“Staying Found” Tools and Concepts

Presented by Foothills Branch Mountaineers

April 28, 2026

Please turn off your video, mute your audio and lay out your map.
If possible, make some space around you to move around.
The class will start at 6:30PM

Learning Objectives for this Session

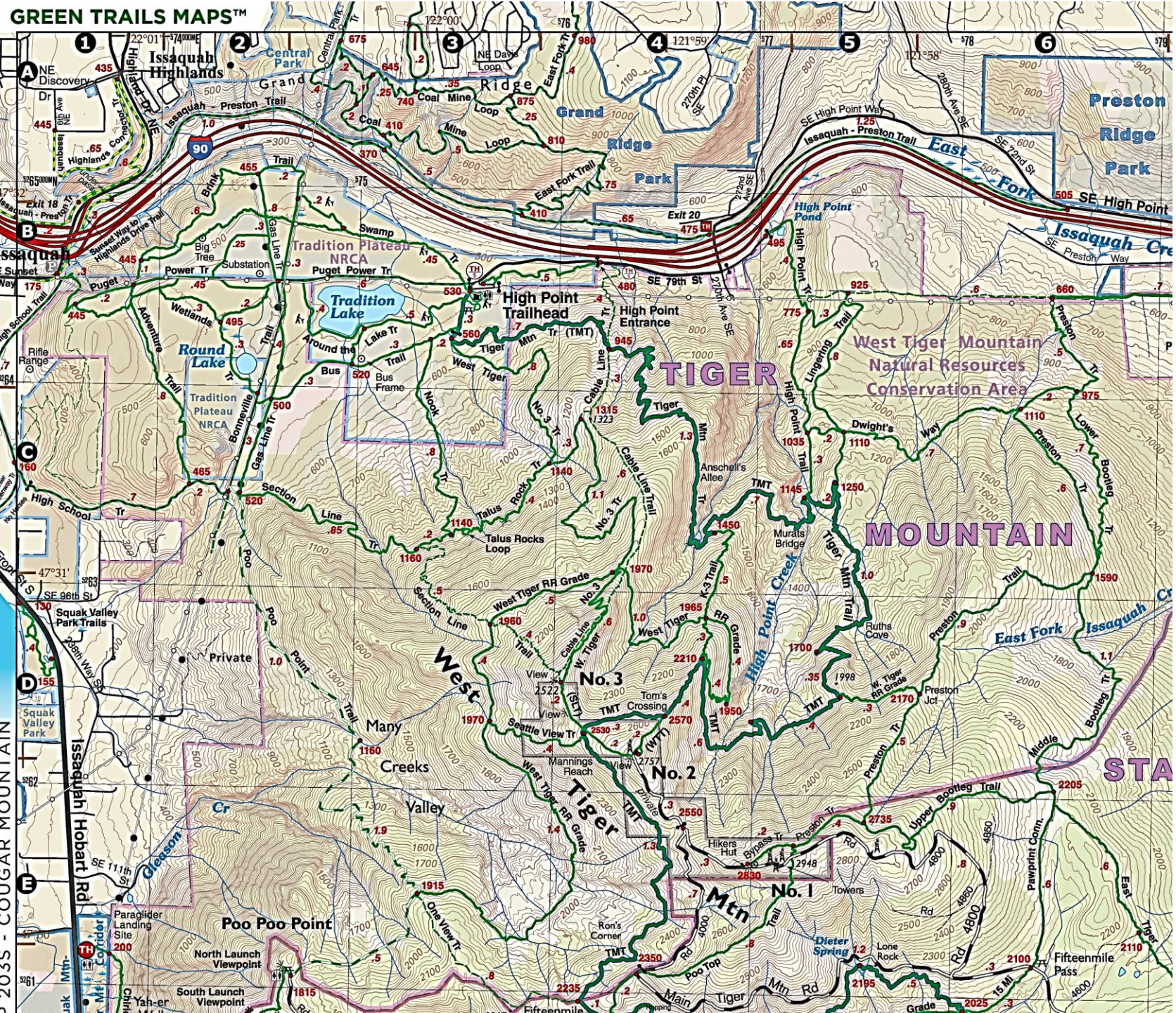
1. Be able to recognize major landscape features on a topographic map, read and interpret the scale and legend, and use the map for basic planning and on-trail navigation applications.
2. Learn how to use a compass with a topo map to make navigation decisions including measuring and following a bearing on a map and on the trail.
3. Learn how to use a watch (elapsed time), observed terrain and altimeter with a topographic map to maintain awareness of where you are on a trail and how long a given route should take.

Learning Objective #1. Learn to recognize major landscape features on a map, read and interpret the scale and legend, and use the map for basic planning and on-trail navigation applications

A. Interpret major map features using your map's legend, and understand how to match map features with observed features along your route to keep track of where you are.

B. Use your map's scale and trail distance info on your map to work out how far you have to go.

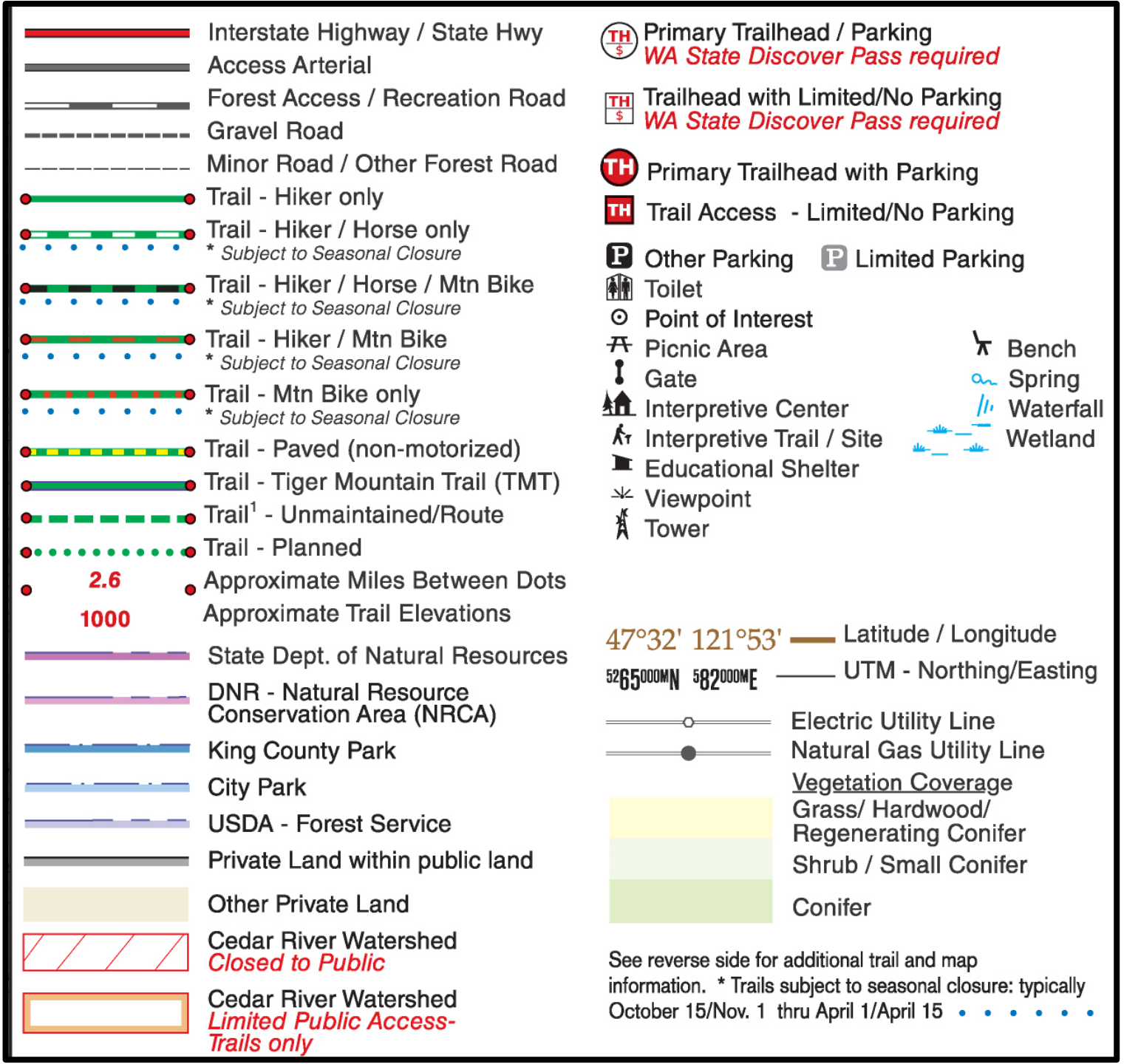
C. Understand how to 'read' the contour lines on your map to determine your elevation and important terrain information



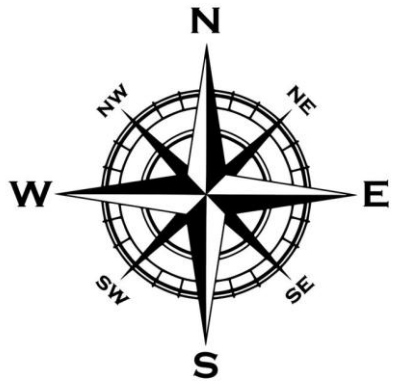
Green Trails 204S is the map we will be using in this seminar. Lay it out in front of you. We'll go back to this map several times for practice exercises.

We will focus on the upper left section of the map, as shown here. Find this area on your paper map (you identified several features in this area in your pre-work).

Be sure to use the paper map and NOT the maps in this powerpoint for your exercises!

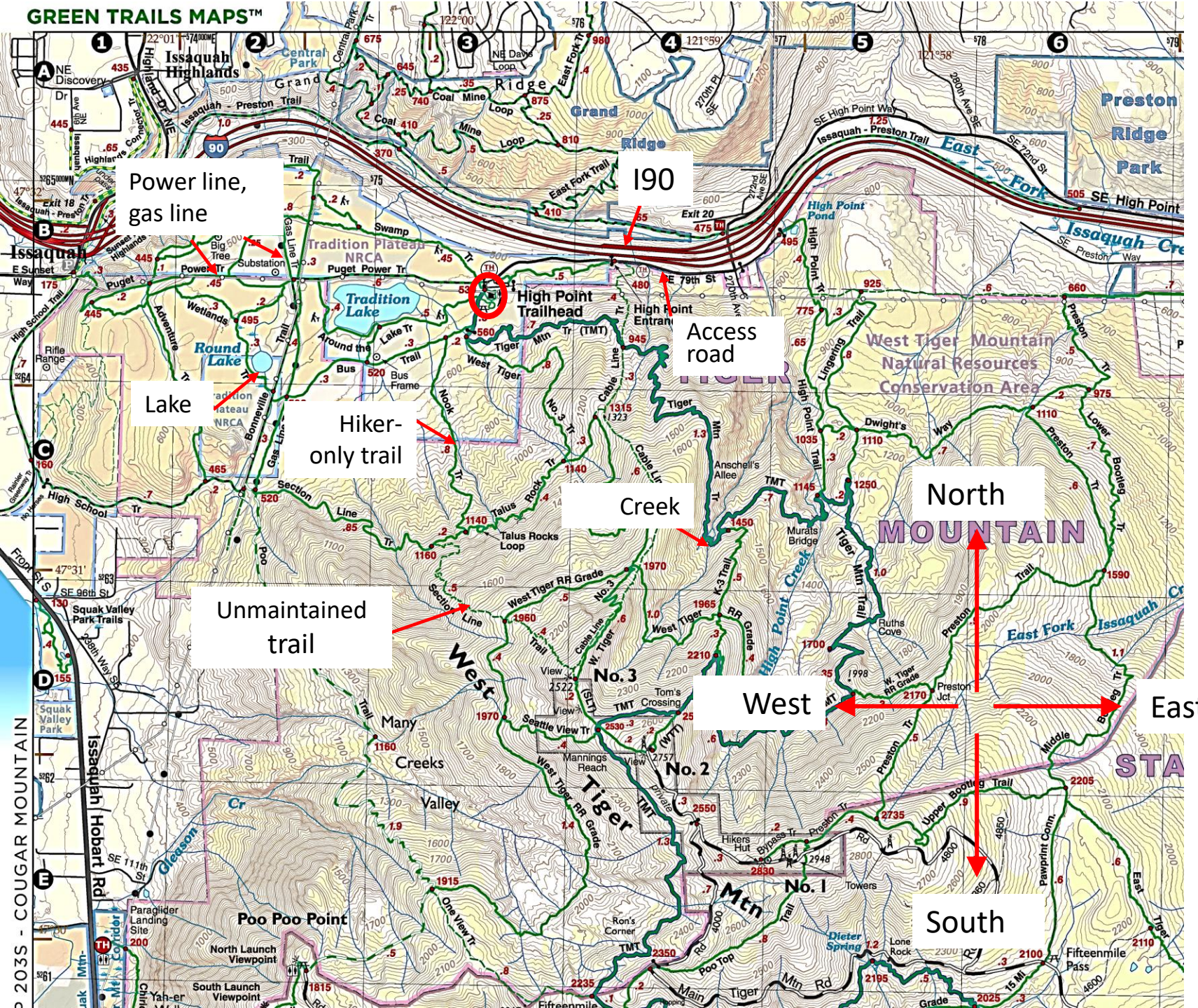


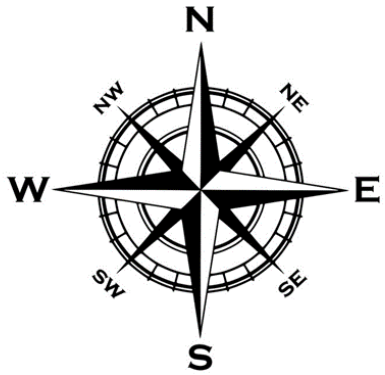
Map Legend



First, use your Green Trails Tiger Mountain map to answer the following:

- What direction is North on the map? South, east, west?
- Find the High Point Trailhead education shelter
- Find interstate 90 and the access road you drive on to get to the trailhead
- Find a hiker-only trail, and an unmaintained trail
- Find a lake. Find a creek that crosses the Tiger Mountain Trail.
- Find a power line and a gas line.





- What direction is North on the map? South, east, west?
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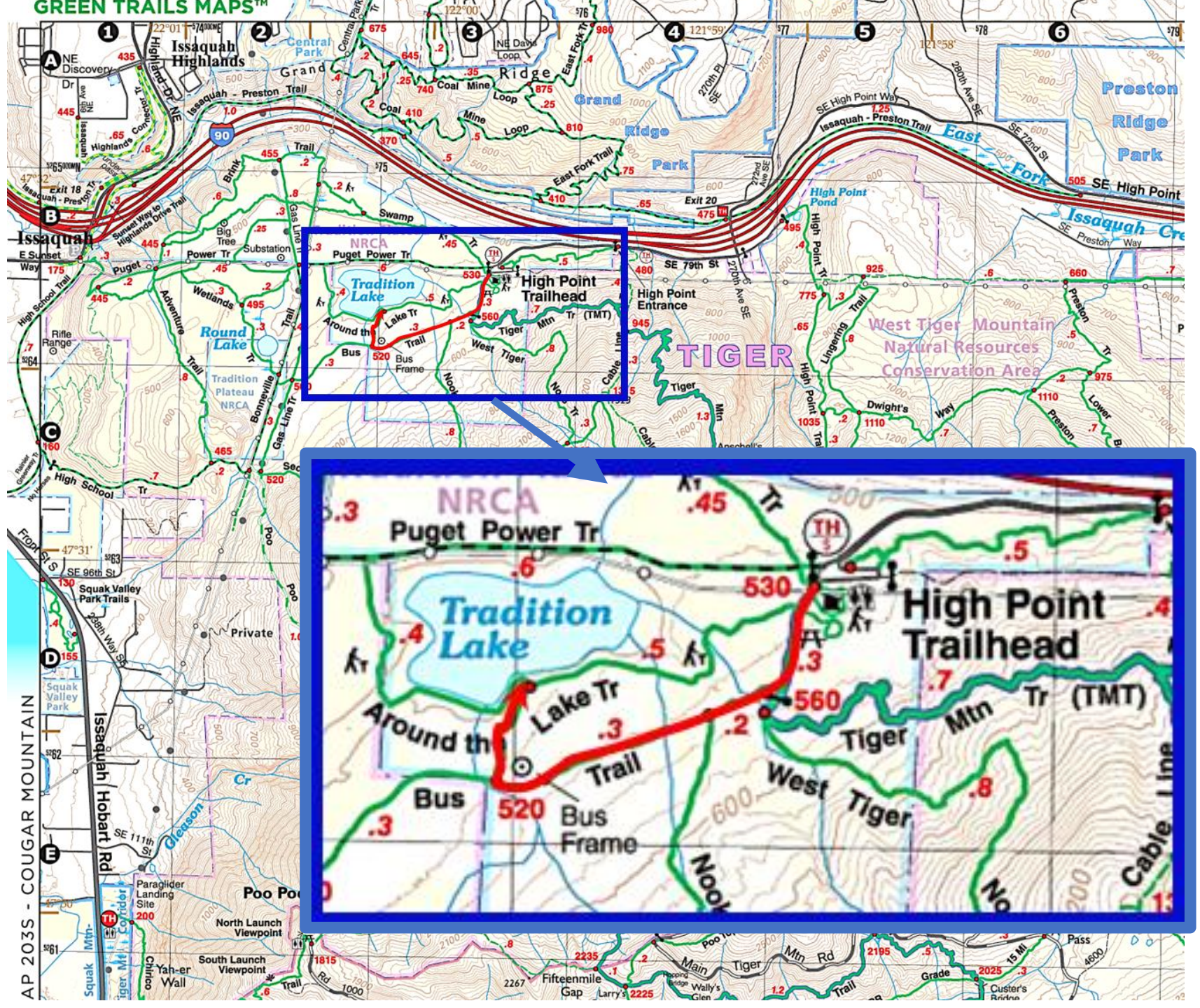
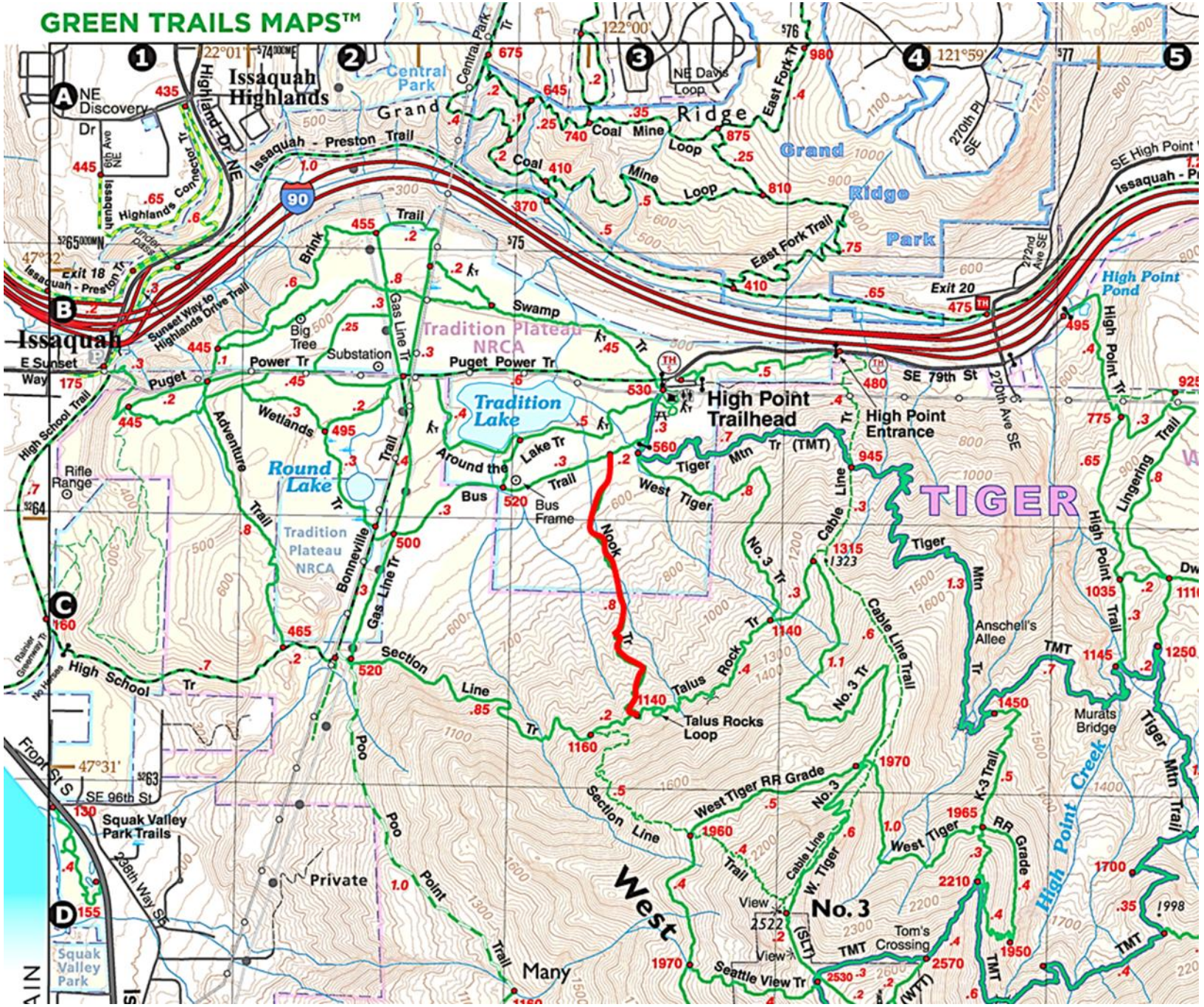


Let's find the first hiking route that we used in the homework!

Trace the West Tiger 3 trail <u>on your map</u> as it leaves the education shelter; then turn onto the Bus Trail going west, to the short spur that goes from the bus trail to the Around the Lake trail.

- What are some map features that could help you while hiking to:
  - (a) Find the turnoff from the Bus Trail to the Around the Lake trail.
  - (b) Tell if you've missed that turnoff and gone too far.



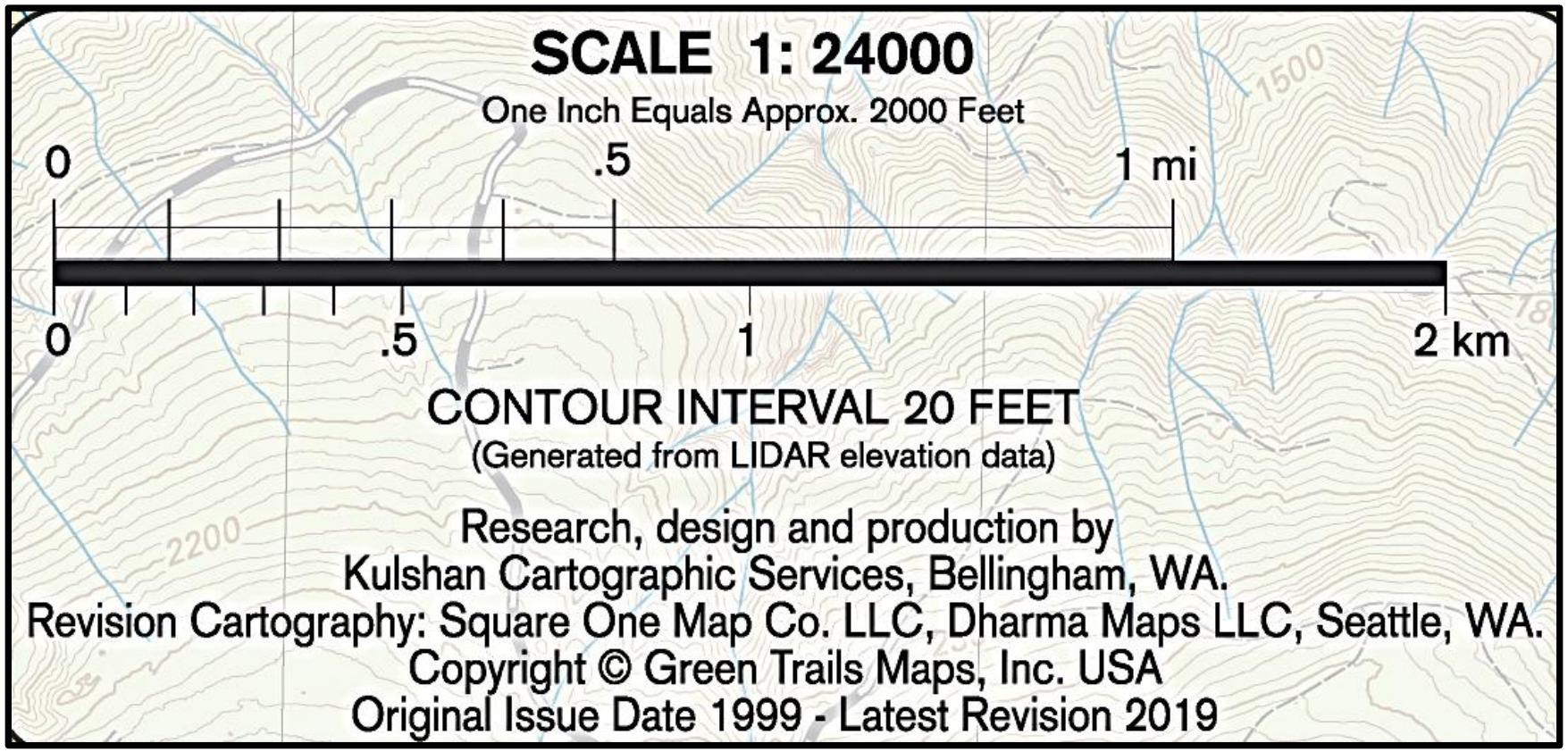
Now find and trace on your map the Nook Trail between the Bus trail and the Talus Rocks trail, as shown here.

Q1. What would be a good example of a map feature that parallels the Nook Trail?
(A feature that parallels your trail and can be used to stay on track is called a ‘handrail’.)

1.B. Use your map's scale and trail distance info on your map to work out how far you have to go.

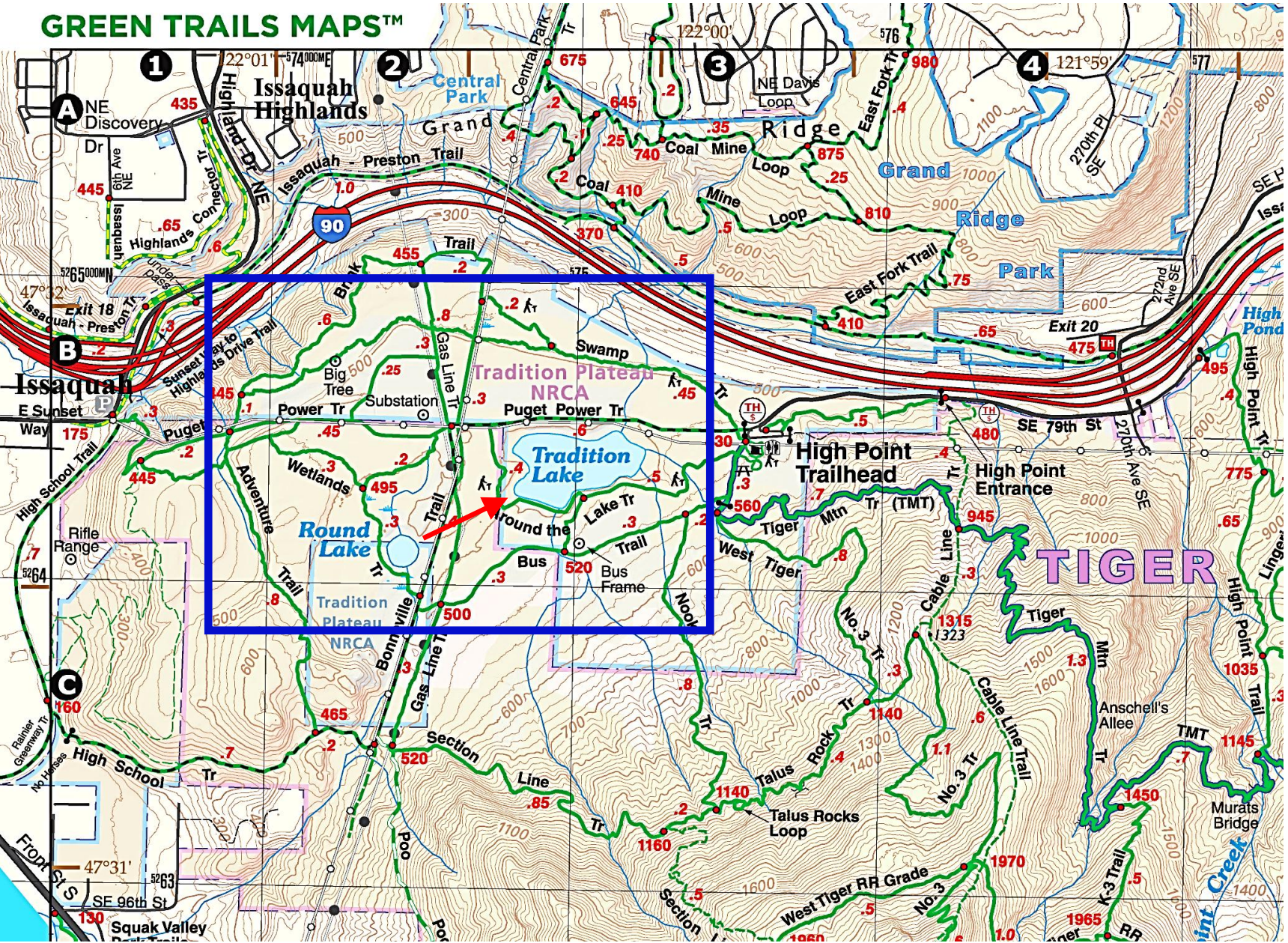
Find the scale on your map.

Q2. What distance on the ground is represented by one inch on your map?



(Be sure to use the scale that corresponds to the map you're using)

Interpreting the Map Scale



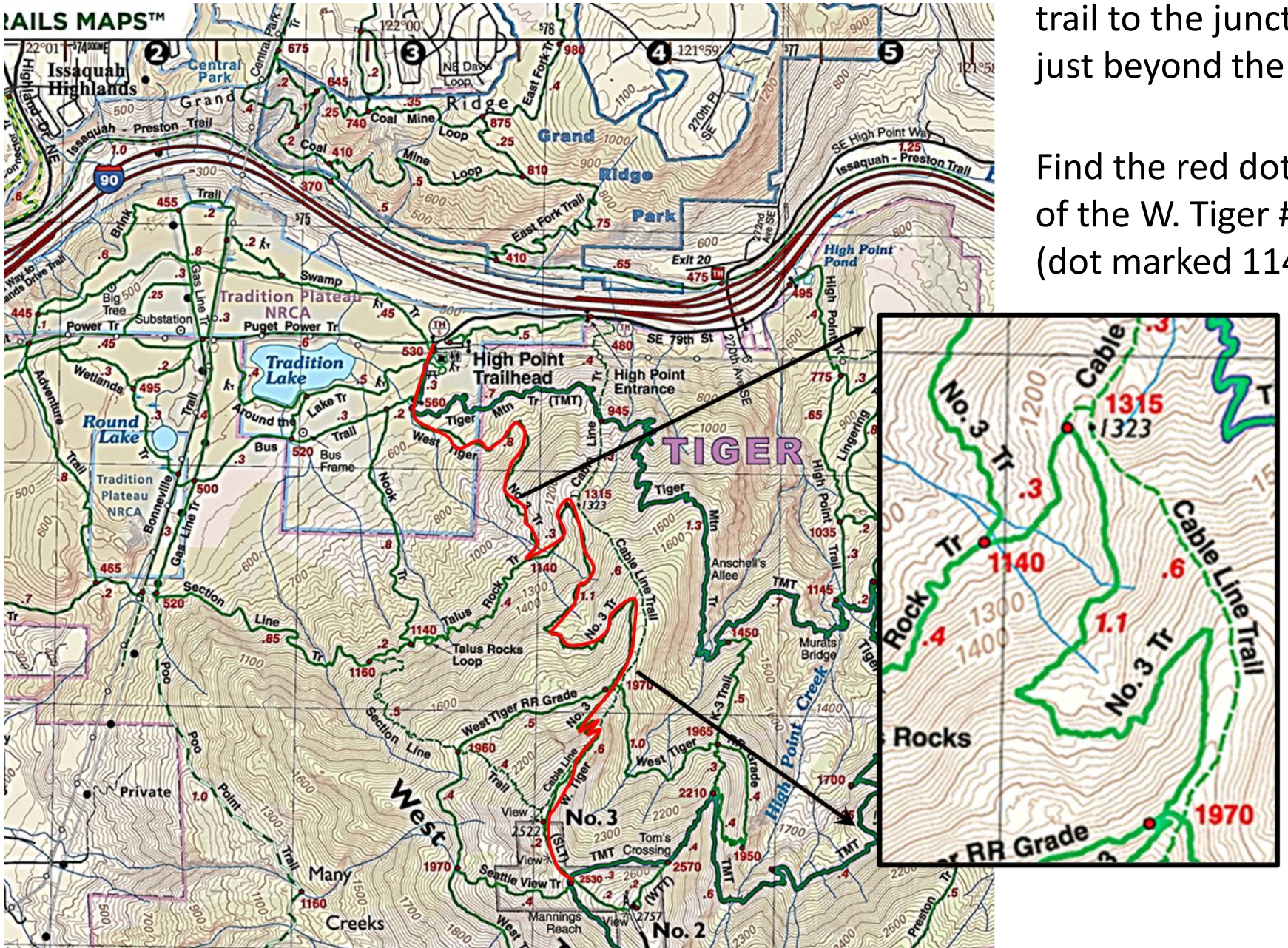
Q3. Using your paper map and the map scale, what is the straight line distance in feet between Round Lake and Tradition Lake?

Hint: Measure distance in inches on the actual paper map, and convert to feet according to the corresponding map scale.

1.B. Scale and Distance - continued

The most useful hiking maps give the distance between points on each major trail – look for numbers beside the trails and the red dots marking the start and end of that distance.

1.B. Scale and Distance - continued



On your map, trace the West Tiger Mountain #3 trail to the junction of the Tiger Mountain Trail, just beyond the West Tiger #3 summit as shown.

Find the red dots on your map marking the section of the W. Tiger #3 trail between the Talus Rock Jct (dot marked 1140) and the W. Tiger RR grade junction (dot marked 1970). Then find the red numbers indicating the miles between each pair of red dots.

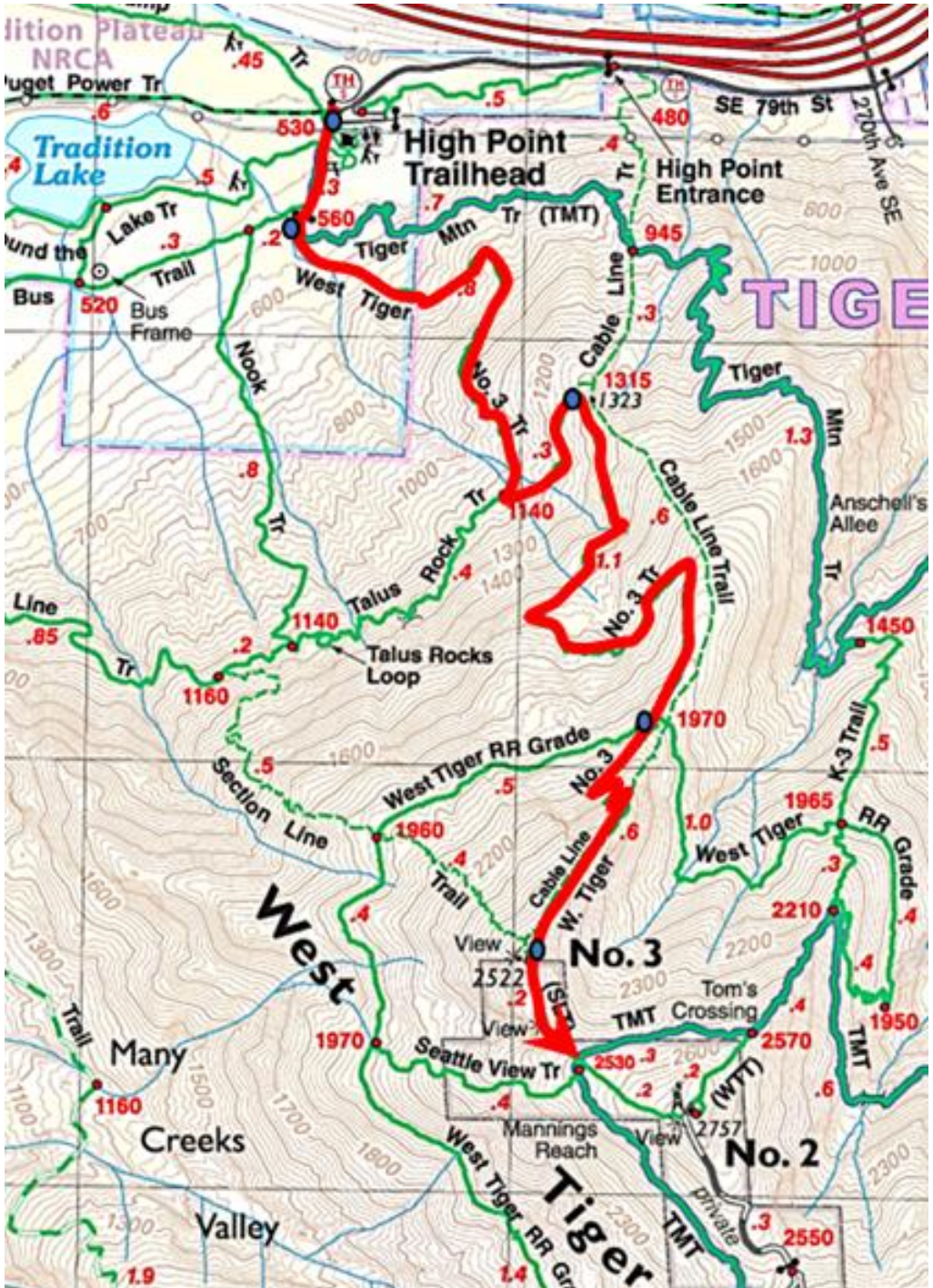
Q4. What is the expected trail distance between the Talus Rock Jct and the W. Tiger RR Grade jct?

1.B. Scale and Distance – continued

Now trace along the West Tiger Mountain #3 trail *<u>all the way from the High Point Trailhead to the jct with the Tiger Mountain Trail just beyond the West Tiger #3 summit</u>*.

Practice question: ***Adding the segment distances on your map, calculate the total distance on the West Tiger Mountain #3 trail from the High Point Way trailhead to the TMT junction just beyond the Tiger 3 summit.***

How might you figure this out if the segment mileages were not shown?



1.C. Now let's learn how to find and decipher the contour lines on your map to determine your elevation and important terrain information .

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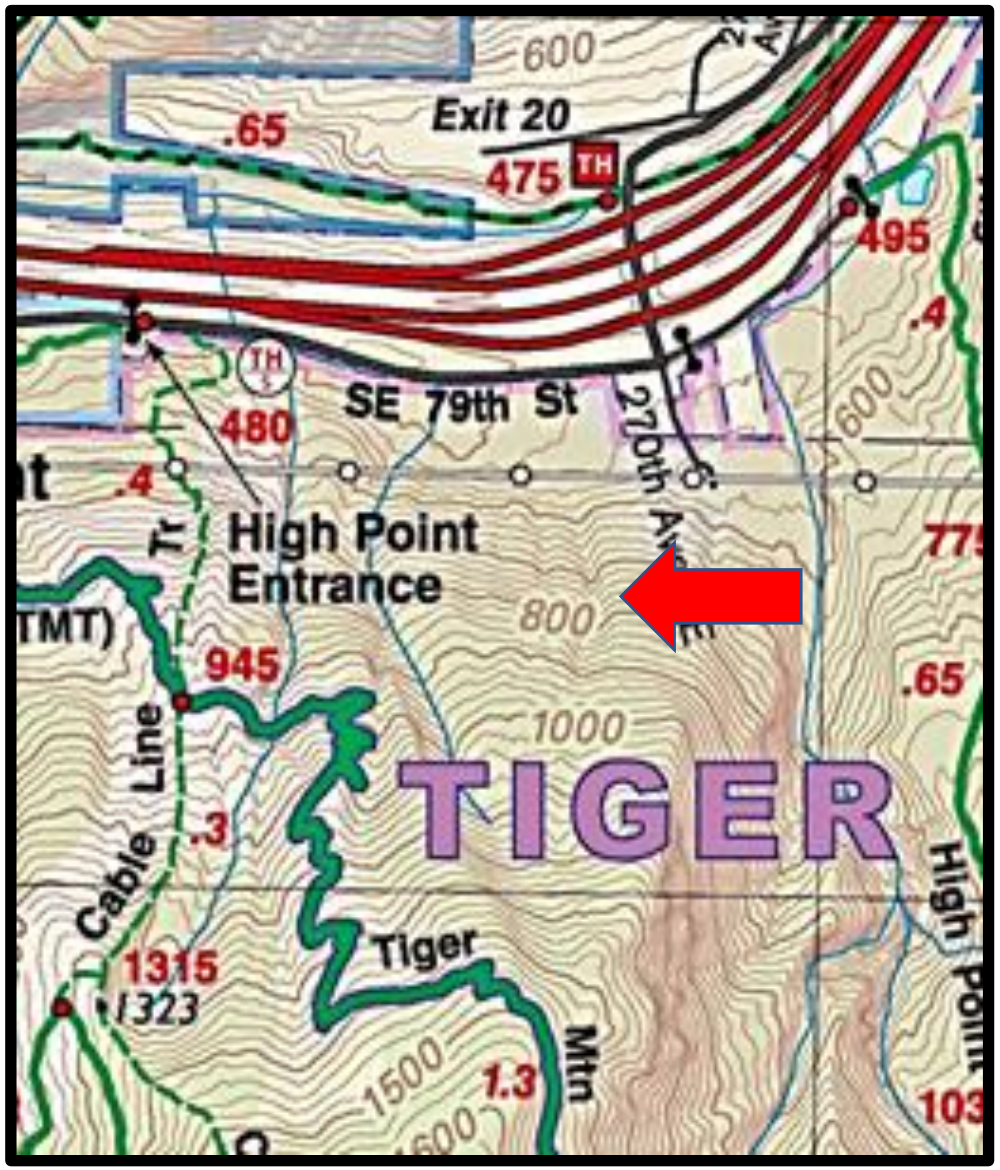
Watch the first 6.45 minutes of video #12 "Contours and Elevation".

1.C. Find and decipher the contour lines on your map to determine your elevation and important terrain information .

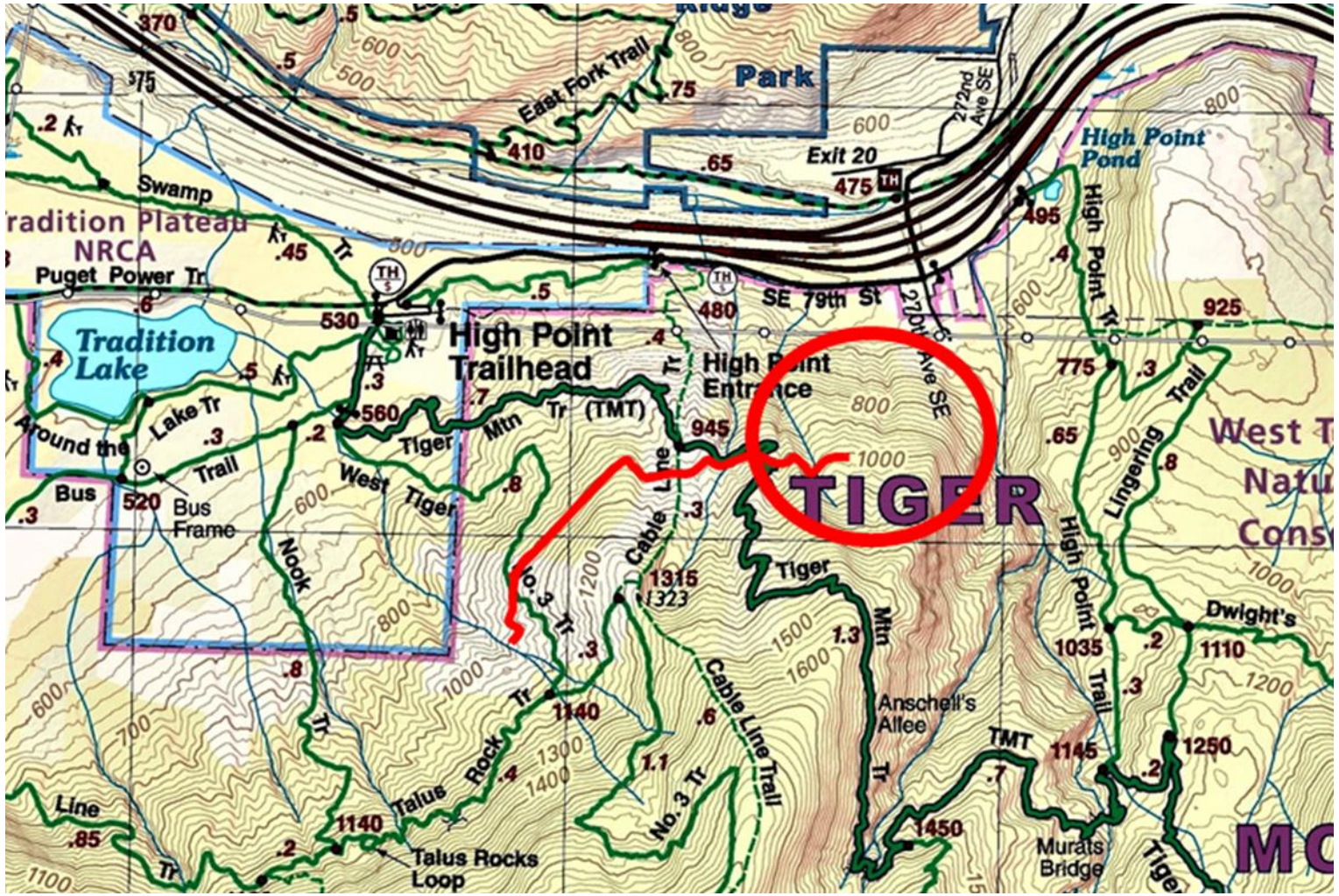


In the pre-work you found the words ‘High Point Entrance’ and the brown wavy lines just below and to the right of those words. (see arrow) These are “contour lines”.

Notice that there are darker and fainter contour lines. The darker contour lines are called ‘Index Contours”.

A number is printed on some of the Index Contours. This is the elevation of any point along that line!

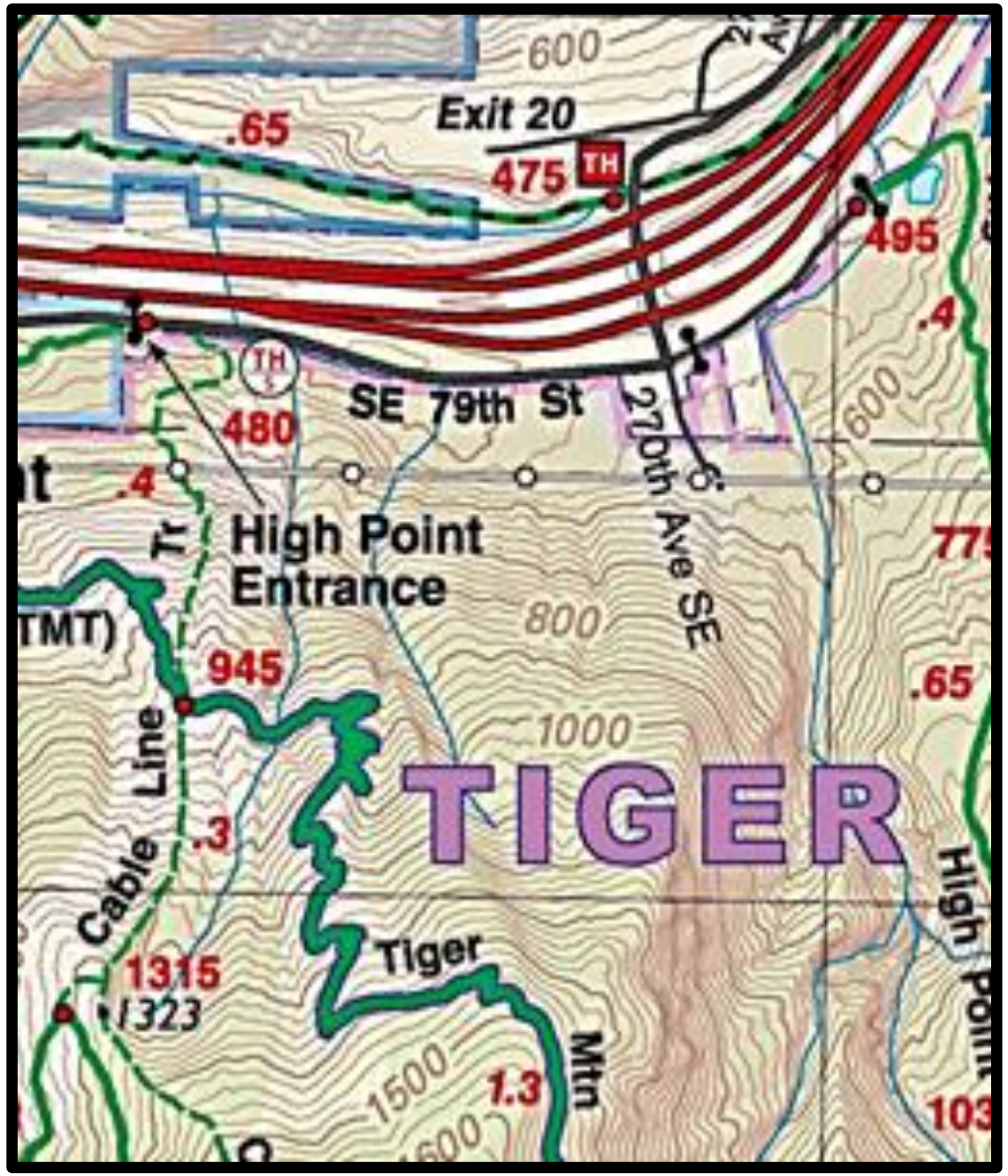
Deciphering Contour Lines (continued.



Trace the 1000’ contour around to the west as shown until it intersects the Tiger Mountain Trail (TMT), and on to the junction with the West Tiger 3 trail.

What will be your elevation at those points on the two trails?

Deciphering contour lines (continued)



Find two Index Contours on either side of the 1000’ contour you just traced. (Not all index contours will have a number on them so you might have to interpolate.)

Recalling that those numbers represent the elevation in feet, see if you can answer the following:

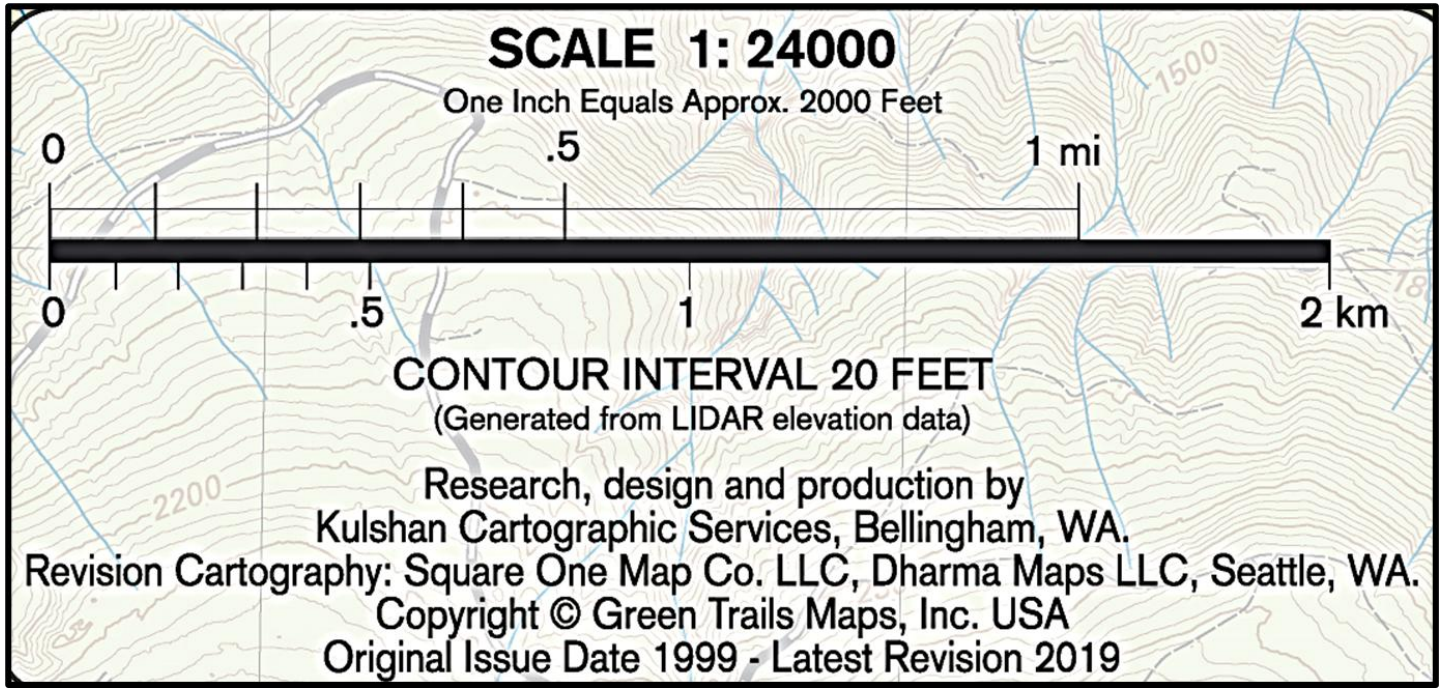
Q5. How many feet are between each Index Contour on your map? (Hint: subtract the smaller from the larger elevations of two adjacent Index Contours.)

Q6. Count the number of spaces (or ‘intervals’) between two adjacent Index Contours. How many feet are there in each space? ***This is called the Contour Interval.***

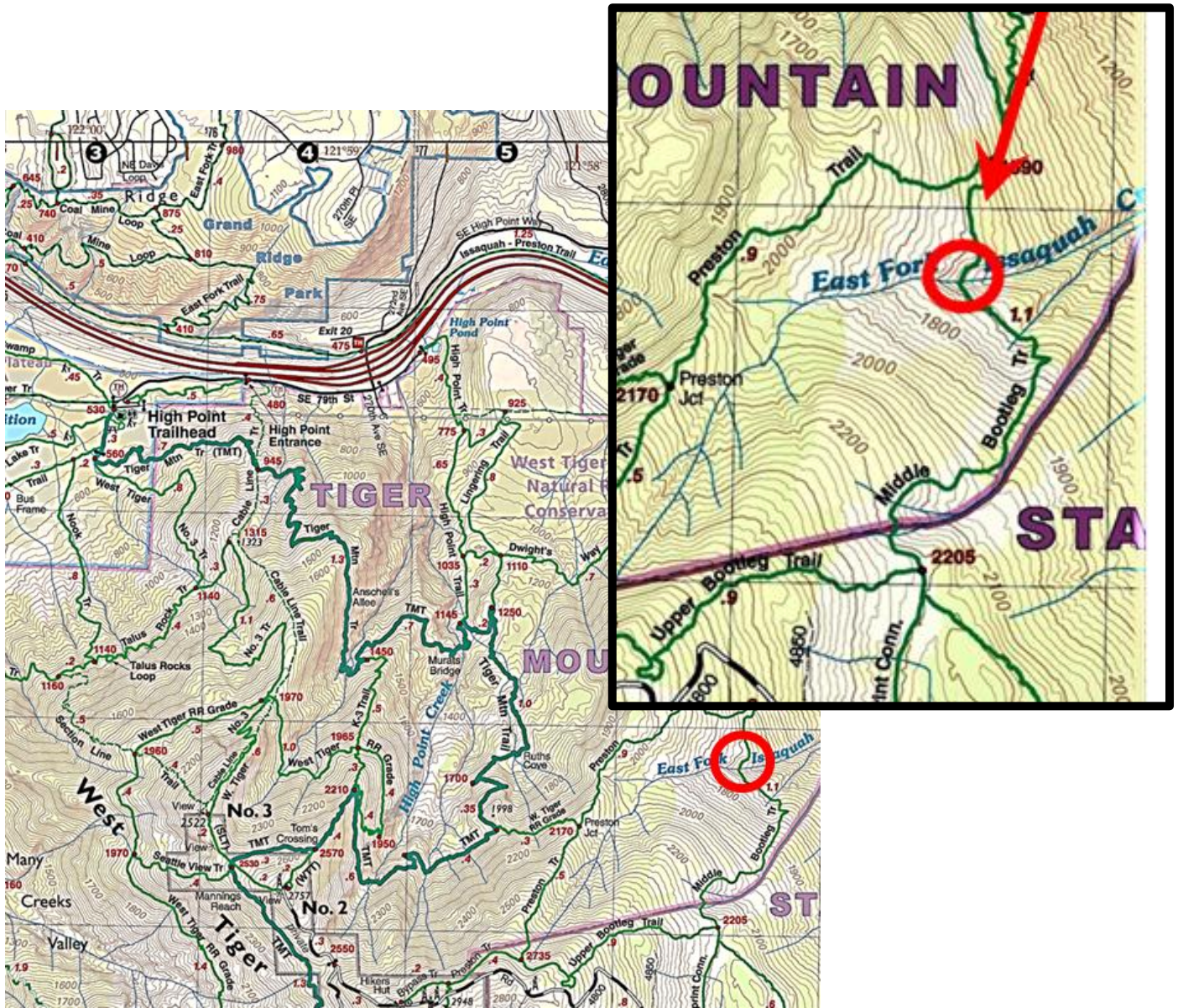
Deciphering Contour Lines (continued)

CROSS-CHECK:

What is the contour interval displayed in the scale box on your class map? Does it match your calculation?



1.C. Now use the contour lines on your map to determine the approximate elevation of any point on the map!



In the prework you found the point on your map where the Middle Bootleg Trail crosses the East Fork Issaquah Creek as shown, and the contour lines nearest to the map location in question.

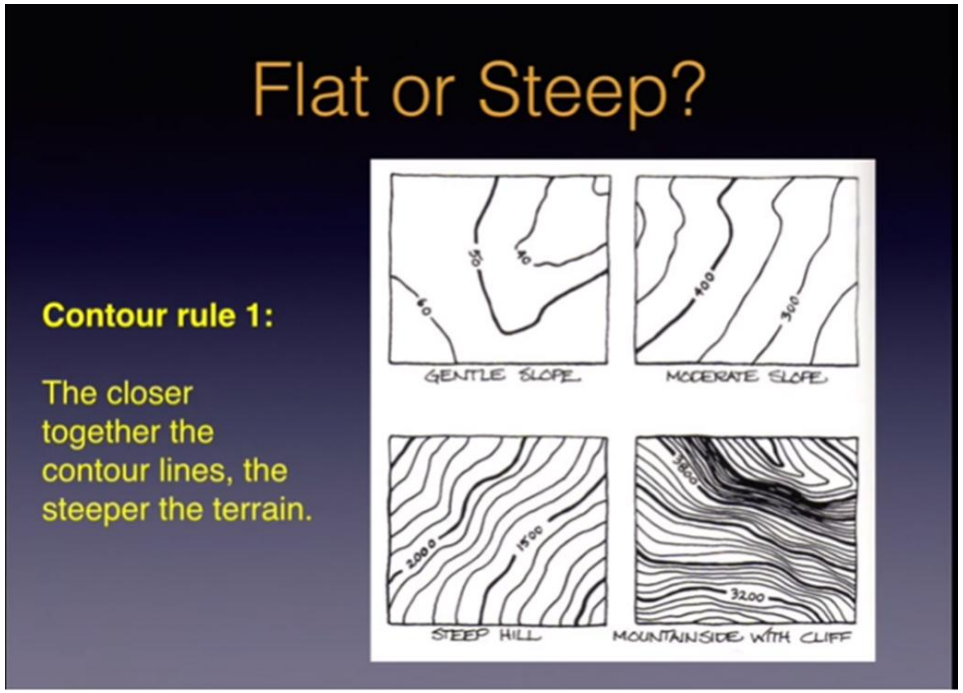
Q7. What is the approximate elevation at the point circled on the map?

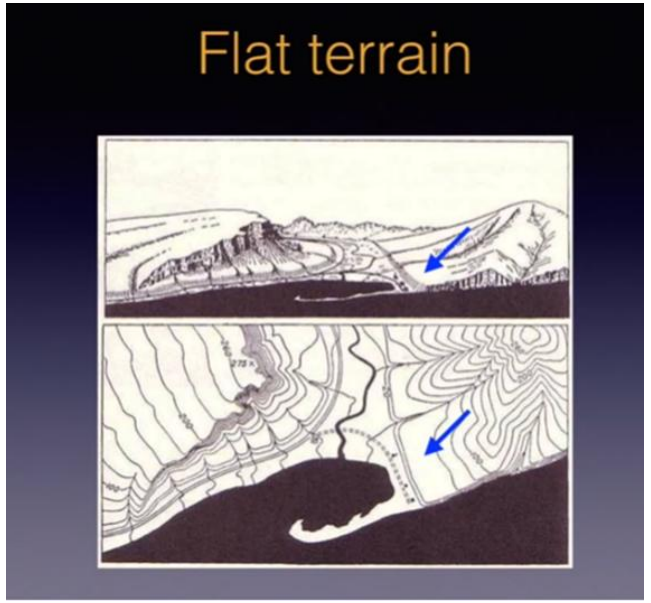
HINT: Use the magnifier on your compass!

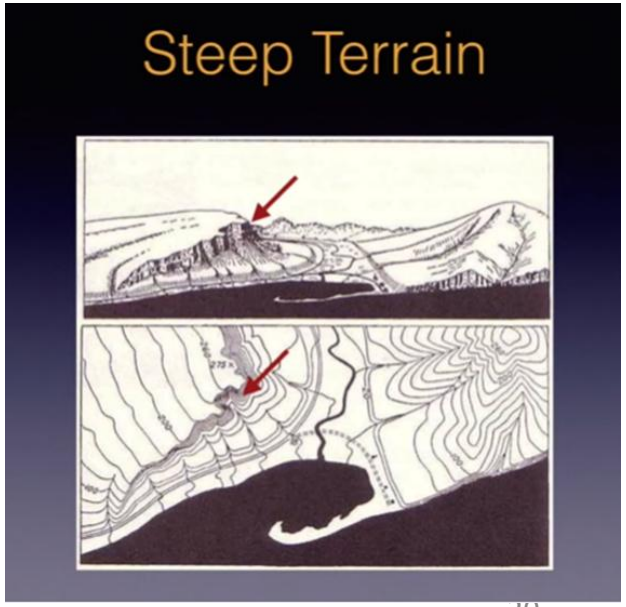
1.C. Using contour lines - continued

Watch the first 2.49 minutes of video #13 “Contours and Terrain”.

- This section will show you how to recognize flat and steep terrain on a topographic map.

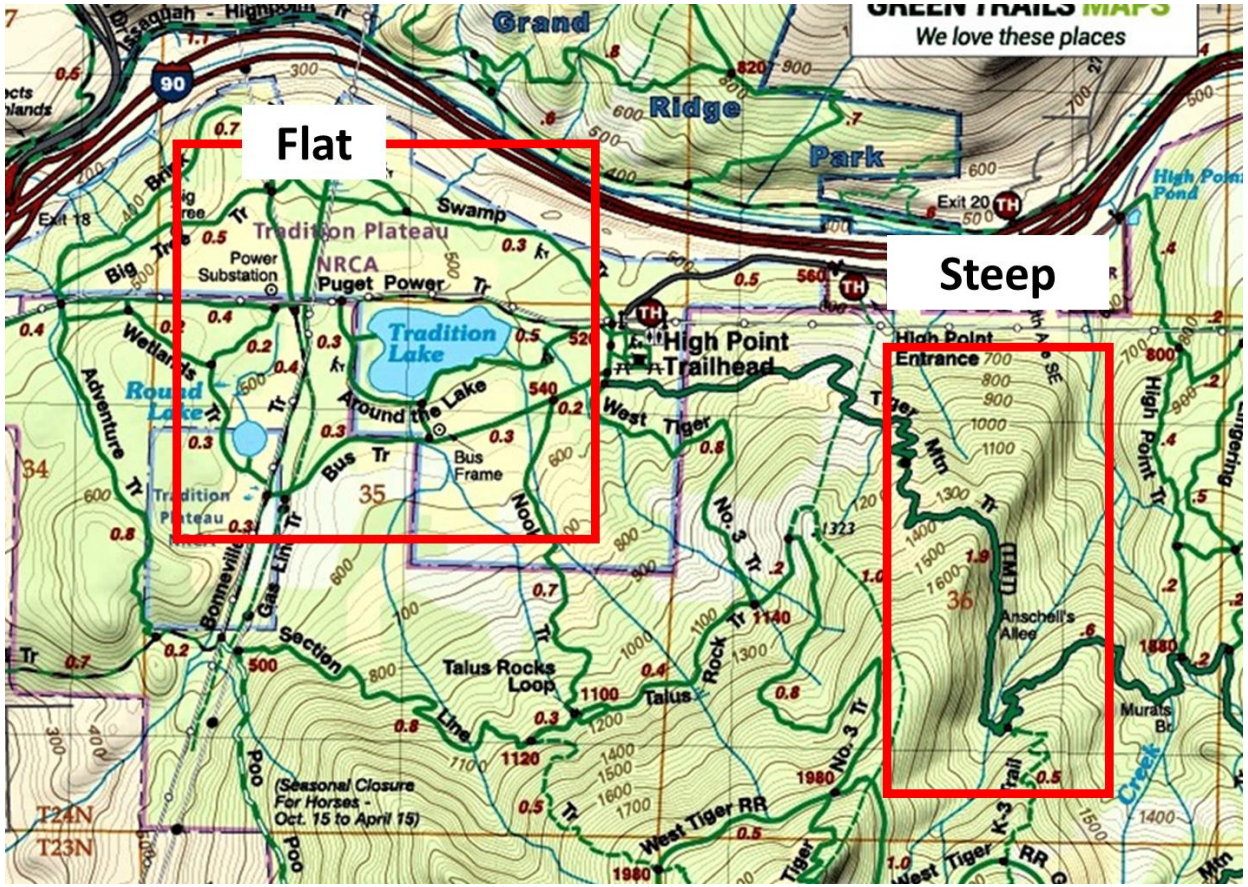


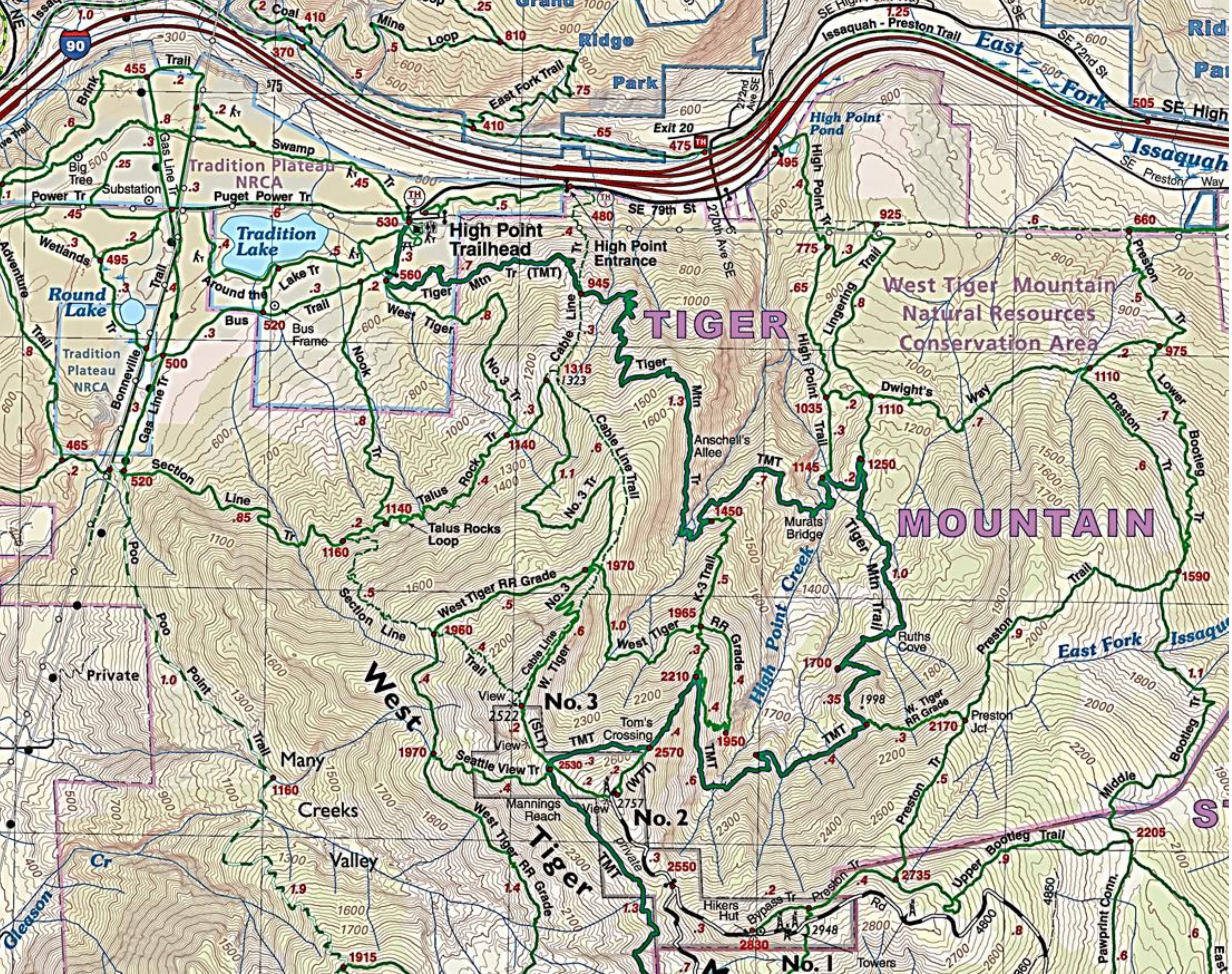




1.C. Using contour lines - continued

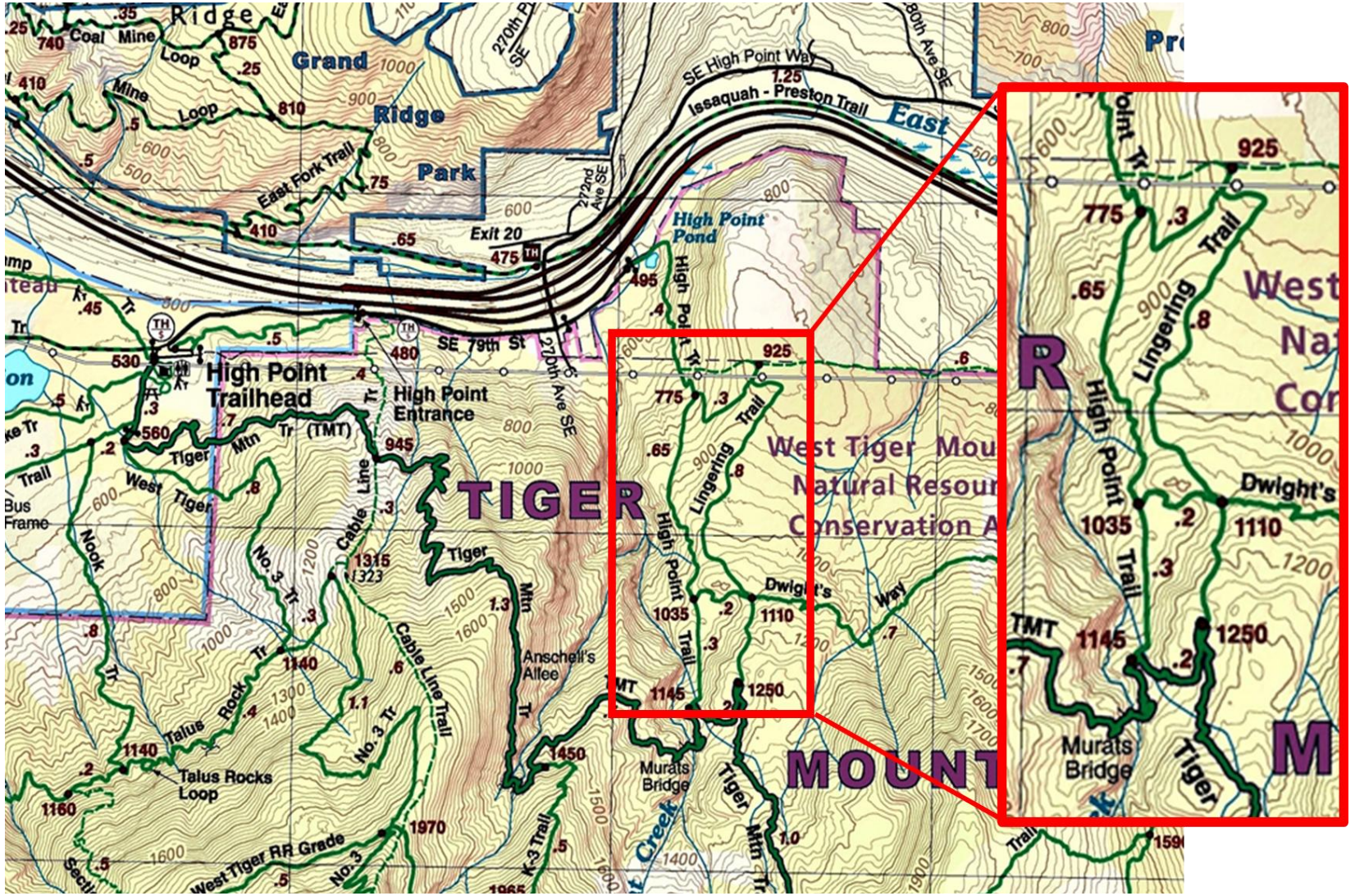
- Here are flat and steep areas on your Tiger Mountain map that we showed you in the pre-work. Where did you find others?





TIGER
MOUNTAIN
West Tiger Mountain Natural Resources Conservation Area
Tradition Plateau NRCA
Tradition Lake
Round Lake
High Point Trailhead
High Point Entrance
High Point Pond
Exit 20
Issaquah - Preston Trail
East Fork
SE 79th St
SE 72nd St
SE Preston Way
272nd Ave SE
277th Ave SE
Power Tr
Puget Power Tr
Swamp
Substation
Big Tree
Wetlands
Bonneville
Gas Line Tr
Around the Lake Tr
Bus Trail
Bus Frame
Nook Tr
Tiger Mtn Tr (TMT)
West Tiger
Cable Line Tr
No. 3 Tr
Talus Rock Tr
Talus Rocks Loop
Section Line Tr
Poo Poo Point Trail
Anschell's Allee
Murats Bridge
High Point Creek
High Point Tr
Lingering Trail
Dwight's Way
Preston Tr
Lower Bootleg Tr
Upper Bootleg Trail
Middle Bootleg
K-3 Trail
West Tiger RR Grade
Ruths Cove
Preston Jct
Tom's Crossing
Seattle View Tr
Mannings Reach
No. 3
No. 2
No. 1
Hikers Hut
Bypass Tr
Towers
Pawprint Conn.
Many Creeks Valley
Private
Gleason Cr
West Tiger
East Fork Issaquah

1.C. Using contour lines - continued

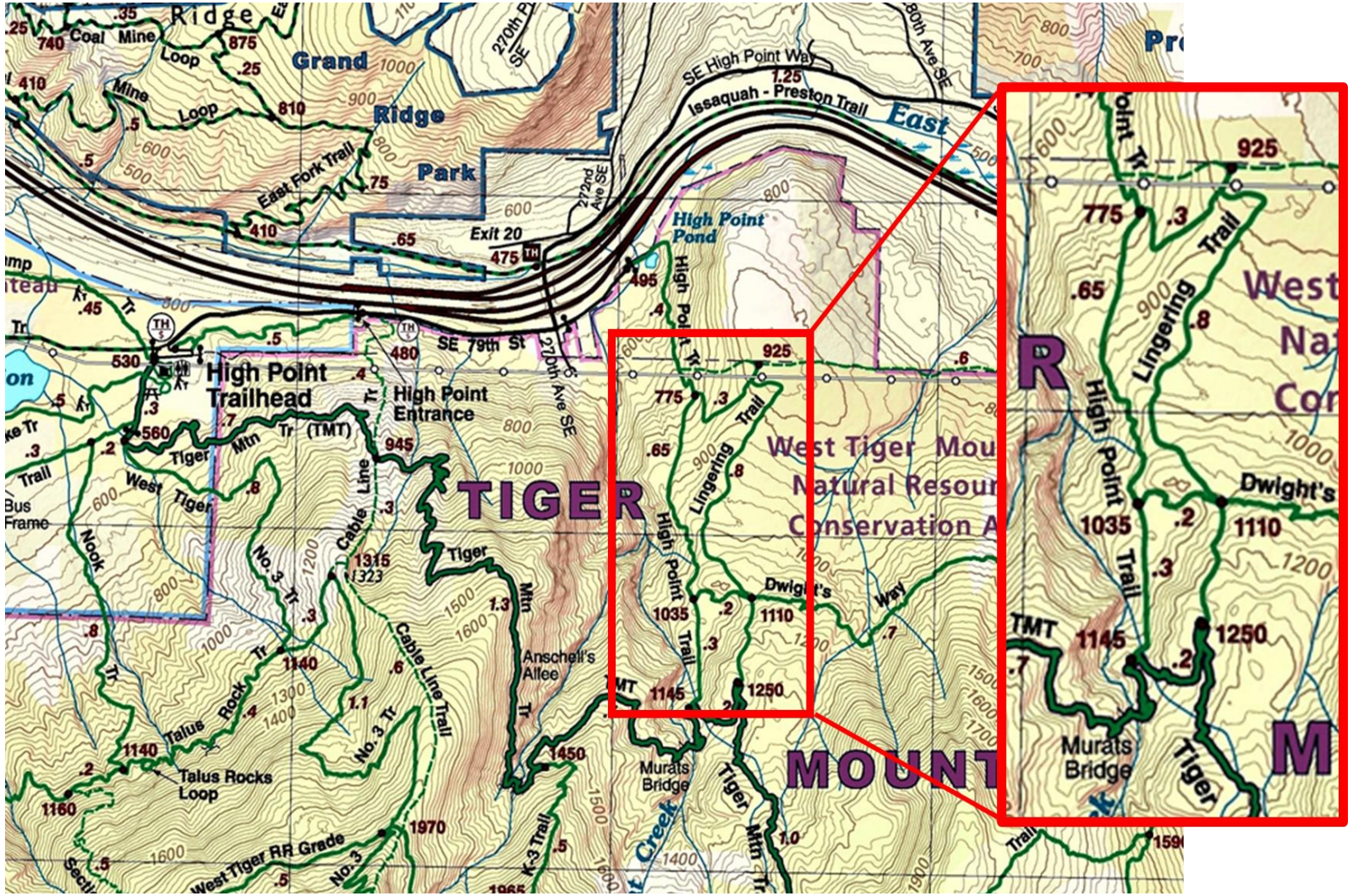


Just east of the High Point trailhead, trace the Lingering Trail on your map as it goes south from the High Point Pond.

Q8. Based on how close together the contour lines are as you travel along the trail, describe how the steepness of the trail will change as you walk between the junctions marked 925 and 1110.

This kind of 'situational awareness can be very helpful to you in figuring out where you are on the trail!

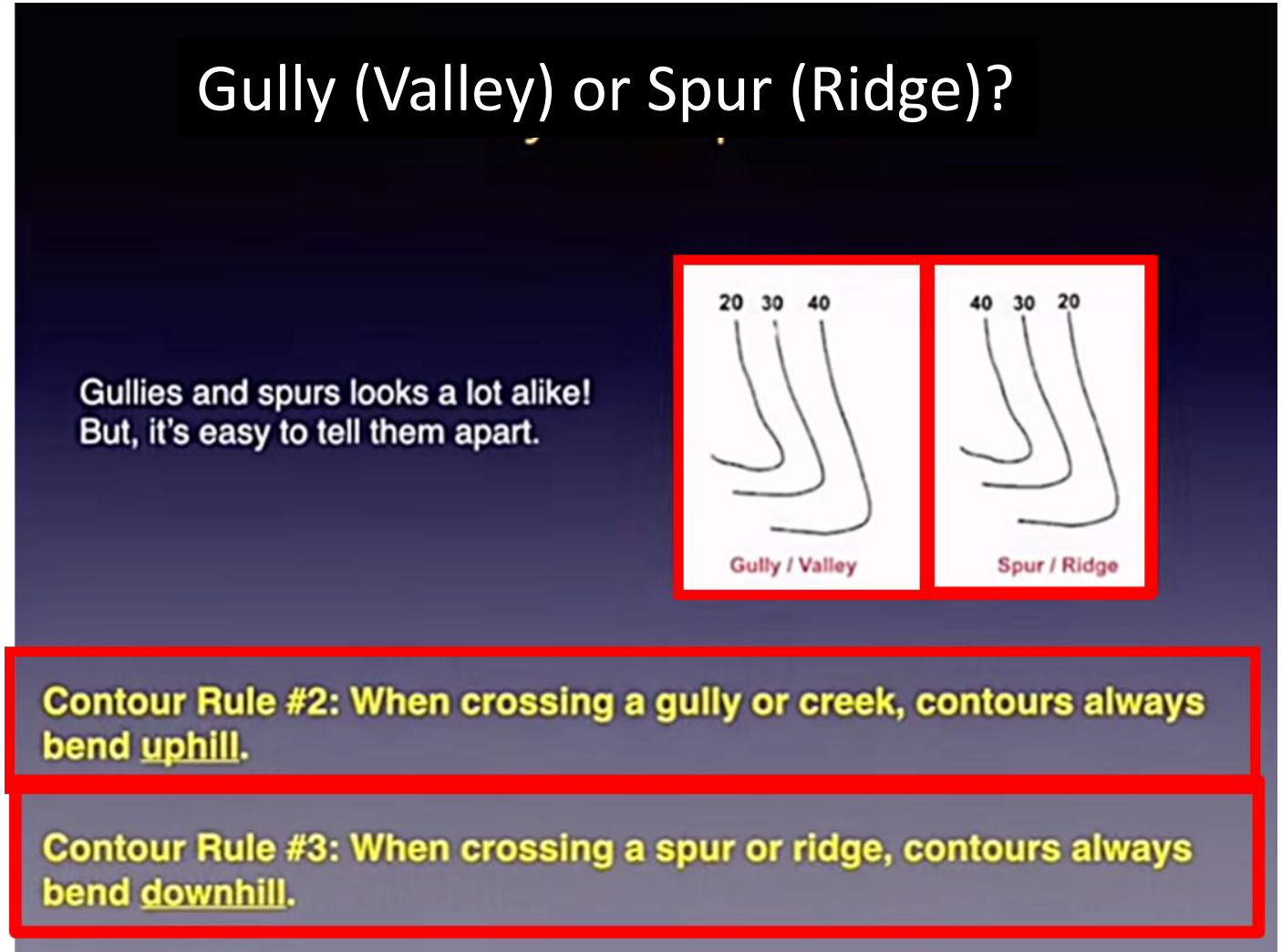
1.C. Using contour lines - continued



Answer:

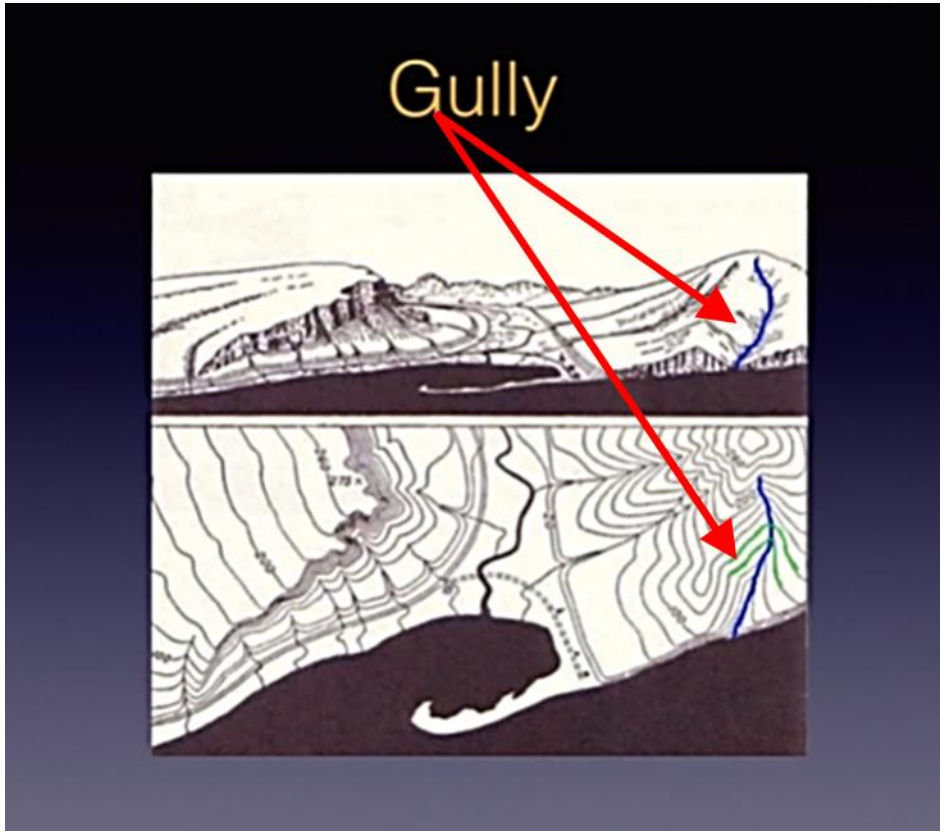
1.C. Using contour lines - continued

- Continue watching video #13 at 2.49 and stop it again at 6.12.



"Ridges roll down and gullies go up!"

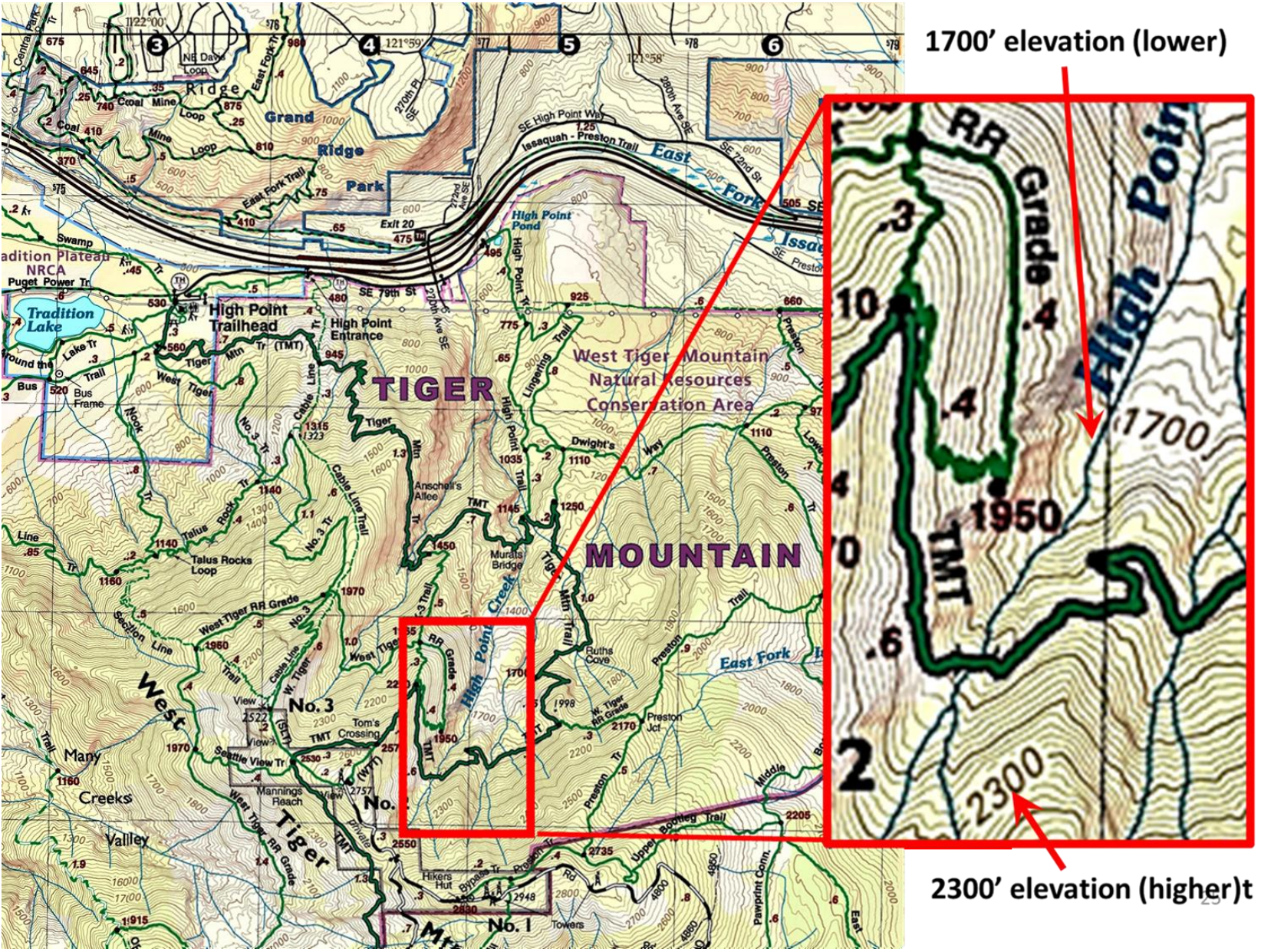
Gullies or valleys



Creeks or rivers are usually great giveaways for the location of a gully or valley. The direction of flow (always downhill!) indicates what direction is uphill and downhill.

See in the lower drawing how the contours curve uphill.

Gullies or Valleys



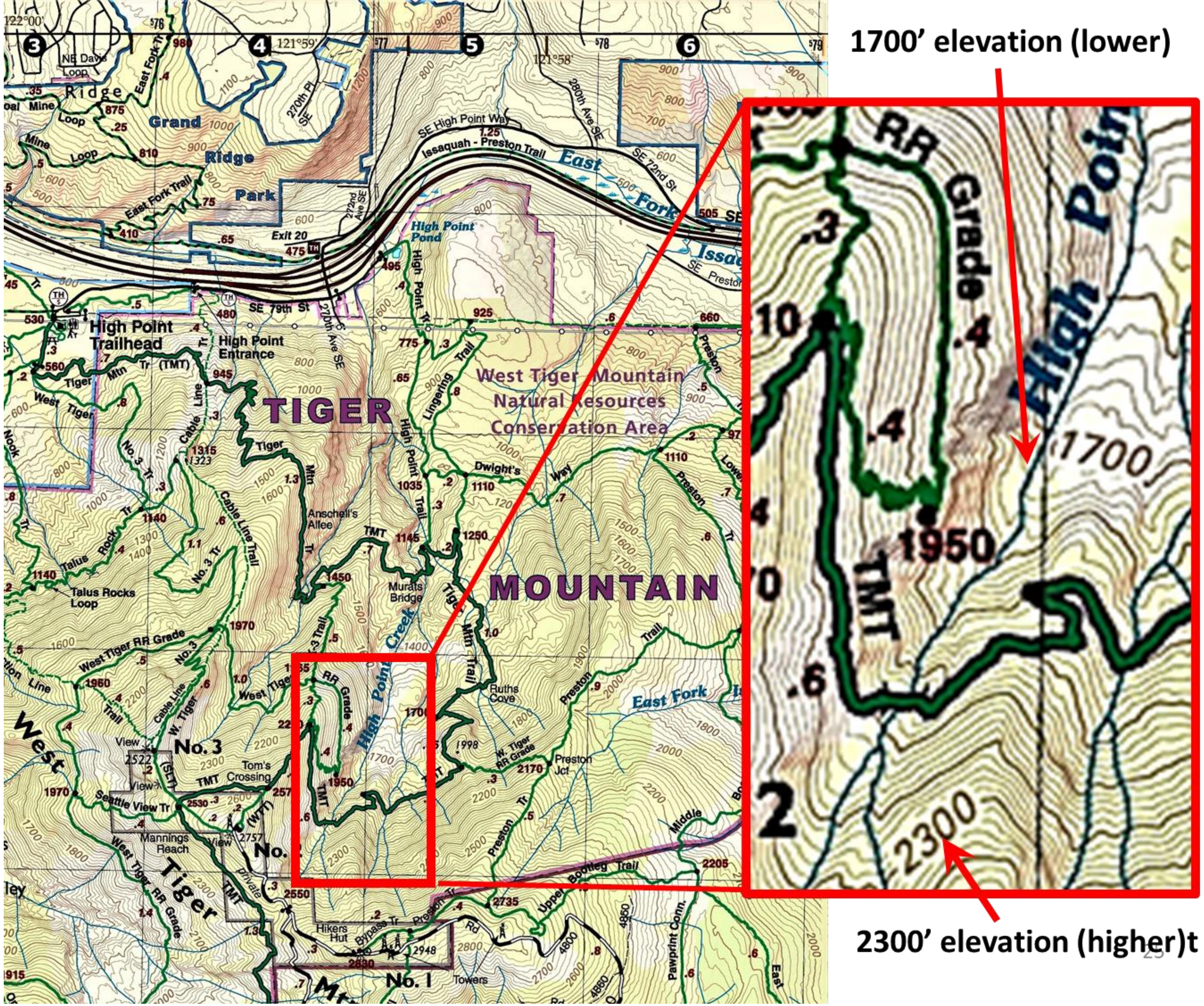
In your pre-work you found the marked portion of High Point Creek on your map.

Q9. What direction is downhill along High Point Creek?

Which way do the contours bend along the creek (pointing uphill or downhill)?

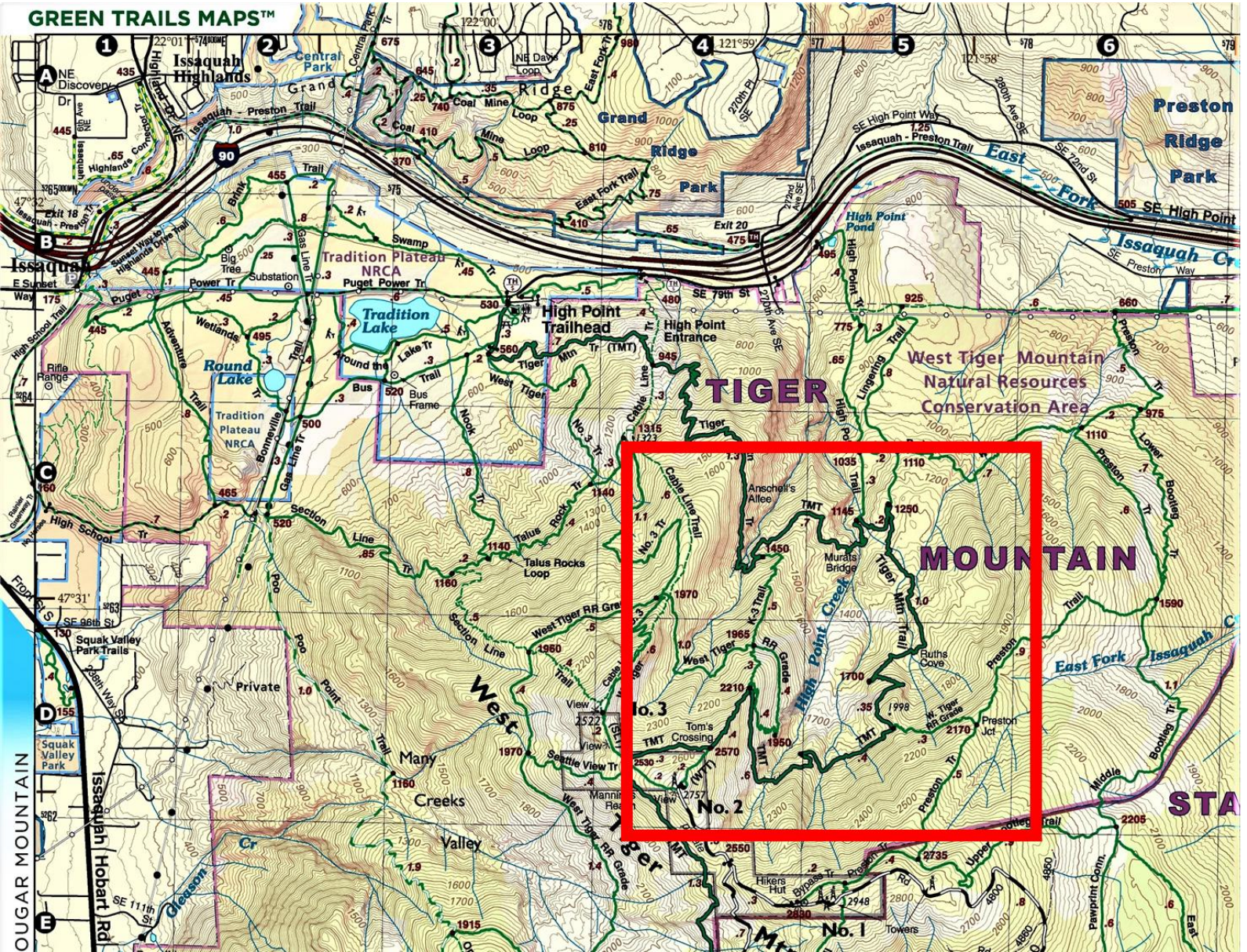
What does this tell you – is this a gully/valley or not?

What is your other great clue?


1700’ elevation (lower)
2300’ elevation (higher)t
TIGER
MOUNTAIN
West Tiger Mountain
Natural Resources
Conservation Area
High Point Trailhead
RR Grade
High Point
1700
1950
TMT
2300

Answer:

1.C. Using contour lines - continued

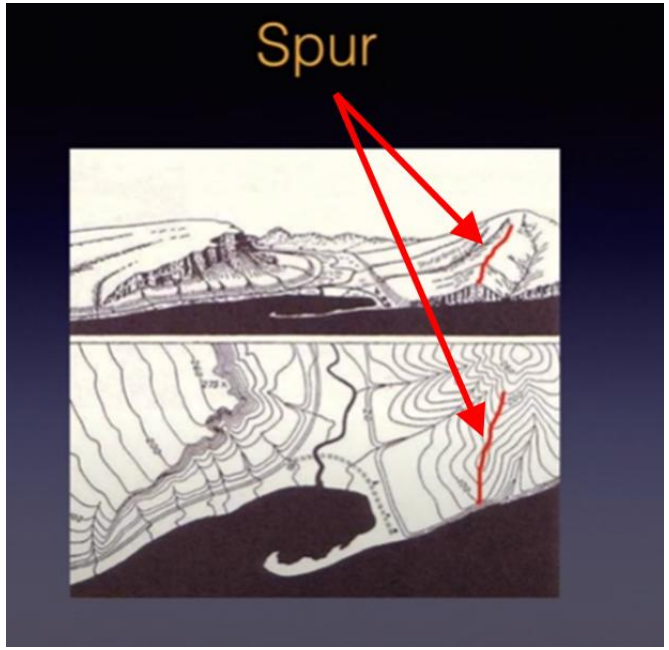


Find the marked section of the Tiger Mountain Trail on your paper map.

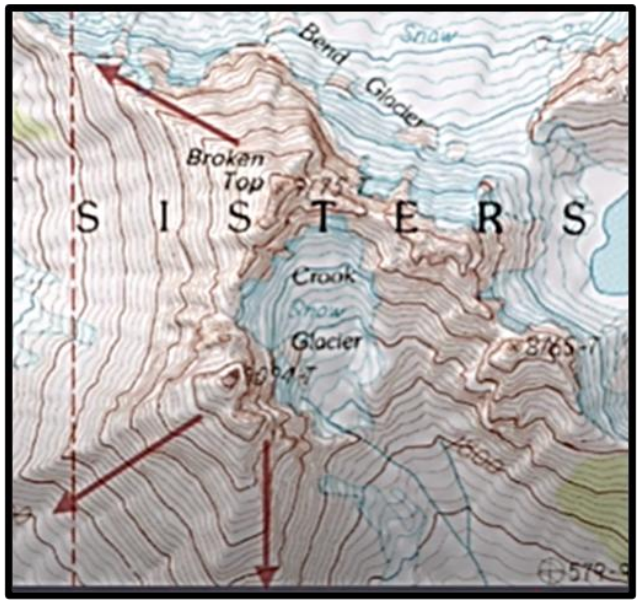
Circle one or two additional examples of a gully that you will cross on the Tiger Mountain Trail. (remember – they are places where the contours bend uphill)

1.C. Using contour lines - continued

- Now lets review how to recognize spurs (ridges) on this topo map of one of the Sisters in Oregon.

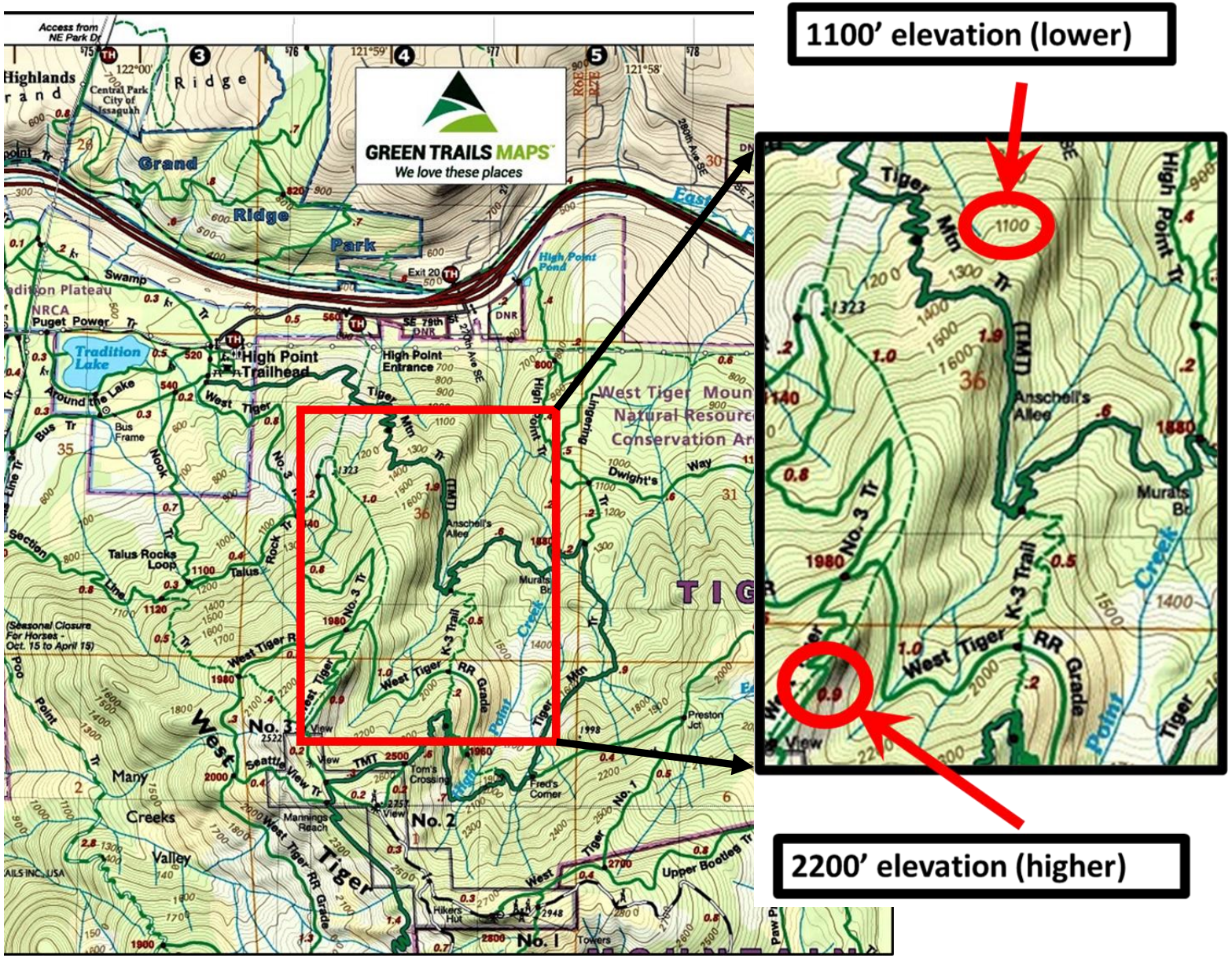


First use the elevations marked on the Index Contours to determine which way is uphill and which way is downhill.



Q10. Which direction do the contours curve in these drawings? From this, are they gullies or spurs?

Gully or Ridge/Spur?

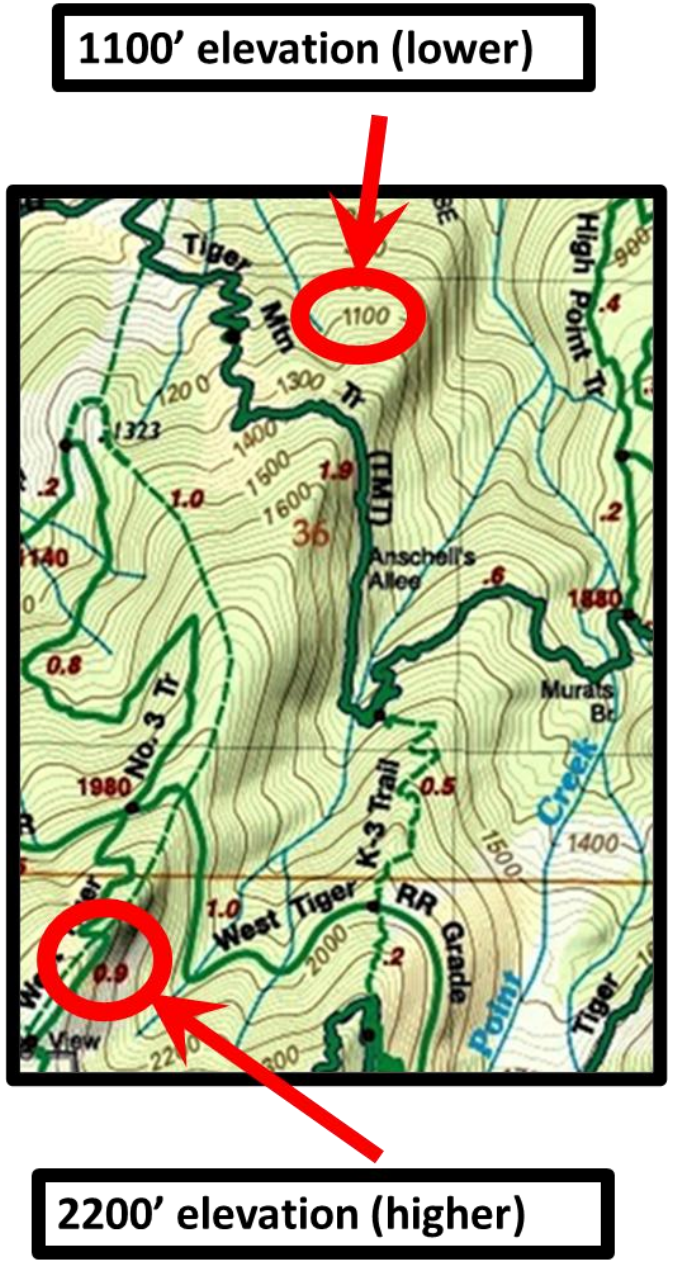


Find this section of the Tiger Mountain Trail on your paper map.

Look closer at the shaded area going from the lower left to the upper right of the magnified square. This indicates a terrain feature along the left of the shaded area.

Q11. Based on the elevations along this feature and the shape of the contours along it, is this a ridge or a gully?

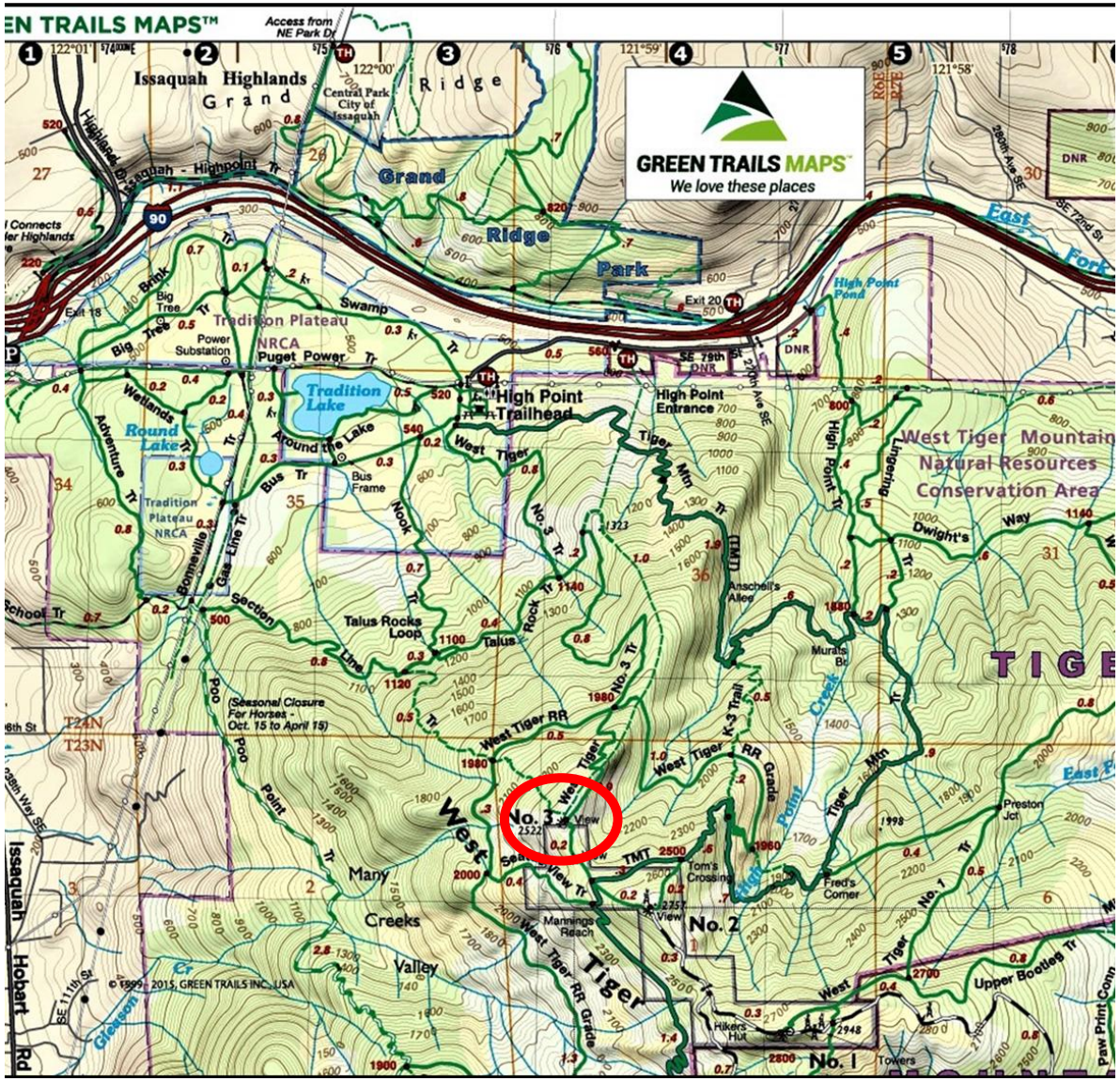
- Hint: Remember that "ridges roll down and gullies go up!"



In a gully the contours bend uphill, while along a ridge the contours bend downhill.

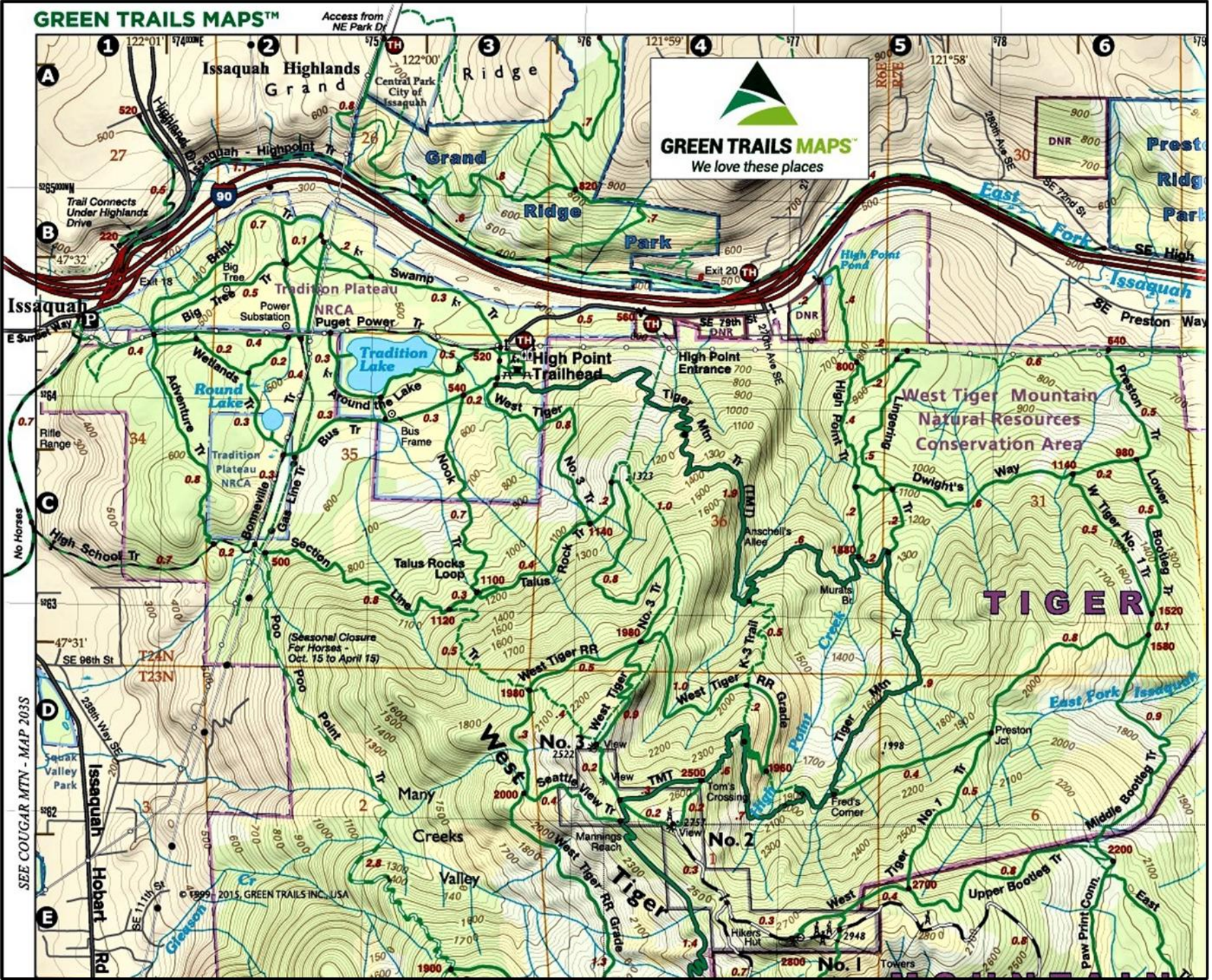
Looking at the elevations along this feature and the shape of the contours along it, is this a ridge or a gully?

1.C. Using contour lines - continued

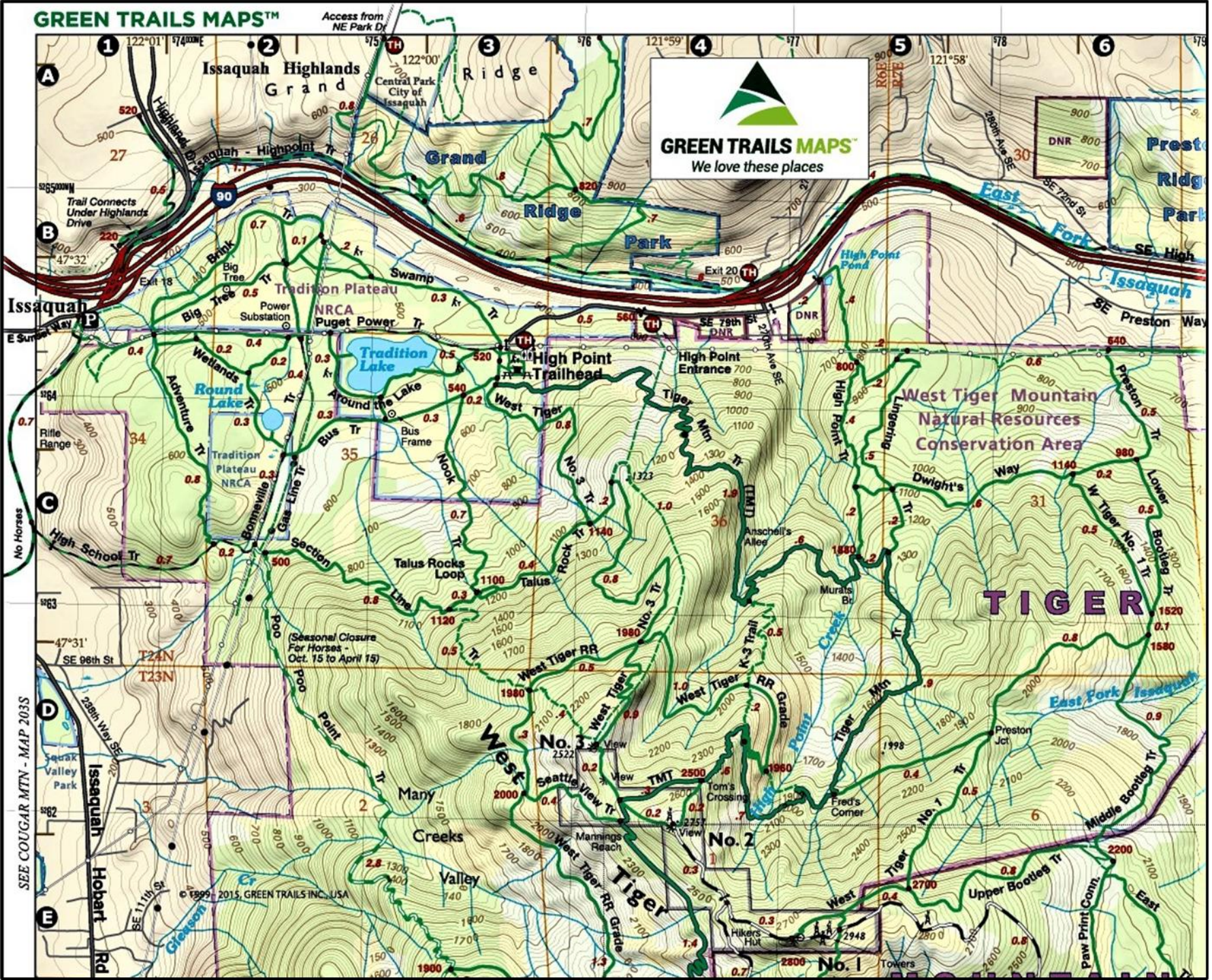


In the prework you located the peak labeled No.3 on your map (West Tiger 3) .

Q12. Where are the two ridges and two gullies you found that extend from West Tiger 3?



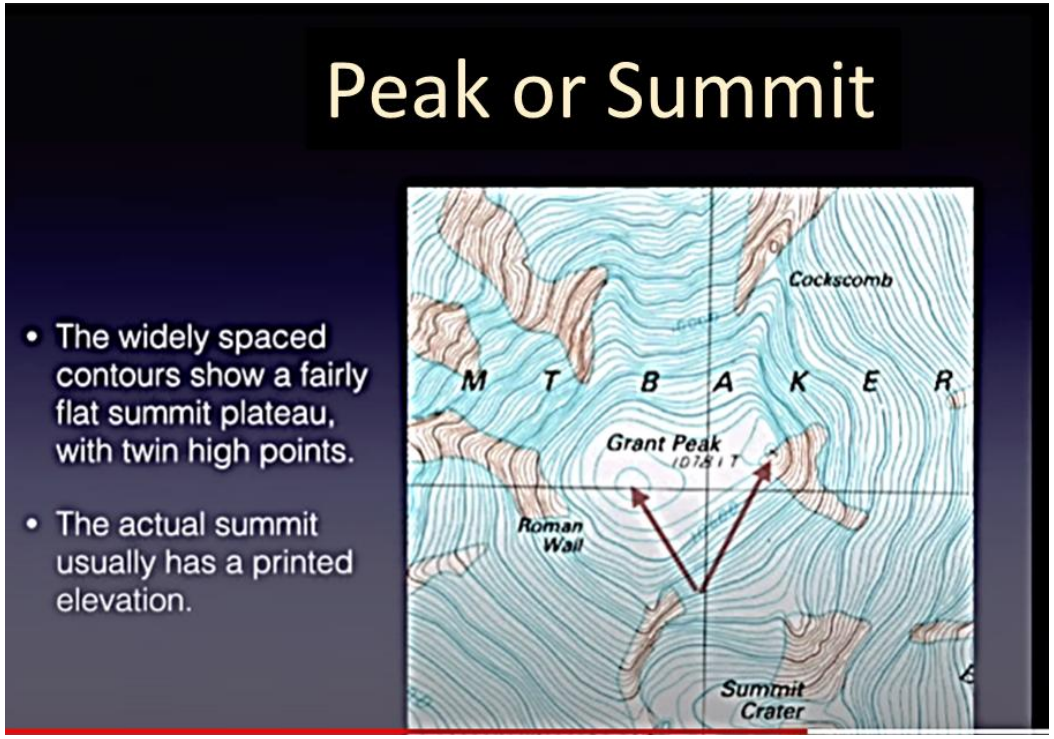
Spurs (ridges) coming off Tiger No. 3?

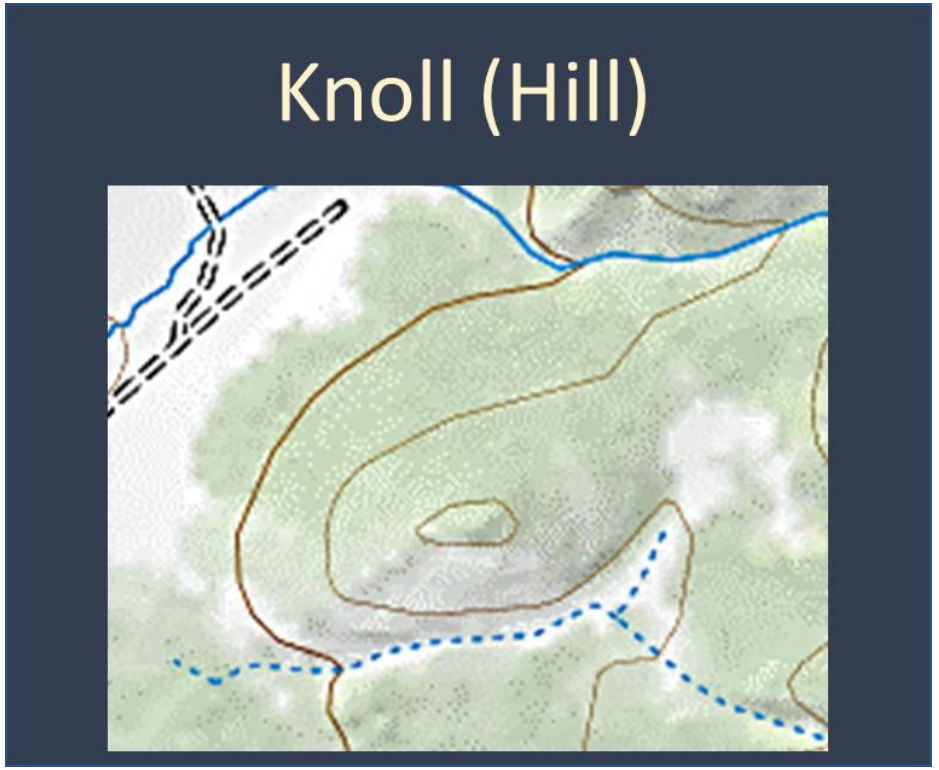


Gullies (valleys) coming off Tiger No. 3?

1.C. Using contour lines - continued

- Continue watching video #13 again at 6m13s and stop it at 7m47s.
  - ➢This section will show you how to recognize summits (peaks), knolls (hills) and saddles (or passes).

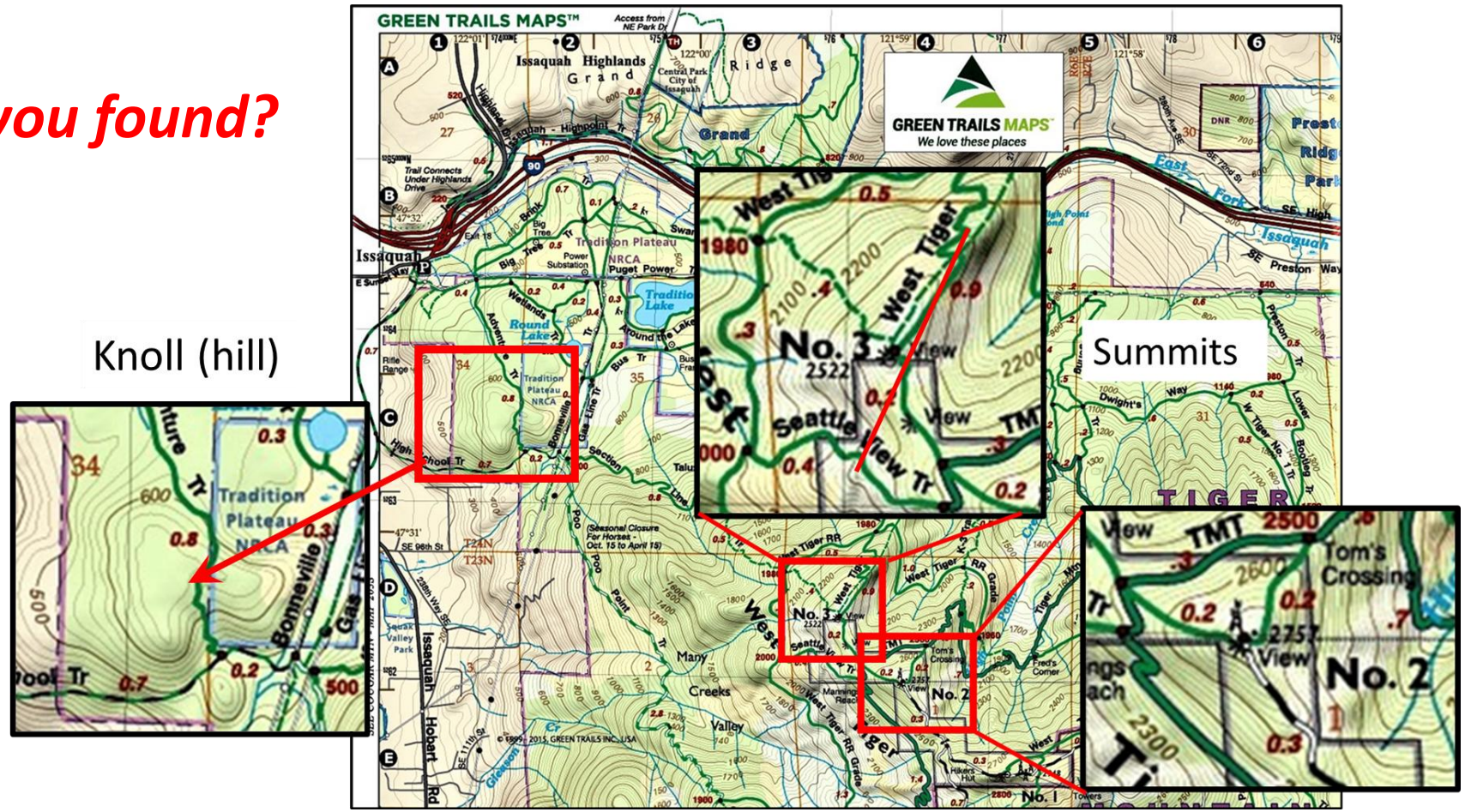




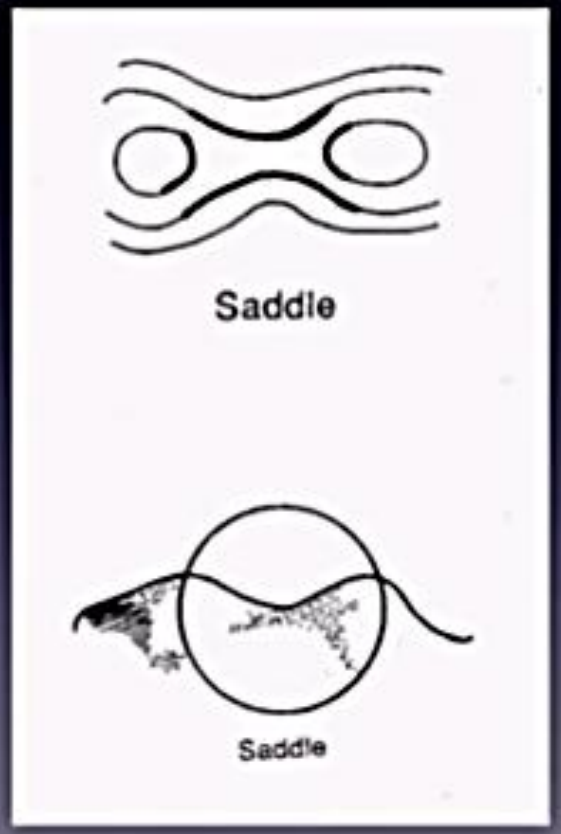
1.C. Using contour lines - continued

Q13. In the prework we asked you to look on your Tiger Mountain map for other examples of a summit (the locally-highest ones often have an elevation printed next to them) and at least one knoll or hill.

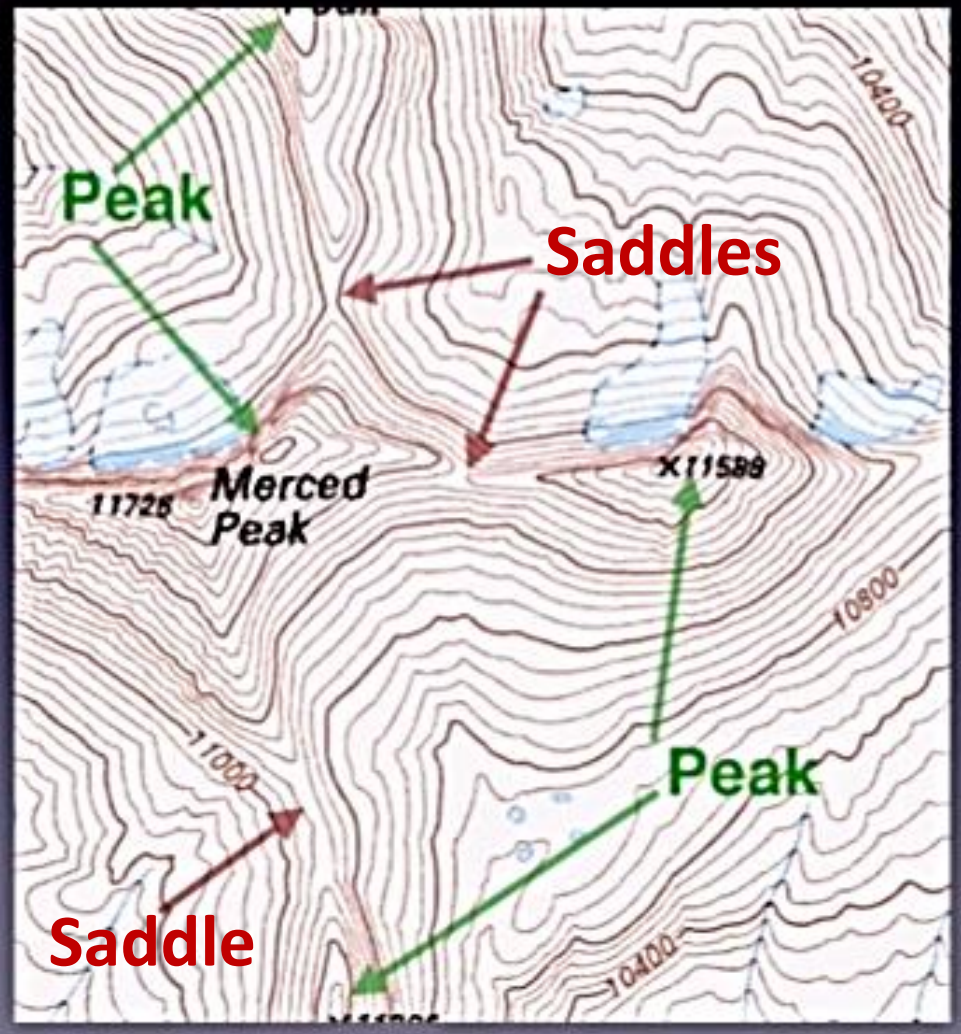
Are these the ones you found?



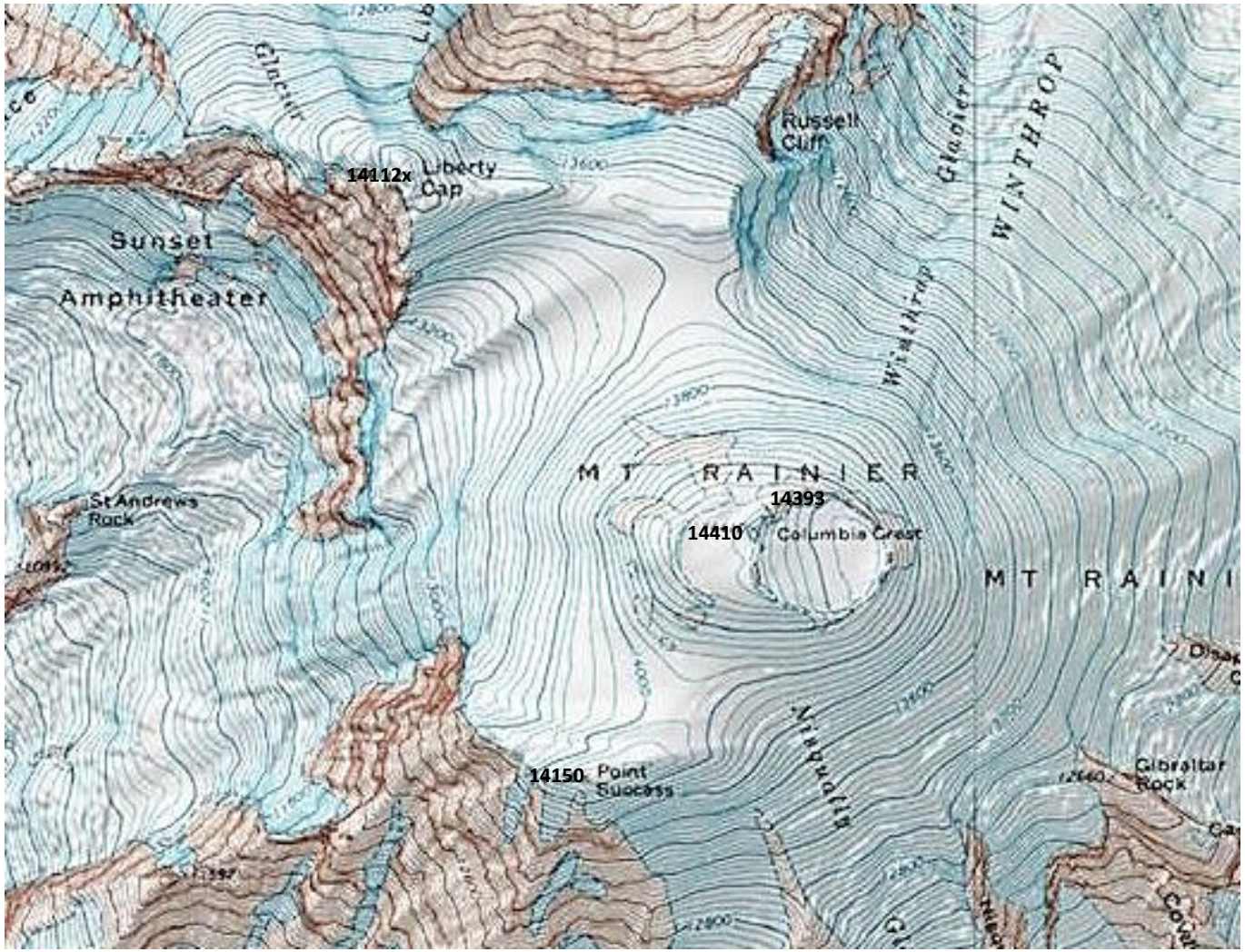
Saddles



Saddles



Find summits on a map

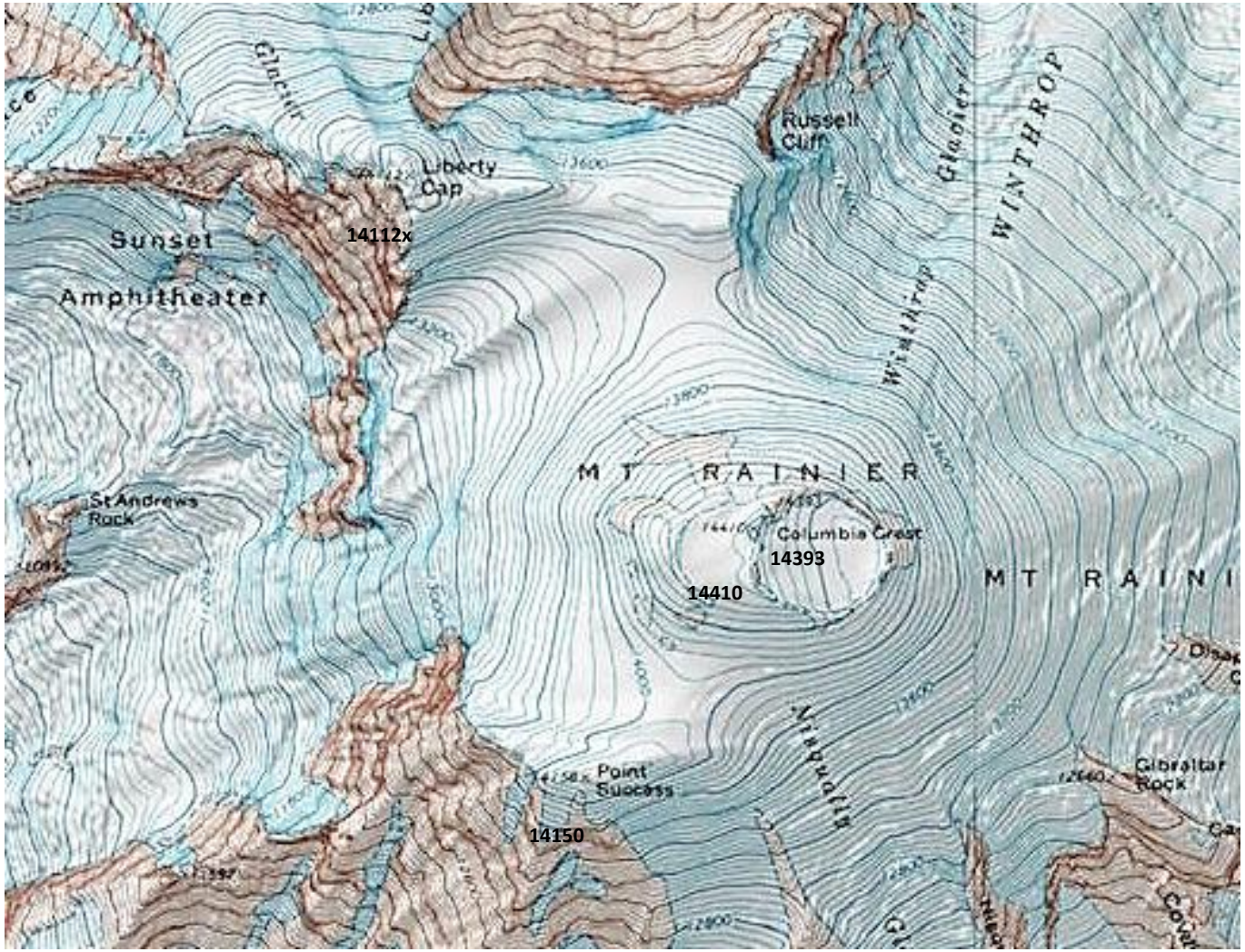


In the prework you used this topographic map of Mount Rainier to practice finding summits and saddles:

Q14. Circle the main summit and a secondary summit. What are their elevations?

Q15. What does the terrain look like around the main summit?

Find saddles on a map



Q16. Now find two saddles near the summits and estimate their elevations.

- First note that the elevation difference between index contours on this map is 200 ft, vs. the 100’ on your Green Trails map.
  - So…what is the contour interval on this map?
- Try estimating the elevation at the northernmost saddle!

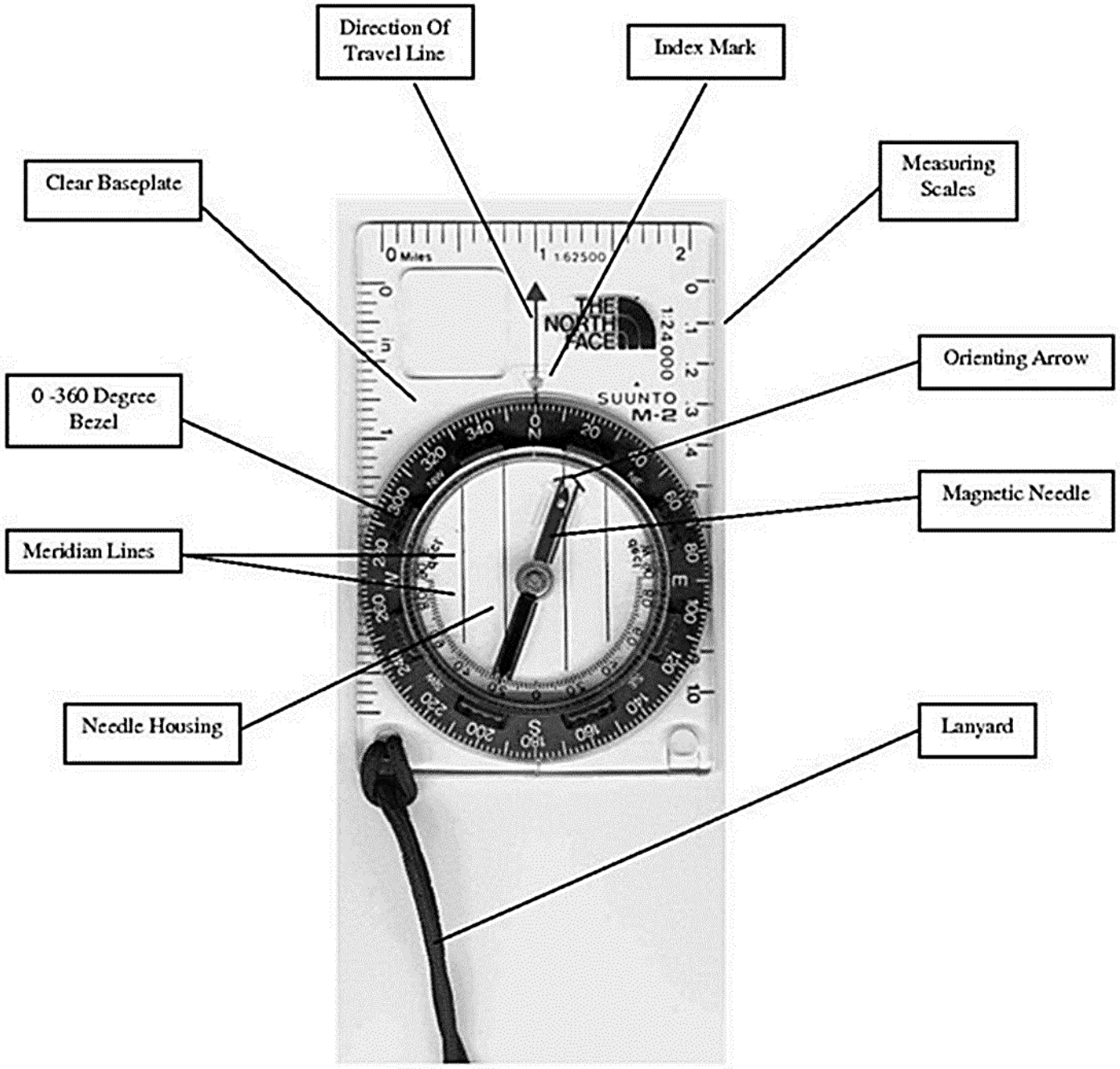
Learning Objective #2: Be able to use a compass with a topo map to make navigation decisions on the trail!

A. Understand the parts of a compass and their basic functions.

B. Understand how to orient your map to north and use that with observed info on the map and on the ground to decide where you are and which trail you want to take without having to use a compass.

C. Determine a compass bearing in the field and on your map.

D. Determine the bearing of the trail you want to be on from your map and follow it in the field



Compass Parts and Functions

In your prework you found the main parts of your compass that match this diagram, and practiced taking a bearing in the field.

Let's briefly review by watching video #2 'Red in the Shed'.

You can clearly see the declination that was set on this compass (the difference between true north and magnetic north.

- *Approx. what declination was set here?*
- *What direction are we facing along the direction of travel line?*

2.B. Orienting your map to north

Watch the first 58 seconds of video #7: Orienting your Map. This shows you how to “orient your map to north”.

When you and your map are facing north, the direction of trails and landmarks from you on the ground is the same as their direction from you on the map. This makes it easier to figure out which way you should go on the ground.

2.B. Orienting your map to north (continued)

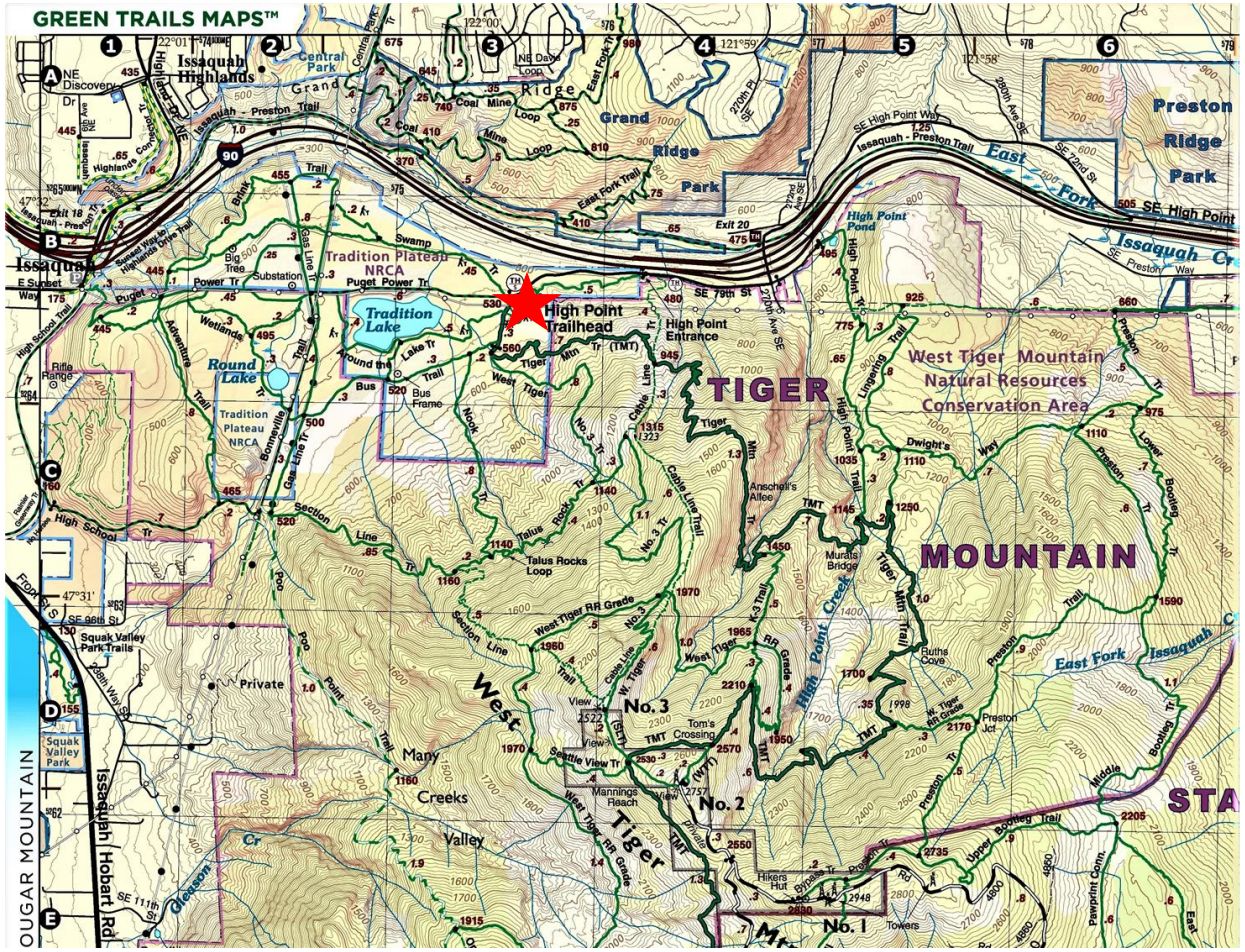
In the homework you practiced orienting your body, compass and map to north.

Q17. Once you got oriented, what should the bearing be along the direction-of-travel arrow on your compass? (this is the direction that you and your map are facing. *It's NOT a trick question!)*

2.B. Orient your map to north (continued)

Keep standing with your body and your map oriented to north.

Pretend that you are standing at the TH mark at the High Point Trailhead (red star).



Q18. While standing at the star facing north, and looking at your map:

- **Point to where Tradition Lake should be.**
- **Point to where West Tiger 2 should be.**

While standing at the star facing north, and looking at your map:

c. You want to walk on the West Tiger 3 trail.

Point in the direction that the West Tiger 3 Trail should go from your current location.

Now let's learn how to measure a bearing to an object or landmark "in the field"

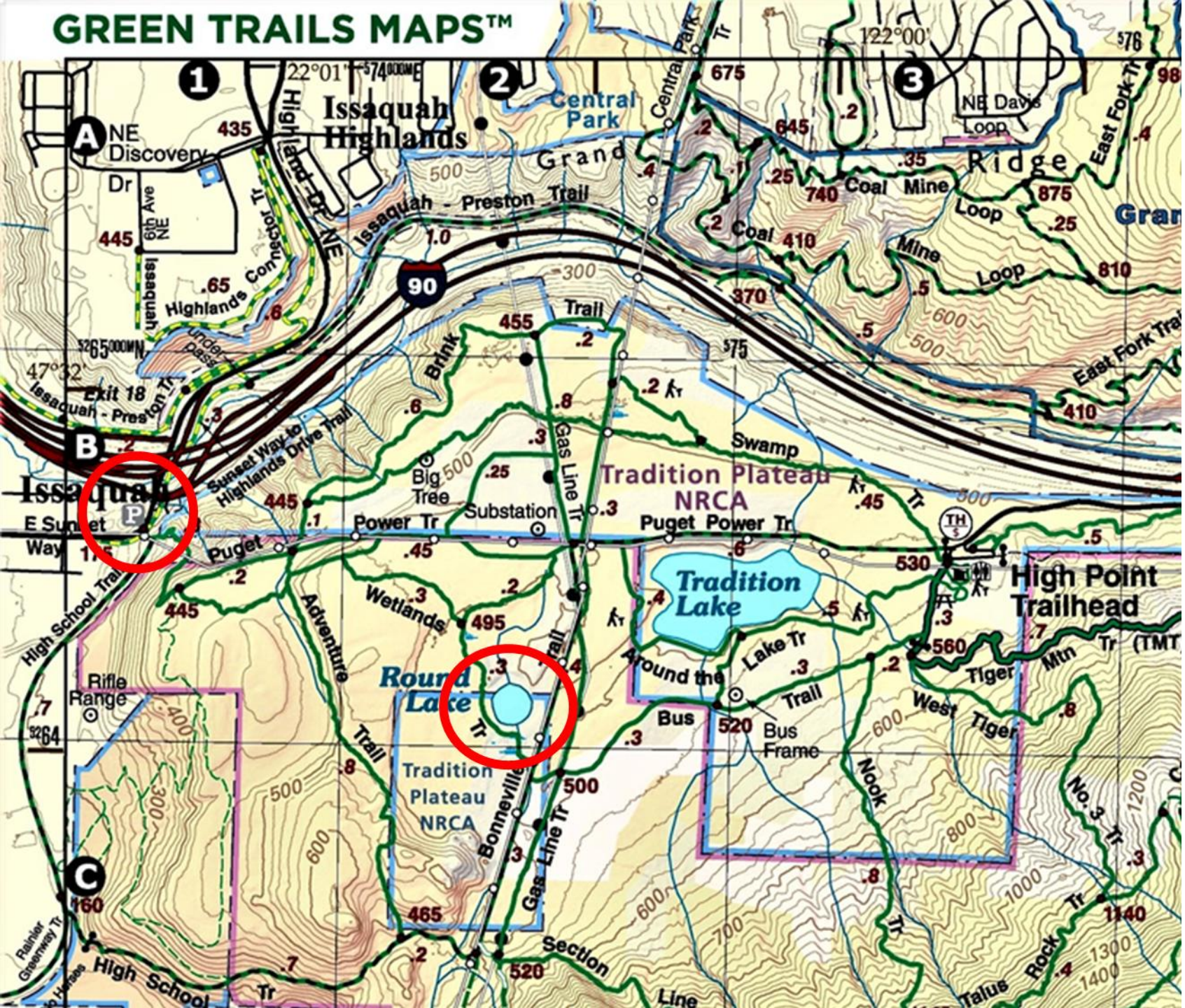
Face an object you can see from your current position. Hold your compass flat in front of you, and turn the bezel until the red magnetic needle is inside the orienting arrow (Red is in the Shed!)

Q19. What is the bearing (the number you read on the bezel) at the index mark?

That bearing can be understood as the direction that the object is from your position, as expressed in the degrees of angle from north.

(There isn't a 'right' answer to this one – it depends on which object you pick!)

We will practice this on the field day!

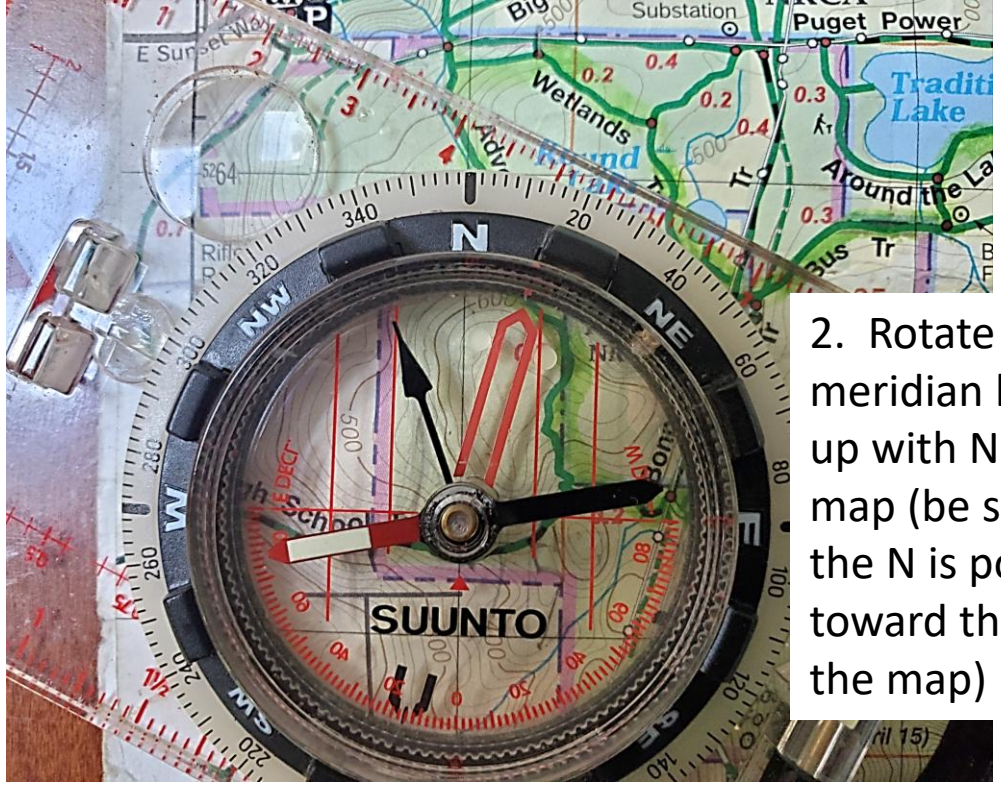


Now let's measure a compass bearing on your map!

In the prework we asked you to use your compass to measure the bearing on your map from the East Sunset Way parking lot directly across to Round lake.

To Review:

1. Line up compass straightedge between origin and destination, with the Direction of Travel arrow pointing toward where you want to go (Round Lake)



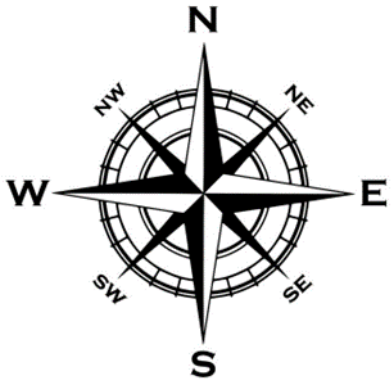
2. Rotate bezel so meridian lines line up with N-S lines on map (be sure that the N is pointing toward the top of the map)

3. Read bearing at index mark

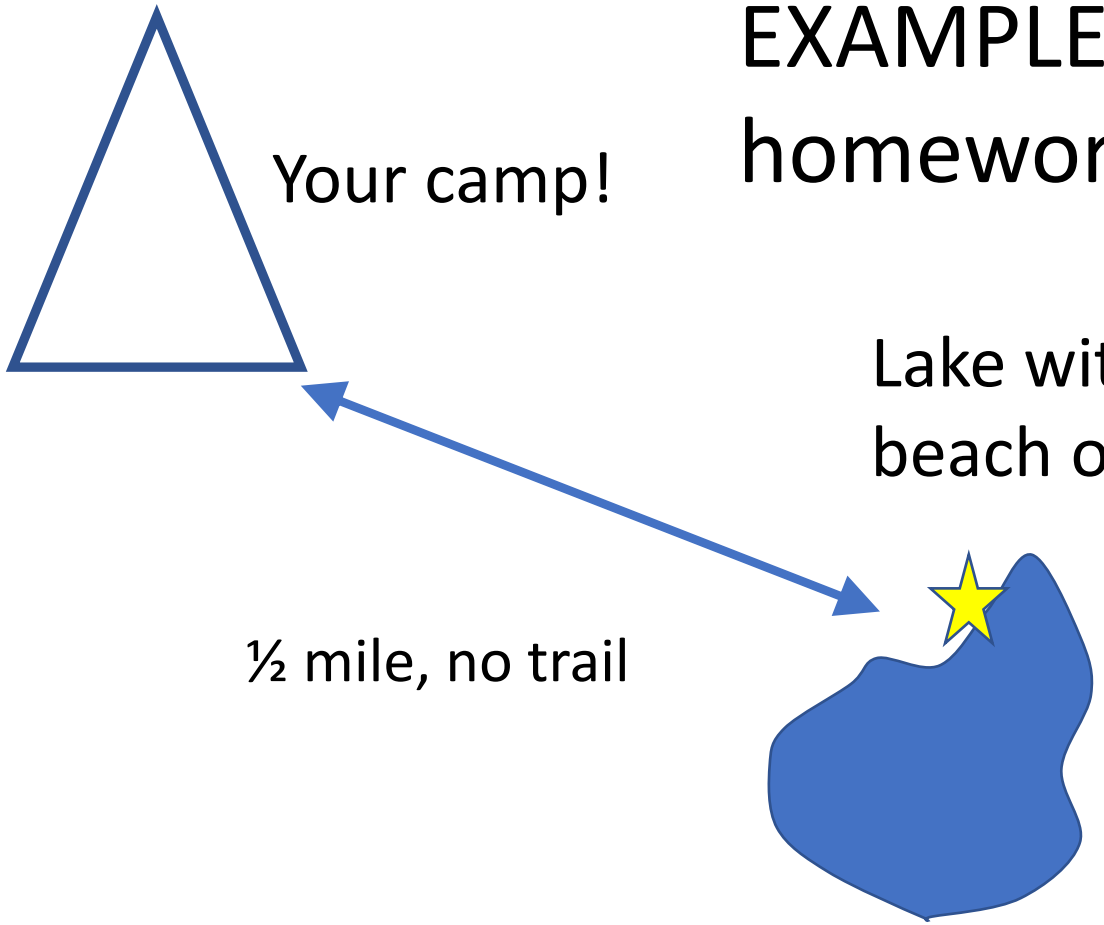
Q20. What bearing did you measure?

What are some factors which could cause your measurement to be different from this one?

How else might you use this skill in real life?

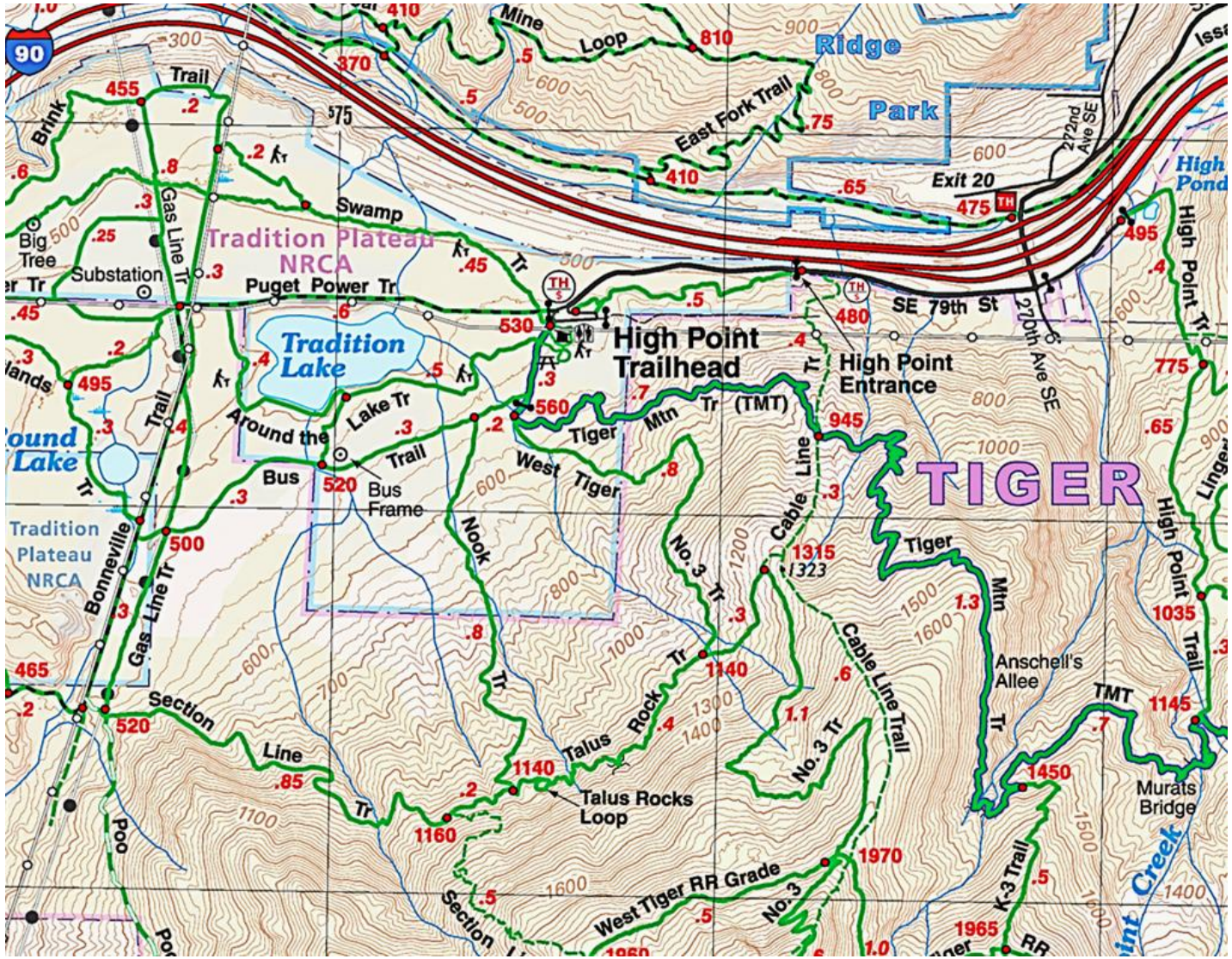


EXAMPLE (NOT in homework!)



Measuring the bearing and distance to the lake from your camp on the map allows you to plan how to get there and back and maintain the right bearing!

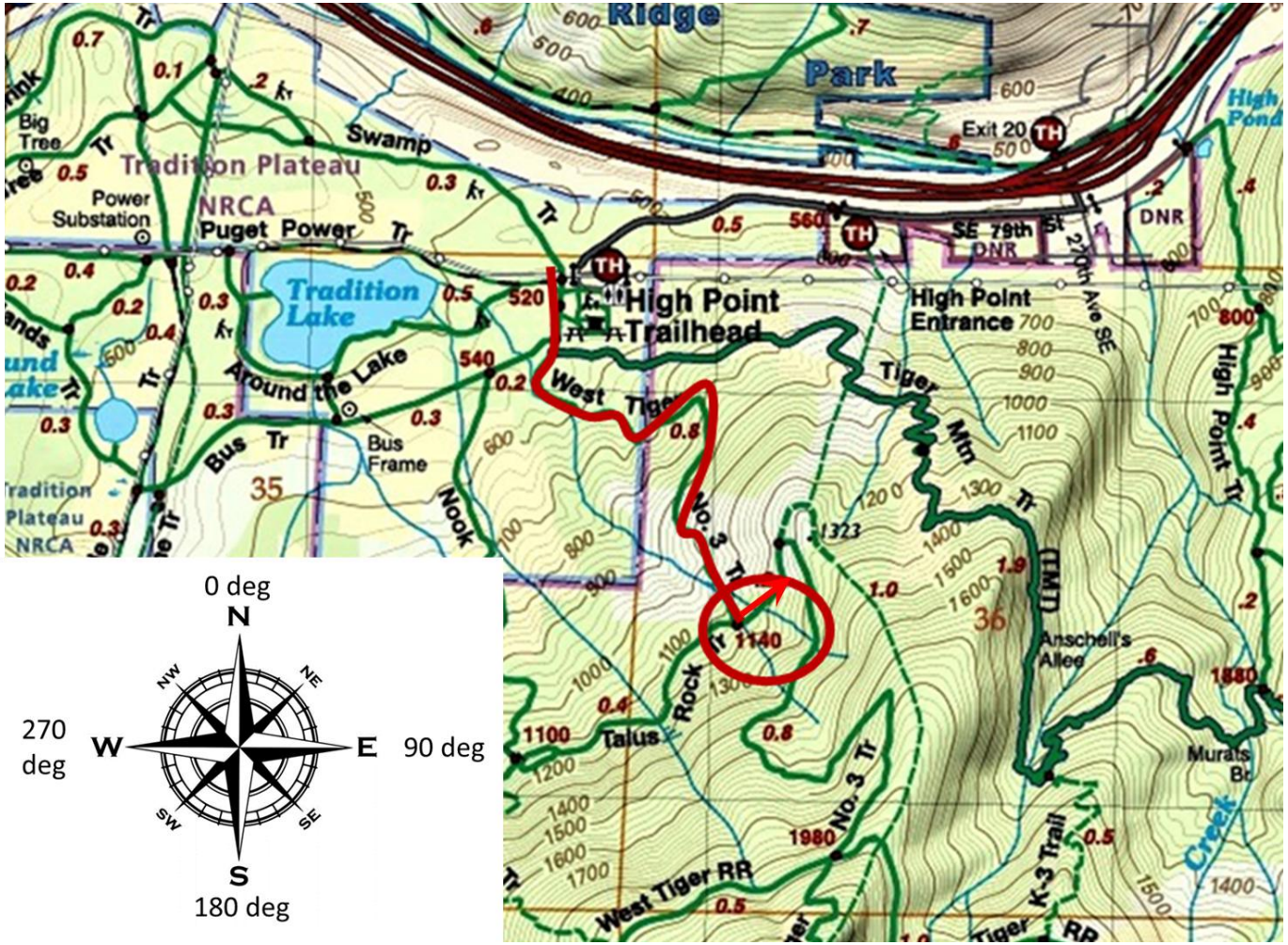
2D. Using these new skills, determine the bearing of the trail you want to be on from your map and follow it in the field.



In your prework we set up a scenario where you walked the West Tiger 3 trail a little over a mile from the High Point Trailhead, and came to an unsigned junction.

Q21. What cross-trail do you think you are standing at?

2D. Determine the bearing of the trail you want to be on from your map and follow it in the field.



Q22.1. Without using your compass, what approximate bearing should you take to stay on the West Tiger 3 trail from that junction? *(Remember that the top of your map is always at true north)*

Q22.2. Now use your compass to measure that bearing on your map. How close are you to the estimate from the previous question?

Practice following that bearing.

The index mark on your compass is now set to the bearing you got in Q22 to stay on the West Tiger 3 trail.

Remember how to put “red in the shed”? Holding the compass flat and square to your body, turn your body and the compass until the red magnetic arrow is boxed into the arrow-shaped box on your compass – now you’re facing the bearing from Q22!

Now, Keeping the compass flat and square to your body, walk forward while keeping ‘red in the shed’. This is ‘following a bearing’, in this case along the West Tiger 3 trail.

Learning Objective #3. Use a watch (elapsed time) and altimeter with a topographic map to maintain awareness of where you are on a trail.

When planning for a hike, you will want to estimate how long the hike will take and tell your contact person when you are likely to get back. To do this, you first need to know your approximate walking pace.

The following are some good starting estimates of walking pace on different kinds of trail:

- A solo hiker of average fitness on a flat trail or downhill trail: 2.5 miles per hour
- A solo hiker of average fitness on a steep uphill trail or one that is rugged: 1.5 miles per hour
- A fit individual might go ½ to 1 mile per hour faster; a group might go ½ to 1 mile per hour slower

Don't already know your approximate pace? Before the field trip, go out in your neighborhood and estimate your normal walking pace going uphill, going downhill, and on the flat. (rugged trail will be slower than a street) ***Here's how:***

3. Use a watch (elapsed time) and altimeter - continued

To calculate your walking pace:

- Use your watch to measure the time it takes you to walk a known distance.
- Divide the distance in miles by the time in hours to get miles per hour.

Q23: Say it takes you 30 minutes (.5 hours) to complete a 1.5 mile section of trail.

A. **What is your pace in miles per hour?**

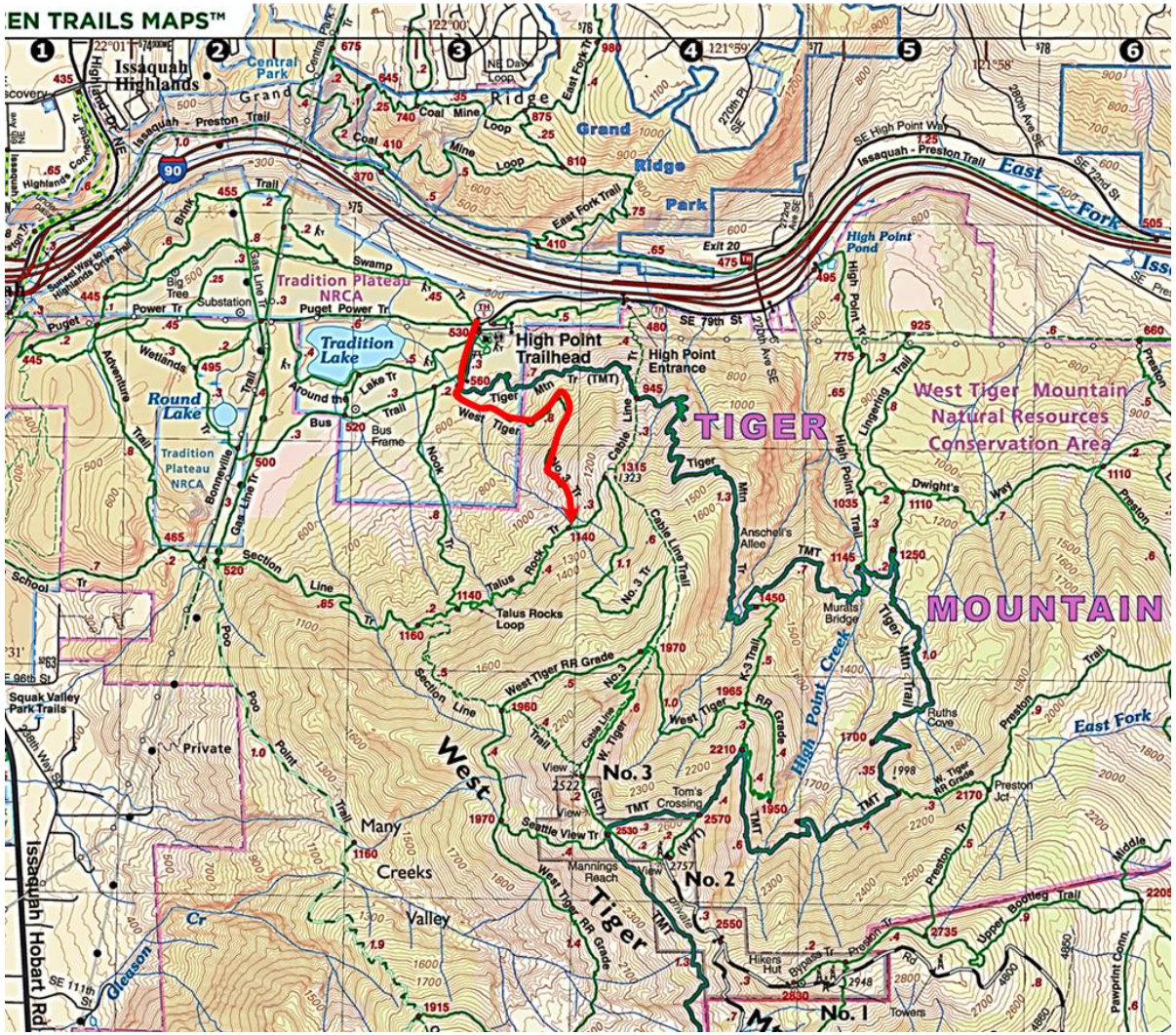
B. **How long would it take you to finish a 6 mile hike if you kept this pace?**

(Extra credit: What is your pace if it takes you 1.5 hours to go 3 miles?

3. Use a watch (elapsed time) and altimeter - continued

Now let’s learn how to make use of distance and elapsed time information to figure out where you are on a trail!

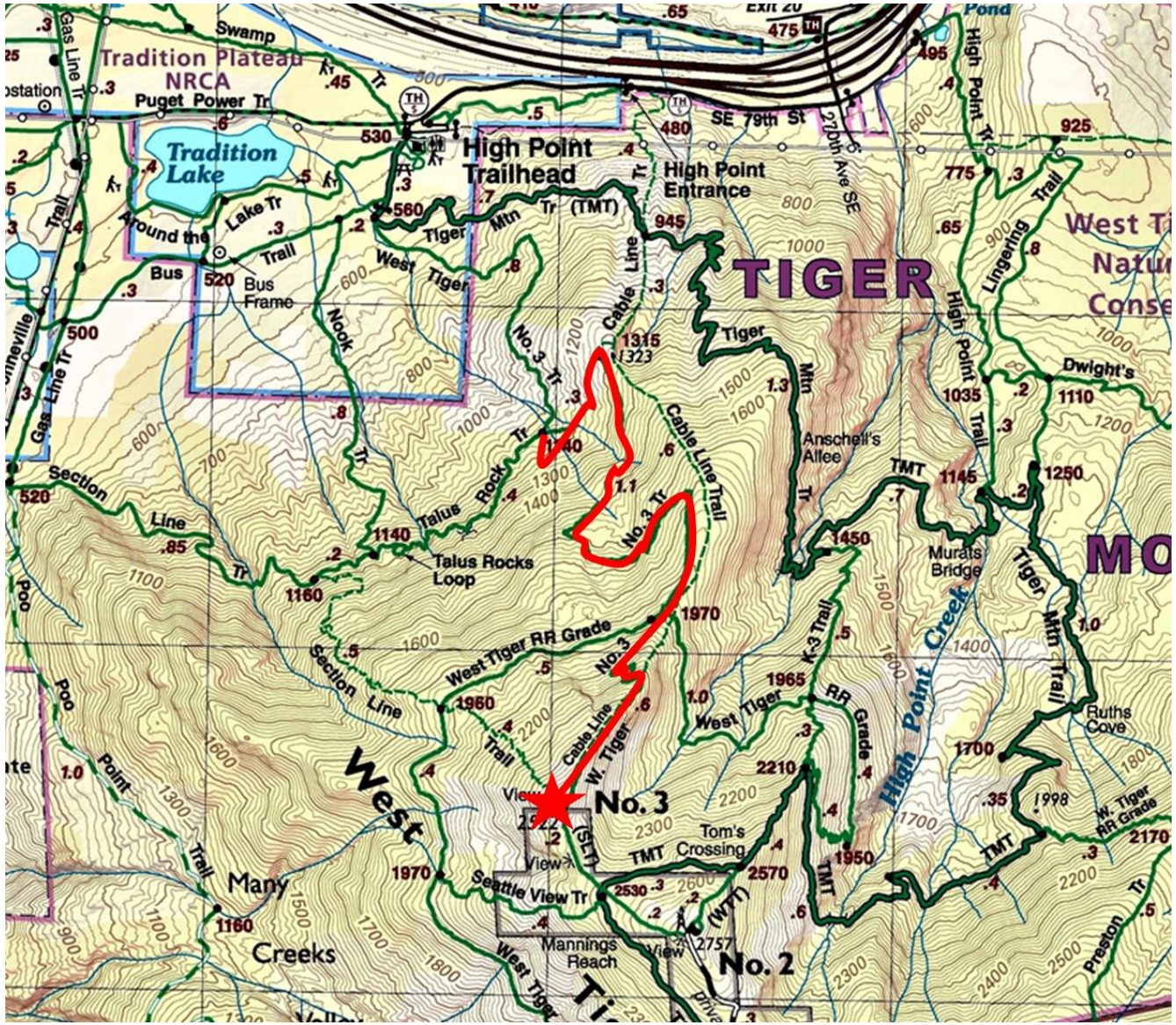
3. Use a watch (elapsed time) and altimeter - continued



In your prework you were given a situation where you started up the West Tiger 3 trail from the High Point trailhead at 9AM, and checked it again at the Talus Rock Trail junction and it read 9:30AM.

Q24. What was your walking pace over that section?

3. Use a watch (elapsed time) and altimeter - continued



Extra Credit!!

Now, if you were able to maintain the same pace from Talus Rocks trail all the way to West Tiger #3, approximately what time would you expect to get there?

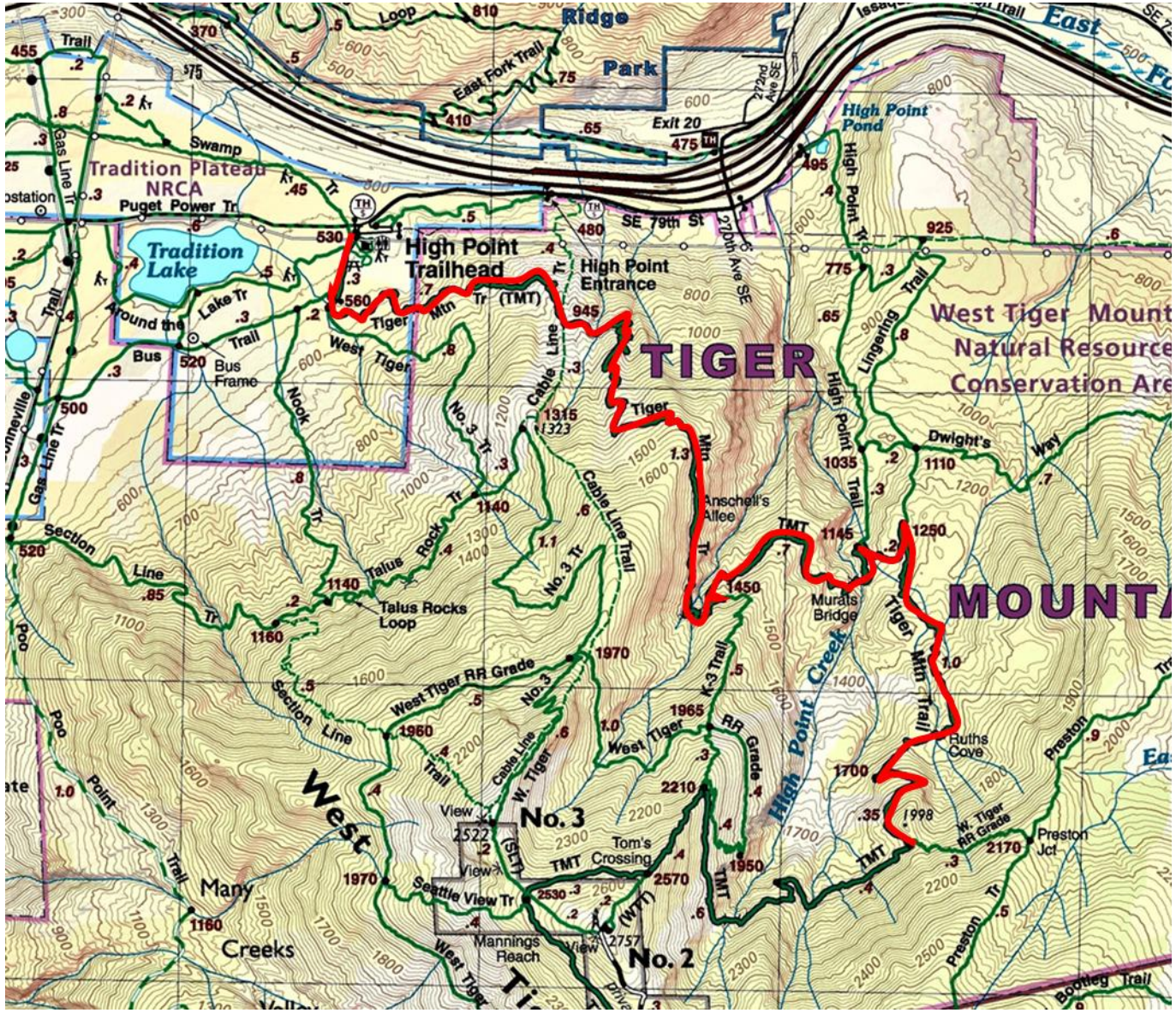
{HINT: Miles you have to go divided by Miles/hour Pace = expected hours to complete a distance}

3. Now combine the watch and altimeter info to stay found on a trail!

How?

1. Note the time and location when and where you start walking (make this a habit!)
2. After walking awhile, use an altimeter to find the elevation at your current location
3. Use the elapsed time since you started walking, along with your approximate pace, to figure out approximately how far you've walked
4. Find a location along the chosen trail on your map that most closely matches your current elevation and the distance you've walked.

Let's try out this new skill!



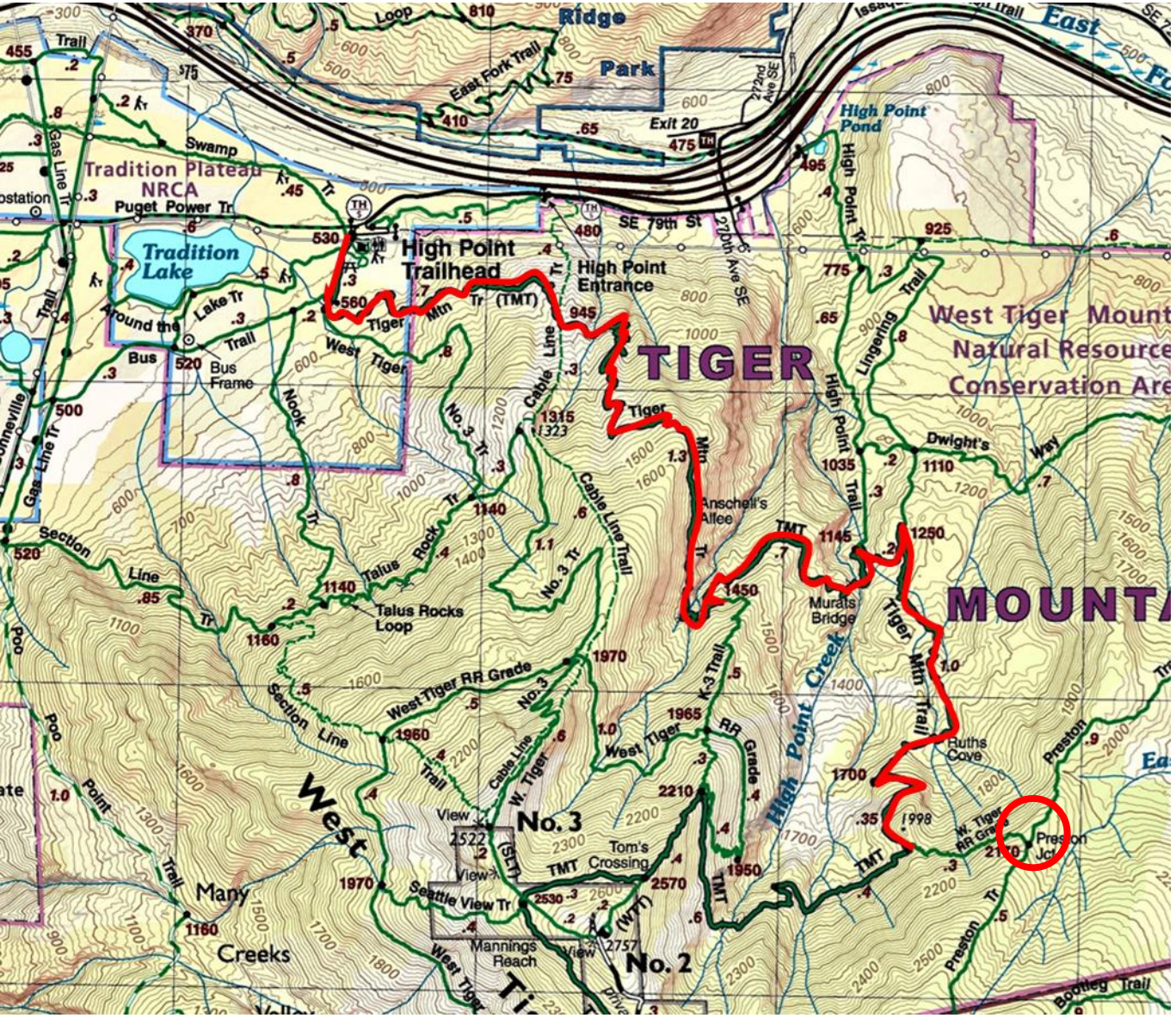
Trace the Tiger Mountain Trail (TMT) southeast from the High Point trailhead on your map, as shown.

Say you have walked an hour at your normal walking pace (~2 MPH) and wonder where you are. Your altimeter says your current elevation is 1500 feet.

Q25. Circle where you think you are on the map!

Hint: Work out how far on this trail that you would go if you walked at your normal pace for one hour. Find places where a 1500-foot contour crosses your trail – which one is about an hour from the High Point trailhead?

3. Use a watch (elapsed time) and altimeter - continued



Now say you walk a bit under an hour more and come to an unmarked junction. Your altimeter says 1960 feet.

Q26. From your map, what trail do you think you have reached?

Q27. From your position, what bearing would you follow on the West Tiger RR Grade trail to get to Preston Jct?

Q28. What bearing would you want to follow to stay on the TMT?

Next steps: Prepare for your field navigation practice session