equal altitudes of the sun were taken on an artificial horizon when the corresponding times by chronometer were 25d. 6h. 31m. 20s. and 25d. 12h. 30m. 35s. Required the error of the chronometer on ap. and mean time at place, and also its error on G. m. t.

168. Supposing the wind at S.W. and a ship beating to windward, runs on her port tacks 220 miles and then on her starboard tacks 225 miles, and now finds she has made 160 miles directly to windward. Required the courses steered on each tack, and how near the wind did the ship lie.

169. May 1st, 1858, the meridian altitude of the star Deneb (a cignus) below the pole is 12° 40′ the eye 18 feet—index error + 3′ 12″. Required the latitude.

170. Nov. 4, 1858, lat. 0° long. 177° 30′ W. the observed alt. ☉ 14° 18′ at 5h. ap. time at ship—the magnetic azimuth of the sun's centre was S. 74° 7′ W. Index error—1′ 20″, eye 19 feet. Required the variation of the compass.

171 Required the arithmetical compliment of the log, corresponding to the decimal number. 87694.

172. April 3, 1858, in lat. 5° 36′ S. about half past four A.M., at ship. Several sets of altitudes and distances of the moon and Spica were taken, of which the means were—observed alt. moon's l.l. 63° 45′, observed alt. of spica, (west of meridian) 30° 19′ 41″, observed distance between star and moon's nearest limb 32° 32′ 0″, mean of times by chronometer, corrected for error and rate—2d. 18h. 15m. 49s. the eye 22 feet, index error + 1′ 20″. Required the error of the chronometer on G. m. t. and the longitude.

173. July 21, 1858, in lat. by account, 12° 28′ S. and long. 20° 10′ W. the observed alt. ☉ near the meridian was 56° 30′ 40″ when 21d. 1h. 48m. 54. were shewn by a chronometer corrected for error and rate, the eye 16 feet. Index error—3′ 2″. Required the true latitude.