Nautical Charts

Adapted from SEA (Sea Education Association) "Lights, Shoals, and Soundings" compiled and edited by Pat Harcourt and Teri Stanley http://sea.edu/academics/k12.asp?plan=lightsshoals

Logistical note: These charts are big. You may need to find a room with big tables to be able to completely spread out the charts.

Introduction:

This activity revolves around nautical training chart #1210 TR. There is a lot of new terminology involved in nautical sciences, and the first is that the tool you're using is a 'chart' not a map. Sailors get annoyed with 'landlubbers' who call their sea-tools by their 'land' names. See "Sailor Terms" for other special sailing/nautical terms. This is a special chart developed for training purposes and has a key to all the symbols used on this and all other nautical charts on the back. Because it is a training chart it should not be used for navigation purposes (which shouldn't be a problem for most of you), basically the variable information like local magnetic north, and the depths have not been updated in decades, but that is just fine for learning purposes. This is a chart of the New England area, but it is the most widely used training chart throughout the country. Actual charts used for navigation are updated every few years and are much more expensive than the training charts. If you are actually going out on a ship it is crucial that you have accurate and up to date charts when in coastal areas.

Background:

This activity relies heavily on being able to plot latitude and longitude and that club members are familiar with the degrees and minutes of latitude and longitude.

Latitude: the measurement system for the North-South position of a point on the globe. The Latitude scale runs from 90˚N at the North Pole to 0˚ at the Equator to 90˚ S at the South Pole. Southern hemisphere latitudes are often represented as negative so the South Pole could be - 90˚ N. Latitude lines are parallel to each other, but they are not a uniform length. Look at a globe and find 0˚, 45˚ and 60˚, either make a visual comparison, measure around a globe using a string at each of these latitudes, or use geometry to determine the difference in size of each of these latitude lines. Latitude is measured in degrees (°), minutes (') (60 minutes in a degree), and either seconds (") (60 seconds in a minute) or into 1/10, 1/100 of a minute, etc. depending on how exact the measurement needs to be. A nautical mile is the length of 1' (one minute) of latitude AT THE EQUATOR or one minute of longitude. 1 nm = 1.15 mi = 1.852 km
** I remember that latitude lines look like the rungs in a ladder going up the globe.

Longitude: the measurement system for East-West position. Longitude lines encircle the earth North-to-South starting with 0° at the Royal Observatory at Greenwich England and radiate West and East meeting again at 180˚ - the International Date Line in the Pacific Ocean between Fiji and the Solomon Islands. The International Date Line is the North-South line where the 12 time

zones radiating out from Greenwich meet up and when it is 12:00 AM August 8th on one side of the line, it is 12:00 AM August 9th on the other side of the line.

Longitude is linked to time and time zones, and it was very difficult to determine longitude at sea for thousands of years. Latitude could be found by measuring the angle of the sun at its highest point and using simple geometry. To determine longitude you need to know the exact time of your measurement, so before there were precise time mechanisms that could go out to sea longitude was virtually unknown when you were out to sea. This was the huge international mystery of the 1700's. Because shipping was the main mode of transportation of people and goods there was a huge prize awarded to the person who developed the chronometer. Dava Sobel chronicles the story of the quest for accurate time out at sea in the book *Longitude*. We will be giving it out at the winter workshop.

Lines of longitude are all the same length, but are not parallel to each other. Like degrees of latitude, degrees of longitude are broken into minutes and tenths of minutes.
** I remember that lines of longitude are LONG.

To make sure that club members are somewhat familiar with plotting a point on a chart (or map) a section of the chart is on an overhead sheet so you can demonstrate how to do this.

Materials:
(materials provided by SMILE in bold)
Training Chart #1210TR (5 per club, for teams of 4)
Overhead of a section of the chart
Straightedge
Compasses (2 per team)
Protractors (2 per team)
Pencils

Procedure:
1. Split club members into teams of 4 per training chart.

2. Pass out charts and give teams time to look at the chart and the symbols on the back.

3. Go over the basics of orienting to the chart:
   - Place chart so that North is pointing up
   - Identify the area that the chart covers
   - Determine the scale
   - Are depths at high or low tide

4. Pass out activities and have teams work through the problems. If your club members get into navigation, or you want to do more vector addition and subtraction problems, there are books of navigation exercises.

Here are a couple of resources:

Onboard Navigation Exercise Book
by David Burch
Paperback, 42 pages, coil bound, 8.5" x 11", (Starpath, 2005, Seattle)

SMILE Teachers Workshop
August 2006
Nautical Charts

Discounts are available to schools and organizations for multiple purchases.
$24.95
http://www.starpath.com/catalog/books/1930m.htm

Navigation Exercises
by Colin Jones
Synopses & Reviews
Publisher Comments:
Colin Jones. Provides clear and illustrated information on all the most essential areas of owning and sailing a boat. Topics covered include chartwork, collision regulations, compass, tides, cruise planning and electronics.