Dear candidates,

We wish to thank you for considering our training centre **ADRIALIBAR** for your education in becoming a yacht master.

Our instructors with over 20 years of experience in teaching and transferring knowledge have prepared these initial instructions for you to be able to better prepare yourself for the course schedule.

Initial instructions contain some common knowledge questions and examples, we expect the candidate to know prior to attending the yacht masters course.

Our mutual goal is for you to have the best learning experience during the course schedule.

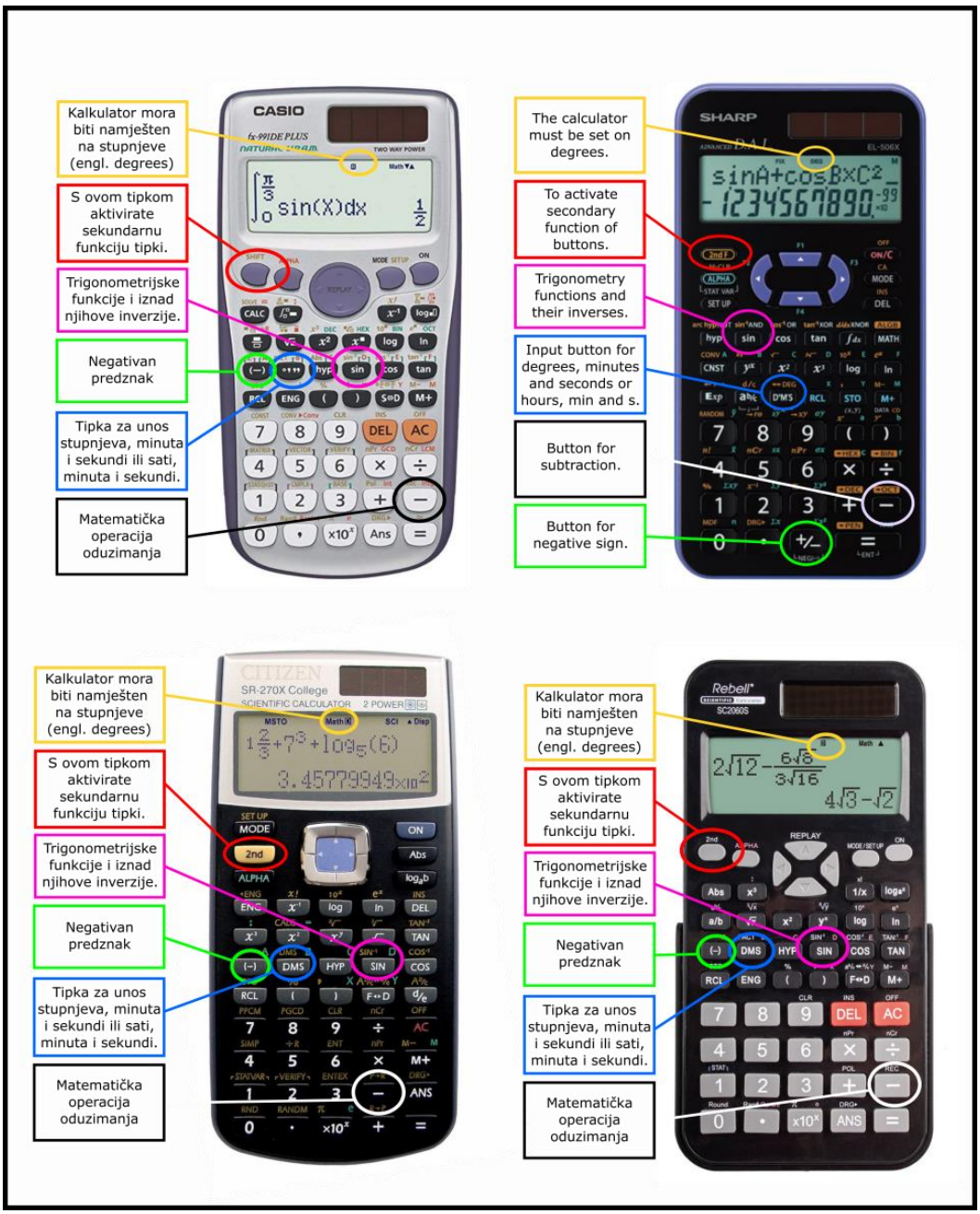
Yacht-master course schedule covers wide variety of subjects and as per our experience in the last 30 years of training, most candidates are overwhelmed by the quantity of information they need to obtain and learn in a short period of time, especially the basic knowledge they must pose prior to attending the course.

Subjects that will be covered during the course schedule are:

1. Maritime Navigation
2. Construction and ship stability
3. Maneuvering and collision avoidance
4. Safety at sea with first aid
5. Meteorology
6. Maritime law
7. Maritime English

Each lecture gives you a short explanation, task, and sample of the solution with multiple samples for practice and you have short explanation why is provided information important for the yacht master or mariner.

We recommend you prepare technical pen, eraser, notebook, scientific calculator, nautical triangles or plotter (if not available use ordinary triangle with angle measurement marks) and any other tools you believe will help you during preparation for the course.



1. USAGE OF SCIENTIFIC CALCULATOR

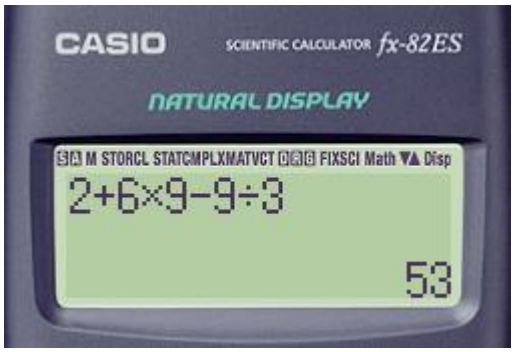
1,5 or 1.5 decimal comma or decimal dot ?

Note that usage of decimal comma and decimal dot is not standardizes around the world, so please look out how you write numbers, with comma or with dot.

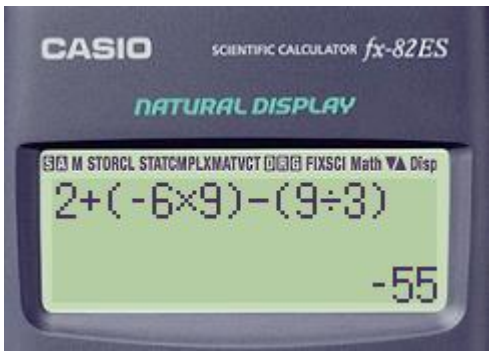
In some countries one and a half is written as 1,5 or in other country it could be 1.5

Using the scientific calculator calculate following:

a) 2 + 6 × 9 – 9 ÷ 3 = 53



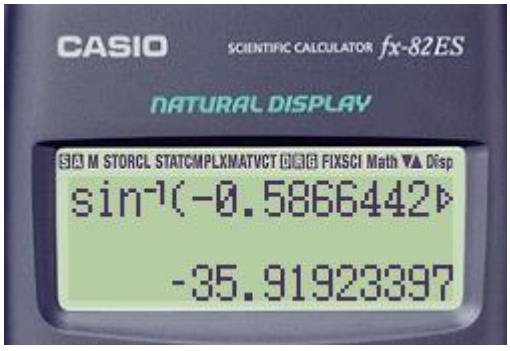
b) 2 + (-6×9) – (9 ÷ 3) =



c) sin 34°= 0.5591929035 (same as 0,5591929035)

d) cos 26° 19’ = 0.8963575083

e) sin -1 (-0.5866442515) = -35.9°



f) sin 23°20,5' × sin (-12°25,4') + cos 23°20,5' × cos (-12°25,4') × cos 124° =

-0.5866442515

For the next example we need to remember rule regarding rounding of the numbers:

If the last digit of a value that is not recorded when rounding decimal digits is 0, 1, 2, 3, or 4, then the last digit retained does not change, and if the last digit that is not written is 5, 6, 7, 8 or 9 , then the last digit we are recording increases by 1.

Vrijednost (engl. value)	zaokružena na (engl. rounded to)		
	jednu decimalu (engl. one decimal)	dvije decimale (engl. two decimal)	tri decimale (engl. three decimal)
67,9523647	68,0	67,9**5**	67,95**2**
12,0200569	12,0	12,0**2**	12,02
0,964187	1,0	0,9**6**	0,96**4**
43,332594	43,3	43,3**3**	43,33**3**

Please solve following using a calculator

1) 65 + 70 - 49 × 75 = _____

2) 57 + 54 - 36 × 84 = _____

3) 84 + 32 - 46 × 44 = _____

4) 20 + 15 - 13 × 3 - 22 ÷ 13 = _____

5) Round the previous task (4) result on 3, 2 and 1 decimal

3 = _____ 2 = _____ 1 = _____

Express value in degrees or degrees and minutes 29° 5.8' = 29.0966667°

6) 75° 34.0' = _____

7) 30° 28.1' = _____

8) 5° 36.7' = _____

9) 46° 5.9' = _____

10) 74.6° = _____

11) 8.3° = _____

12) 68.7° = _____

13) 12° 8.6' = _____

Trigonometry functions

14) sin (83° 17.9') = _____

15) cos (28° 54.2') = _____

16) tan or tg (59° 10.5') = _____

17) sin (-32° 5.7') = _____

18) cos (-51° 5.7') = _____

19) tan or tg (-78° 46.3') = _____

20) sin (40° 38.8') × sin (-40° 44.2') = _____

21) sin (24° 24.2') × cos (-8° 28.6') = _____

22) cos (8° 33.0') × cos (-73° 53.4') = _____

RESULTS

1) -3540 **2)** -2913 **3)** -1908 **4)** -5.69230769 **5)** -5.692 , -5.69 , -5.7

6) 75.5666667° **7)** 30.4683333° **8)** 5.6116667° **9)** 46.0983333°

10) 74° 36.0' **11)** 8° 18.0' **12)** 68° 42.0' **13)** 12.1433333°

14) 0.993167255 **15)** 0.875436409 **16)** 1.675852626

17) -0.531324652 **18)** 0.62803097 **19)** -5.037294107

20) -0.425087906 **21)** 0.408644069 **22)** 0.274398536

2. TIME

One day is the amount of time that takes planet Earth to rotate once around its axes (360°).
This is approximately 24 hours (not exact).

By dividing 360° with 24 we get:

360°/24 = 15° per hour

This means it takes one hour for Earth to rotate by 15° or Earth rotates by 15° within 1 hour.

1h = 60’ One hour has sixty minutes.

1‘ = 60 ‘’ One minute has 60 seconds.

The proper way of adding or subtracting time is by noting that 50 + 12 we do not write 62 but 1 hour and 2 minutes.

Why is this important to know?

Coordinates of an object on the surface of Earth or sea level are latitude and longitude. Longitude is the measurement east or west of the prime meridian (Greenwich).

Longitude is expressed in angles but we can use information 1 hour = 15° of angle to our advantage in navigation by simply following:

If you live at 0° (Greenwich, England) and another person lives at 015° E (Sibenik, Croatia) that means that the time difference between you two is 1 hour.

For example, if the person at 15° E is observing Sun rise, you, at 0° have to wait 1 hour to see that same Sun rise.

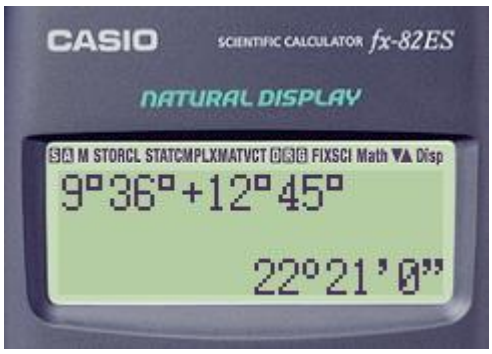
Time in Greenwich is also called UTC or UT universal time central (1 day = 24 hours).

Examples:

a) If the time of departure is 09:36 and we are going to travel for 12 hours and 45 minutes to our destination, what is our arrival time?

09:36 + 12:45 = 22:21

On calculator that could be solved like this (using DMS button or ° ’ ‘’):



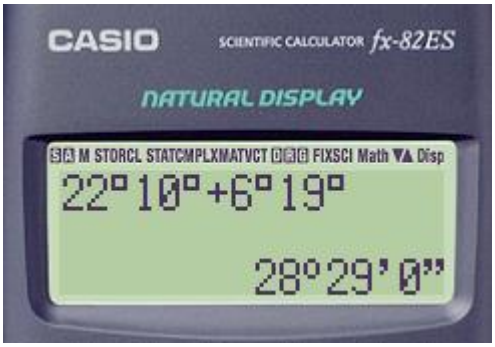
b) If the time of departure is 06.08. 22:10 and we are going to travel for 6 hours and 19 minutes to our destination, what is our arrival time?

22:10 + 06:19 = 28:29

Since we have crossed midnight we need to subtract 24 from the result and add 1 day to date of departure.

28:29 – 24 = 04:29 07.08.

On a calculator that could be solved like this:



Time and date calculations (hh:mm:ss)

23) 23:14:23 + 0:27:02 = _____

24) 11:10:12 + 0:38:01 = _____

25) 3:43:28 - 0:24:19 = _____

26) 4:38:15 + 0:56:18 = _____

27) 8:04:30 - 0:48:51 = _____

28) 6:01:47 + 0:13:38 = _____

29) 18:53:26 - 0:04:04 = _____

30) 1:07:55 + 0:48:24 = _____

			D/M/Y		
31)	If you start your voyage at	00:55:56	29/02/2016	and travel for	18:47:38
	calculate arrival time and date.				

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32)	If you start your voyage at	01:03:52	29/02/2016	and travel for	04:07:00
	calculate arrival time and date.				

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33)	If you start your voyage at	20:13:01	07/03/2016	and travel for	07:17:00
	calculate arrival time and date.				

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34)	If you start your voyage at	10:44:02	06/03/2016	and travel for	12:40:17
	calculate arrival time and date.				

RESULTS

23) 23:41:24 **24)** 11:48:13 **25)** 3:19:09 **26)** 5:34:33 **27)** 7:15:39

28) 6:15:26 **29)** 18:49:22 **30)** 1:56:19

31) 00:55:56 + 18:47:38 = 19:43:34 DATE 29/02/2016

32) 01:03:52 + 04:07:00 = 5:10:52 DATE 29/02/2016

33) 20:13:01 + 07:17:00 = 3:30:01 DATE 08/03/2016

34) 10:44:02 + 12:40:17 = 23:24:19 DATE 06/03/2016

Time, speed, distance

distance = speed × time speed (s) = $\frac{\text{distance (d)}}{\text{time(t)}}$ time (t) = $\frac{\text{distance (d)}}{\text{speed (s)}}$

35) If s = 20 knt (Nm/h), and t = 0.3 h, calculate distance travelled.

distance = speed × time = 20 × 0.3 = _____ Nm

36) If s = 14 knt (Nm/h), and t = 0.3 h, calculate distance travelled.

distance = speed × time = 14 × 0.3 = _____ Nm

37) If s = 16 knt (Nm/h), and d = 2 Nm, calculate time.

time (t) = $\frac{\text{distance (d)}}{\text{speed (s)}} = \frac{2}{16} =$ h

38) If s = 7 knt (Nm/h), and d = 8 Nm, calculate time.

time (t) = $\frac{\text{distance (d)}}{\text{speed (s)}} = \frac{8}{7} =$ h

39) If t = 0.4 h, and d = 6 Nm, calculate speed.

speed (s) = $\frac{\text{distance (d)}}{\text{time(t)}} = \frac{6}{0.4} =$ knt

40) If t = 0.8 h, and d = 6 Nm, calculate speed.

speed (s) = $\frac{\text{distance (d)}}{\text{time(t)}} = \frac{6}{0.8} =$ knt

41) If s = 17 knt (Nm/h), and t = 18 min, calculate distance travelled.

distance = speed × time = 17 × $\frac{18}{60}$ = _____ Nm

42) If s = 15 knt (Nm/h), and t = 6 min, calculate distance travelled.

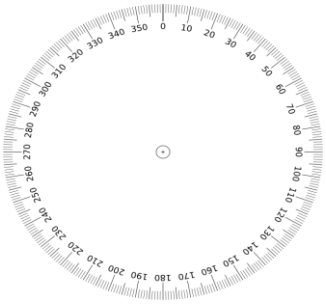
distance = speed × time = 15 × $\frac{6}{60}$ = _____ Nm

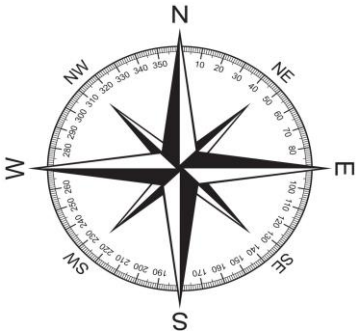
RESULTS

35) 6 Nm **36)** 4.2 Nm **37)** 0.13 h **38)** 1.14 h **39)** 15 knt

40) 7.5 knt **41)** 5.1 Nm **42)** 1.5 Nm

Compass rose

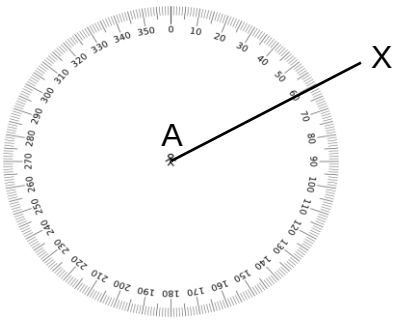


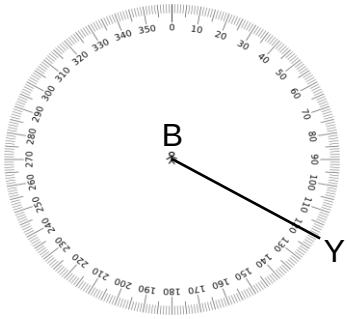


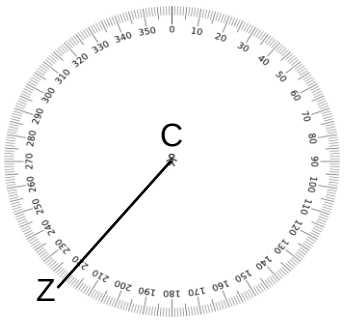
A compass rose is a figure used to display the orientation of the cardinal directions (north, east, south, and west) and their intermediate points (NE, SE, SW and NW).
Mesuring angle with compass rose starts with north being zero 0° and moving in clockwise direction to 360°.
In navigation, line conecting you and object is called azimuth line.
Azimuth is angle between north part of your meridian and azimuth line measured clockwise.

Examples:

Observer A is looking at object X and reads from compass that angle of the object is 60°.
Observer B is looking at object Y and reads from compass that angle of the object is 120°.
Observer C is looking at object Z and reads from compass that angle of the object is 220°.

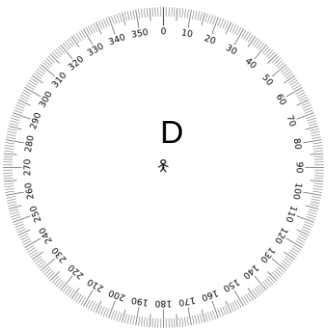


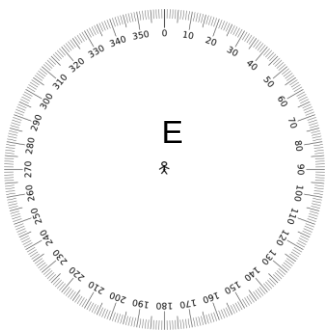


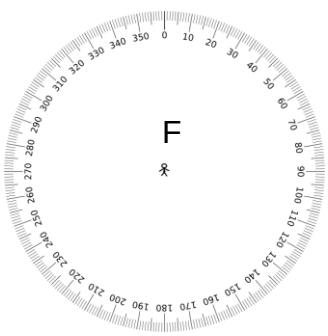


Draw azimuth line from observer to object and mark approximate position of the object

Observer D is looking at object X and reads from compass that angle of the object is 40°.
Observer E is looking at object Y and reads from compass that angle of the object is 150°.
Observer F is looking at object Z and reads from compass that angle of the object is 300°.



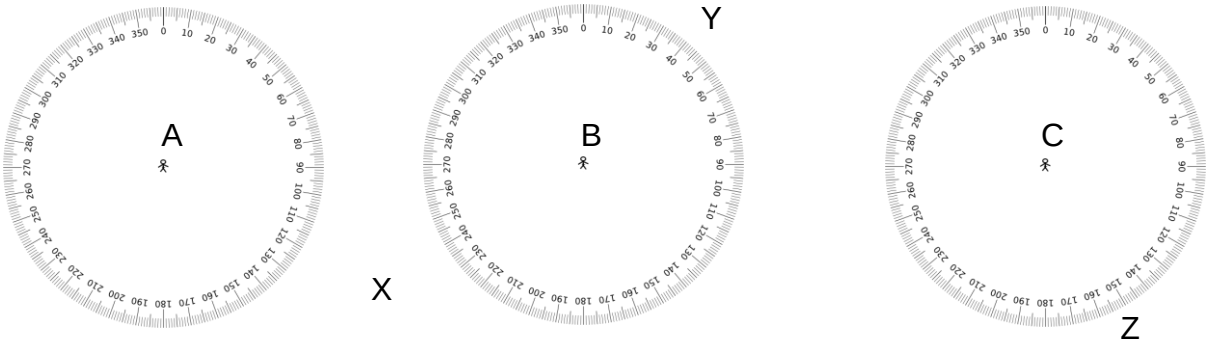




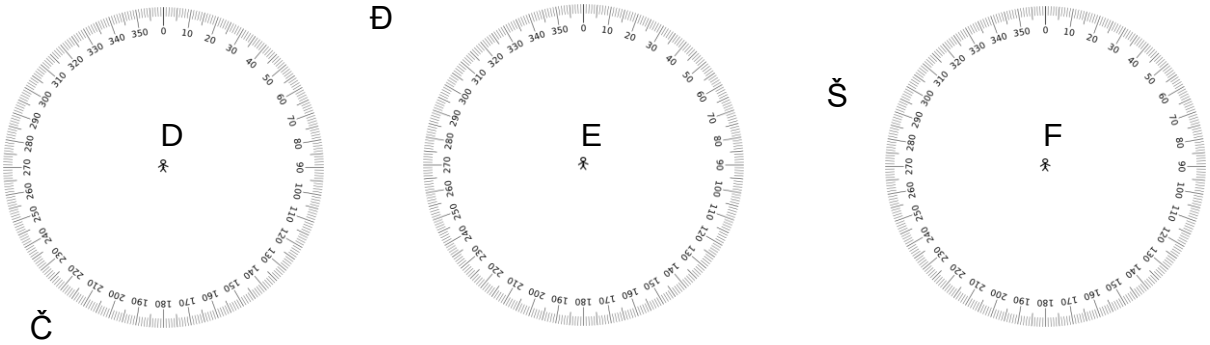
If you have hard time obtaining correct results please inform us about the results you are getting with image of calculator you are using (switched ON).

Connect observer and object and read from compass rose approximate azimuth

Observer A is looking at object X, what is the angle (azimuth) of the object? _____
Observer B is looking at object Y, what is the angle (azimuth) of the object? _____
Observer C is looking at object Z, what is the angle (azimuth) of the object? _____



Observer D is looking at object Č, what is the angle (azimuth) of the object? _____
Observer E is looking at object Đ, what is the angle (azimuth) of the object? _____
Observer F is looking at object Š, what is the angle (azimuth) of the object? _____



a) On compass rose, what is opposite to NE ? _____

b) On compass rose, what is opposite to SW ? _____

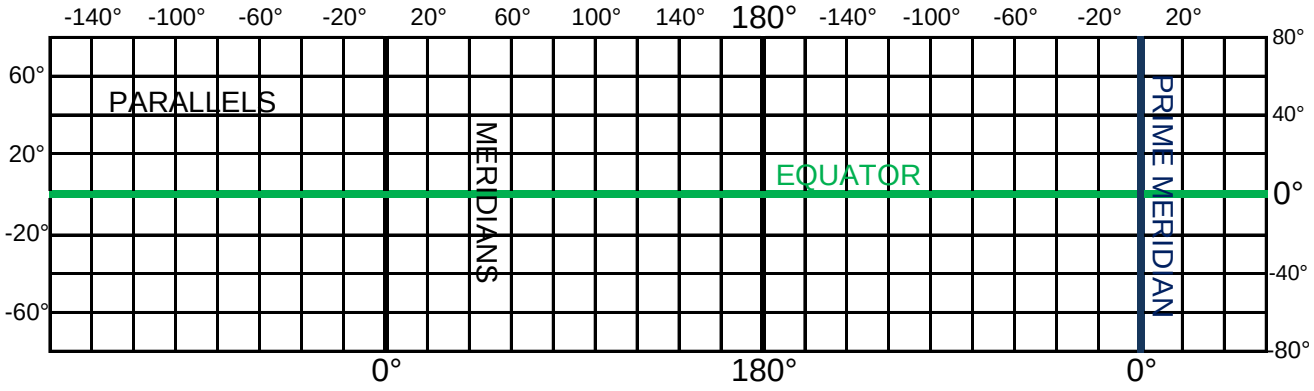
c) On compass rose, what is opposite to NW ? _____

d) On compass rose, what is opposite to SE ? _____

Azimuth cannot be negative or larger then 360° so if we get by calculation that azimuth is:

-2°	it is actually	358°	(-2° + 360°)
364°	it is actually	004°	(364° - 360°)

Coordinates



Coordinates of a location on Mercators chart are determined by knowing the angle between location parallel and equator and location meridian and prime meridian.

Angle between equator and location parallel is called LATITUDE (0° - 90° north or south)

Angle between prime meridian and location meridian is called LONGITUDE
(0° - 180° east or west)

In order to distinguish north from south values and east from west values in equations, it has been internationally decided that all values north and east will have plus sign, while south and west values will have minus (negative) sign.

So,	44° 12.0'	N	in equation is entered as	44° 12.0'
	101° 36.0'	E	in equation is entered as	101° 36.0'
	6° 6.0'	S	in equation is entered as	- 6° 6.0'
	102° 42.0'	W	in equation is entered as	- 102° 42.0'

Difference (Δ) between latitudes and longitudes of Position 1 and Position 2

If difference (Δ) between longitudes is greater then 180° or -180° we need to correct it.

If LONG is over 180° subtract result with 360° (example for 245°; 245°- 360° = - 115°)

If LONG is over -180° add 360° to result (example for -195°; - 195° + 360°= 165°)

Position 1	LAT_1 =	49° 17.4' S	Position 2	LAT_2 =	35° 39.4' N
	$LONG_1$ =	144° 14.7' W		$LONG_2$ =	93° 37.8' W

Solution:

LAT_2 =		35°	39.4'	$LONG_2$ =	-	93°	37.8'
- LAT_1 =	-	49°	17.4'	- $LONG_1$ =	-	144°	14.7'
Δ LAT =		84°	56.8'	Δ LONG =		50°	36.9'

Δ LONG = 50.615

Calculate difference (Δ) between latitudes and longitudes of Position 1 and Position 2

43) Position 1 LAT_1 = 42° 12.6' N, $LONG_1$ = 125° 51.6' W; Position 2 LAT_2 = 5° 7.9' S, $LONG_2$ = 52° 31.0' E

Solution:

LAT_2 =	-	5°	7.9'	$LONG_2$ =		52°	31.0'
- LAT_1 =		42°	12.6'	- $LONG_1$ =	-	125°	51.6'
Δ LAT =	-	47°	20.5'	Δ LONG =		178°	22.6'

Δ LONG = 178.3766667

44) Position 1 LAT_1 = 10° 12.3' S, $LONG_1$ = 134° 50.2' E; Position 2 LAT_2 = 31° 37.8' N, $LONG_2$ = 127° 38.0' W

Solution:

LAT_2 =		31°	37.8'	$LONG_2$ =	-	127°	38.0'
- LAT_1 =	-	10°	12.3'	- $LONG_1$ =		134°	50.2'
Δ LAT =		41°	50.1'	Δ LONG =	-	262°	28.2'

Δ LONG = 97.53

45) Position 1 LAT_1 = 52° 48.1' S, $LONG_1$ = 5° 17.6' W; Position 2 LAT_2 = 10° 37.8' N, $LONG_2$ = 120° 17.3' E

Solution:

LAT_2 =		10°	37.8'	$LONG_2$ =		120°	17.3'
- LAT_1 =	-	52°	48.1'	- $LONG_1$ =	-	5°	17.6'
Δ LAT =		63°	25.9'	Δ LONG =		125°	34.9'

Δ LONG = 125.5816667

46) Position 1 LAT_1 = 39° 52.0' N, $LONG_1$ = 127° 13.0' W; Position 2 LAT_2 = 31° 25.2' N, $LONG_2$ = 5° 5.2' E

Solution:

LAT_2 =		31°	25.2'	$LONG_2$ =		5°	5.2'
- LAT_1 =		39°	52.0'	- $LONG_1$ =	-	127°	13.0'
Δ LAT =	-	8°	26.8'	Δ LONG =		132°	18.2'

Δ LONG = 132.3033333

Međunarodna fonetska abeceda (International Phonetic Alphabet):

A	Alpha	N	November
B	Bravo	O	Oscar
C	Charlie	P	Papa
D	Delta	Q	Quebec
E	Echo	R	Romeo
F	Foxtrot	S	Sierra
G	Golf	T	Tango
H	Hotel	U	Uniform
I	India	V	Victor
J	Juliett	W	Whiskey
K	Kilo	X	X-ray
L	Lima	Y	Yankee
M	Mike	Z	Zulu

EXAM QUESTIONS

BOLD - MANDATORY

ITALIC - Frequent

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MARITIME NAVIGATION

1. Types of charts
2. **Symbols and abbreviations on the charts, reading lights feature**
3. *Update charts procedure (OZP Notice to Mariners)*
4. Electronic charts
5. Maritime publications: pilots, lists of lighthouses, range finders, updating manuals
6. **Sea depth: definition, high and low water, currents and tide tables**
7. Waterways and buoyage, IALA system
8. **Indexing means waterways; cardinal and lateral marks**
9. **The position of the ship in coastal navigation (practical on the charts):**
   a. **Plotting position on the chart**
      - **Using the set of coordinates**
      - **Using two azimuth**
      - **By using azimuth and distance**
   b. **Reading the position from the chart (coordinates LAT and LONG)**
   c. **Determination and plotting a true course**
      - **Course compass and course of the magnetic compass (YM)**
   d. **Determination and plotting azimuth true**
      - **magnetic azimuth and the azimuth of the compass (YM)**
   e. **Measuring and determining the travel times and speeds**
   f. **Determination of speed and direction of drift**
      - **Course over ground and the water, the speed over ground and through the water (YM)**
10. *Yachtmaster CAT B extra: The position of the ship in ocean navigation (operation on the chart):*
    a. *Getting the ship's position by observation of celestial bodies*
    b. *Compass deviation control with the observation of celestial bodies*
    c. *Great circle sailing and loxodromic (rhumb line) sailing*
11. Sailing in the traffic separation schemes (TSS)
12. **Compass and magnetism, compass rose**
13. **Magnetic variation, computing**
14. *Magnetic deviation and control of deviations, conversion*
15. Gyroscope - basic properties
16. Radar - principles of radar, the distance measurement and angle from the radar
17. ARPA radar - working principle
18. *Satellite navigation systems: GPS, GLONASS*
19. *Depthsounders: types, principles, errors*
20. *Speedometer: types, principles, errors*
21. **Planning maritime journey**
22. Watchkeeping

EXAM QUESTIONS

BOLD - MANDATORY

ITALIC - Frequent

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SAFETY AT SEA

1. Maritime accidents and procedures
2. SOLAS Convention
3. Abandonment and escape (controlled and uncontrolled) (YM)
4. **Saving Appliances - types, quantities, equipment and characteristics for boats and yachts**
5. **Life rafts and lifeboats, equipment (essentially - radar reflector)**
6. **Hydrostatic hook release**
7. *Personal flotation devices (buoys, jackets, thermal suits and, thermal protecting bags)*
8. *Survival at sea - procedures in rafts and lifeboats*
9. *Providing medical first aid*
10. *Procedures in case of "Man Overboard"*
11. *Reporting of distress positions (pyrotechnics, EPIRB, SART, heliograph)*

MANEUVERING

1. **Regulations for Preventing Collisions at Sea (definitions and light)**
   - **Application of the rules in case of the meeting of two yachts, yachts and sailing boats and two boats (while sailing exclusively with the sail and / or with the engine)**
   - **The sound signals (turn to the port, starboard, astern, in fog)**
   - **Advantages when leaving the harbor / marina, sailing in channels**
2. **Characteristics of lights on the mast for a power-driven boat, fishing boat, trawler, sailboat, pilot, ship with limited manoeuvrability, the vessel not under command, vessel constrained by draught**
3. Manoeuvring characteristics of boats and yachts
4. Equipment for ship manoeuvring
5. *Types of forces acting during manoeuvring of the boat*
6. *Impact of stern drift on the ship maneuvering*
7. The impact of the type of propulsion and transmission power to the manoeuvring of the boat
8. Interaction, influence between ships in passing or overtaking
9. A process after a collision or grounding of impact
10. *Maneuver after the fall of man in the sea (as per ship length)*
11. *Anchoring and turning radius at anchor*
12. Berth and effect of the ropes
13. Berthing with port or starboard side
14. Maneuvering / yacht in exceptional circumstances
15. **Seamanship skills (knots)**

EXAM QUESTIONS

BOLD - MANDATORY

ITALIC - Frequent

yacht training adrialibar

METEOROLOGY AND OCEANOGRAPHY

1. **Air temperature**
2. **The atmospheric pressure**
3. **Standard Atmospheric Pressure**
4. **Wind, wind rose, how to measure and expresses speed and direction**
5. **Bora, sirocco breeze**
6. **The most unfavorable wind in a certain part of the Adriatic (Sibenik, Split, Zadar, Rijeka, Dubrovnik?**
7. **Cyclone**
8. **Anticyclone**
9. **Fronts**
10. **Clouds and precipitation**
11. **Fog**
12. **Tides**
13. **Sea currents and waves**
14. **Reading meteorological and oceanographic charts**
15. **Weather Analysis and Forecast**

LAW OF THE SEA

1. **The ship - definition**
2. **Boat - definition (note to 12m up to 01.01.2020. after up to 15m)**
3. **The yacht - Definition**
4. **The passenger - Definition**
5. **Internal waters**
6. **Territorial sea**
7. **Sovereignty**
8. **The right to safe passage**
9. **The area of navigation and category of navigation**
10. **Enrollment of yachts / boats in the register / register (Registration form content)**
11. **Entry to the port and departure from port**
12. **Name / identification of boats and yachts**
13. **Technical overview, basic, regular and irregular**
14. **Navigation in channels**
15. **Safe planning, distance from the coast**
16. **License for sailing boats and yachts**
17. **Mandatory equipment for boats and yachts**
18. **Mandatory documents, papers and books**
19. **Insurance for boats and yachts**
20. **Obtaining the Croatian flag**
21. **List of crew members and passengers (crew list)**

EXAM QUESTIONS

BOLD - MANDATORY

ITALIC - Frequent

ENGLISH LANGUAGE

1. Introduce yourself in English
2. **Explain: The keel, mast, draft, freeboard, superstructure, the highest point of the ship**
3. My boat has limited maneuvering capability (translate)
4. I am passing / crossing / overtaking you on your port / starboard side
5. Please alter your course to the starboard
6. Definitions of meteorology elements (wind, tides, clouds, fog, cyclone, anticyclone)
7. The basic boating commands on English
8. Calling radio stations - procedures
9. *Abbreviations:*
   ETA - Estimated Time of Arrival - estimated time of arrival
   ETD - Estimated Time of Departure - estimated time of departure
   MSI - Maritime Safety Information – message regarding security
   MRCC - Maritime Rescue and Coordination Center - Center for coordinating search and rescue at sea
   EPIRB - Emergency Position Indicating Radio Beacon - satellite radio buoys to locate the position of person in danger
   SART - Search And Rescue Transponder - radar responder for Search and Rescue

SHIP ENGINE

1. *Operating modes, steering position*
2. *The main parts of the engine*
3. *Type of engine and fuel delivery per stroke*
4. *The working principle of a two-stroke diesel engines*
5. *The working principle of four-stroke diesel engines*
6. *Measuring instruments on the main switchboard*
7. *The cooling system of the main engine and its control*
8. *Lubrication system for the main and auxiliary engines*
9. Lights onboard and their replacement
10. Electric panel and its significance in the operation of the vessel
11. Batteries and their maintenance
12. Centrifugal pump and its application on board
13. Refuelling procedure
14. Test of the machine and the devices prior to departure
15. Fuses and their maintenance
16. Process of extinguishing fire on board in the case of diesel engines and petrol engines
17. *Maintenance of the rudders and steering gear*
18. *Entries in the log in case of damage*
19. *Oil books*
20. The process in case the pressure drops in the engine
21. Bilge separator
22. The system of lubrication for the main engine

23. Reducing the risk of fire in the engine room
24. Fire extinguishing system in the engine room
25. Prevention of pollution and the procedure in case of

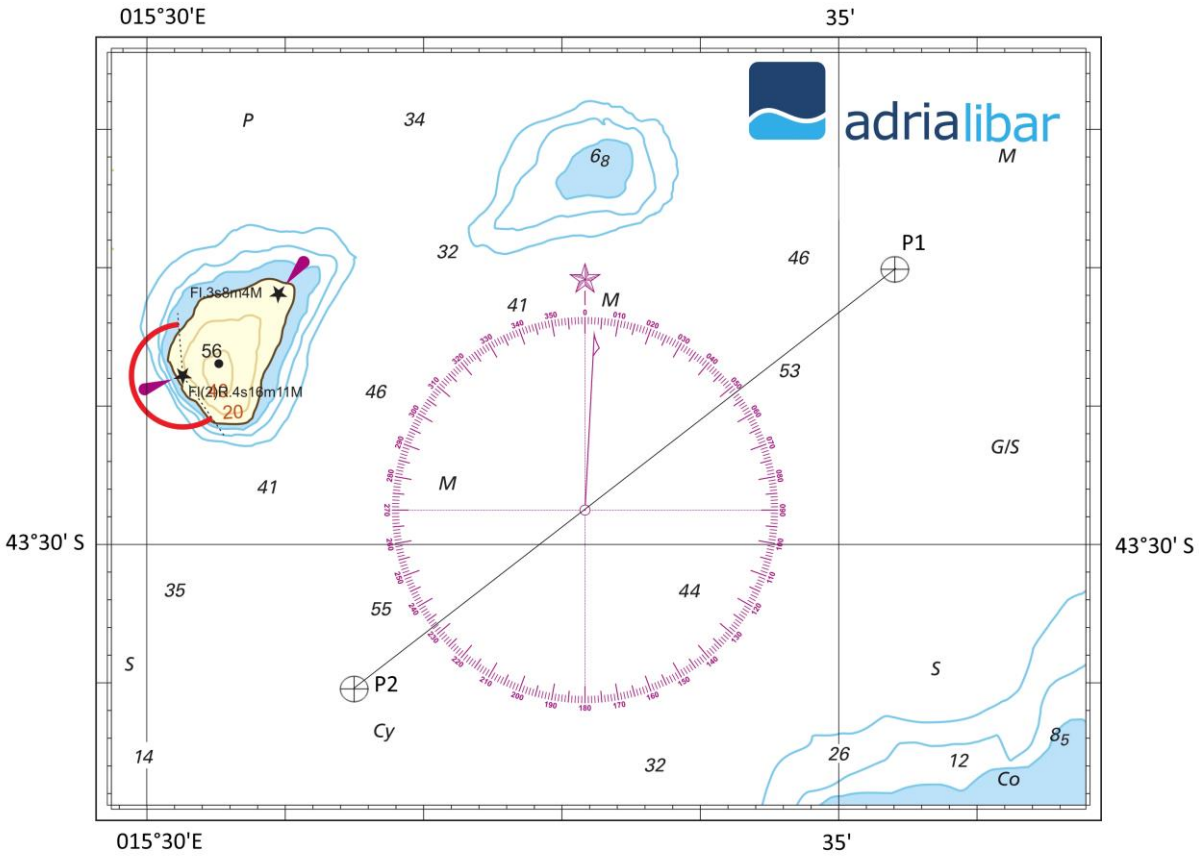
SHIP STABILITY

1. **The definition of stability of the ship**
2. **Positive and negative stability**
3. *The longitudinal and transverse stability of the ship*
4. *Dynamic and static stability of the ship*
5. *Basic Ship points in stability*
6. *Rules of flotation*
7. **Trim**
8. The angle of heel

RADIOCOMMUNICATIONS

1. **Working with VHF device and alternative VHF-in at transmitting the MSI message**
2. **MAYDAY messages**
3. **PAN PAN message**
4. **SECURITE message**
5. **Routine communication - call another ship**
6. **Spelling**
7. **GMDSS (VHF, EPIRB, SART)**
8. **NAVTEX**
9. **Travel from Italy to Croatia, describe, and who to contact, procedures (HR / ENG)**

1. Determine coordinates of the position on the chart Ship P1, P2, the ship's course from P1 to P2, and the azimuth on the light characteristic of coastal Fl 3s 8m 4M when the ship is at the position P1 and P2.



2. Convert the courses and bearings

a) ωc =163 °, Var 2009 = 1.8 ° W (6 ' E), dev = + 3.5 °. Determine the azimuth true for 2019?

b) CT = 001 ° Var 2012 = 2.4° E (7’ W), dev = - 2.1 °. Determine course compass 2019?

c) Var 2011 =4.3° W (7’ W) per year. Determine variation for year 2019.

3. What is represented with these chart symbols?