.

"Why hasn't anyone suggested that we call the police? After all, a very expensive, experi-mental vehicle has been hijacked," Jim asked.

"We don't need the publicity," Hank responded. "Our competitors are only aware of HySol as an unconfirmed rumor. That's why we brought her here concealed in the back of a semi truck."

"In addition, HySol is equipped with an advanced version of On Star. Once we've returned to the semi, we'll use the data center in the trailer to locate HySol. After we've found her, we'll determine whether we'll require any assistance from the law," Grease Pit Charley explained.

"Okay, guys. The azimuth from the '5' in Section 35 to Oak Grove Church is 38* E degrees, and the distance is 39* E miles. We should be in the Jeep within 40 minutes, max."

"Tina, how can we be certain that we're following the proper azimuth?" Hank asked.

"Because I have a compass, and yes, I've adjusted it for the proper declination. The declination between star north and magnetic north on the Ellisville Quad is 40 E degrees."

Just as Tina had predicted, they arrived at their Jeep in just under 40 minutes. They then drove to their motel in Hattiesburg and parked next to the semi. They unlocked the trailer and proceeded directly to the control center located at the front of the trailer.

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Jimmy Bob and Lester drove straight from Ellisville to Greenville, MS. Greenville has a fascinating geography. Its western boundary is Lake Ferguson with a “?” shape (G. Quad) and extending well beyond the northern and southern limits of the city. Running most of the length of Lake Ferguson is a boundary line that not only separates Washington County from **41 G** County, but also serves as the boundary between the states of Mississippi and **42 G** (A. Texas, B. Louisiana; C. Alabama; D. Arkansas).

On the western side of Lake Ferguson is Archer Island with a long, narrow lake of its very own named **43 G** Lake. Actually, this lake is 1.4 miles long and never exceeds a width greater than 0.1 miles. The contour line closest to this lake’s southern shoreline is a depression contour with a value of **44 G** feet above sea level.

When Jimmy Bob and Lester arrived at Luther Washburn’s house, they were told that Luther was fishing at Blue Hole (G, sector 7). To get to Blue Hole, Jimmy Bob and Lester had to drive north out of Greenville on a light-duty road. The road turned to the northwest. Just before the Mississippi River, they executed a lefthand onto another light-duty road which turned to the south. This road took them the length of Tarpley Neck (G, sectors 4 and 7) and onto Archer Island. Both these light-duty roads **45 G** (A. were built on levees; B. went through miles of swampland; C. crossed numerous intermittent streams; D. were dual highways).

Approaching Blue Hole, they spotted Luther’s van. Before they had reached it, HySol ran out of hydrogen. Jimmy Bob steered the car to the side of the road and parked. They left HySol to search for Luther and soon found him fishing from the shoreline of Blue Hole.

“Mr. Washburn,” Jimmy Bob greeted the fisherman, “we’re in a heap of trouble. You’re the only who can help us. We were arrested in Laurel for breaking into a store and stealing a computer.”

“When was the theft?” Luther asked.

“Two days ago, at about 10:00 p.m.,” replied Jimmy Bob.

“You couldn’t have done it. You were with me entertaining the children at the Greenville Hospital. Why in the world would you want to go to Laurel?”

“We were told that a resident of Laurel was willing to sell one of the Elvis Presley’s guitars from his collection. I really wanted a chance to see that guitar, but unfortunately that never happened. We were arrested as soon as we entered the town.”

Luther, shaking his head after hearing Jimmy Bob’s response, replied, “As sheriff of Washington County, I’ve had the opportunity to meet Sheriff Clay over in Laurel. In fact, we’ve become really good friends. I’m certain we can straighten this whole thing out.”

“Yes, Sir,” Jimmy Bob replied, “but there’s more. We broke out of his jail.”

“Well, that complicates matters a bit. Maybe I can get him to work around that.”

“But there’s more to the story than simply breaking out of jail. We also stole a car to get here.”

“I’ll have to think about this for a moment,” Sheriff Washburn muttered softly as he sat down in his fishing chair.



Hank turned on the tracking equipment and immediately located HySol traveling north on US 49 W. north of Yazoo City (HM, Grid 11). Hank and Tina chose to remain at the control center while Grease Pit Charley and Jim took the Jeep in pursuit of HySol. Hank and Tina promised to keep Grease Pit Charley and Jim informed of HySol’s movements by cell phone. Grease Pit Charley loaded the Jeep with tools and equipment that might be needed. Then off they sped in pursuit of HySol.

Two hours later, Tina placed a call to Grease Pit Charley and Jim.

“HySol hasn’t moved for the past 20 minutes,” Tina reported.

“She may have run out of hydrogen,” Grease Pit Charley responded. “Where exactly is HySol?”

“We’ve changed from a highway map to a topographic map in the hope of finding more details. HySol is at Blue Hole, a lake on an island west of Greenville. It’s parked near x151 a short distance northeast of Blue Hole, but that won’t help you because x151 is a **46 G** (A. horizontal control station; B. vertical control station; C. spot elevation) which means that it doesn’t have a tablet. Exactly where are you?”

“We’re at Yazoo City (G-11).”

“Then you’re **47 HM** miles south of Indianola. Remain on US-49 W until you reach Indianola (F8). When you arrive in Indianola, turn west onto **48 HM** (A. U.S; B. Interstate; C. State) Highway 82. That will take you to Greenville. When you’ve arrived in Greenville, give me a call. From that point on we’ll keep our phone line open because it’s a bit tricky to get to Blue Hole. We’ll talk you through each and every turn.”

“Thanks, Tina. I’ll give you a call in about an hour,” Jim replied.

When Grease Pit Charlie and Jim reached Blue Hole, they had no problem locating HySol since a Jones County Sheriff’s car was parked directly behind her, its red lights beaming brightly. Five men, two of whom were in police uniforms, were busily conversing at the side of the road. Grease Pit Charley pulled in behind the police car. He and Jim joined the other men. They informed the officers that HySol belonged to Modern Marvel Motors, and that it had been stolen while parked outside of the city of Ellisville.

After hearing Jimmy Bob and Lester’s story, Jim, with input from Grease Pit Charley, Hank and Tina, informed Sheriff Clay that since HySol hadn’t been damaged, they wouldn’t be pressing charges.

After Sheriffs Washburn and Clay conferred in private for a moment, they returned to the others. Sheriff Washburn said, “Jimmy Bob, Lester, Sheriff Clay is going to recommend that you each serve 100 hours of community service – not so much for your crimes, but mostly for your stupidity. Think about it. You could have called me, and all this could have been avoided.”

Sheriff Clay and his driver then left for Laurel. Sheriff Washburn offered to give Jimmy Bob and Lester a lift back to Greenville. Grease Pit Charley replaced the empty hydrogen tank, and he and Jim started their trip back to Hattiesburg.

Tina, while still on her cell phone, asked, “Should Hank and I wait for you to return so we can all have dinner together?”

“No, go ahead and eat,” Grease Pit Charley suggested. “It’ll be quite late before we return to Hattiesburg. We’ll stop in **49 HM** (G-13), the Mississippi State Capitol, where Jim knows a great restaurant. We’ll be back at about 10:30 p.m. We can meet then.”

The Rescue of HySol – Response Sheet Name: _____

Mississippi Map and Quads used in this event:

MS Highway Map (HM); Carterville Quad (C); Ellisville Quad (E); Greenville Quad (G)

In this story, US Routes are designated “US”; Interstate Highways are designated “I”.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8 – 12. Draw the features described within the square on the accompanying sheet. Use USGS symbols. Do not number the features.

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. _____

20. _____

21. _____

22. _____

23. _____

24. _____

25. _____

26. _____

27 – 29. See “profile” notes below.

30. _____

31. _____

32. _____

33. _____

34. _____

35. _____

36. _____

37. _____

38. _____

39. _____

40. _____

41. _____

42. _____

43. _____

44. _____

45. _____

46. _____

47. _____

48. _____

49. _____

Draw the profile from Oak Grove Church to Pecan Grove Church on the grid provided.

The vertical scale has been included to save you time. Scoring will be as follows:

Question 27 – Accurately dropping the intersection points from the map onto the grid.

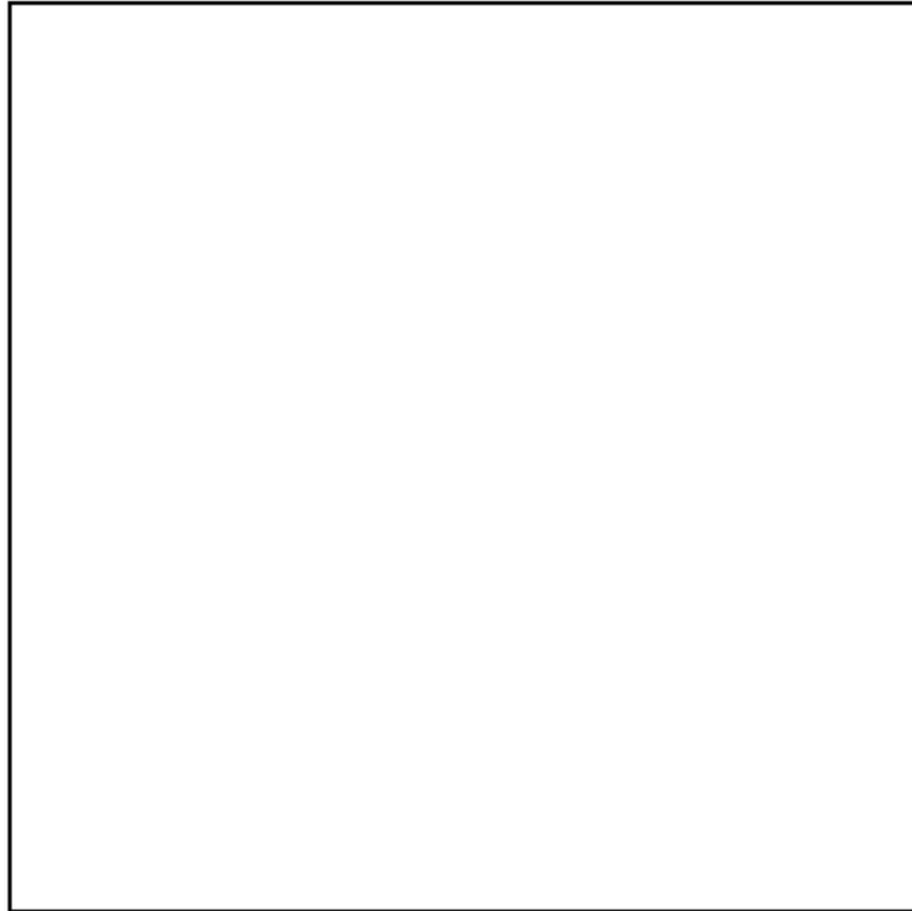
Question 28 – Connecting the points you have placed on the grid.

Question 29 – Drawing and labeling the two intermittent streams and the road you crossed onto your profile.

Questions 8 through 12

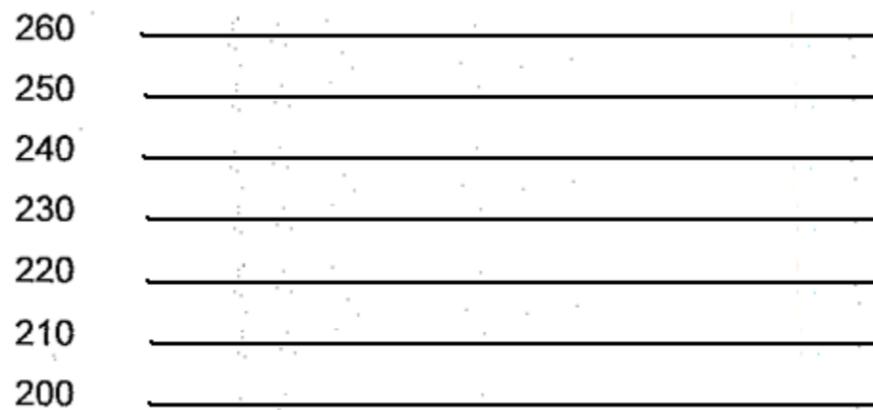
Your Map Draw the five features, using USGS symbols, within the square below.

- # 8 – Engineering Research Building
 - # 9 – Light-duty Road
 - # 10 – Man-Made Lake
 - # 11 – Water Tower
 - # 12 – Pipeline
- Important: Do not label the symbols.



Questions 27 through 29

Profile



The Rescue of HySol

Answer Key

- | | | | |
|--|-------|-------------------------------------|-----------------|
| 1. 7.5 | | 27 – 29. See “profile” notes below. | |
| 2. 1:24,000 | | 31° 35' 45” | |
| 3. 10 | | 30. ★ <u>31° 35' 49”</u> | |
| 4. 1985 | | 31° 35' 55” | |
| 5. D [8 – several are very small portions] | | 89° 09' 15” | |
| 6. kilometers | | 31. ★ <u>89° 09' 19”</u> | |
| 7. B | woods | 89° 09' 25” | |
| 8 – 12. Draw the features described within the square on the accompanying sheet. Use USGS symbols. Do not number the features. | | 32. Lanham | |
| | | 33. Tallahala | |
| | | 34. 2 | |
| | | 35. 31° 35' | |
| | | 36. 89° 12' 30” | |
| | | 37. NE ¼ / SE ¼ / Sec 26 / T7N-R12W | |
| | | 38. ★ 141° – 151° <u>145°</u> | |
| | | 39. ★ 1.63 – 1.73 <u>1.68</u> | |
| | | 40. 3° | |
| | | 41. Chicot | |
| | | 42. D | Arkansas |
| | | 43. Archer | |
| | | 44. 115 | |
| | | 45. A | Built on levees |
| | | 46. C | Spot elevation |
| | | 47. 44 | |
| | | 48. A | U.S. |
| | | 49. Jackson | |

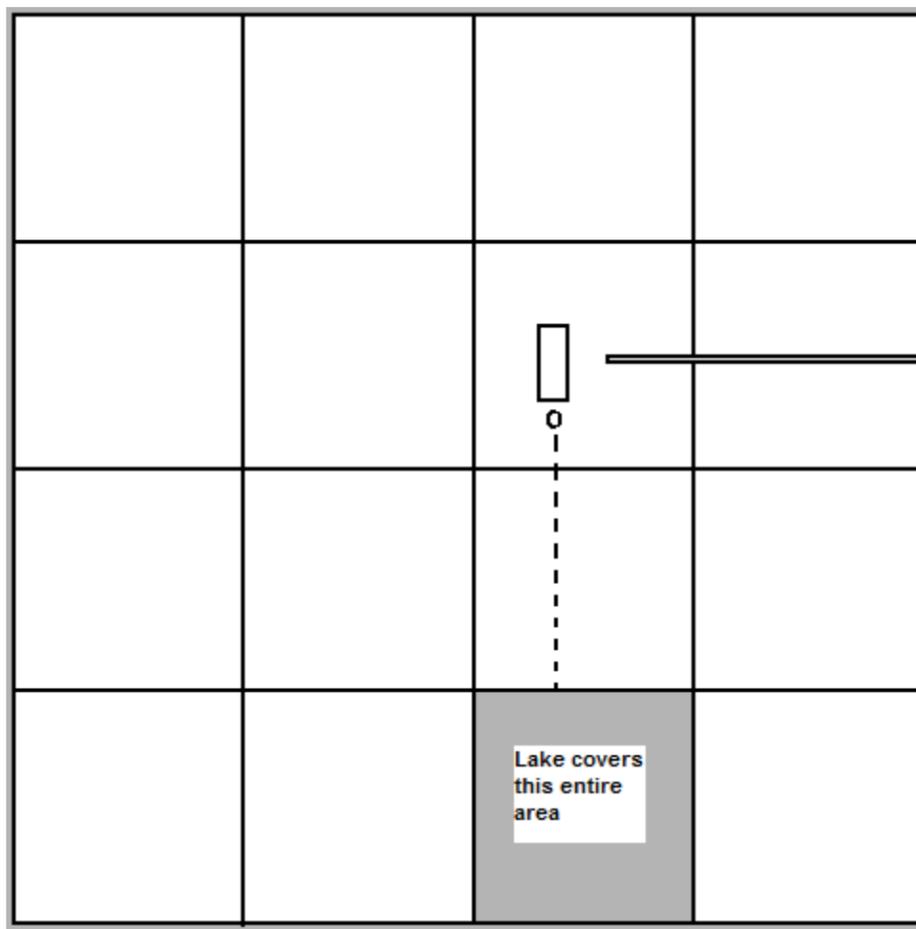
★ Indicates a tie-breaking question

Draw the profile from Oak Grove Church to Pecan Grove Church on the grid provided. The vertical scale has been included to save you time. Scoring will be as follows:
Question 27 – Accurately dropping the intersection points from the map onto the grid.
Question 28 – Connecting the points you have placed on the grid.
Question 29 – Drawing and labeling the two intermittent streams and the road you crossed onto your profile.

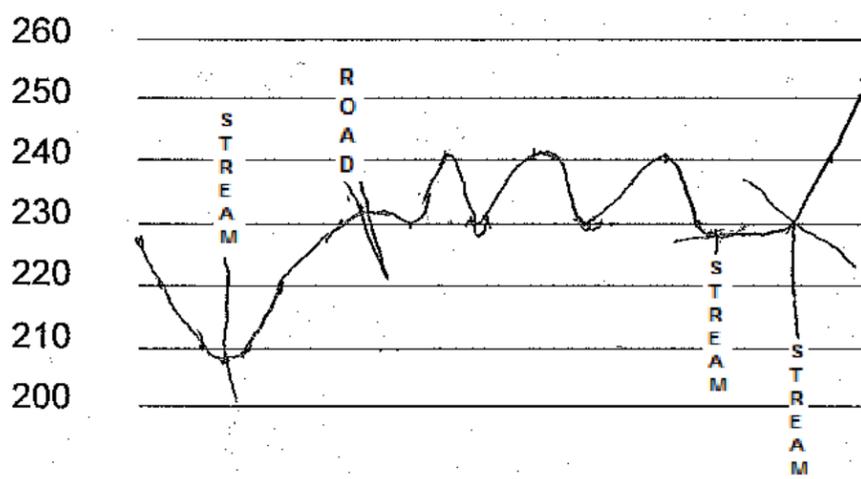
Questions 8 through 12

Your Map Draw the five features, using USGS symbols, within the square below.

- # 8 – Engineering Research Building
 - # 9 – Light-duty Road
 - # 10 – Man-Made Lake
 - # 11 – Water Tower
 - # 12 – Pipeline
- Important: Do not label the symbols.



Questions 27 – 29: Profile



Scoring will be as follows:

Question 27 – Accurately dropping the intersection points from the map onto the grid.

Question 28 – Connecting the points you have placed on the grid.

Question 29 – Drawing and labeling the two intermittent streams and the road you crossed onto your profile.