

U.S.C.G. Merchant Marine Exam  
Second/Third Mate of Unlimited Tonnage  
Q117 Navigation Problems – Oceans  
(Sample Examination)

**Choose the best answer to the following Multiple Choice questions.**

1. On 22 April your 1852 DR position is LAT  $23^{\circ}54.5'N$ , LONG  $117^{\circ}36.8'W$ . You observe an unidentified star bearing  $248^{\circ}T$  at an observed altitude ( $H_o$ ) of  $25^{\circ}00.9'$ . The chronometer reads 02h 54m 53s, and is 02m 51s fast. What star did you observe?
- (A) Rigel
  - (B) Arcturus
  - (C) Gienah
  - (D) Betelgeuse

*If choice A is selected set score to 1.*

2. On 15 February at 0610 ZT, in DR position LAT  $56^{\circ}53.0'N$ , LONG  $157^{\circ}02.9'E$ , you observe Polaris at a sextant altitude ( $hs$ ) of  $56^{\circ}10.4'$ . The index error is  $2.5'$  on the arc, and the height of eye is 18 meters. What is the latitude?
- (A)  $56^{\circ}41.8'N$
  - (B)  $56^{\circ}47.9'N$
  - (C)  $56^{\circ}48.1'N$
  - (D)  $57^{\circ}10.6'N$

*If choice A is selected set score to 1.*

3. A vessel at LAT  $28^{\circ}00'N$ , LONG  $116^{\circ}00'W$  is to proceed to LAT  $34^{\circ}00'N$ , LONG  $123^{\circ}40'W$ . What is the course and distance by mid-latitude sailing?
- (A)  $302^{\circ}T$ , 539 miles
  - (B)  $324^{\circ}T$ , 453 miles
  - (C)  $323^{\circ}T$ , 428 miles
  - (D)  $312^{\circ}T$ , 533 miles

*If choice D is selected set score to 1.*

4. While on a course of  $216^{\circ}pgc$ , a light bears  $12^{\circ}$  on the port bow at a distance of 11.2 miles. Which course should you steer to pass 2 miles abeam of the light leaving it to port?
- (A)  $208^{\circ}pgc$
  - (B)  $210^{\circ}pgc$
  - (C)  $212^{\circ}pgc$
  - (D)  $214^{\circ}pgc$

*If choice D is selected set score to 1.*

5. On 8 November your 1731 zone time DR position is LAT  $27^{\circ}16.0'N$ , LONG  $137^{\circ}25.0'W$ . Considering their magnitude, azimuth, and altitude, which group includes the three stars best suited for a fix at star time?
- (A) Peacock, Ankaa, Al Na'ir
  - (B) Sirius, Hamal, Dubhe
  - (C) Antares, Rasalhague, Altair
  - (D) Alphecca, Fomalhaut, Schedar

*If choice D is selected set score to 1.*

6. Your vessel is steering course  $352^{\circ}psc$ , variation for the area is  $11^{\circ}E$ , and deviation is  $9^{\circ}W$ . The wind is from the northeast, producing a  $1^{\circ}$  leeway. What true course are you making good?
- (A)  $351^{\circ}T$
  - (B)  $349^{\circ}T$
  - (C)  $353^{\circ}T$
  - (D)  $355^{\circ}T$

*If choice C is selected set score to 1.*

7. On 2 April your 0830 zone time fix gives you a position of LAT  $20^{\circ}16.0'S$ , LONG  $004^{\circ}12.0'E$ . Your vessel is steaming a course of  $143^{\circ}T$  at a speed of 18.0 knots. An observation of the Sun's upper limb is made at 0903 zone time, and the observed altitude ( $H_o$ ) is  $42^{\circ}39.6'$ . The chronometer reads 09h 05m 40s, and the chronometer error is 02m 15s fast. Local apparent noon occurs at 1145 zone time, and a meridian altitude of the Sun's lower limb is made. The observed altitude ( $H_o$ ) for this sight is  $63^{\circ}46.2'$ . Determine the vessel's 1200 zone time position.
- (A) LAT  $21^{\circ}10.1'S$ , LONG  $004^{\circ}53.9'E$
  - (B) LAT  $21^{\circ}14.0'S$ , LONG  $004^{\circ}55.0'E$
  - (C) LAT  $21^{\circ}18.0'S$ , LONG  $005^{\circ}00.5'E$
  - (D) LAT  $22^{\circ}42.0'S$ , LONG  $004^{\circ}57.0'E$

*If choice C is selected set score to 1.*

8. Determine the great circle distance and initial course from LAT  $08^{\circ}53.0'N$ , LONG  $79^{\circ}31.0'W$  to LAT  $33^{\circ}51.5'S$ , LONG  $151^{\circ}13.0'E$ .
- (A) 7809 miles,  $247.0^{\circ}T$
  - (B) 7763 miles,  $247.0^{\circ}T$
  - (C) 7618 miles,  $230.3^{\circ}T$
  - (D) 7635 miles,  $233.9^{\circ}T$

*If choice D is selected set score to 1.*

9. You observe the star Deneb at a sextant altitude (hs) of  $48^{\circ}34.8'$  on 16 December. The index error is 4.0' off the arc. The height of eye is 58 feet. What is the observed altitude (Ho)?
- (A)  $48^{\circ}02.9'$
  - (B)  $48^{\circ}30.5'$
  - (C)  $48^{\circ}31.4'$
  - (D)  $48^{\circ}46.5'$

*If choice B is selected set score to 1.*

10. You depart LAT  $51^{\circ}48.0'S$ , LONG  $178^{\circ}35.0'W$  and steam 179 miles on course  $270^{\circ}$ . What is the longitude of arrival?
- (A)  $176^{\circ}36'E$
  - (B)  $173^{\circ}47'W$
  - (C)  $174^{\circ}27'E$
  - (D)  $179^{\circ}52'W$

*If choice A is selected set score to 1.*

11. On 10 November your 1630 zone time DR position is LAT  $25^{\circ}10.0'N$ , LONG  $71^{\circ}12.0'W$ . You are on course  $335^{\circ}T$  at a speed of 24 knots. What will be the zone time of sunset at your vessel?
- (A) 1650
  - (B) 1700
  - (C) 1715
  - (D) 1730

*If choice B is selected set score to 1.*

12. On 7 February your 0800 zone time DR position is LAT  $22^{\circ}16.0'N$ , LONG  $92^{\circ}26.0'W$ . Your vessel is on course  $270^{\circ}T$  at a speed of 20.0 knots. What is the zone time of local apparent noon (LAN)?
- (A) 1218
  - (B) 1222
  - (C) 1226
  - (D) 1230

*If choice D is selected set score to 1.*

- 13.** On 5 May your 1600 zone time DR position is LAT 17°28' S, LONG 143°39' E. You are on course 316°T at a speed of 17 knots. You observed 3 celestial bodies. Determine the latitude and longitude of your 1800 running fix.

Body	Zone Time	GHA	Observed Altitude	Declination
Avoir	1727	209°18.2'	47°24.4'	S 59°27.3'
Regulus	1732	184°14.7'	46°35.2'	N 12°03.6'
Betelgeuse	1738	249°03.6'	49°41.5'	N 7°24.1'

- (A) LAT 17°05.2'S, LONG 143°11.4'E
- (B) LAT 17°07.8'S, LONG 143°17.5'E
- (C) LAT 17°08.2'S, LONG 143°07.9'E
- (D) LAT 17°09.7'S, LONG 143°10.1'E

*If choice A is selected set score to 1.*

- 14.** On 22 February your 2045 ZT position is LAT 33°19'N, LONG 52°06'W. You observe Polaris bearing 358.1°pgc. At the time of the observation the helmsman noted that he was heading 048°pgc and 065°psc. The variation is 19°W. What is the deviation for that heading?

- (A) 1°E
- (B) 3°E
- (C) 1°W
- (D) 3°W

*If choice B is selected set score to 1.*

- 15.** On 16 September your 0600 ZT fix gives you a position of LAT 29°47.2'N, LONG 65°28.4'W. Your vessel is on course 242°T and your speed is 13.5 knots. Local apparent noon (LAN) occurs at 1227 ZT, at which time a meridian altitude of the Sun's lower limb is observed. The observed altitude (Ho) for this sight is 63°25.3'. What is the calculated latitude at LAN?

- (A) 29°07.9'N
- (B) 29°06.1'N
- (C) 29°04.7'N
- (D) 29°01.6'N

*If choice C is selected set score to 1.*