the sun's bearing by compass N. 35° E., time by a chronometer (27th April) 22 h. 29 m. 36 s., which was slow for mean noon at Greenwich, 4th March, 1925, 4 m. 44·8 s., and losing 2·3 s. daily. The latitude by meridian altitude at noon being 40° 31′ S., the ship having run 033°, 37 m., between the time of taking the observation for longitude and noon.

Required—The longitude by chronometer at the time of taking the observation; also brought up to noon.

Required also the true alt.-azimuth and error of the compass; and, supposing the variation to be 13° 30′ E., required the deviation of the compass for the direction of the ship's head.

2. Required the true course and distance from B to H, by calculation on Mercator's principle; also the compass course, assuming the variation to be 20° W., and deviation of the compass 27° 30′ E. Lat. of B, 46° 45′ N.; long. 53° 00′ W. Lat. of H, 34° 22′ S.; long. 18° 29′ E.

3. On 21st August, 1925, the observed meridian altitude of the star α Pavonis was 35° 57′, south of the observer, height of eye 28 ft., and index error 3′ 00″ to subtract.

Required—The latitude.

4. On 21st August, 1925, in lat. by account 2° 35′ S. and long. 52° 45′ E., compute the approximate observed meridian altitude of α Aquilæ (Altair), as a guide to setting the sextant for observation, height of eye 28 ft., and index error of sextant 3′ 00″ to subtract.

5. Supposing you are not familiar with the stars and wish to take an observation, find the names (from the Nautical Almanac) of the stars, not less bright than the second magnitude, that will be within half an hour east of your meridian, above the Pole and above the horizon, at about 04 h. 10 m., apparent time at ship, on 17th December, 1925, in lat. 40° 20′ N. and long. 5° 30′ E.

Required also approximately the hour angle of each of the stars, and state also whether they will be to the north or south of your zenith when passing the meridian.

6. Define the terms "zenith," "nadir," and "prime vertical."

2. NAUTICAL ASTRONOMY AND TRIGONOMETRY.

Time allowed 2 hours.

Draw suitable figures and give necessary description for each problem.

1. On 15th May, 1925, at ship, being in lat. by account 4° S., long 85° W., required the approximate apparent time at ship when the star α Boötis (Arcturus) would be on the meridian.

2. On 10th May, 1925, in lat. by account 43° 13′ S., long. 136° 19′ E., the observed altitude of the sun's L.L., near the meridian, was 28° 33′, north of the observer, height of eye 24 ft., time by a chronometer 02 h. 18 m. 14 s., which was 2 m. 02·3 s. slow of mean time at Greenwich.

Required—The latitude of the ship at the time of taking the observation; also required the latitude at noon, the ship having run 031°, 7 m., between the time of taking the observation and noon.

3. Two ships, A and B, steam from positions 13½ m. apart, North 15 knots and East 18 knots, respectively. Find the bearing and distance of A from B one hour later, supposing that B bore N. 36° W. from A at the commencement of the run.

4. Draw a figure and prove that $\tan A = \frac{\sec A \cos A}{\cot A}$

3. DOUBLE ALTITUDE (POSITION LINES) PROBLEM.

Time allowed 2 hours.

Draw a suitable figure and give the necessary description for this problem.

On 27th January, 1925, a.m. at ship, in lat. by account 46° 50′ N., long. by account 151° 30′ E., when a chronometer (corrected) indicated mean time at Greenwich (26th January) 23 h. 42 m. 21 s., the observed altitude of the sun's L.L. was 17° 19′, and again p.m. on the same day, when the same chronometer (corrected) indicated 03 h. 15 m. 07 s., the observed altitude of the sun's L.L. was 22° 54′, height of eye at