

## Great Circle Sailing Problems

### Great Circle Initial Course and/or Distance

GRC B1. Determine the great circle initial course from  $29^{\circ} 46'S$ ,  $30^{\circ} 26'E$ , to  $31^{\circ} 52'S$ ,  $115^{\circ} 22'E$ .

- a)  $074^{\circ} T$
- b)  $113^{\circ} T$
- c)  **$117^{\circ} T$  - correct**
- d)  $121^{\circ} T$

GRC B2. Determine the great circle initial course from  $07^{\circ} 05'N$ ,  $81^{\circ} 45'W$ , to  $21^{\circ} 15'N$ ,  $157^{\circ} 40'W$ .

- a)  $128^{\circ} T$
- b)  $217^{\circ} T$
- c)  **$290^{\circ} T$  - correct**
- d)  $326^{\circ} T$

GRC B3. Determine the great circle distance and initial course from latitude  $24^{\circ} 52.0' N$ , longitude  $78^{\circ} 27.0' W$  to latitude  $47^{\circ} 19.0' N$ , longitude  $6^{\circ} 42.0' W$ .

- e) **3593 miles,  $048.1^{\circ} T$  - correct**
- f) 3457 miles,  $053.3^{\circ} T$
- g) 3389 miles,  $042.4^{\circ} T$
- h) 3367 miles,  $045.0^{\circ} T$

GRC B4. Determine the great circle distance and initial course from latitude  $26^{\circ} 00' S$ , longitude  $56^{\circ} 00' W$  to latitude  $34^{\circ} 00' S$ , longitude  $18^{\circ} 15.0' E$ .

- a) 3705 miles,  $153^{\circ} T$
- b) 3841 miles,  $068^{\circ} T$
- c) 3849 miles,  $248^{\circ} T$
- d) **3805 miles,  $117^{\circ} T$  - correct**

GRC B5. Determine the great circle distance and initial course from latitude  $38^{\circ} 42' N$ , longitude  $09^{\circ} 10.5' W$  to latitude  $32^{\circ} 05' N$ , longitude  $81^{\circ} 05' W$ .

- a) 3402.0 miles,  $072.5^{\circ} T$
- b) 3412.6 miles,  $085.8^{\circ} T$
- c) 3432.0 miles,  $278.3^{\circ} T$
- d) **3449.4 miles,  $287.2^{\circ} T$  - correct**

Great Circle Latitude or Longitude of the Vertex

GRC B6. The great circle distance from latitude  $08^{\circ} 50' N$ ,  $80^{\circ} 21' W$ , to a position  $12^{\circ} 36' N$ ,  $128^{\circ} 16' E$  is 8664 miles and the initial course is  $306.6^{\circ} T$ . Determine the latitude of the vertex.

- a)  $38^{\circ} 46.2' N$
- b)  $38^{\circ} 16.4' N$
- c)  **$37^{\circ} 30.2' N$  - correct**
- d)  $37^{\circ} 05.3' N$

GRC B7. The great circle distance from latitude  $35^{\circ} 08' S$ , longitude  $19^{\circ} 26' E$  to latitude  $33^{\circ} 16' S$ , longitude  $115^{\circ} 36' E$  is 4559 miles and the initial course is  $121^{\circ} T$ . Determine the latitude of the vertex.

- a)  $44^{\circ} 29.1' S$
- b)  **$45^{\circ} 30.9' S$  - correct**
- c)  $46^{\circ} 18.2' S$
- d)  $43^{\circ} 41.8' S$

GRC B8. The great circle distance from latitude  $38^{\circ} 17' N$ , longitude  $123^{\circ} 16' W$  to latitude  $35^{\circ} 01' N$ , longitude  $142^{\circ} 21' W$  is 4330 miles and the initial course is  $300.9^{\circ} T$ . Determine the latitude of the vertex.

- a)  $46^{\circ} 54.8' N$
- b)  $47^{\circ} 24.7' N$
- c)  $47^{\circ} 35.2' N$
- d)  **$47^{\circ} 40.5' N$  - correct**

GRC B9. The great circle distance from latitude  $8^{\circ} 50.0' N$ , longitude  $80^{\circ} 21.0' W$  to latitude  $22^{\circ} 36.0' N$ , longitude  $128^{\circ} 16.0' E$  is 7801 miles and the initial course is  $318^{\circ} 45' T$ . The latitude of the vertex is  $49^{\circ} 20.6' N$ . What is the longitude of the vertex?

- a)  $156^{\circ} 43' W$
- b)  **$162^{\circ} 41' W$  - correct**
- c)  $159^{\circ} 32' W$
- d)  $161^{\circ} 18' W$

GRC B10. The great circle distance from latitude  $35^{\circ} 08' S$ , longitude  $19^{\circ} 26' E$  to latitude  $33^{\circ} 16' S$ , longitude  $115^{\circ} 36' E$  is 4559 miles and the initial course is  $121^{\circ} T$ . Determine the longitude of the vertex.

- a)  $26^{\circ} 50.9' E$
- b)  **$65^{\circ} 45.9' E$  - correct**
- c)  $69^{\circ} 19.1' E$
- d)  $72^{\circ} 18.3' E$

GRC B11. The great circle distance from latitude  $38^{\circ} 17.0' N$ , longitude  $123^{\circ} 16.0' W$  to latitude  $35^{\circ} 01.0' N$ , longitude  $142^{\circ} 21.0' E$  is 4330 miles and the initial course is  $300.9^{\circ} T$ . The latitude of the vertex is  $47^{\circ} 40.5' N$ . What is the longitude of the vertex?

- a)  $173^{\circ} 04.6' E$
- b)  $167^{\circ} 18.0' E$
- c)  $173^{\circ} 04.6' W$
- d)  **$167^{\circ} 18.5' W$  - correct**

### Points Along the Great Circle Route

GRC B12. You are on a great circle track departing latitude  $25^{\circ} 50'$  N, longitude  $77^{\circ} 00'$  W, and your initial course is  $061.7^{\circ}$  T. The position of the vertex is latitude  $37^{\circ} 35.6'$  N, longitude  $25^{\circ} 57.8'$  W. What is the distance along the great circle track between the point of departure and the vertex?

- a) 2735.1 miles
- b) 2664.9 miles- correct**
- c) 2583.2 miles
- d) 2420.0 miles

GRC B13. You are on a great circle track departing from position latitude  $25^{\circ} 50'$  N, longitude  $77^{\circ} 00'$  W. The position of the vertex is latitude  $37^{\circ} 35.6'$  N, longitude  $25^{\circ} 57.8'$  W. The distance along the great circle track from the vertex to a point (x) is 600 miles westward. Determine the position of point (x) on the great circle track.

- a)  $36^{\circ} 47.5'$  N,  $38^{\circ} 21.8'$  W
- b)  $36^{\circ} 50.4'$  N,  $38^{\circ} 25.6'$  W
- c)  $36^{\circ} 55.6'$  N,  $38^{\circ} 30.0'$  W- correct**
- d)  $37^{\circ} 02.3'$  N,  $38^{\circ} 34.4'$  W

GRC B14. The great circle distance from latitude  $25^{\circ} 50'$  N, longitude  $77^{\circ} 00'$  W to latitude  $35^{\circ} 56'$  N, longitude  $06^{\circ} 15'$  W is 3616nm and the initial course is  $061.7^{\circ}$  T. The position of the vertex is latitude  $37^{\circ} 34.9'$  N, longitude  $25^{\circ} 59.0'$  W. The difference of longitude from the vertex to a point (X) on the great circle route is  $10^{\circ}$  W. Determine the latitude which intersects the great circle at point X.

- a)  $37^{\circ} 02.5'$  N
- b)  $37^{\circ} 09.5'$  N - correct**
- c)  $37^{\circ} 15.6'$  N
- d)  $37^{\circ} 21.2'$  N