

certificate of a lower grade must prove that he has served twelve months in the foreign trade, or eighteen months in the home or coasting trade, in a square-rigged sailing-vessel.

**29. Value of Ordinary Certificate.**—Ordinary certificates will entitle the holders to go to sea as mates or masters of any vessel, sailing or steam.

*Second Mate, Ordinary.*

**30. Second Mate, Ordinary.**—A candidate must be not less than eighteen years of age, and must have served four years at sea.

**31. Examination in Navigation.**—A candidate for a second mate's certificate will be required—

- (a.) To write a legible hand and spell correctly. For the purpose of testing his ability the candidate will be required to write a short essay on some suitable subject.
- (b.) To show a competent knowledge of the first five rules of arithmetic and the use of logarithms.
- (c.) To answer questions on elementary plane trigonometry.
- (d.) To work a day's work complete, correcting the courses for leeway, deviation, and variation.
- (e.) To find the latitude by the meridian altitude of the sun.
- (f.) To work any practical problem in parallel sailing.
- (g.) To find the true course and distance from one given position to another by Mercator's method; also the compass course, the variation and deviation being given.
- (h.) To find the true amplitude of the sun, and the error of the compass therefrom; also the deviation, the variation being given.
- (i.) To find the longitude by chronometer from altitude of the sun by the usual methods, computing the daily rate of chronometer from errors observed when required; also to find the true azimuth of the sun, and the error of the compass; and the deviation, the variation being given.
- (j.) To find the true azimuth of the sun by Time Azimuth Tables; the error of the compass; also the deviation, the variation being given. (NOTE.—The candidate will be required to give a figure and explanation for each problem worked, and give a written explanation of any of the terms used in navigation or nautical astronomy that may be asked.)
- (k.) To find on a chart or plan the course or courses to steer, and the distance or distances from one given position to another; to find the ship's position, together with the set and drift (if any), on the chart or plan from cross-bearings of two objects; to find the ship's position from two bearings of the same or different objects, the course and distance run between taking the bearings being given, making due allowance for a given tide or current; also the distance of the ship from the object or any given position at the time of taking the second bearing; to find on a chart or plan the course to steer by compass in order to counteract the effect of a given tide or current, and find the distance the ship will make good towards a given point in a given time; to fix a ship's position on a chart or plan by horizontal sextant angles, using a station-pointer; and to work out practically the correction to apply to soundings taken at a given time and place to compare with the depth marked on the chart; and to give a method of finding approximately the time of high water at any given place without the aid of the Admiralty or other Tide Tables.

He will be examined orally in the following subjects:—

- (l.) The Morse and British movable semaphore alphabets, the International Code of Signals, and the British Signal Manual. He will be required to attain a minimum speed of eight words a minute in semaphore, and five words a minute in Morse flashing and flag-waving.
- (m.) The use and adjustments of the sextant, read off and on the arc, and the mode of finding the index error by both horizon and sun.
- (n.) The construction, use, and principle of the barometer, thermometer, and hydrometer; also the use and care of a chronometer.
- (o.) Weights and measures.
- (p.) The markings, signs, and abbreviations on the Admiralty charts or plans.