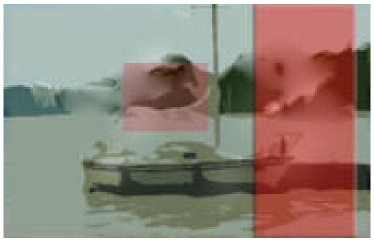


BANANA WIND

www.BananaWind.us

The sea is the same as it has been since before men ever went on it in boats. - Ernest Hemingway

Seaman's Eye

With all the charts, gadgets, and electronic devices onboard, sometimes the most valuable asset is a well trained eye.

1. **Estimating Angles**

   It is not always necessary to take a bearing of an object using a hand-bearing compass. Often it is enough to estimate the angle by "eyeing" it across the binnacle compass. You can also use the bow of the boat (as 12 o'clock) and mentally measure the angle in relation to the bow.

2. **Lines of Positions**

   Lines of positions with objects on shore and the edges of islands are often all you need to successfully navigate short distances.

3. **Open Ranges**

   Your hand, extended out at arm's length , is often enough to measure the angle of a range.

   Extend the hand with the palm facing outward and use the width of your fingers to measure the lateral angle from an object.

   Index finger = 2 degrees

   Index and middle fingers = 4 degrees

   Index, middle and ring fingers = 6 degrees

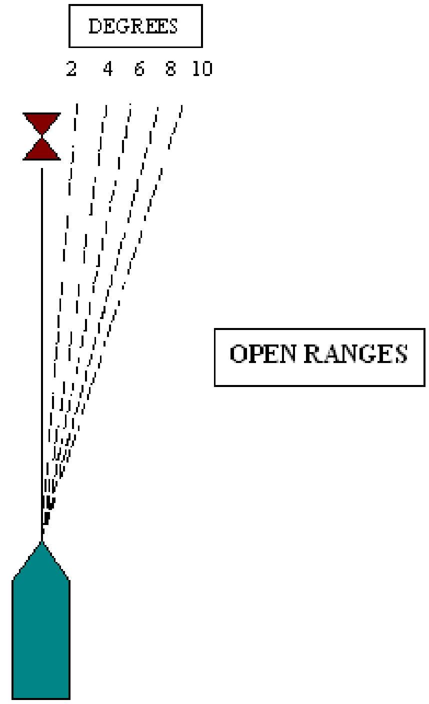
   Index, middle, ring and little fingers = 8 degrees

   All fingers and thumb = 10 degrees

Fist = 12 degrees

Hand with extended thumb = 15 degrees

Standing on deck and using the width of your fingers, you can measure the range angle that you will need to steer clear of a buoy or some obstruction.



Three Finger Rule

Similar to using your fingers to determine the angle of a range, you can also use the width of your fingers to determine the height of a charted object on shore (e.g. a lighthouse), and then use the angle and height of the object to determine your distance from the object.

An object makes a 6 degree vertical angle at a distance 10 times its height.

4.

1 1/2 fingers (3 degrees): Distance = 20 X height of an object

3 fingers (6 degrees): Distance = 10 X height of an object

6 fingers or fist (12 degrees): Distance = 5 X height of an object

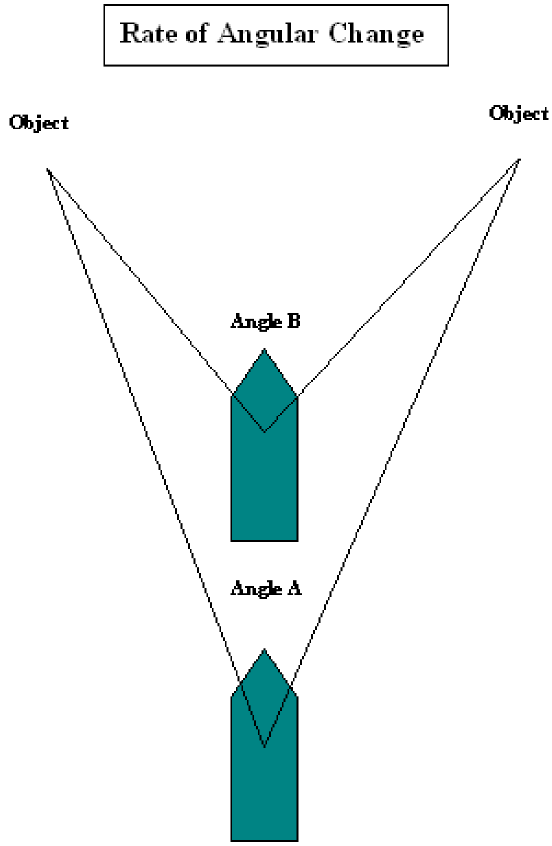
Rate of Angular Change

The angle between two stationary objects increases as you get closer to the objects.

This is helpful at night when it is difficult to determine if you are approaching or moving away from lights on a shore.

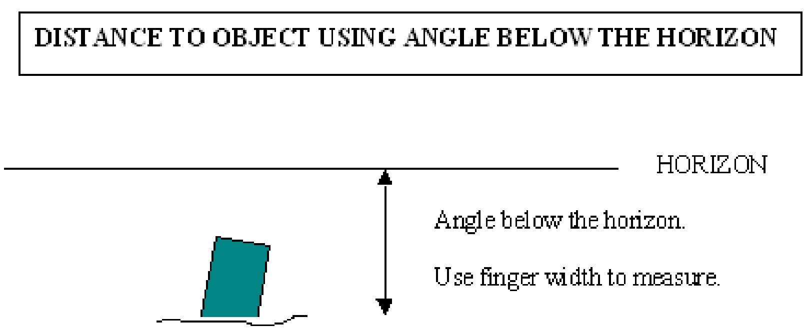
In the example to the right, angle B is larger than angle A.

5.



Vertical Angle Below the Horizon

6. You can determine the distance to an object in the water by measuring the vertical angle below the horizon. You can use your fingers to measure the angle, but you must also know how high you sit above the waterline (i.e. height of eye)



The following figures are for a height of eye 6 feet and 12 feet.

Height of eye = 6 feet

Height of eye = 12 feet

Angle	Distance
2.3 degrees	50 yards
1.1 degrees	100 yards
.5 degrees	150 yards
.25 degrees	200 yards

Angle	Distance
4.5 degrees	50 yards
2.2 degrees	100 yards
1.5 degrees	150 yards
1 degrees	200 yards
.75 degrees	250 yards
.5 degrees	300 yards

7.

Sketches

When sailing from a port to which you plan to return, it is always a good idea to look behind you at regular intervals to get a perspective of what things should look like upon your return.

It is also a good idea to sketch shapes of islands at difference distances and directions. You will then be able to use these sketches to refresh your memory and use these islands as landmarks.

8.

Buildings on Shore

Within 3 miles of shore, you can see the windows in buildings. When beyond 3 miles, you can only see the outlines of buildings.

9.

Distance to the Horizon

Nautical miles = 1.144 X square root of the height of eye (in feet) above the waterline.

Statute miles = 1.5 X square root of the height of eye (in feet) above the waterline.

10.

Distance by Color

Islands closer to the observer are darker in color. Islands farther away are lighter in color.

Trees are darker and more vivid on closer islands.

Differences in color are more

noticeable on hazy days.

Departure Fix

11. Take a good departure fix when leaving a port (either electronic or manual).

It is this departure fix from which you will relate the rest of the voyage.

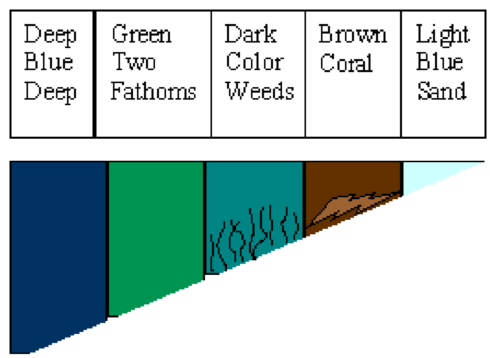
Depth by Water Color

In the tropics, light color means thin (shallow) water, and dark blue means deep water. (This rule cannot be used with dark mud bottoms.)

12.

Determining water depth works best in bright sunshine.

You need a high sun and polarized or dark gray sunglasses.



Night Vision

It takes 15 minutes for the eyes to totally adjust to the dark. A red light (such as a "stop light" used in photography) does not cause night blindness.

13. Red or green buoy lights are visible at 4 - 5 nautical miles at night.

White buoy lights are visible slightly farther than 4 - 5 nautical miles at night.

Lights from a lighted buoy are discernable at only 2 - 3 nautical miles during the day. (The buoy itself is normally visible in the day long before the light can be discerned.)

Maximum Range for Seeing Lighthouse on the Horizon

1. Calculate distance to horizon for lighthouse (1.144 X square root of lighthouse height in feet.)

2. Calculate distance to horizon for the boat (1.144 X square root of height of eye of observer in feet.)

3. Add the two distances.

This is the maximum distance (in nautical miles) at which you can first see the lighthouse over the horizon.

14.

Example: If the height of eye is 9 feet standing on the boat, when will and 81 foot tower appear on the horizon?

Distance to horizon (in nautical miles) = 1.15 x square root of height of eye. (Using 1.15 instead of actual 1.144 to simplify the calculation.)

1.15 x square root of 81 = 10.35 nautical miles.

1.15 x square root of 9 = 3.45 nautical miles.

10.35 + 3.45 = 13.8 nautical miles (distance when the tower first appears on the horizon).

Binoculars

15.

7X (power) binoculars are the maximum for use on a boat (due to the motion of the boat), but 6X (power) binoculars are better.

For night use, the objective lens should be at least five times the power. (e.g. 6X binoculars should have an objective lens of 30 mm for night use.)

16.

Rule of Sixty

To clear an object by a fraction of the range to an object, use an angle equal to the same fraction of 60 degrees.

For example: If you are 20 yards (range) from a buoy, and you wish to clear the buoy by 10 yards (1/2 the range), you would steer 30 degrees from the buoy (1/2 x 60 degrees)

1/2 X 60 degrees = 30 degrees

1/3 X 60 degrees = 20 degrees

1/4 X 60 degrees = 15 degrees

1/5 X 60 degrees = 12 degrees

1/6 X 60 degrees = 10 degrees

Computing Boat Speed

1. Wood Chip Method

Drop floating wood chips off the bow and record the time it takes them to reach the stern.

Use the formula: Length of boat (in feet) ÷ recorded time of the wood chips (in seconds) X 0.5925 knots (0.5925 knots = 1 foot/second) = boat speed in knots.

Example:

A floating chip takes 5 seconds to reach the stern of a 60 foot boat.

60 ÷ 5 X 0.5925 = 7 knots

Take several readings and calculate an average to get a more accurate boat speed.

2. Distance-Time Angular Method

17.

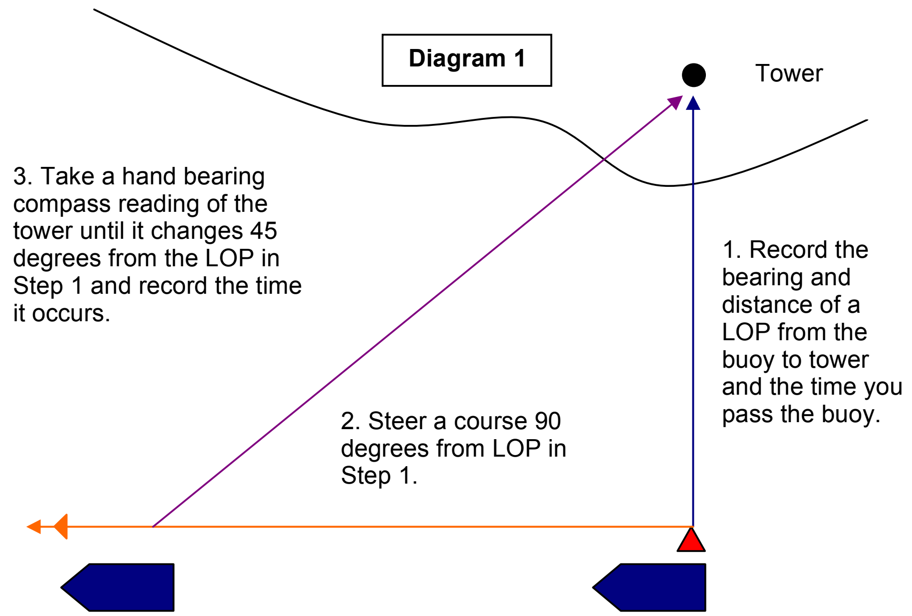


Diagram 1:

1. Identify a landmark (e.g. a tower) on the chart visible from the water and a charted buoy or island.
2. Draw a line of position (LOP) from the buoy to the tower and record the bearing using a chart protractor or the compass rose on the chart. Also record the distance in nautical miles from the buoy to the tower.
3. Determine a course-to-steer bearing that will enable you to sail 90 degrees from the LOP bearing determined in Step 2. (Sailboats would have to adjust for leeway—see Basic Navigation.)
4. Sail by the buoy as close as possible and record the time your hand-bearing compass reading of the tower matches what you recorded from the chart in Step 2.
5. Continue sailing on the course determined in Step 3 while taking a hand-bearing compass reading of the tower.
6. When the hand-bearing compass reading of the tower changes by 45 degrees from the LOP bearing determined in Step 2, record the time.
7. Determine the time in minutes it took for the bearing to change 45 degrees (i.e. Step 6 time minus Step 4 time).

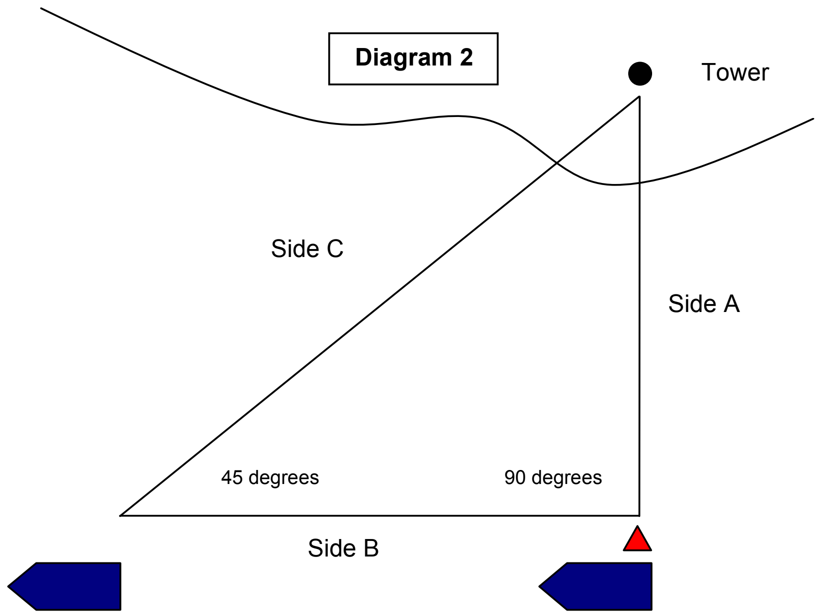


Diagram 2:

You have created a right triangle with Side A being the distance from the buoy to the tower and Side B being the distance you traveled until the angle forming Side C became 45 degrees. Since it is a right triangle, Side A = Side B; therefore, you already know the distance you traveled (i.e. Side B) from the chart measurements in Step 1 (i.e. Side A). With that information and the time in minutes it took you to traverse Side B, you can calculate your speed using the following formula:

Speed in knots = [(Distance of Side A in nautical miles) X (60 minutes)] ÷ (Minutes to travel Side B)

Example:

The distance from an island to a coastal tower shown on a chart is 2 nautical miles. You draw a LOP from the island to the tower, measure the distance, and determine a course setting 90 degrees from the LOP. You sail as close to the island as possible on your determine course and take your readings. The time it takes you to travel to the 45 degree change reading is 30 minutes. How fast were you traveling?

[(2 nautical miles) X (60 minutes)] ÷ (30 minutes) = 4 nautical miles per hour or 4 knots

3. Tennis Ball Method (Source: *The Complete Sailor*)

- Tie 51 feet of ¼ inch nylon braided line to a tennis ball and cleat the loose end off at the stern.
- Toss the ball overboard ahead of the stern cleat.
- Record the time it takes the 50 foot cord (51 feet - 1 foot for cleating and angle compensation) to become taut.
- Take multiple readings to ensure accuracy.
- Use the table below to determine boat speed.

TIME	KNOTS	MPH	KMPH
30 seconds	1	1.1	1.8
15 seconds	2	2.3	3.7
10 seconds	3	3.5	5.5
7.5 seconds	4	4.6	7.4
6 seconds	5	5.8	9.2
5 seconds	6	6.9	11.0
4.25 seconds	7	8.1	12.9

3.75 seconds	8	9.2	14.7

Clouds

18. Stationary clouds form over mountainous islands during the day.

They can be a sign of land.

Low level cumulus clouds form above and inland from a beach on a warm sunny day with an onshore breeze.

Birds

19. Land birds fly away from land during the day.

Land birds fly toward land in the evening.

Potato Navigation

20. When in fog, throw potatoes from the bow every 30 seconds.

A splash indicates that everything is clear.

A thud indicates you are too close to land or some obstruction.

Distance to a Storm

21. In nautical miles = Number of seconds between lightning & thunder ÷ 5.5

In statute miles = Number of seconds between lightning & thunder ÷ 5

Top of page

---

www.BananaWind.us

1397