

Direction and Distance on Nautical Charts

Learning Objectives for the first nautical chart Lab

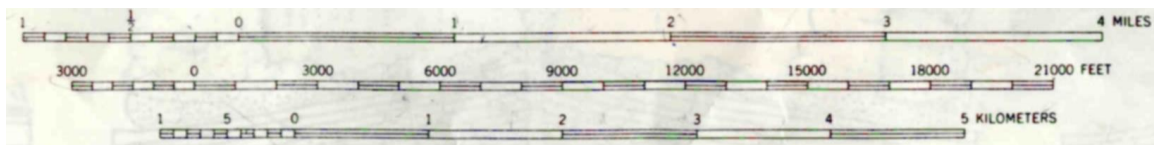
1. Use a scale to determine distance between two points on a map or chart.
2. Describe a compass direction in terms of a bearing.
3. Identify the locations of true north and magnetic north on the globe, as well as the reasons for their positions.

I Scale -- Measuring size and distance

The ratio of distance on a chart or map to actual distance on the Earth's surface is the **scale**. There are two important ways to describe the scale of a map or chart.

The first is a **fractional scale** such as 1:100,000. The number to the left of the colon refers to a distance on the map in any unit of length. The number to the right of the colon refers to the distance on Earth in that same unit of length. For example, 1:100,000 means that 1 inch on the map is equal to 100,000 inches on the surface of the Earth. Or, 1:100,000 means that 1 centimeter on the map is equal 100,000 centimeters on the Earth. Fractional scales work for any unit of measure. It is the *ratio* of distance on the map to distance on the Earth's surface.

The second is a **bar scale**. The bar scale shows graphically the length of a given unit of distance is on the map. They can be used like a ruler. The diagram below is an example of a bar scale.



Large Scale vs Small Scale.

Large scale maps show objects larger and in more detail. Small scale maps show objects smaller and in less detail. A 1:50,000 scale map is larger scale (and shows more detail) than a 1:100,000 scale map.

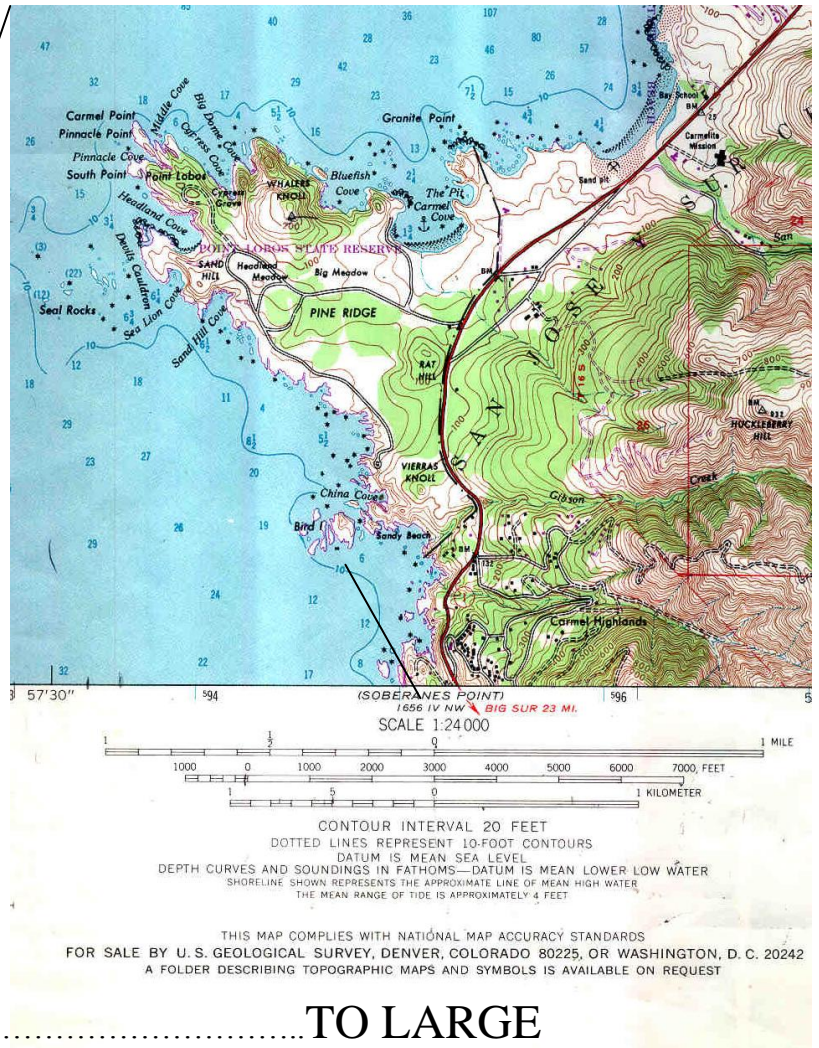
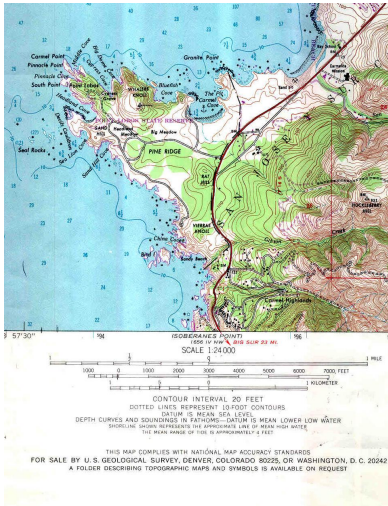
1. What is the fractional scale of the Monterey chart?

2. Find the United States map entitled “Landforms and Drainage of the 48 States” on the wall near the office door in the classroom. What is its fractional scale of this map?

4. Which of the two maps is able to show similarly sized objects in more detail?

3. Is the “Landforms and Drainage of the 48 States” larger scale or smaller scale than the Monterey Bay chart? Why? Please explain your rationale.

Original size



Enlarged from original.....**TO LARGE**

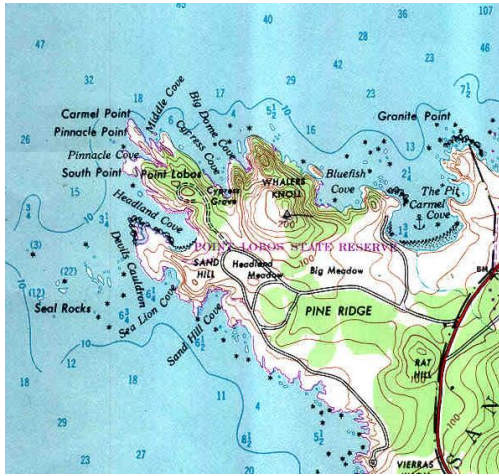
5. Assume that you've taken a map (shown on the left above) and enlarged it on a copy machine to the size shown on the right above. All the words, numbers, and images are the same on the two maps, it's just that everything is larger size on the enlarged map at right.

a. Would the bar scale, as shown on the newly enlarged map, still be accurate?

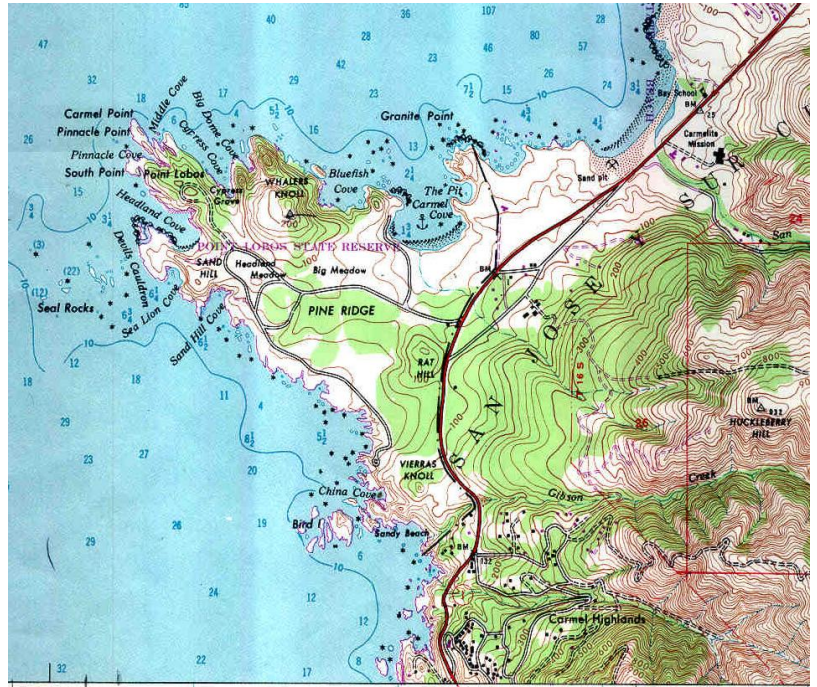
Why? Please explain your rationale.

b. Would the fractional scale, as shown on the newly enlarged map, still be accurate?

Why? Please explain your rationale



Map A



Map B

6. Are Map A and Map B the same scale? Measure some features with a ruler to verify.

Why? Please explain the rationale of your answer.

7. On the Monterey Bay Chart, how far is it, in nautical miles, from Pt Pinos to Pt Santa Cruz? Use the bar scale to estimate this distance.

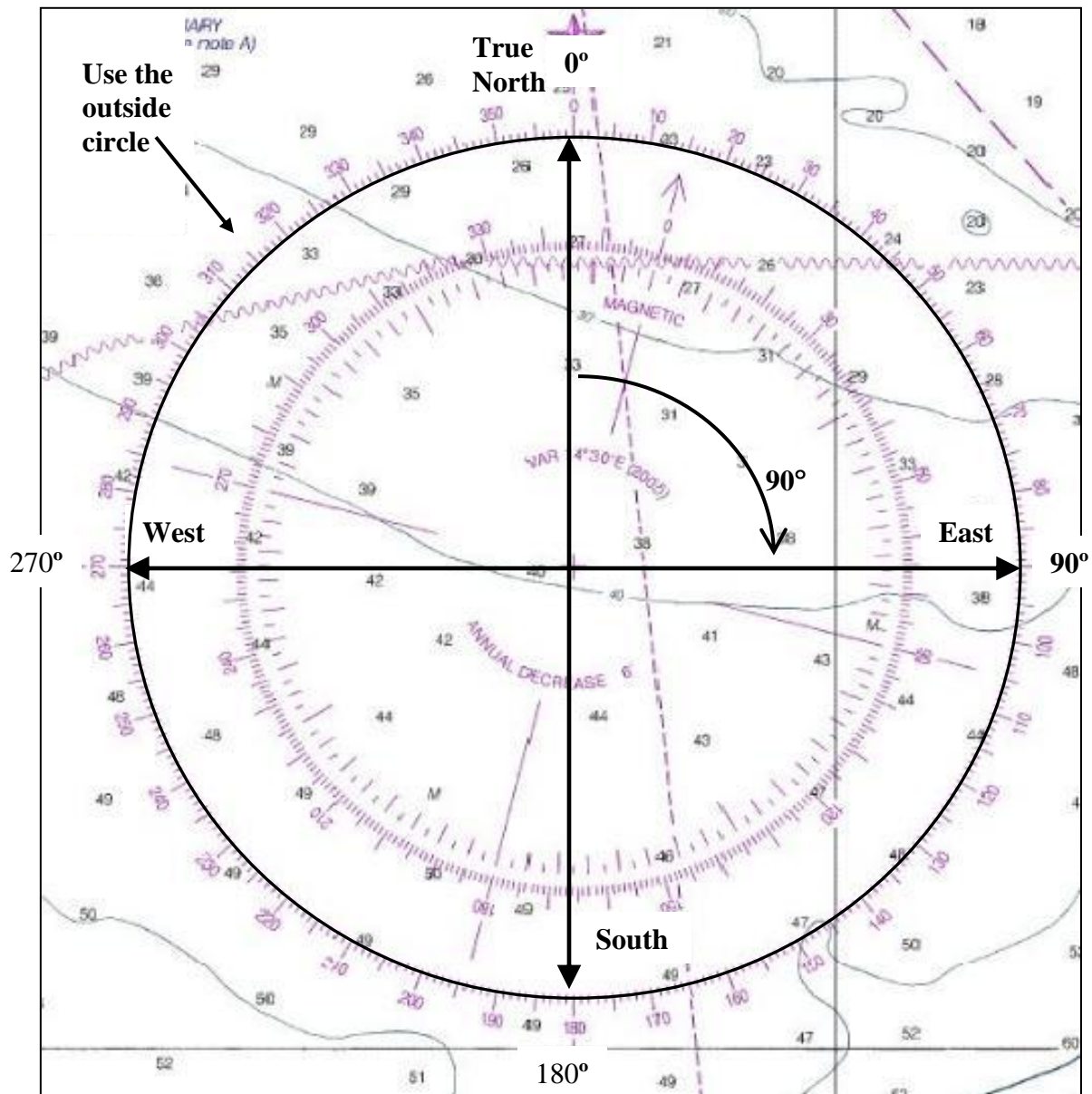
8. On the Monterey Bay Chart, how far is it, in nautical miles, from Pt Pinos to the mouth of the Salinas River?

9. On the Monterey Bay Chart, how far is it, in yards, from the northernmost rocks of Pt Joe to the northernmost rocks of Pt Pinos?

10. On the Monterey Bay chart, how far is it, in yards, from the tip of Municipal Wharf #1 to the tip of Municipal Wharf #2. Use the inset in the lower right corner of the chart for this question.

IV Direction (bearing)

In navigation, a particular direction is referred to as a **bearing**. Bearings are described as an angle measured in degrees clockwise from true north.



Compass rose diagram found on nautical charts. The compass rose is used to determine bearings. Always use the outside circle, with true north at the top, to determine bearings. A bearing of directly East, would be described as a bearing of 90° as shown on the image.

Example: What is the bearing from the Pt. Pinos lighthouse to the mouth of the Salinas River? (You should get about 42° for the answer here)

1. What is the bearing from Pt Santa Cruz to the stacks at Moss Landing?
2. What is the bearing from the stacks at Moss Landing to Lovers Point?
3. What is the bearing from Lovers Point to the stacks at Moss Landing?