
Q135 - Navigation Problems: Oceans

1. 0' off the arc, and your height of eye is 48 feet. What is the latitude at meridian transit?

- 20°08.2'N
- **19°58.0'N**
- 19°53.2'N
- 19°50.6'N

Note:
The latitude at meridian transit is calculated using the formula Lat = 90 - Ho ± Dec, where Ho is the observed altitude and Dec is the Sun's declination. Correct application of index correction, dip correction for the height of eye, and the meridian-passage relation yields a latitude of 1958.0'N.

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2. What is a characteristic of a rhumb line?

- **It cuts each meridian at the same angle.**
- It is the shortest distance between two points on the Earth.
- The course angle constantly changes to form the loxodromic curve.
- It plots as a straight line on a Lambert conformal chart.

Note:
A rhumb line is defined as a line that intersects all meridians at a constant angle, maintaining a constant compass course.

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3. You are on course 222°T and take a relative bearing of a lighthouse of 025°. What is the true bearing to the lighthouse?

- **247°**
- 197°
- 315°
- 335°

Note:
The true bearing to the lighthouse is calculated by adding the relative bearing to the true course: 222T + 025 = 247T. This formula converts a relative bearing, measured from the ship's bow, into a true bearing, accounting for the ship's current heading.

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4. What defines a great circle?

- A curved line drawn on a Mercator Chart
- A course line that inscribes a loxodromic curve
- The smallest circle that can be drawn on the face of a sphere
- **The intersection of a plane passing through the center of a sphere.**

Note:
A great circle is defined as the intersection of a plane passing through the center of a sphere.

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5. The difference of latitude (l) between the geographic position (GP) of a celestial body and your position, at the time of upper transit, is represented by _____.

- altitude
- colatitude
- **zenith distance**
- codistance

Note:
At upper transit, the difference of latitude between an observer and a celestial body's geographic position equals the zenith distance, as both represent the arc along the same meridian.

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6. What is the difference in local time between an observer on 114°W and one on 119°W?

- 1.25 minutes
- 5 minutes
- **20 minutes**
- 75 minutes

Note:
A 5 difference in longitude corresponds to a 20-minute difference in local time, as each degree of longitude represents 4 minutes of time.

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7. The distance between any two meridians measured along a parallel of latitude and expressed in miles is the _____.

- **departure**
- difference in longitude
- meridian angle
- mid-longitude

Note:
Departure is the distance between two meridians measured along a parallel of latitude. It represents an east-west distance, is measured along a line of constant latitude, and is expressed in nautical miles, aligning with the question's description.

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8. What is the equivalent of 4°36' in time units?

- 9 min. 12 sec.
- 14 min. 36 sec.
- 15 min. 36 sec.
- **18 min. 24 sec.**

Note:
*436' is equivalent to 18 minutes 24 seconds because 1 of longitude represents 4 minutes of time and 1' of longitude represents 4 seconds of time; the degrees are converted to minutes (4 * 4 min/ = 16 min) and the minutes are converted to seconds (36' * 4 sec/' = 144 sec = 2 min 24 sec), which are then summed (16 min + 2 min 24 sec = 18 min 24 sec).*

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9. Except for N-S courses, and E-W courses on the equator, a great circle track between two points, when compared to a rhumb line track between the same two points, will _____.

- be nearer to the pole or the equator depending on the latitudes of the arrival and departure positions
- always be nearer to the equator
- be nearer to the pole in the Northern Hemisphere and nearer to the equator in the Southern Hemisphere
- **always be nearer to the elevated pole**

Note:
A great circle track, excluding meridian or equatorial routes, always lies nearer the elevated pole than a rhumb line track between the same points.

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10. Which of the four adjustable errors in the sextant is the principle cause of index error?

- Horizon glass not being perpendicular to the frame
- **Index mirror and horizon glass not being parallel**
- Index mirror not being perpendicular to the frame
- Telescope not being parallel to the frame

Note:
Index error results from the index mirror and horizon glass not being parallel when the sextant reads zero. This misalignment causes a displacement of the reflected image relative to the direct image, defining index error and distinguishing it from side error, index-mirror error, and collimation error.
