Exploring the World of Science

B Road Scholar Coaching Version

Notes for Coaching Version:

This version of the event contains all questions, with answer and calculations. Extra background information is included that did not appear in the competition version.

Maps:

Hamilton uses two hard copy maps, a series of 4 large Mapscans, and a number of smaller insert Mapscans. Everything is included in the event files except the AAA Road Map.
They are:

1. **AAA New York Road Map, dated 4/18-7/19. (not included in these files)**
   Other dates should work well but a few answers may change**.** Free to AAA members; begging teenage non- members with a copy of the event can probably also get it free from an AAA office. The map itself is not printed on line, but AAA members can order a hard copy of the current version.

2. **USGS Mount St Helens 7.5 min Quadrangle Map 1998, 1:24,000. (This file should be posted here).** If not, it can be downloaded free from USGS at www.usgs.gov. USGS constantly updates the website and your pathway may be different, but the steps below worked as of 8/8 2024.
   1. www.USGS.gov
   2. Products
   3. Maps
   4. Topographic maps
   5. Get topographic maps
   6. Historical Topo Map Collection
   7. Search by Location: enter "Mount Saint Helens"
   8. From pull-down menu select **Mount Saint Helens, WA , then 1998 1:24000 GeoPDF**
   9. View PDF- adjust your view to 100% or actual size. Save on your computer as file Name **"USGS Mount St Helens, WA 1998"**

Question Booklet With Answers, Work, and Notes

In this coaching version, Mapscans that were separate sheets "Station Graphics" in the in-person event have been moved to be in sequence with questions.

To the Students: Welcome to Road Scholar!

Teams may bring stand-alone non-programmable, non-graphing calculators, protractor, ruler, other measuring devices, USGS Map Symbol Sheet, and hard copies of other information in any form and from any source along with colored marking devices consistent with the colors utilized on USGS topographic maps. No computers are allowed. Cell phones may not be used as calculators and must be turned off.

Your team name and team number must be written on all answer sheets.
Your answers must be complete – measurements must have units; town names must include state, province, or other appropriate identification. You may ignore magnetic declination unless a question specifically asks about it.

If you are not certain as to what you should be doing, or if a question does not make sense to you, ask the event supervisors what to do.

Make sure you read the story line in italics. Some of the questions will not make sense without the story, so they will be harder to do.

Cautions: Avoid penalty points!!!
Do not make any marks on any questions or images provided to you!
Start and stop working exactly when told to do so by the event supervisor.

Conversion factors:

Feet to meters = feet x 0.305	Meters to feet = meters x 3.281
Miles to kilometers = miles x 1.6090	Kilometers to miles= kilometers x 0.621

This event uses both original USGS Quadrangle Maps and Mapscans. The original date of the Mapscans varies, but is noted on individual maps, along with altered scales as needed. Answers are correct based on specified maps, but different edition maps may give different results.

Do Not Write on Anything but Your Answer Sheets and work sheets.

Hamilton

It was cold and dark on Wall Street. All the kids on the Science Olympiad team at Wall Street Middle were makin' plans for the Nationals at Cornell. Me and the new kid, Alexander Hamilton, were fighting as usual. "Aaron Burr", they said, "Give us a verse-drop some knowledge! Tell us about Alex!". They were snapping their fingers so I rapped his story:

How does a young kid, fun kid, workin' for a dolla
Grow into an Olympic kid who's starrin' in Road Schola?
He's a sharp kid, smart kid, goin' to his classes
Wantin' to grow and share his rhymes with all the masses
He cold, you know, moves slow, you know, he flowin' like molasses
Hangin' with his friends, you know, an doin' all that rappin'
He's gonna find his way someday -- he's studyin' the mappin'!

"Hey Alex! You really gonna win Road Scholar this year? You got one shot, right? Why don't you just throw away your map for a while and relax?"

Alex got mad, like he always does.

I am NOT throwin' away my map!
I am NOT throwin' away my map!
Hey, I'm just like my pappy
I'm young, so cool and snappy
When I sing sometimes I'm rappy
No one else can use my mappy!

And the rest is history. We both got mad and I sorta shot him---so I get hated and he gets a Broadway show. Nowadays, I coulda shot him on Fifth Avenue and still got elected! But he was OK about it, and we're buddies again.

We decide to carpool from New York City up to Cornell. After Alex wins Road Scholar, we can drive out West. He wants to visit Mount St. Helens, the famous volcano. He was always blowin' his top, so it figures. He's even gonna bring his old maps, 'cause he never throws them away! One more thing-- we're both time travelers, so we can do old stuff and new stuff with no problem. I got no idea how this works.

**********Map Usage*** Mapscan 1, Downtown New York City, 1776 **********

You can see Trinity Church on Broadway at Wall Street. Address numbers on Wall St start at Broadway and go up as you walk Eastward. Ya know, there's a lot of guys made money on Wall St. How 'bout you walk along with me for a minute? Trump Tower is at 40 Wall. Hamilton lived at 48 Wall; Burr lived at 35 Wall.

Hamilton Mapscan 1- Downtown New York City, 1776
Electronic map courtesy Mapquest.com

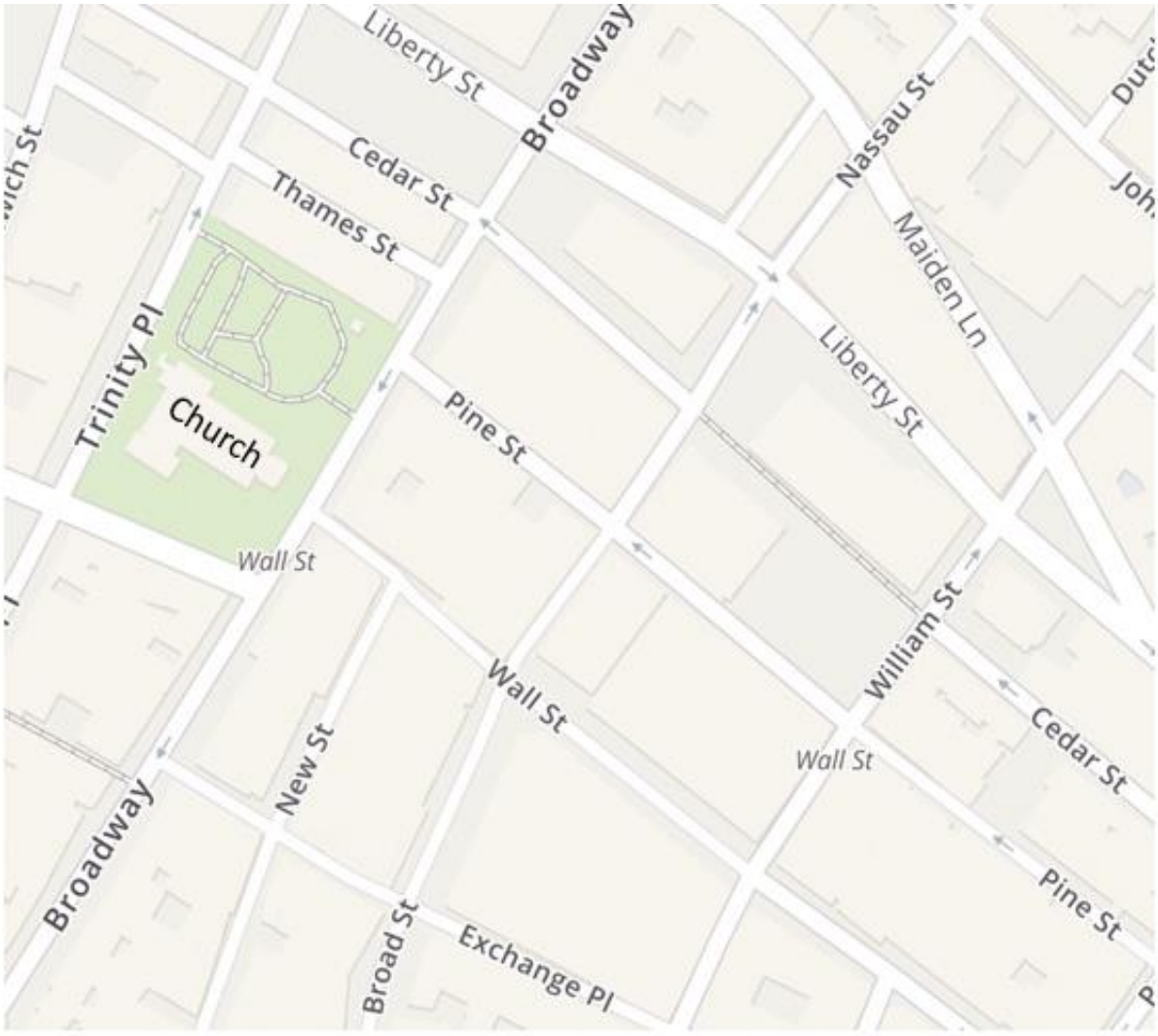
Station Graphic- Do Not Write on This Map

Use this Mapscan for Questions # 1 and 2

Note Trinity Church on Broadway, Wall Street and William Street.

This map was produced in 2019 but the streets and church are in the same places as they were in 1776.

Scale 1.0 cm= 100 ft



Station Graphic- Do Not Write on This Map

1. Walking on Wall St. from Broadway Eastward, whose places would you pass (in sequence)?
A) Trump- Hamilton- Burr B) Hamilton- Trump- Burr C) Burr- Trump- Hamilton
D)Trump- Burr- Hamilton **C) Burr- Trump- Hamilton**

2. These days, Alex spends most of his time at Trinity Church. 48 Wall Street is at the Northeast corner of Wall and William Streets. What is the distance from 48 Wall Street to the closest point on Trinity Church? Express your answer in feet.
Distance= 850 ft (Range 830 to 870) Map scale= 1.0 cm to 100 ft. map distance 85 mm
Note- Alex really does spend most of his time at Trinity; he and his wife are buried there.

******** Map Change**Use AAA Long Island Map*********

Goodbye Wall Street-We gotta go! Alex and I get on I-495 along the center of the Island, headed to the Eastern End. I'm drivin' and he's readin' his map. He's always studying his map!

3. What name is given to I-495 on Long Island?

Long Island Expressway

We stop at Starbuck's in Riverhead, NY.

4. What are the AAA map grid coordinates for Riverhead?

P-52

At the Eastern end of Long Island, the Island splits into the North Fork to Orient Point and the South Fork to Montauk Point.

5. On which Fork are the famous resort towns of the Hamptons-- East Hampton, South Hampton, and Bridgehampton? **South Fork**

*******Map Change ****Use Toll Facilities Insert Chart on AAA Southern New York Map********

Alex gets excited: "Aaron! We have to take the Long Island Sound car ferry from Orient Point to New London, CT-- that's where the US Coast Guard Academy is. I founded the Coast Guard, you know! There's a toll for the ferry, but I have a stack of ten dollar bills. Oh look! Whose picture is on the bills? Why it's me! That's why they call me the ten-dolla founding fatha!

Founding fatha on ten dolla bill.

6. What will it cost for the car and two adults, even if they act like children, to cross from Orient Point to New London?

$93 exact no range $59 for car; 17 per adult= $34; total = $93 exact no range

****** Map Change*** Use AAA Southern New York Map ****************

After leaving the Coast Guard Academy, we drive Southeast on I-95 all the way through Connecticut and into New York State. We turn onto I-287 and cross the Hudson River. At Interchange 11, we exit the Interstate and enter NY 9W Northward.

As we drive Northward on NY 9W, we can see the majestic Hudson River. We both remember how important this River was back in the Revolution- the British Navy wanted to control it so they could split New England from the other colonies, and the Americans wanted a way to stop the British ships from sailing up the River.

7. As we drive Northward on NY 9W, where is the River?

A) to our left B) to our right C) straight ahead D) it switches sides as we drive on the road

B) to our right

After driving about 20 miles, we enter a large green area on the map.

8. What protected area is shown in green here?
Bear Mountain State Park or Harriman State Park

After leaving the green area, we enter the United States Military Academy Reservation. We drive to West Point (G-40). It's right on the Hudson. Before it was a school, West Point was the most important Army base in the colonies. We were both officers during the Revolution!

9. What cultural institution is on the US Military Academy Reservation? **West Point Museum**

10. How does the classification of NY 9W change when it enters the West Point Military Reservation? **changes from undivided to divided**

*************Map Change** Use Mapscan 2 - West Point, 1780*********

Station Graphic- Do Not Write on This Sheet

Note the Hudson (North) River, Fort Clinton, and the Great Chain across the Hudson. The chain stopped British ships from sailing up the River.

Note-

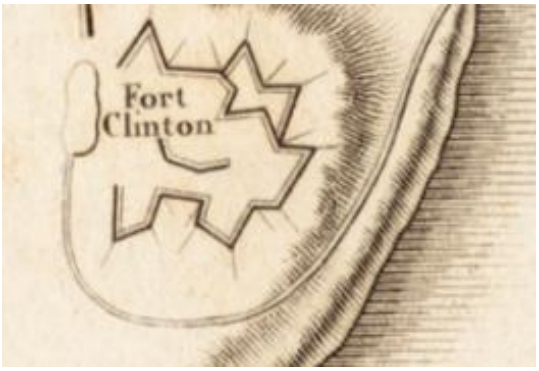
Benedict Arnold commanded the forts at West Point and all troops for miles around. West point was vital because it controlled movement in the Hudson River. If the British captured West Point, they would control the Hudson, thus splitting the colonies in two.

Arnold drew the original "teaser" version of this map by hand and gave it to his British handler, Major Andre, along with a letter stating his asking price to betray West Point. Hamilton and Washington just happened to be at West Point that day, could not find Arnold, and realized something was wrong. Andre was captured a few miles from West Point with the map in his boot. Rough calculations show that Arnold wanted about $20 million in today's money, plus a pension and British rank. He actually got much less because the plot didn't work out, but he got part payment, became a British officer, and invaded Connecticut. Many folks think Arnold's wife came up with the whole idea. The New York State Science Olympiad held its high school tournament at West Point for many years!

12. Measured in a straight line, what is the maximum width of Fort Clinton?
560 ft (range 480- 640)

Note the hachure marks encircling Fort Putnam

13. Contours are shown by hachure marks pointed away from the forts. Assuming each row of hachures shows a 50 ft rise, what is the maximum possible elevation of Fort Clinton above the River level? **149 ft**
In between fort and River, note two rows of hachures--no third row. At 50 ft per hachure that gives a range of 101 to 149 ft--see map. (Google Earth shows top of current fort remains as 150 ft)



Alex, I'm glad they pinned that whole thing on Benedict Arnold instead of me!
We leave West Point, headed North on NY 9W. When we reach Newburgh, NY (AAA F-40) we enter I-84 Westbound. We follow I-84 to NY 17, In Middletown, NY and turn Northwest onto NY 17.

****** Map Change*** Return to AAA Southern New York Map ****************

14. If we had entered I-84 East instead of West, what is the next State we would enter?
Connecticut

We exit NY 17 at Interchange 100 and stop for lunch in Grossinger, NY (AAA C-35). The restaurant has a big poster on the wall advertising "Hamilton-the Musical". Alex smiles, signs autographs, and I frown 'cause I know someone is gonna start singing. I ask for a wrap and the cleaning guy starts rappin':

Don't be grumpy, Sir, I'm workin' here, just scrubbin' down some tiles
Why don't you just be happy, Burr, and send me out some smiles?
You can say how long you're drivin' for an' give me all the miles
So I can write them down right here and keep them for my files!

15. How far have Alex and Aaron travelled on NY 17 from Middletown to Grossinger? You must calculate this distance using the AAA road mile figures printed right next to NY 17-see map legend. **36 miles** 8+5+12+1+10

We continue Northwest on NY 17-- and we drive right off the Southern New York map.

******** Map Change** Use Main AAA New York Map********************

We enter the map area at AAA R-22, continuing on NY 17. Guess who is reading the map? We pull into Binghamton, NY.

16. The name Binghamton is printed in red on the main AAA map. How can we use the AAA to help identify good places to eat or stay while in town? **Check tourbook guide listings**

******** Map Change** Use Binghamton Insert Map********************

Aaron and Alex were both college guys. Aaron went to Princeton and Alex graduated from Columbia. Alex once punched out the financial aid office! They always look at colleges when they travel.

17. Name two colleges or universities in Binghamton.
Binghamton University// Davis College// SUNY Broome Community College

***** Map Change** Use Main AAA New York Map********************

After a good meal and a good night's sleep, we drive to Cornell University in Ithaca, NY. (AAA P-16). It's in the Finger Lakes Region.

18. There are several long Finger Lakes near Cornell. Which lake has the greatest straight-line length? **Cayuga Lake**

19. Using the AAA map, what is Ithaca's longitude? Express your answer to the nearest tenth of a degree, using either East/West or +/- notation.
-76.5° or 76.5° West (Range 76.4-76.6)
map measure= 1 mm map distance= 0.01°. Map measure= 57mm West of -76; -76 to -77 = 117mm; 57/117= .48° rounded to .5°.

Alex is still looking at his map. He annoys me so much I'd just like to shoot him--oh darn, too late--but driving from New York City to Binghamton with our stops took a long time.

***** Map Change***** Use Driving Distances Insert on AAA Southern New York Map*******

20. How long does the AAA think it would have taken us to drive from NYC to Binghamton by the fastest route, and with no stops? Express your answer in hours and minutes.
3 hours and 13 minutes. from distance chart 1:19 + 0:37 + 1:17 = 2:73= 3:13

*************End of Road Map Questions**************

Hamilton Topographic Map Questions

************Map Change**** Use Mapscan 3 **** USGS Mount St. Helens 1958******

Boom! We're at Mount St. Helens in 1958! How did that happen? Alex is impressed with the beauty and peace at Mount St. Helens. He builds a little cabin on the mountain. "Now I can live out the next three hundred years in peace and quiet" he says.

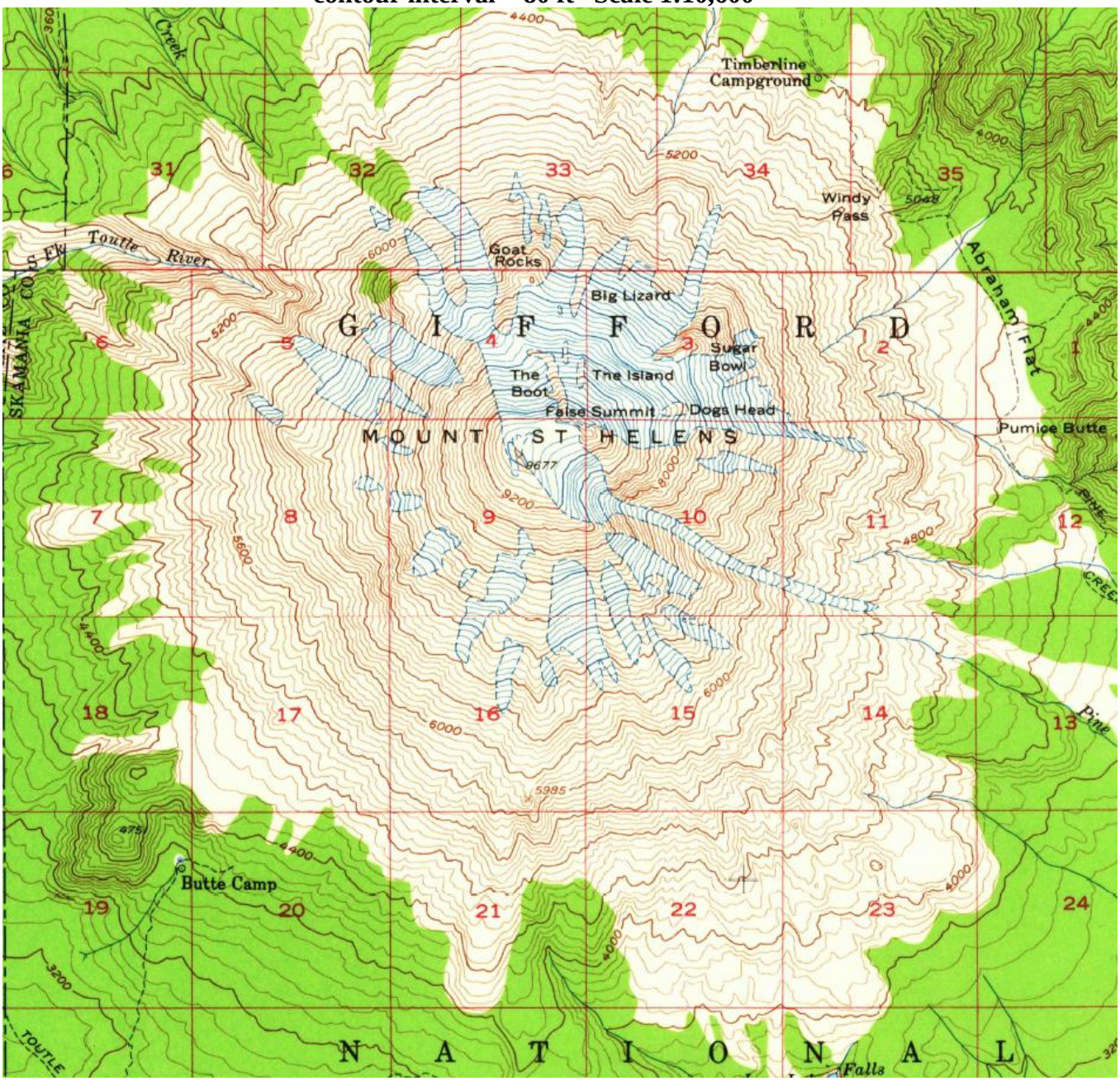
"Nice place you got here, Alex. Be a shame if somethin' happened to it--know what I mean? Lemme look around"

Hamilton Mapscan 3 - USGS Mount St Helens 1958

Station Graphic- Do Not Write on This Sheet

Use this Mapscan for Questions# 21,22,30,32

contour interval = 80 ft Scale 1:10,600



21. What was the highest marked point on the mountain in 1958? **9677 ft**

The summit of Mount St. Helens is surrounded by glaciers.

22. There are more glaciers on the North side of the mountain than on the South side. Why?
Sunlight hits the South slopes directly- dries water, melts snow (or similar)

******** Map Change** Use USGS Mount St. Helens Quadrangle 1998***************

Alex and I time warped around and came back to his cabin in 1998. Something happened to it! It's gone! It's a shame- but don't look at me. I met a guy sez the whole thing blew up in 1980. BOOM! Large sections of the mountain were blown away. Following the explosion, the eruption was mostly steam, mud, and ash rather than molten lava.

CREDIT: GARY ROSENQUIST ©JOEL E. HARVEY

Mount Saint Helens acts like Hamilton and blows her top.

23. In what part of Washington State is Mount St. Helens located? **Southwest**

Alex speaks: "Burr, there's mad crazy contour lines on this map!"

24. If contour lines are very close together in an area, what does that tell us?
the area is very steep (similar)

25. What is the contour interval of this map? **40 ft**

26. Using the Map Sector Reference System, in what Map Sector is the crater of Mount St. Helens located? **Sector C5 or 5**

27. All of the area in this map is protected land. What two protected areas make it up?
Gifford Pinchot National Forest and **Mount St Helens National Volcanic Monument**

28. What material covers the ground in the Northern map area? **pumice and/or mud**

*******Map Usage- *** Use Both USGS 1998 and Mapscan 3 -1958 *******

Let's play "Before and After". Use both the 1958 and 1998 maps to do your time warping.

29. What is the highest marked elevation on the mountain in 1998? **8333 ft**

30. How much elevation was blown away in the 1980 eruption? **1344 ft**
1958 map shows elevation as 9677. Eruption was in 1980. 1998 Map shows 8333 elevation.
9677 - 8333= 1344 ft

31. Which side of the mountain was most changed by the 1980 eruption? Describe your answer using compass direction, and explain why you think so.
North slope. North side of crater breached/blown away, flows of material form Sasquatch Steps
or- North side of mountain slid away in eruption--similar - North + anything reasonable.

The summit of Mount St. Helens is surrounded by glaciers.

32. In 1958, which PLSS Section had the greatest percentage of its area taken up by glaciers?
Jefferson originated PLSS back when Burr was Vice President.
Sec 3, Town 8N, Range 5 E. By inspection, Section 3 on 1958 map has the most ice coverage.
The 1958 map is a screen grab and does not show Town or Range. They are on the 1998 map.

33. If the mountain were to erupt again in 2025, how would the glaciers probably change?
They would melt-shrink-etc- any reasonable. They mostly, but not totally, melted in the 1980 eruption

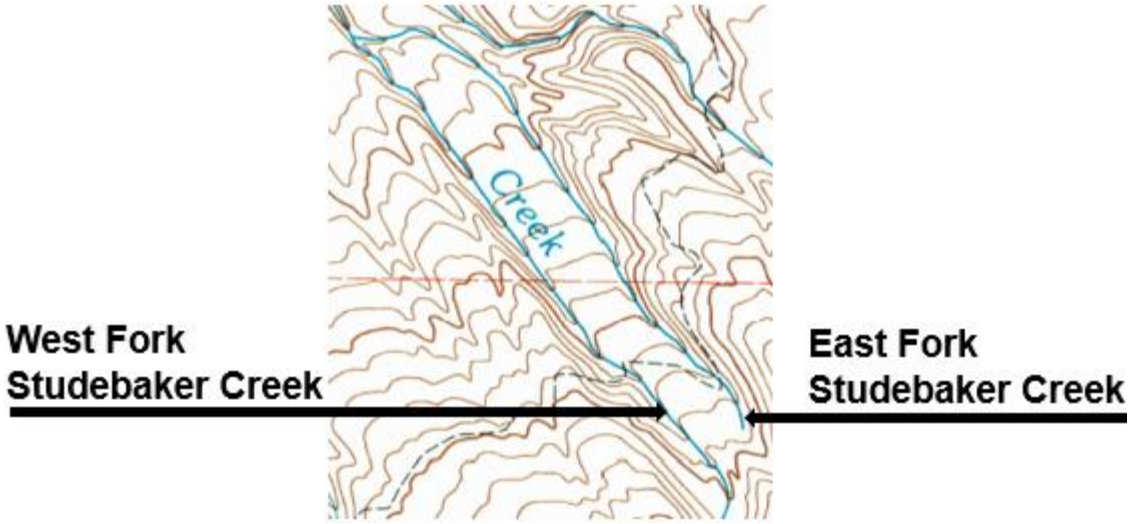
************ Map Change- Use USGS 1998 Map****************

There's almost no roads! But we see some trails, and we both want to get up the mountain. It'll be blasting, miserable sun and full of ash but we can't resist. Alex studies the map.

On the 1998 Map: Sector NW1 --

In Map sector NW1, Alex and I explore Studebaker Creek's Eastern Fork. I measure its highest point as 4159 ft elevation, and Alex sees it join the West Fork at 3639 ft.

Insert Mapscan - use to locate features. Make measurements on actual map

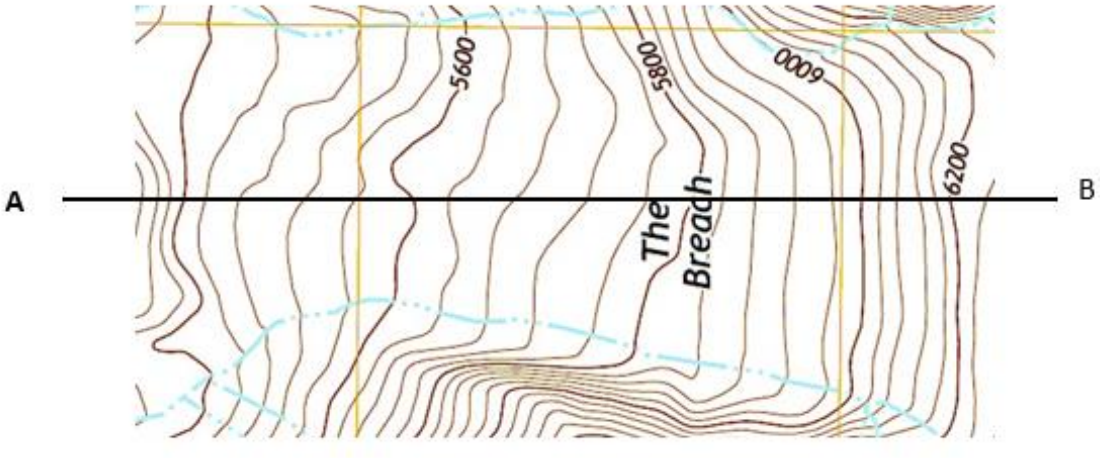


34. In what compass direction is Studebaker Creek flowing? **Northwest**

35. What is the Stream Gradient of the East Fork? Express as feet of drop per 1,000 ft.
123.42 ft/1,000 ft (Range 117 to 130 ft per thousand)
From map: length on 400% screen = 53.5 map dist=1284 m= 4213 ft
lower elevation = 3639 ft; upper from 400% screen= 4159 ft
height dif= 520 ft. height/ distance= 520/4.213 thousand ft = 123.42 ft per thousand feet

On the 1998 Map: Sector C 5--

Insert Mapscan Mount St. Helens 2017- rotated
Base your measurements for Question # 36 on this scan. Use Scale 1:24,000



***note**- this map was originally actual size but was stretched to make contour lines clearer. The original 1:24000 scale was retained for calculations. If you do this problem using the actual 2017 map you will get a steeper slope.*

North of the Crater in Map Sector 5 of the 1998 map, find The Breach and Sasquatch Steps. The 1980 eruption created a breach in the crater and a more gradual surface than most other areas around the mountain. You'd need a Big Foot to climb all those steps!

36. From the 5400 ft contour to the 6200 ft contour, what is the grade of the steps, as measured along line AB? Express your answer as feet of elevation per 100 feet of length. Make measurements on the **Insert Mapscan** above. **10.07 ft/100 ft (Range 19.87- 10.27)**
map distance = 101 mm from 5400 ft to 6200 ft ; height diff = 6200- 5400= 800 ft.
map distance =101 mm= 2424 meters= 7943 ft. Slope 800 / 7943= **10.07 ft/100 ft**

On the 1998 Map: Sector 7

We drive into the map area from the West, traveling Eastward on National Forest Road 81.

37. What material makes up the surface of Forest Road 81? **Gravel**

We pass Redrock Pass. About a mile further we turn left onto Forest Road 830, and drive to Climber's Bivouac campground. **Insert Mapscans- use to locate features**

Note trail and triangle in campground symbol

We camp near the trail head at Climbers Bivouac. Our tent site is exactly right at the top of the red triangle at Climbers Bivouac. I'm relaxed and happy just to look around, but not Alex. He's mappin! Always mappin'!

38. What is the magnetic declination at the center of the map? Express your answer as degrees and direction away from true North. **18° East of North**

39. On the map, Alex measures the Azimuth from our tent to the 4747 ft summit of Butte Camp Dome over in Map Sector West 4. He knows the amount of Magnetic Declination 'cause you just told him. What will his magnetic Azimuth be?
284.5° (Range 281- 288) uncorrected Azimuth= 302.5° - 18° Declination= 284.5°

****** Map Change*** Use Mapscan 4- Lewis and Clark 1805 *******

Back when I was Vice President, President Jefferson bought Louisiana from the French. What a deal! He set up the Lewis and Clark Expedition to explore the Missouri River Watershed and discover if there was a navigable water route to the Pacific Ocean. On November 4, 1805, Lewis and Clark sighted Mount St. Helens. Clark wrote observations using Compass Bearings instead of Azimuths. See his journal entry below:

Entry from the Journal of William Clark -Nov 4, 1805.

(The expedition is advancing by boat on the Columbia River, along the boundary between present day Washington and Oregon. Original spelling retained.)

> *…met a large canoe from below with 12 men, the canoe ornamented with Images carved and …fixed very netely on the canoe … had a full view of Mt. St. Helien which is perhaps the highest pinnacle in America it bears North 25 East ... it rises Something in the form of a Sugar lofe.*
>
> *(A sugar loaf is solid sugar and looks like an upside down ice cream cone. It was the standard way of buying sugar at the time.)*

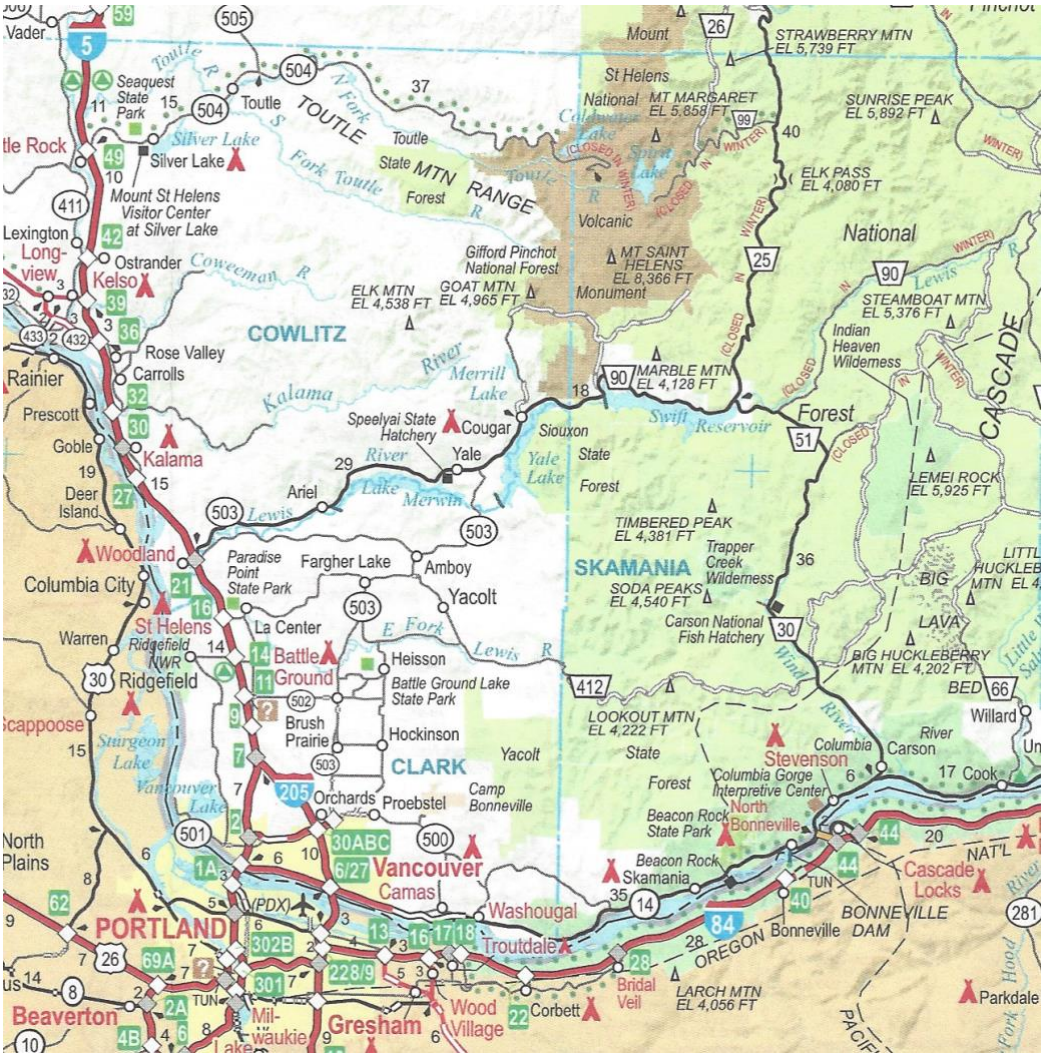
40. What was the compass bearing from Mount St. Helens to Clark's position? Your answer must start with "North" or South" **South 25° West (Exact no range)**

41. On your special answer sheet, (the black and white Mapscan), draw a solid line to show this Compass Bearing from Mount St. Helens to Clark. Draw an "X" to mark the spot of Clark's position.

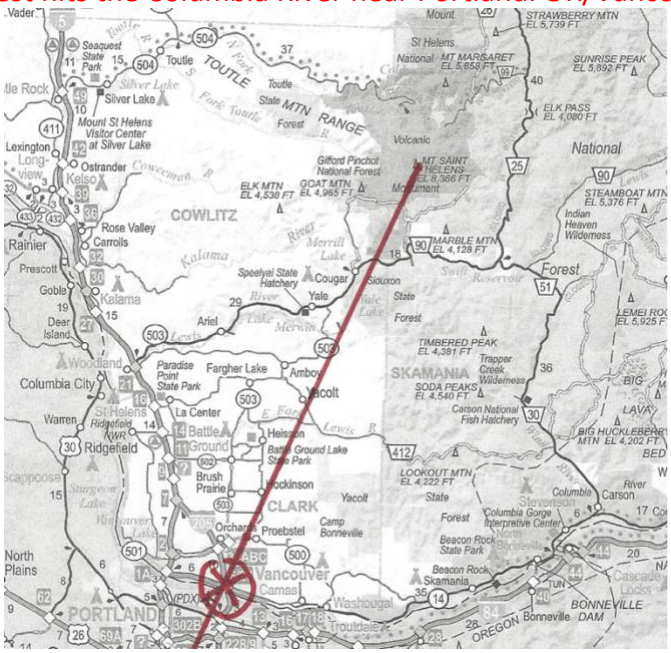
Hamilton Mapscan 4 Lewis and Clark 1805 ***Station Graphic- Do Not Write on This Map***

Use this Graphic for Questions # 41 and 42.

In 1803 President Jefferson (Burr was Vice President) began to organize the Lewis and Clark expedition to explore the Louisiana Purchase and a water route to the Pacific Ocean.



40 and 41 are map measurement and drawing problems. Drawing on answer sheet- bearing of South 25° West hits the Columbia River near Portland. OR/Vancouver, WA.



We both want to know exactly where we are in 1998- in Lat/Long and UTM.

********** Map Change- Use USGS 1998 Map, Sector 7**********

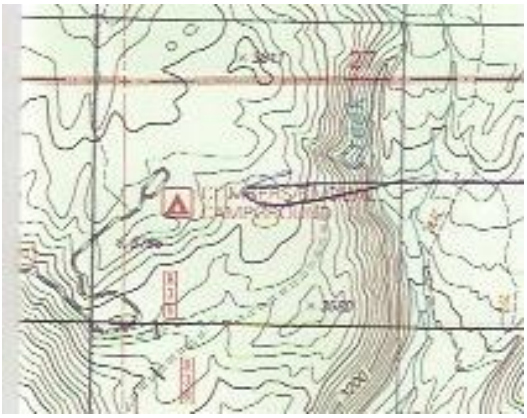
42. What is the latitude at our tent site? Express in degrees, minutes, and seconds.
Latitude = **46° 08' 46.94" North (range 42- 51")**
above base 46 07' 30"; target distance 99 mm; distance to sector 193mm;
99/193mm= 76.74"= 1' 16.94" + base 46° 07' 30" = 46° 08' 46.94"

43. What is the longitude at our tent site? Express in degrees, minutes, and seconds
Longitude= **122° 10' 51.07" West (range 47- 55")**
45.8/134.5 mm= 51.07" west of base 122 10' 00"W = **122° 10' 51.07" West**

44. What is the UTM Easting for our tent site? Give Zone and Easting value.
zone 10 563 297 mE (Range 563 200- 400 mE)
paper T-square method 563 to tent=12.5mm. 563 to 564= 42mm. 12.5/42= 297
map distance UTM grid= 42 x 42 mm

45. What is the UTM Northing for our tent site?
zone 10 5110 420 mN (Range 5110 380-460 mN
tent 18 mm above 510 margin ticks; 18 x 1000 / 42 = 458
map distance UTM grid= 42 x 42 mm

Note: *For 44 and 45- The 1998 map does not have a black UTM grid printed on it- just margin ticks. When running this event at Cornell, we hand drew lines across the map, 2 NS and 2 EW lines, to "grid off" the UTM box needed for these questions. The thinking was that the kids need some baseline to get good results in the time provided. Below is the original scrap version of this.*



We leave camp and start climbing up the trail. When we get to the 4800 ft line, Alex looks West toward the Butte Camp Dome and admires its profile. He tells me he is going to retire, buy a farm, and get rich making maple syrup. You'll be drawing the profile for questions #49 to 54. You'll be mapping his farm for questions # 55 to 60.

Suddenly the mountain shakes, cracks open, and ash and rocks come flying out. The other hikers scream "Alex-run for your life! Run! Run! Burr, take your time!"

Poof! Alex vanishes in a cloud of ash. But don't worry- he always shows up when you don't want him to.

Well, we love how you bold with the problems -no fear!
While we travel 'round the world -- it's our rappin' sphere
Soon we'll get some maple trees and we'll be sappin' here
We take the out the sap an' then we just boil it
We filter up the syrup 'cause we don't wanna soil it
We cook and we cook with no breaks for the toilet
You Road Scholarin' good, don't give up now and spoil it!
If a question's real tough and you stuck then just oil it!
Some problems still to do, and we know you'll be zappin' 'em
We love you and hope that you never stop mappin' 'em!

*****************End of Topo Map Questions*******************

Make sure you do: Satellite Images, Profile, Map drawing problem

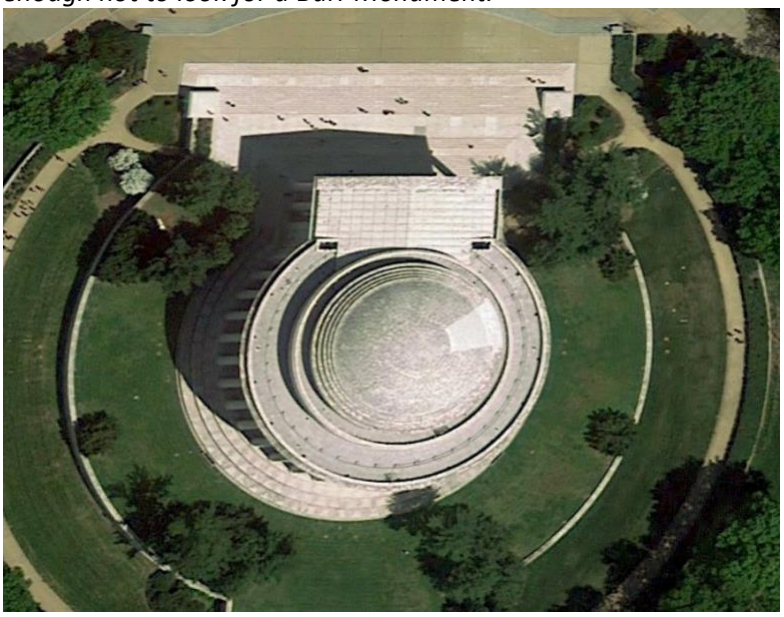
Questions 46 to 48 - Use Mapscan 5, Washington DC 2019 Satellite Images

Hamilton Mapscan 5- Satellite Questions- Washington, D.C, 2019

Station Graphic- Do Not Write on This Sheet

Image- Jefferson Memorial Images Courtesy Google Earth Pro. Assume North is "straight up".

Alex shows up in Washington, DC and visits monuments to Washington and Jefferson. He's smart enough not to look for a Burr Monument.



Jefferson Monument
scale 1mm = 4.25ft

46. What is the diameter of the memorial?
Express your answer to the nearest whole foot.

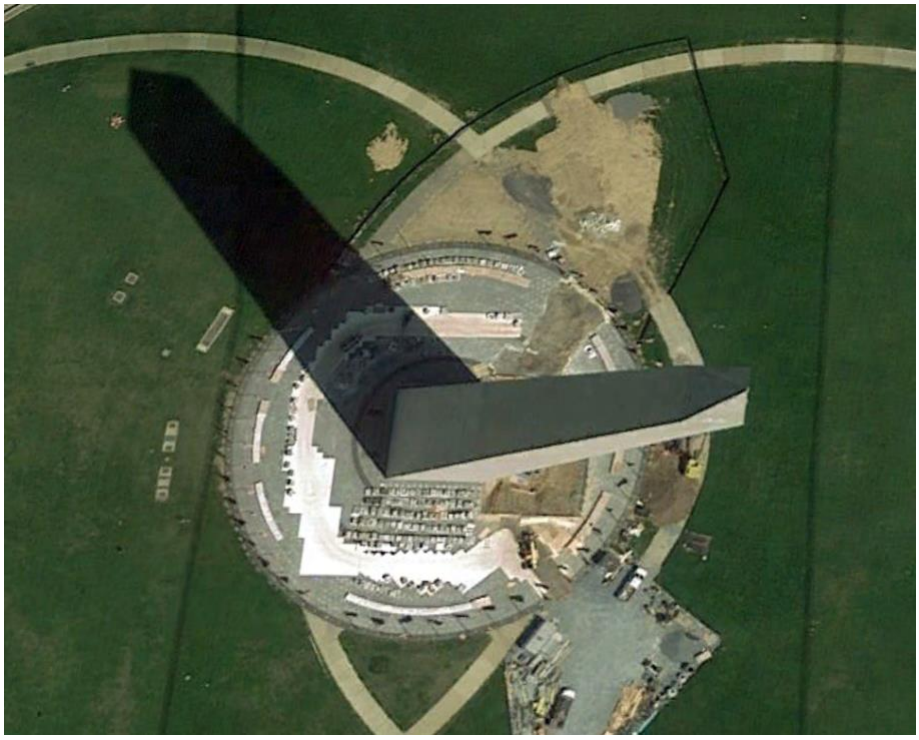
Range 150-180 ft

46. What is the diameter of the memorial? Ignore the rectangle on the North side.

Range 150-180 ft The building is a perfect circle but the image is not. Map measurement varied from 37 to 41 mm, depending on angle of ruler.

Image- Washington Monument

Note the shadow, measured at 292 ft on the ground. The height of the monument is 555 ft.



47. What time of day was this image captured? A) 6 AM B) 10AM C) 2 PM D) 6 PM

Based on shadow pointing to Northwest- B (10 AM)- sun is in Southeast.

48. What is the angle of the sun above the horizon? (Clever students can do this by drawing a sort of map)

63° (Range 59- 67 °) Drawing horizontal and vertical lines to scale for the distances given, then connecting, gives a triangle to show a 63° sun elevation. Note: students in the event were told this problem could be done several ways but drawing was suggested.

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Hudson River Steamboat Alexander Hamilton, about 1960.

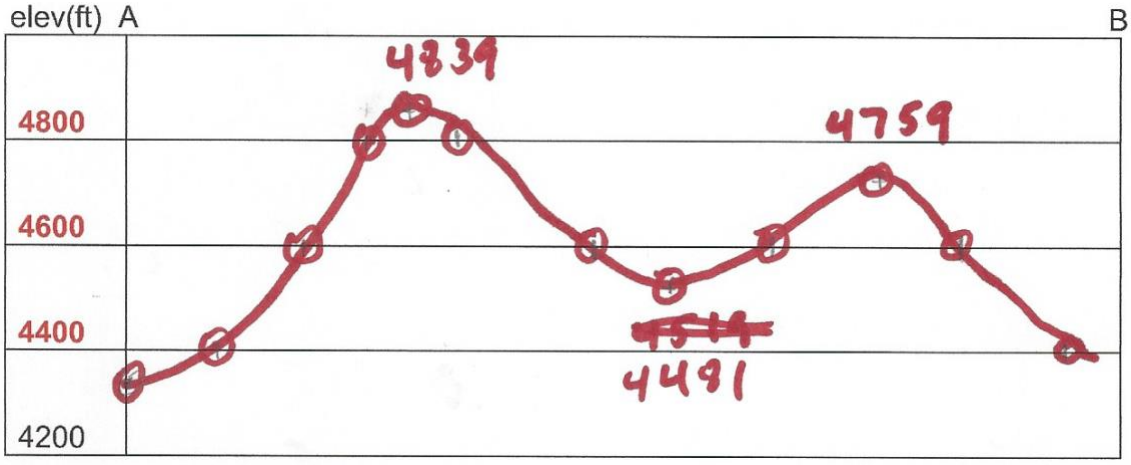
A cool three- cylinder triple expansion steam engine; you could stick your head into the engine room and watch it run. The pistons traveled about five feet on each stroke!

Profile Drawing Questions # 49-54

Alex noticed the twin summits of Butte Camp when he saw it from the 4800 level of Mount St. Helens. The Mapscan below is from the 2017 map and has been enlarged and rotated.

Base all measurements on this scan. 'A" is North. "B" is South. Do not use the 1998 Map.

49. Graduate the Y- axis to match elevations of index contours
50. Plot the index contours only. Show each point as a "dot in a circle"
51. Determine the highest possible point on North (left) summit. Plot and show elevation.
52. Determine the highest possible point on South (Right) summit. Plot and show elevation.
53. Determine the lowest possible point between the two summits. Plot and show elevation.
54. Connect your points to form a profile along line AB.

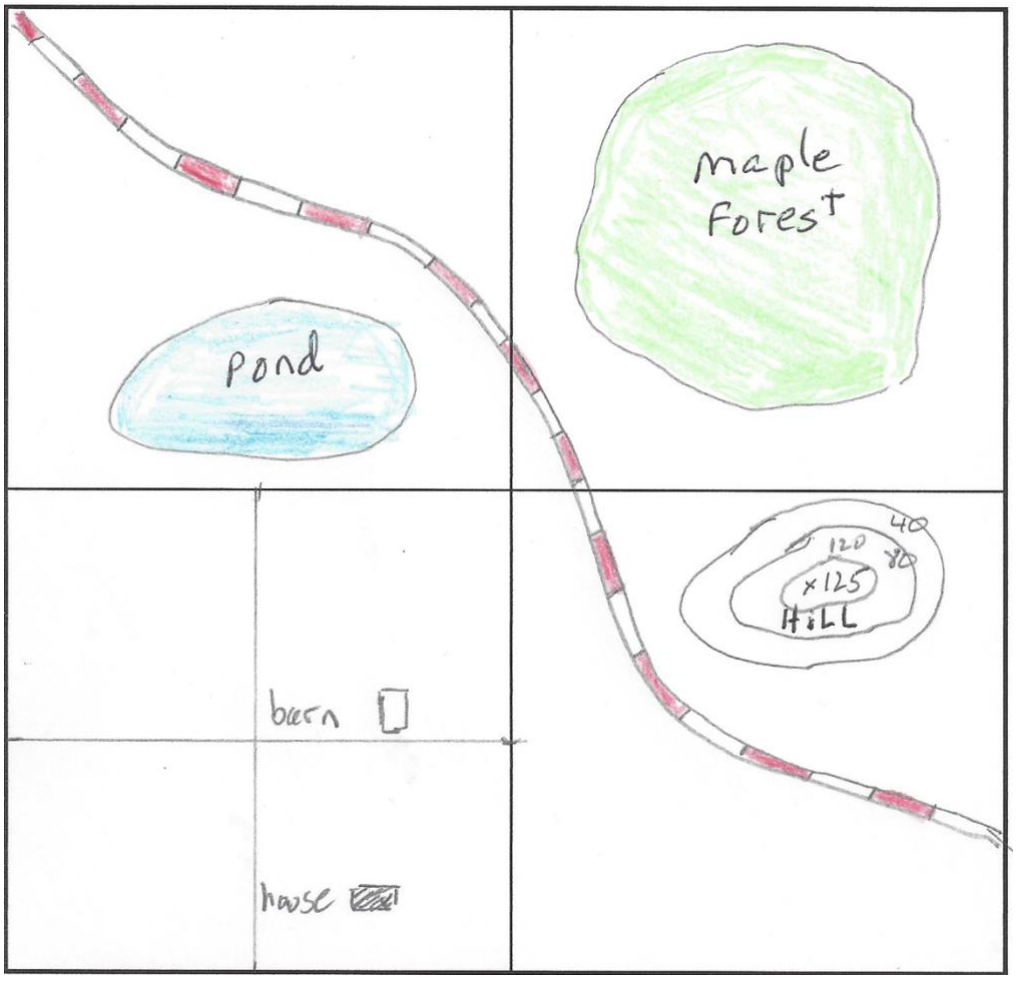


Map Draw Questions # 55-60

Draw a map of Alex's Maple Syrup Farm. On the deed it's Section 31 of Town 2 North, Range 5 West. It's got a big pond in the South half of the NW 1/4 Section. It's mostly flat at 0 ft, but there's a hill, 1235 ft maximum elevation, in the Northern half of the Southeast 1/4 Section. The Northeast 1/4 section is mostly covered with maple trees to produce sap Alex will use to make pancake syrup. A secondary highway enters at the NW corner and proceed overall at an average azimuth of 130° through the Section. The road curves around both the pond and the hill. There is a big house in the SE 1/4, SW1/4, Sec 31, T2N, R 5E. About 800 feet North of the house, I have a big barn to boil the sap down into syrup.

55. Draw and label the pond.
56. Draw and label the maple forest.
57. Draw and label the hill. Show contours and height using a 40 ft contour interval.
58. Draw and label the house and barn.
59. Draw the secondary road as described.
60. Use appropriate colors in showing all features.

Scale 1mm= 40 feet Base elevation= 0 ft. Contour interval = 40 ft.
Assume borders are true North- South and East-West lines.



What's real?

Hamilton and Burr were good friends for many years. Both men were orphans. Burr was from a well- known New Jersey family (his father was a founder of Princeton University) but Hamilton grew up destitute in the Virgin Islands. Both fought in the Revolution. Burr served in the US Senate and Hamilton was Treasury Secretary under George Washington.

They disagreed on many political issues. In the election of 1800, Burr ran for president against Thomas Jefferson. Voting was tied in the electoral college and went to the house of representatives, where Hamilton's opposition caused Burr to lose the election to Jefferson. Although he became Vice President, Burr was embittered and eventually shot Hamilton in a duel. Hamilton died and Burr's career was ruined.

This event story is a mix of totally accurate history and totally made up stuff. Some folks might call it partial fake news. Read Ron Chernow's book ***Hamilton*** for more real news details.

Thanks to Mark Kramer (New York SO), and Dan Haggarty, (Michigan SO), for their help in writing and editing. Many thanks also to Lin-Manuel Miranda. The rhythms used in the event were mostly based on his compositions for the musical ***Hamilton***. After the event was run, I sent it to Lin-Manuel. He liked the event and was delighted to see his music adapted to teach science. No kidding - he told me so himself! See scan below.

I am happy to answer any questions on the event.

Brendan Herlihy, Event Writer
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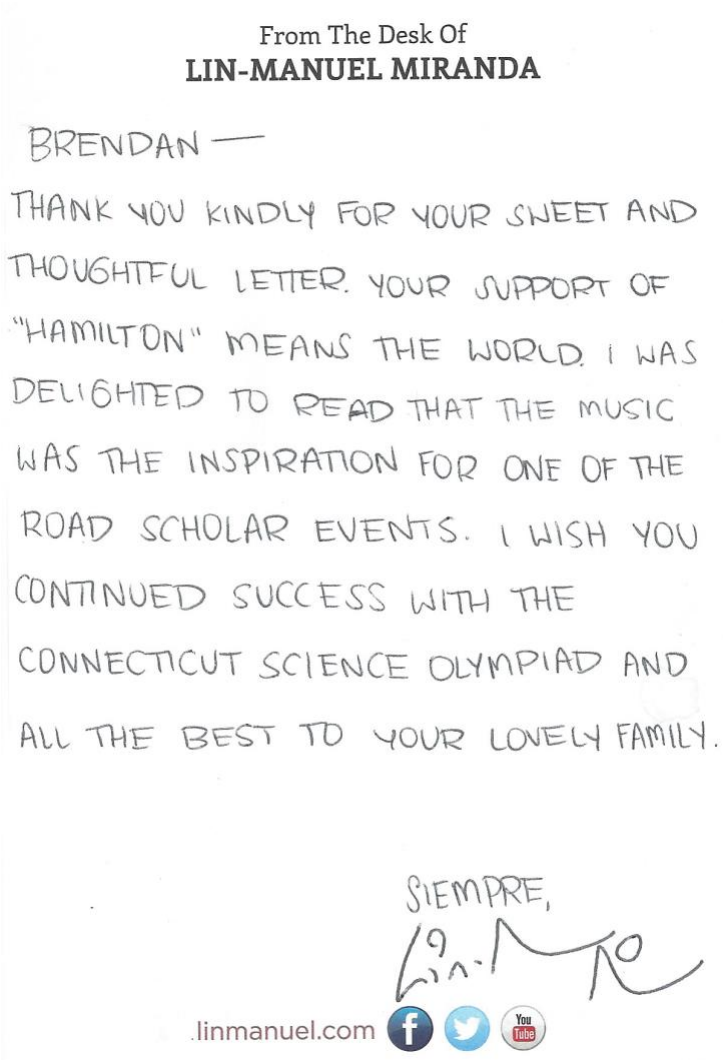

From The Desk Of
LIN-MANUEL MIRANDA

BRENDAN —

THANK YOU KINDLY FOR YOUR SWEET AND THOUGHTFUL LETTER. YOUR SUPPORT OF "HAMILTON" MEANS THE WORLD. I WAS DELIGHTED TO READ THAT THE MUSIC WAS THE INSPIRATION FOR ONE OF THE ROAD SCHOLAR EVENTS. I WISH YOU CONTINUED SUCCESS WITH THE CONNECTICUT SCIENCE OLYMPIAD AND ALL THE BEST TO YOUR LOVELY FAMILY.

SIEMPRE,

Lin-Manuel

linmanuel.com