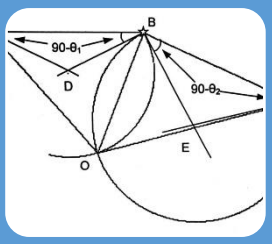
TERRESTRIAL & COASTAL NAVIGATION

By : Anupam Singh Rajput

: SMART MARINER(Please subscribe)

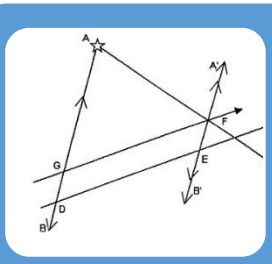
Q NO 1

- PASSAGE PLANNING



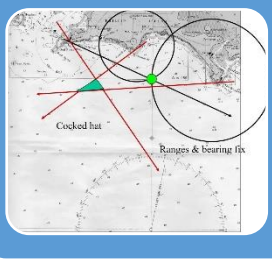
Q NO 2

- HORIZONTAL SEXTANT ANGLE



Q NO 3

- THREE POINT BEARING

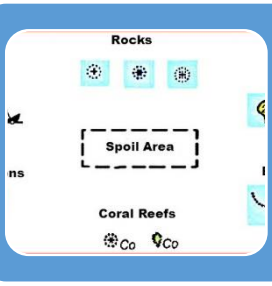


Q NO 4

- TRANSFER OF POSITION CIRCLE/POSITION LINE

Q NO 7

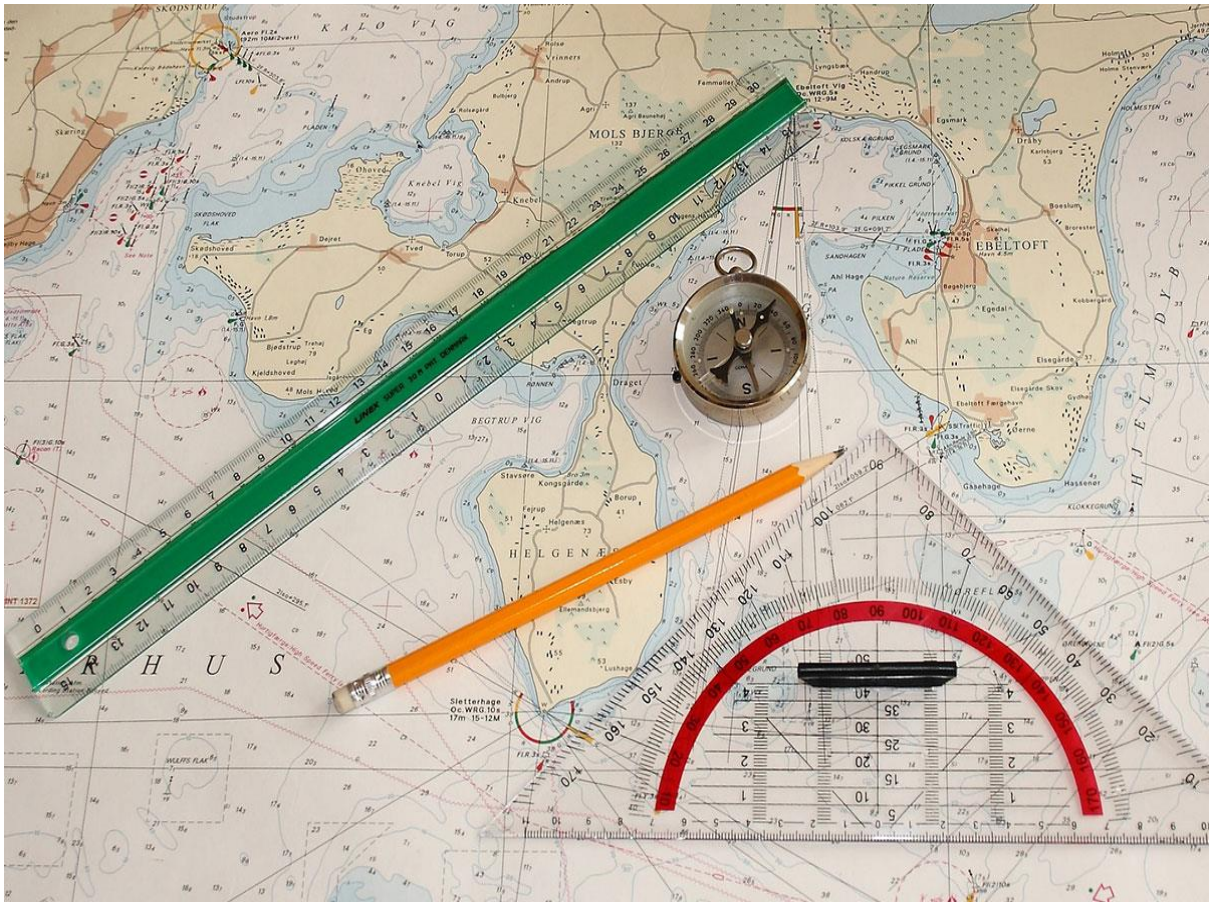
- TIDE CALCULATION



Q NO 8

- CHART SYMBOLS

PASSAGE PLANNING



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Prepared by : Anupam Singh Rajput

Website : marineredition.com

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11.01.2022

CHART WORK

1. Explain the importance of planning a passage, including the legal requirements.

Ans:- a) The main objective of planning a passage berth to berth in order to ensure a safe voyage includes safety of a ship, safety of personnel.

b) The passage plan determines a route to be followed by :-

- Recognizing the hazards associated, assesing the risk and decision points like abort points etc.
- Complying with all the requirement including SOLAS, MARPOL etc.
- Checking the available depth of water and the sufficient sea room.
- Recognizing the danger to navigation areas / NO GO areas where there is less depth which cause (damage to ship) Grounding, any wreck etc.
- Fixing margins of safety, course alteration & wheel over position
- Acting as per the anticipated traffic and weather condition

c) Passage planning is done to ensure that the ship sticks to the required route for reaching the port of destination.

d) A Ship's passage planning involves 4 steps :-

1. Appraisal
2. Planning
3. Execution
4. Monitoring

e) Legal requirements for/during passage planning :-

- SOLAS chapter 5, Annex 24 & 25 titled "voyage planning" and "Guidelines for voyage planning" respectively give specific regulatory information with regard to the passage plan
- In addition CH-VIII, Section A VIII/2 Part-2 title "voyage planning" also give the same information.

PASSAGE PLANNING

- Solar chapter 5, Annexs 24 & 25 titled "Voyage planning" and "Guidelines for voyage planning" respectively, give specific regulatory information with regard to the passage plan
- In addition STCW CH VIII, section A VIII/2 Part-2 title "Voyage planning" also title the same

Steps to follow in exams (in passage planning question)

1. Introduction
   - Solas requirements
   - Berth to Berth
   - Risk assessment
2. 4 stages in details
   - Appraisal
   - Planning
   - execution
   - Monitoring.
3. Plotting on chart

3 hrs paper :- 90 mins for chart work
↓
3 question is there so, 40 min for passage planning

40 min
↓
10 min for writing
↓
30 min for plotting

- Appraisal

This is the process of gathering all information relevant to the proposed passage, including ascertaining risk and assessing its critical areas. This involves information extracted from publication as well as those within the chart. The appraisal will include detail from:-

- ✓ Chart catalogue
- ✓ Navigational charts
- Ocean passages for the world
- ✓ Routeing charts or pilot charts
- ✓ Security charts
- load line charts
- ✓ Sailing direction
- ✓ Light lists
- ✓ tide tables
- tidle stream atlases

- Notices to Mariner
- Routeing Information
- Distance tables
- Electronic navigation system info
- Radio and local warning
- draught of the vessel
- Radio signal information
- Climatic information
- Personal experience
- Mariner's Handbook
- Guide to port entry.

* Planning

The points to be taken into account when planning a passage are:-

- NO-GO Areas
- Margins of safety
- Safe water
- Ocean and open water track
- Coastal & estuarial track
- Chart change
- Track consideration
- Distance off
- Deviation from track, underkeel clearance
- Course alterations & wheel over
- Parallel indexing
- Waypoints
- Aborts & contingencies
- Position fixing.

Continue on Page - 43

Continued from P-38

* Execution

It include

- ETA's for tide
- ETA's for daylight on certain type of vessel
- Traffic condition
- Tidal streams
- Plan modification
- Additional personnel when required
- Briefing
- Fatique

* Monitoring

- various fixing methods
- frequency maintained
- estimated position
- sounding.
- cross track error
- International regulation for preventing collision at sea.
- Non-navigational emergencies
- LOOK-out
- UKC-maintained
- Waypoints.

* Points to mark on chart

1) NO GO Areas
2) Parellel Indexing
3) Use of terestial object for Navigation (except buoys)
4) Use of constant radius turn in alteration.
5) PPI & posn plotting means
6) Eng. status
7) Nav. watch arrangement
8) Calling master
9) Reporting points.
10) VHF channel
11) Abort point
12) Contingency Anchorage
13) Use of TSS & ROR
14) Safety margins - NMT/NLT.
15) W/O points & W/O lines (wheelover)

2) Your vessel is 10' south of Bill of Portland Lt. & equipped with Magnetic & Gyro compass, RADAR with ARPA, ROTI & Echo sounder. She is bound for a position with Ies Sept Iles lt. bearing 180°(T) x 6'. Plan your passage in a safe manner complying with international rules regulation. List all publication you will refer for this passage

BERTH TO BERTH

Ans:- Name of vessel _____ VOY NO: _____ Date: _____

Master _____

(a) Appraisal

(i) In preparing the passage plan following publications/ data were referred to:

See P-69 & 70

(ii) All publications and charts/ENCs corrected upto : ANM no _____ notice no

(iii) Chart/ENC required for planned passage : BA 5049

(b) Planning

Risk assessment carried out

Following are marked on the chart

- NO GO Areas (Eddystone rocks, start point, Skerries bank)
- Use of constant radius turn in alteration

$$ROT = \frac{Velocity}{Radius} \quad \frac{8^2}{4} = 2 \text{ degree per min.}$$

- PPI & pos^n plotting means

  PPI - 5 mins

  Pos^n fix - VISUAL, RADAR & GPS fix

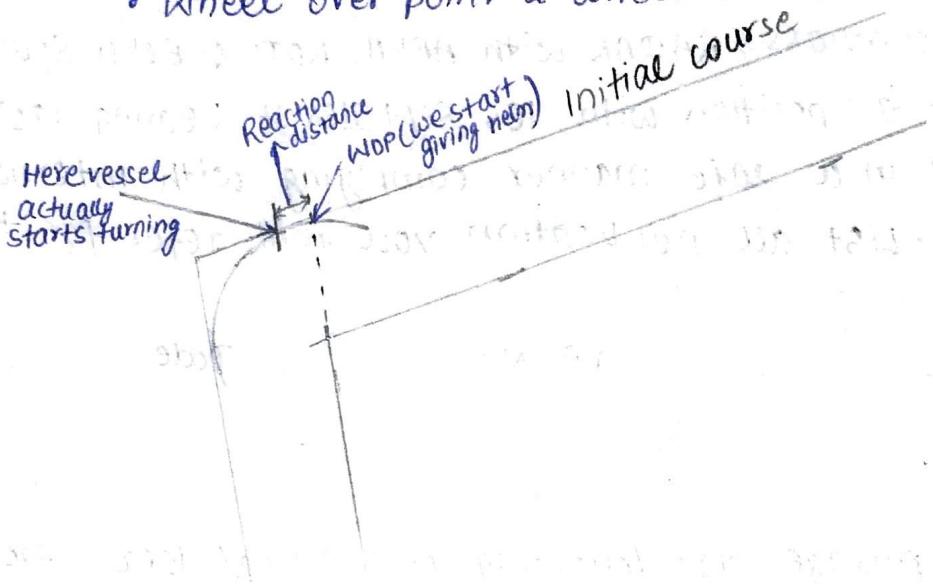
- Engine status i.e. S.B.E

  all the time

- Call Master
- Nav watch arrangement i.e. BRIDGE WATCH LEVEL 03
- Use of Rule 10 - Traffic seperation scheme

  Since the traffic flow is in direction 075°, I will cross the TSS at course 075°+90° = 165°(T) as per ROR 10(c)

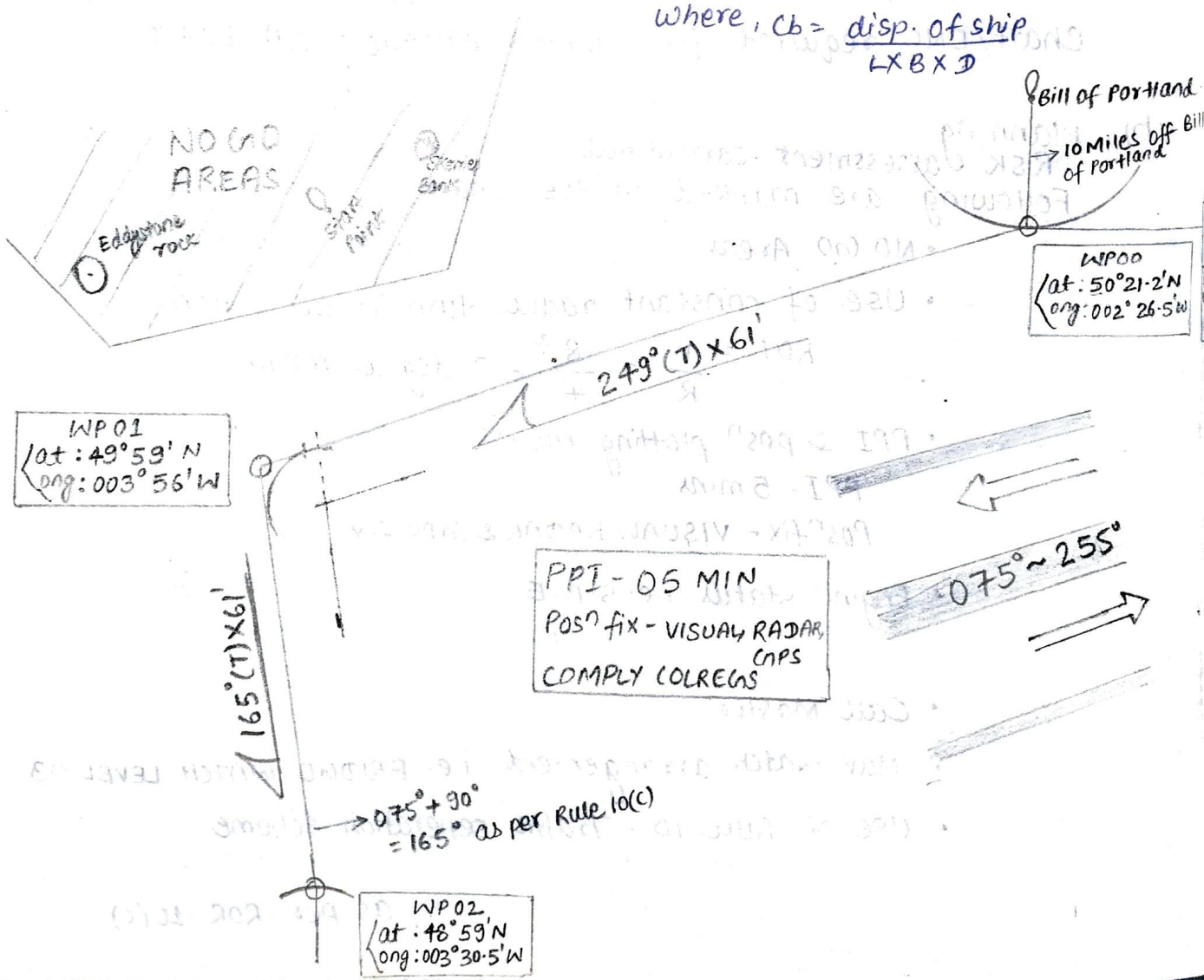
- Wheel over point & wheel over line



- Squat

As it is coastal passage, squat = $\frac{C_b \times V^2}{50}$

where, $C_b = \frac{\text{disp. of ship}}{L \times B \times D}$



Voyage NO. _____ From 10 Miles South of Bill of Portland To Posn 1es sept Iles brg 180°(T) x 6' Dep Date: _____ ETA: _____

SWP NO.	From	TO	CO (T)	Dist. (NM)	DTG (NM)	Speed	Posn fixing method	Charts	Remarks
1.	50°21·2'N 002°26·5'W	49°59'N 003°56'W	249°	61	ECDIS	8	R/G/V	5049	Comply with related SMS Nav Cl, monitor record UKC, give notices as marked
2	49°59'N 003°56'W	48 59'N 003°30·5'W	165°	61	ECDIS	6	R/G/V	5049	Comply with related SMS Nav Cl, monitor record UKC, give notices as marked, monitor wx warning

Prepared by Navigating officer _____ Sign _____ Date _____

Approved by Master _____ Sign _____ Date _____

Execution:

- Condition & reliablity of the vessel navigational equipment
- Meteorological condition & forecast as well as weather routeing information
- Traffic condition.

Monitoring

- Regularly pixing the position of ship particulary at alteration of course.
- Visual fixes if possible
- Determine compass error.
- Radar plotting
- Monitor & record UKC

Practise assignment

① your vessel is a tanker with a draft of 10 mtrs and a speed of 15 Kts. Plan a safe passage from Torquay pilot station to 10 miles due south of Lizard point, taking into account heavy fishing traffic area and visibity of 5 miles for the entire route.

Ans:- Name of vessel _____ VOY NO. _____ DATE _____

MASTER _____

(A) Appraisal

In preparing the passage plan, following publications were referred to :-

→ Admiralty chart catalogue
→ Admiralty list of lights
→ Admiralty tide tables
→ Admiralty list of radio signals
→ Admiralty sailing direction
→ Navigational charts
→ Routeing chart
→ Security (Q-series) chart
→ Load line chart
→ Bridge procedure guides
→ Ocean passages of the world
→ Distance Table
→ Mariner's Handbook (NP 100)
→ Guide to port entry
→ T&P Notices in force
→ Manoeuvring characteristics diagram
→ SMS manual
→ SMS Nav. checlist.

6- Admiralty
4- Chart
5- Books
4- niche waala 4

All publication and charts/ENC corrected upto notice no. : ANM NO _____

Chart/ENC required for planned voyage : BA 5049

Vessel arrival/departure draft : (F) 10.0 mtr (A) 10.0 mtr

(B) PLANNING

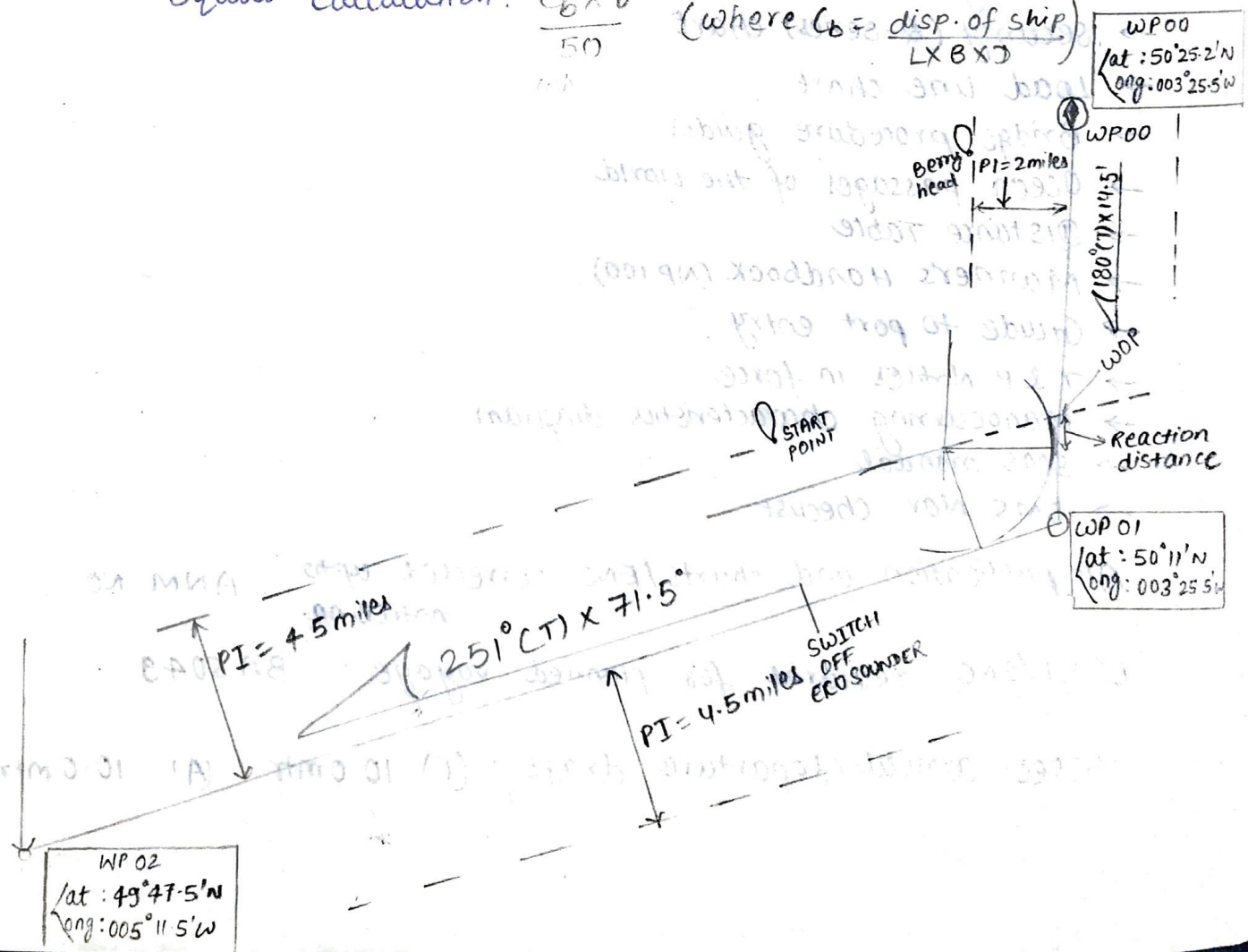
→ Risk assessment carried out

→ Following are marked on the chart:

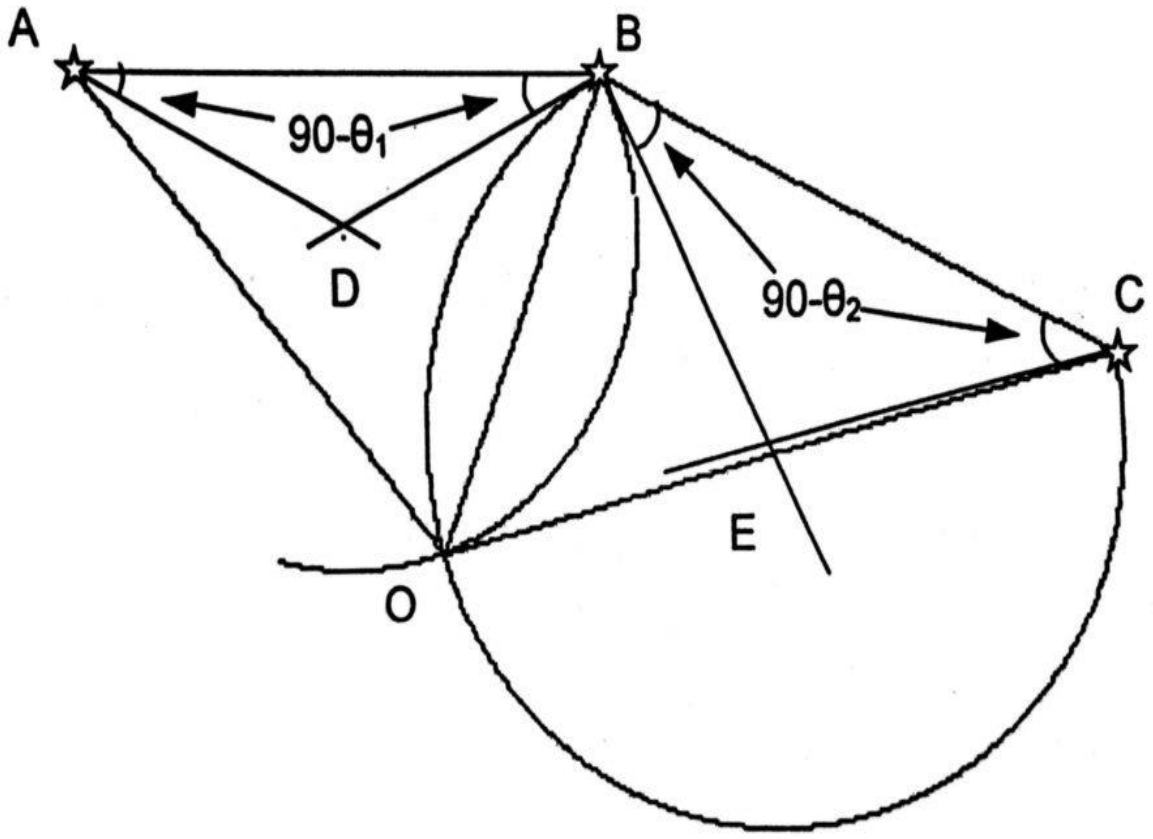
- ND GD Areas
- Constant Radius Turn

$\left(\frac{V}{R}\right)$ RDT $= \frac{12}{3} = .4°/min$

- PPI & posn plotting means
- Engine status
- Call master
- Nav watch arrangement
- Echo sounder on/off
- Wheel over point & wheel over line
- Parallel indexing
- COMPLY COLREGS
- Squat calculation: $\frac{C_b \times V^2}{50}$ (where $C_b = \frac{disp. of ship}{L \times B \times D}$)



Horizontal sextant angle



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(For more notes: visit the website)

Example II - Page 77 of book.

Needles Pt. Lt. HO - 345°(C)
St. Catherine Pt. Lt. HO - 015°(C)
Nab Tower - 039°(C)

Soln:- Difference in the bearing :-

(i) Needles point & St. catherine light house

HSA ⇒ 345 ~ 015° = 30°

& if the horizontal sextant angle θ is less than 90°, the compliment of horizontal angle will be

$90° - \theta$
$= 90° - 30°$
$= 60°$

(ii) St. catherine Lt. HO & Nab Tower

HSA ⇒ 015° ~ 039° = 24°

Compliment of horizontal sextant angle will be

$90° - \theta$
$= 90° - 24°$
$= 66°$

Now start plotting

Step ① :- Join all three light house with a line from left to right, & name it A, B & C.

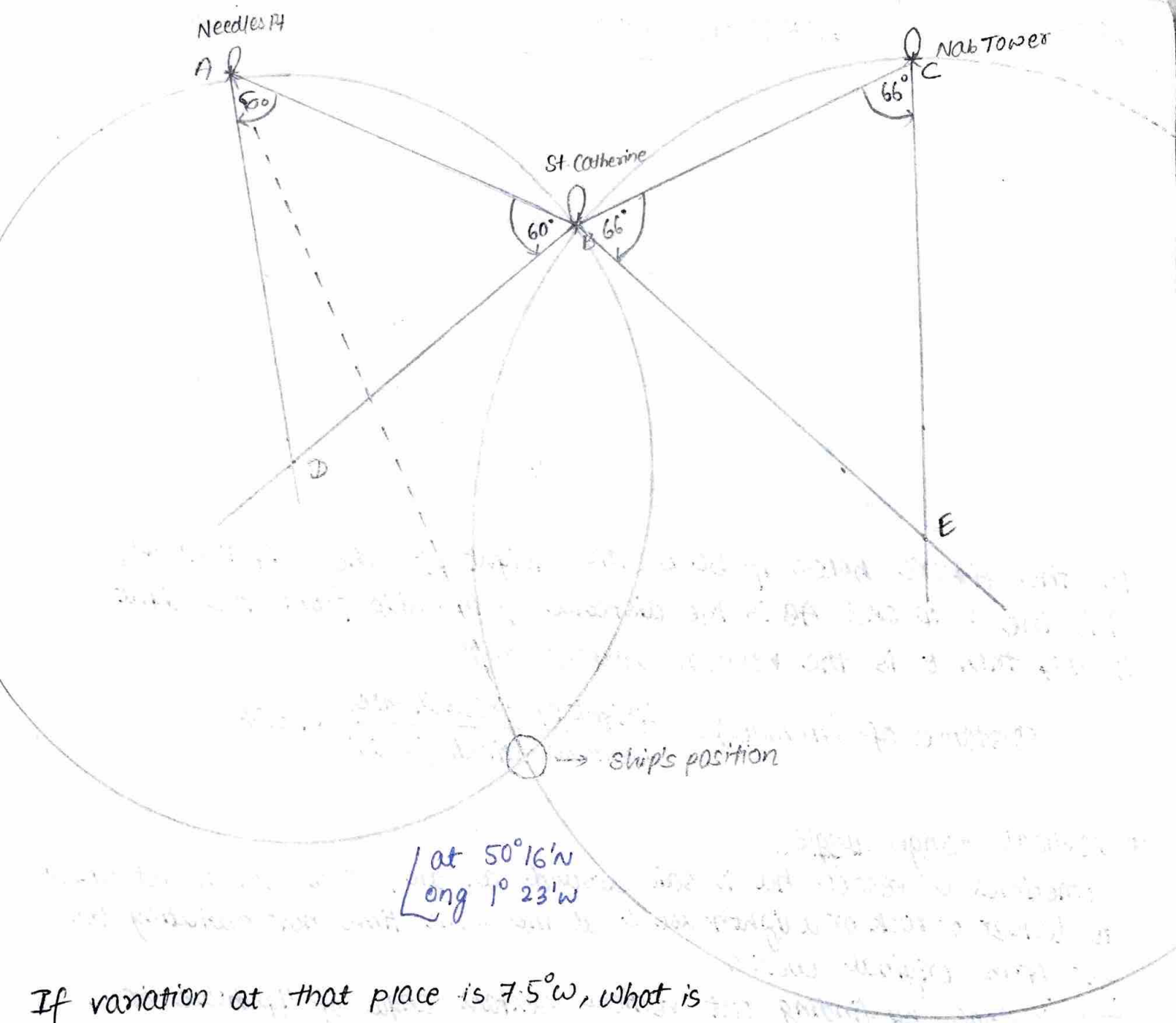
Step ② :- Lay of 60° angle at needles & St. catherine on the same side of the observer
The point where they intersect, name it D

Step ③ :- Taking a centre D, draw a circle passing from both Lighthouse.

Step ④ :- Lay of 66° angle at St. catherine & nab tower on the same side of observer
The point where they intersect, name it E

Step ⑤ :- Taking a center E, draw a circle passing from both the lighthouse

Step ⑥ :- Point where both the circle intersect will be the ship's position.



at 50°16'N
Long 1°23'W

If variation at that place is 7.5°W, what is deviation?

For that we need True bearing

Step :- from the (dotted line) above, take the parallel ruler to the compass rose & that will be the true bearing
(lt. ho. to ship's posn)

True bearing - 341°(T)

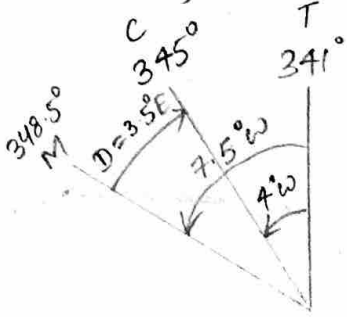
Compass bearing - 345°(C)

Compass Error - 4°W (Error west, compass best)

variation - 7.5°W

Deviation = 3.5°E

C D M V T



* If error at A, B & C are 5, 5 & 10 respectively, take $5+5+10/3 = 20/3 = 6.33$

HORIZONTAL SEXTANT ANGLE (3 lighthouse & their bearing are given / To find : Ship's position & deviation)

① November 2021, Q.No. 4 (see Page-52 for procedures)

Difference in the bearing

(i) Abbekas fishing light & ystand light

$HSA = 303^\circ \sim 014^\circ = 071^\circ$

& the complement of horizontal sextant angle will be

$90^\circ - \theta$

$= 90^\circ - 071^\circ$

$= 019^\circ$

(ii) Ystand light and Kaseberga light

$HSA = 014^\circ \sim 077^\circ = 063^\circ$

& the compliment of the horizontal sextant angle will be

$90^\circ - \theta$

$= 90^\circ - 63^\circ$

$= 027^\circ$

(a) Position of the ship :

$055^\circ\ 20.2'N \quad 013^\circ\ 48.2'E$

DIAGRAM

(b) Deviation of ship's head = ?

True bearing of abbekas fishing light : 298° (T)

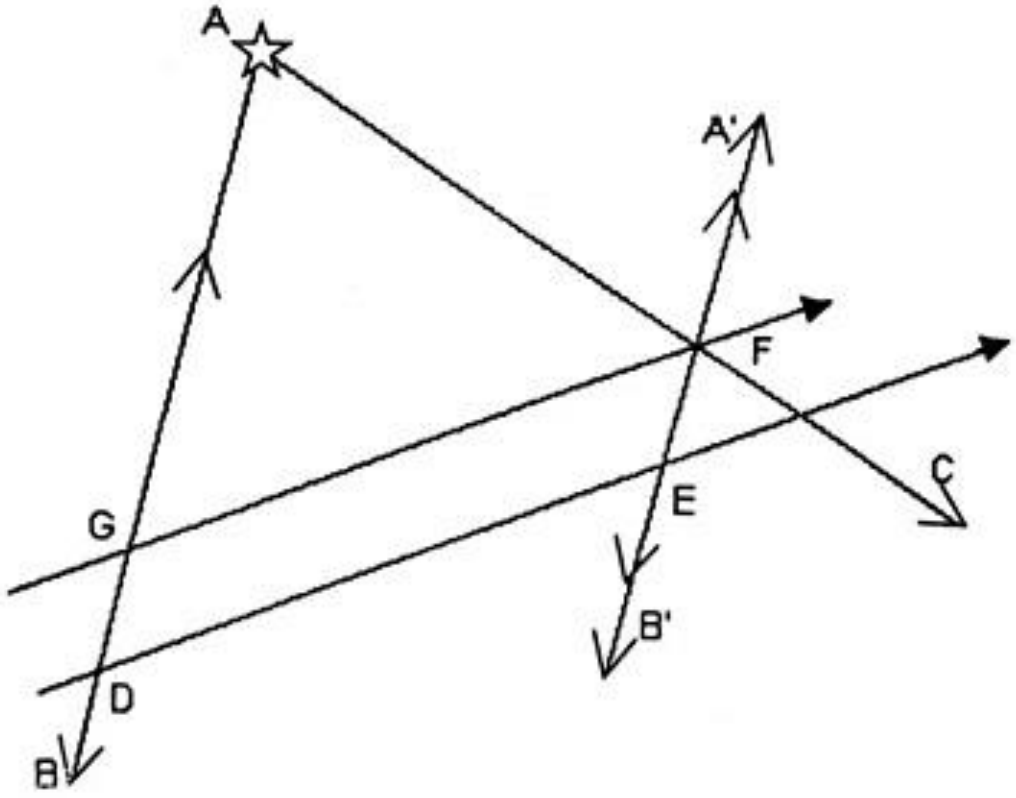
Compass bearing of abbekas fishing light : 303° (C)

Compass error : 5° W

Variation : 6° W

Deviation : 1° E

THREE POINT BEARING



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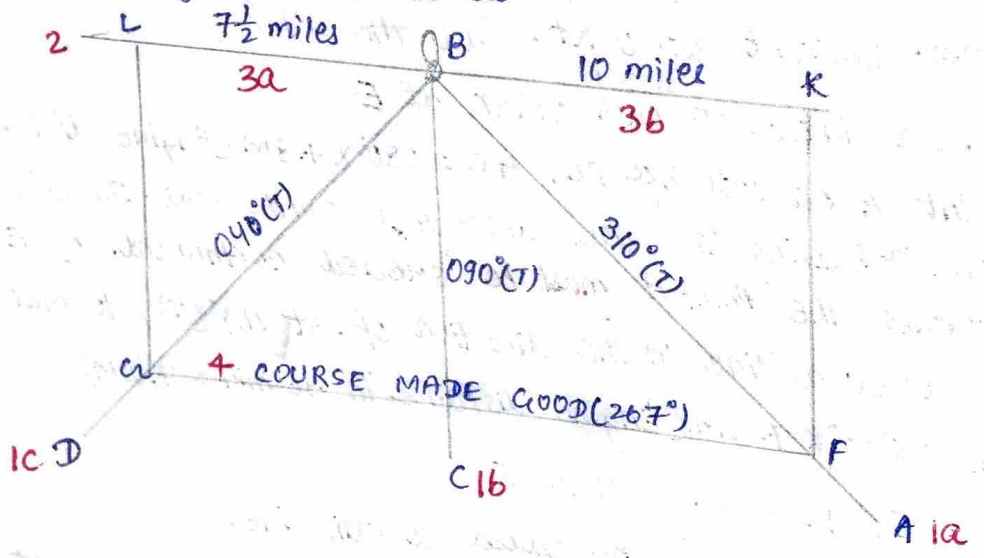
THREE POINT BEARING

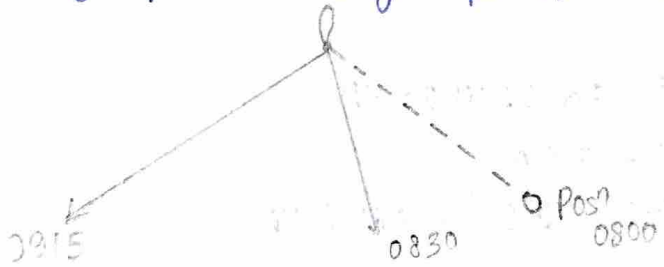
1. Lay three true bearing of the same object on the chart
2. Then a line at right angles to the middle bearing is drawn passing through the central point/object.
3. The distance steamed beetween the first and the center bearing and the distance steamed beetween 2nd & 3rd bearing is marked on this perpendicular line drawn.
4. Now draw lines parallel to the middle bearing through the point just obtained on the perpendicular line to cut the first & third bearing. By joining the points where they cut first and third bearings, the course made good is obtained.



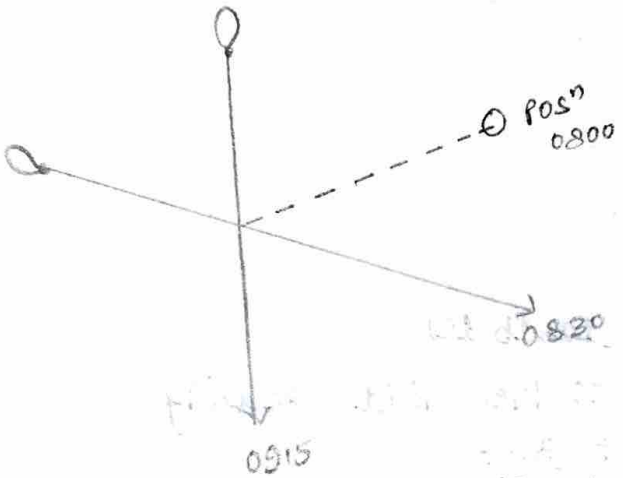
Type of 3 point bearing scenarios

1) Three bearing from a single point/Lt-HD. all at different times.

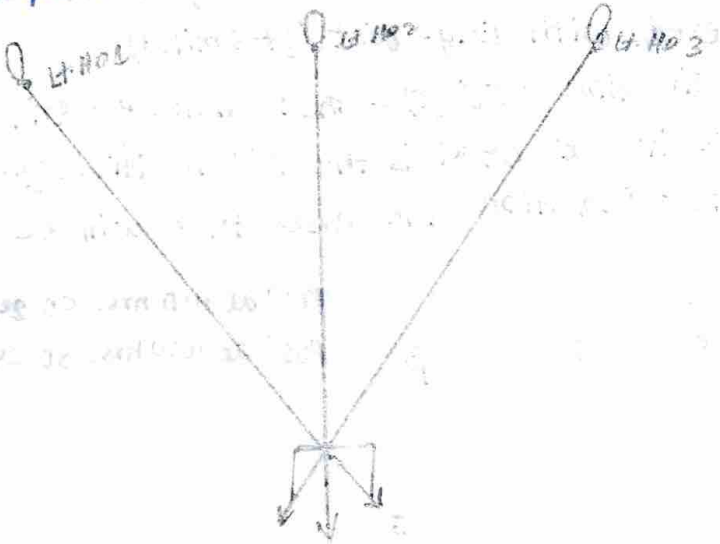
2) Two bearing from a single point/Lt-HD. & one position. All at diff-times



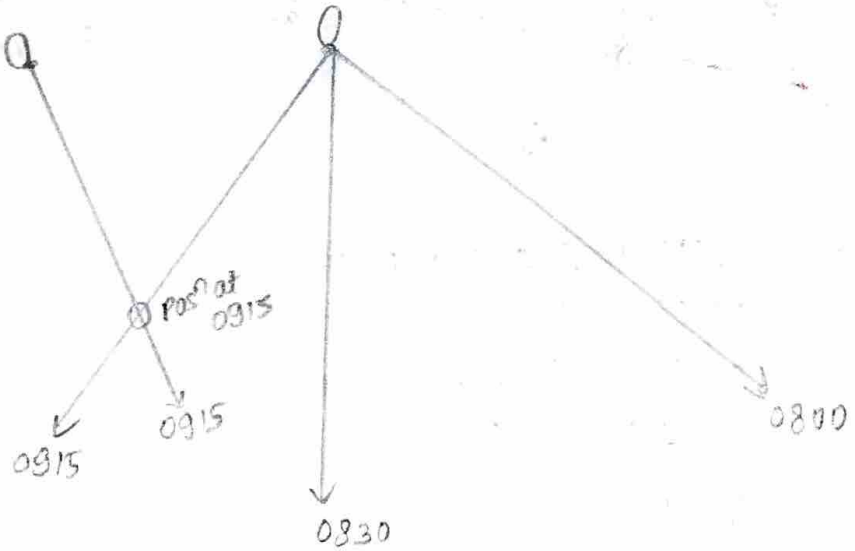
(3) Two bearing from a 2 point/Lt Ho. and one position. All at different times and intersect at a point.



4) Three bearing from 3 different Lt. HO at different times, intersecting at one point.



5) Three bearing from a single Lt. HO at different times. And one from a different Lt. HO intersecting to give a position.



* Three point bearing with current given- find CMG

Exam-pie:- Say CO steered 260°(T) Eng spd 15 Kts

Bearing 1) At 1000 hrs, 310°(T)

2) At 1040 hrs, 000°(T)

3) At 1110 hrs, 040°(T)

Current setting 055°(T)

Steps:-

(1) Draw the three bearing (1a, 1b, 1c)

(2) Draw a perpendicular to the middle bearing (2)

(3) Mark off the eng. dist. (3 & 4)

(4) Drop parallels to center bearing (5 & 6)

(5) Join the 2 parallel Fm and that is the CMG (7) CMG = 267°(T)

(6) Draw FS i.e. course steered with Eng. dist. (17.5 miles) (8)

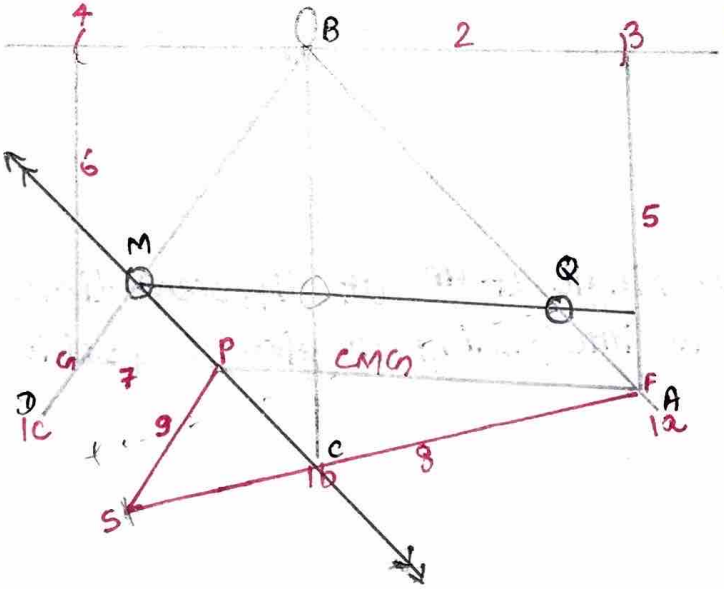
(7) Lay off current SP in direction 055°(T) - then dist. SP = drift (9) = 4.8 miles

(8) Transfer 1a to 1c where it cuts at M is the 3rd position (10)

(9) Walk back with CMG to 1st position line and that will be the 1st position (11)

Posn at 1110 hrs: 50°24'N 002°36'W

Posn at 1000 hrs: 50°24.2'N 002°15'W



P = EP

M = final posn @ 1110 hrs

Q = Initial posn @ 1000 hrs

Exercise III :-

Compass CO - 084°(C)
Deviation: 1·1°W
Magnetic CO: 82·9°(M)
Variation : 6°W
True CO : 076·9°(T) Error : 7·1°W

	1st brg (0700 hrs)	2nd Brg (0800 hrs)	3rd brg (0840 hrs)
C. Brg	130°	185°	229°
C. Error	7·1°W	7·1°W	7·1°W
T. Brg	122·9°(T)	177·9°(T)	221·9°(T)

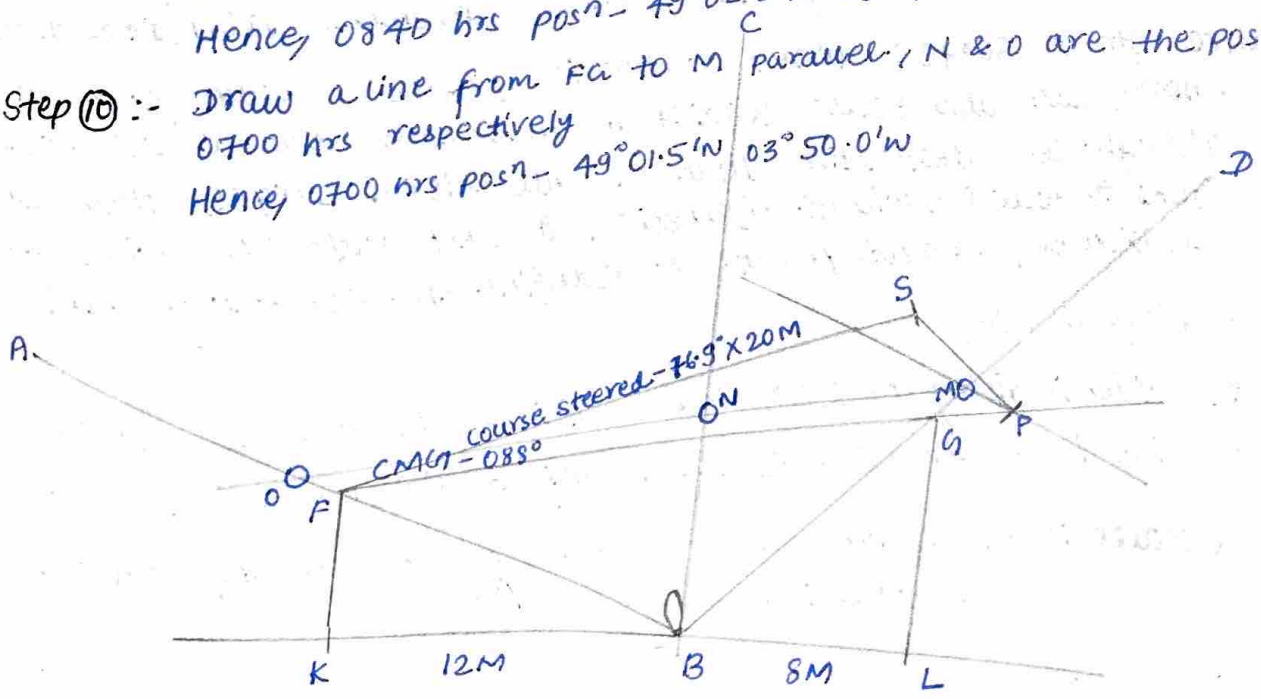
Step ① :- Step 1, 2, 3, 4, 5, 6 same as P-68

Step ② :- Take CMG little further ahead bcz question says current direction in SE Quadrant

Step ⑧ :- Current - 3 Knots
In 1h 40m = 5 Knots
Take 5miles arc from S & cut on the extended CMG part, name it P, then join S & P
i.e. direction of current = 142°(T)

Step ⑨ :- The position of 3rd brg can now be found by Running fix.
From 1st brg AB take parallel to P, the line cuts at 3rd brg M
M is the posn of ship at 3rd brg
Hence, 0840 hrs posn - 49°02·5'N 03°17·0'W

Step ⑩ :- Draw a line from Fa to M parallel, N & O are the posn at 0800 & 0700 hrs respectively
Hence, 0700 hrs posn - 49°01·5'N 03°50·0'W



Practise sums

Q.①: From a ship steering a steady course of 262°(T), following bearing were taken of LIZARD POINT Lt. Ho.

1700	299·5°(T)
1735	330°(T)
1825	024°(T)

(Three point bearing)

Find CMG, if ship's speed over water is 14 Kn. & direction of set 119°(T). Also find the rate of current & position at 1825 hours.

Ans:- Steps:

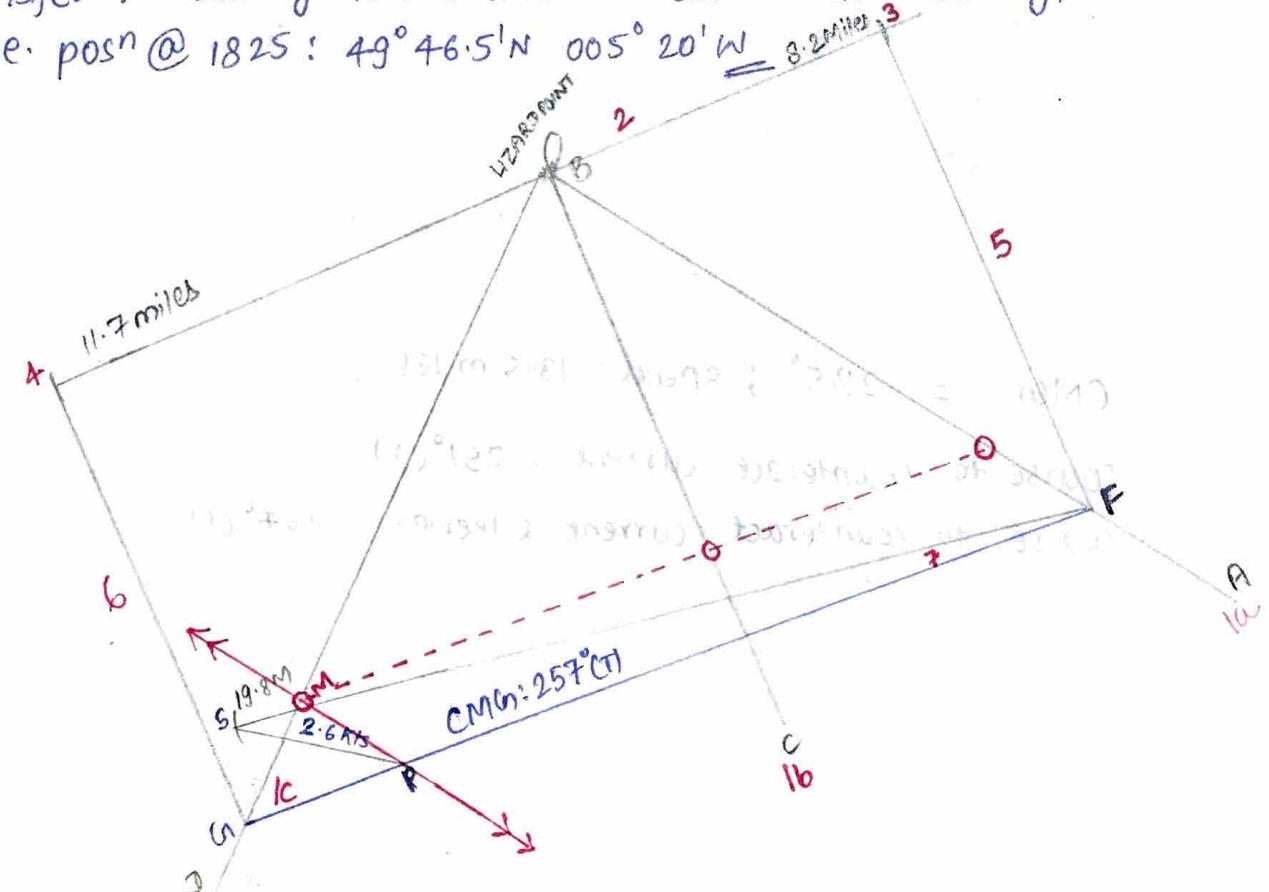
① Draw all three bearing of LIZARD point Lt ho. (1a, 1b, 1c)
② Draw a perpendicular to the middle bearing. (2)
③ Mark off the eng. dist. [1700 to 1735: 8·2M, 1735 to 1825: 11·7M] (3 & 4)
④ Draw parallel from centre bearing to the eng. dist at either side (5 & 6)
⑤ JOIN the 2 parallel FG & that is the CMG (7)

CMG = 257°(T)

⑥ Draw FS i.e. Ship's course - 262°(T) & mark off the total distance [1700 to 1825 : 19·8 M]
⑦ Lay off the current SP [119°(T)] 680 upto CMG
measure the distance SP i.e.

rate of current : 2·6 Kts

⑧ Transfer 1st bearing to P & where it cuts on third bearing, name it M
i.e. posn @ 1825 : 49°46·5'N 005°20'W



THREE POINT BEARING

(Given: • vessel co & spd
• 1 lighthouse & 3 bearing are given of 3 different time; current given
To find: • Posn @ time of 1st brg, 2nd brg & 3rd brg.
• CMG & SMG)

For procedures see page-68

① NOVEMBER 2021, 2 (CHART 5072)

- vessel course & speed = 284°(T) X 12 KNOTS.
- Sandhammaren light house bore:-

At 0900 hrs	-	311°(T)
At 0940 hrs	-	352°(T)
At 1010 hrs	-	038°(T)

- current setting: 190°(T) X 2 knots.

Solution:-

Distance travelled from 0900 to 0940 = 8 miles

60 min = 12 kts
1 min = 12/60
40 min = $\frac{12}{60} \times 40 = 8$
30 min = $\frac{12}{60} \times 30 = 6$

Distance travelled from 0940 to 1010 hrs
= 6 miles.

CMG = 276°(T)

@ Position at 0900 hrs & 1010 hours

Posn at 0900 hrs:- 055° 15·6' N
014° 27·2' E

Posn at 1010 hrs:- 055° 17·0' N
014° 03·0' E

⑥ & © CMG & SMG

CMG = 276° (T)

SMG = 12 Knots

DMG:-
(14 miles in 1hr 10 min)

② Feb 2022, Q. No. 2 (chart 5047)

Given: • vessel co & spd = 020° (T) X 12 Kts.

• North Lundy lighthouse bearing
At 2100 hrs - 083° (T)
AT 2130 hrs - 124° (T)
AT 2148 hrs - 139° (T)

At 2130 hrs same lighthouse was 8.4 n.m. off

Distance steamed from 2100 to 2130 hrs = 6 miles

Distance steamed from 2130 to 2148 hrs = 3.6 miles

60 min = 12 Kts
1 min = $\frac{12}{60}$
30 min = $\frac{12}{60} \times 30$
= 6
$\frac{12}{60} \times 18 = 3.6$

CMG = 012° (T)

vessel movement in 48 min = 9.6 miles.

course made good to reach Port Tabalot pilot station = 073° (T)

distance from 2148 to port talbot pilot station = 33.2 miles.

Question say, we have to reach port talbot pilot station at 0100 hrs

2148 ~ 0100 = 03h 12m

in 03h 12m we have to go 33.2 miles
192m 33.2 miles

SMG = $33.2 \times \frac{60}{192}$ = 10.4 Kts

SMG = 10.4 Kts.

course to steer = 078°(T)

& Engine speed = 8.6 Kts.

③ March 2020, Q. No. 2 (Chart 5048)

Given:

- vessel co & speed: 043°(T) x 12 Kts
- Old head Kinsalet bearing:

  At 0900 hrs - 330°(T)

  At 0924 hrs - 280°(T)

  At 1000 hrs - 245°(T)

- At 1000 hrs, balley cotton island was 10 miles off.

To find: CMG = ?

SMG = ?

Set & drift = ?

posn @ 1012 hrs = ?

60 min = 12 Kts

1 min = $\frac{12}{60}$

24 min = $\frac{12}{60} \times 24$

= 4.8

Solution:

Distance steamed between 0900 to 0924 hrs

= 4.8 miles

Distance steamed between 0924 to 1000 hrs

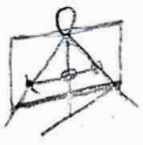
= 7.2 miles.

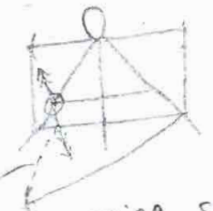
CMG = 357°(T)

NOTE:

* when we have to find set & drift

Go opposite.

① 

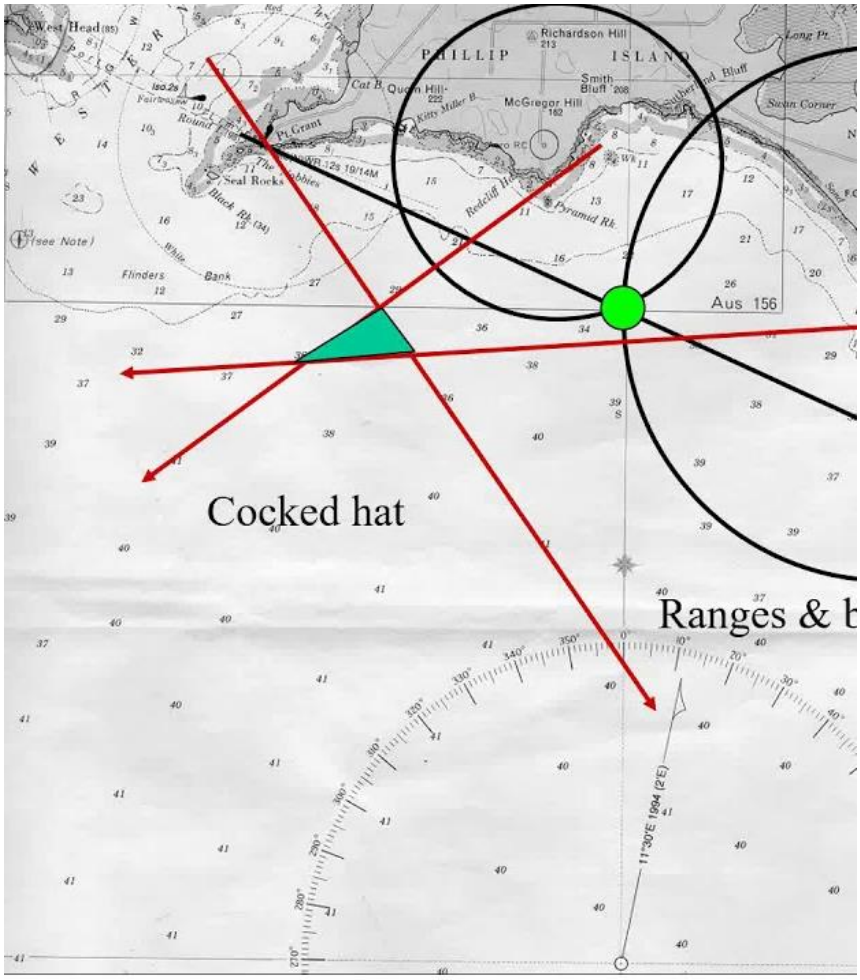
② 

Join the engine speed & point where PL cuts the CMG line

* CMG line ko apne pass toh current starting mein plot karenge

CTS " " " " " current engine dist. kaatne ke baad karenge.

TRANSFER OF PC/PL



YouTube : SMART MARINER

Prepared by : Anupam Singh Rajput

Website : marineredition.com

(For more notes: visit the website)

TYPE 1: RANGE+BRG

* Transfer of position line with current when 1 PL & 1 PC or 1st PC & 1 PL are given @ different times and from different lighthouses.

Steps:-

1a & b - Draw the PL from LH1 & PC from LH2

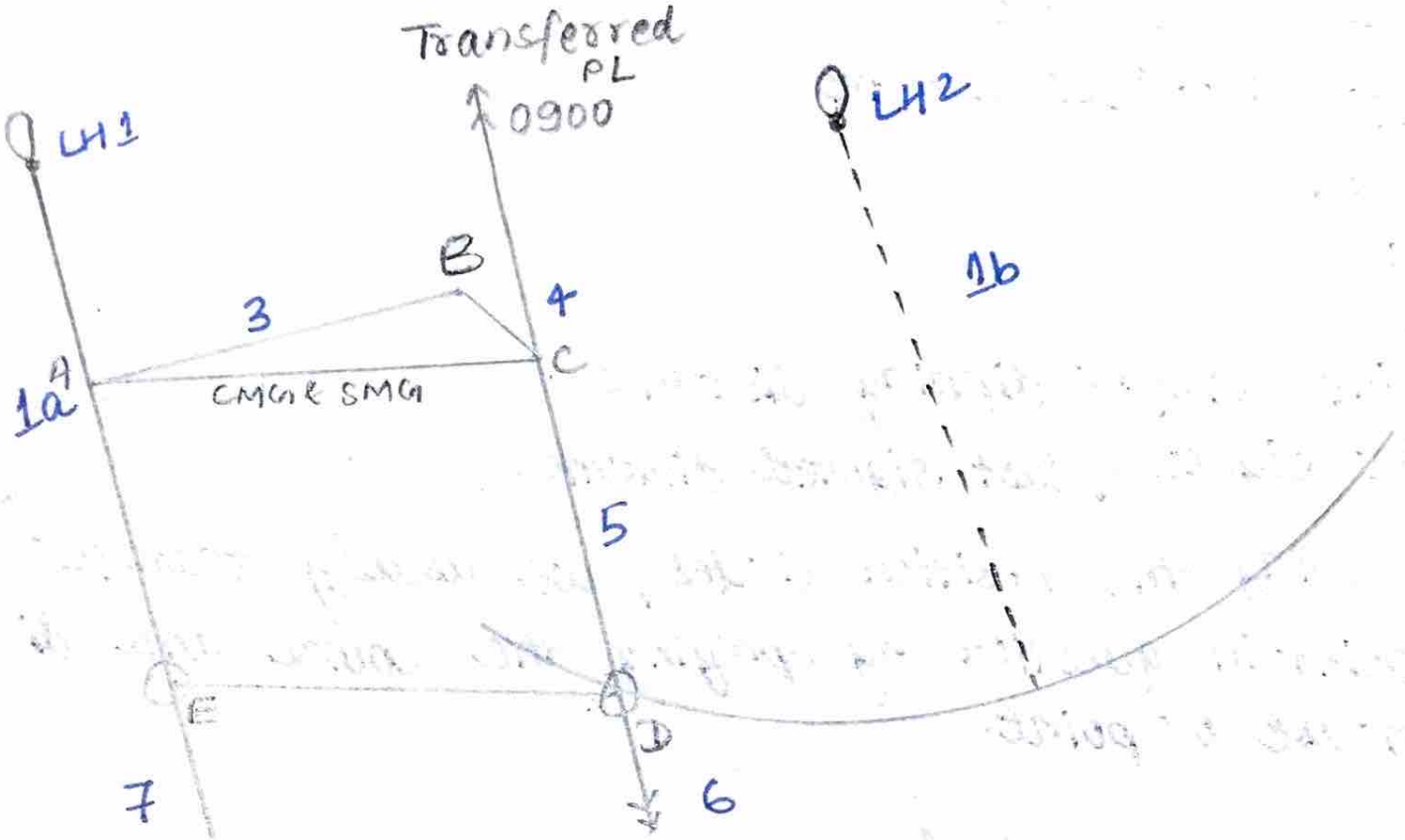
2 & 3 - Take any point 'A' on the PL and draw CTS and cut Engine ~~speed~~ dist. at B

4 - From B draw set and rate to C

5 - Transfer first PL to C

6 - where the transferred PL cuts the PC at D is the second position.

Reverse the plot from d to cut the 1st PL at 'E' which is the 1st position.


Transferred PL
0900
LH1
LH2
1a
1b
A
B
C
D
E
3
4
5
6
7
CMG & SMG

position circle ↑ position line ↑

RUNNING FIX / Transfer PC or PL

Type ①:- 1st Lt. ho. range + 2nd Lt. ho. brg.

For explanation, see page 58

1) November 2024, Q. 3.

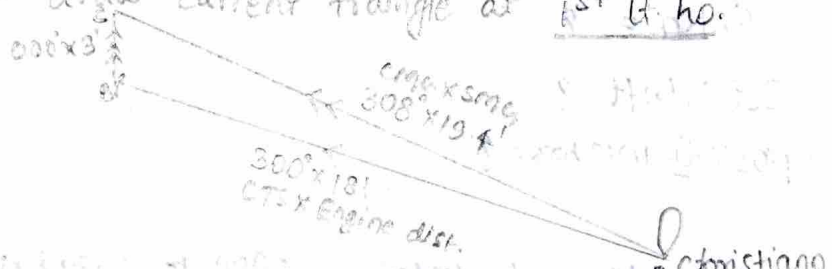
Given:-
- vessel co & spd = 300°(T) X 12 Kts CTS
- Chritianso Lt. ho. = fwd of beam, 7 N.M. @ 1900 hrs
  Simrisham = bear. 302°(T) @ 2030 hrs.
- current setting = 000°(T) X 2 Kts.

TO find: position of 1900 (=)?
position of 2030 =?

Solution:
- Draw 1st PC = 7 N.M
  2nd PL = 302°
- Engine distance from 1900 to 2030 hrs
  = 12 X 1.5 hrs
  = 18 miles

current = 2 X 1.5 hrs = 3 Kts.

Now draw current traingle at 1st Lt. ho.

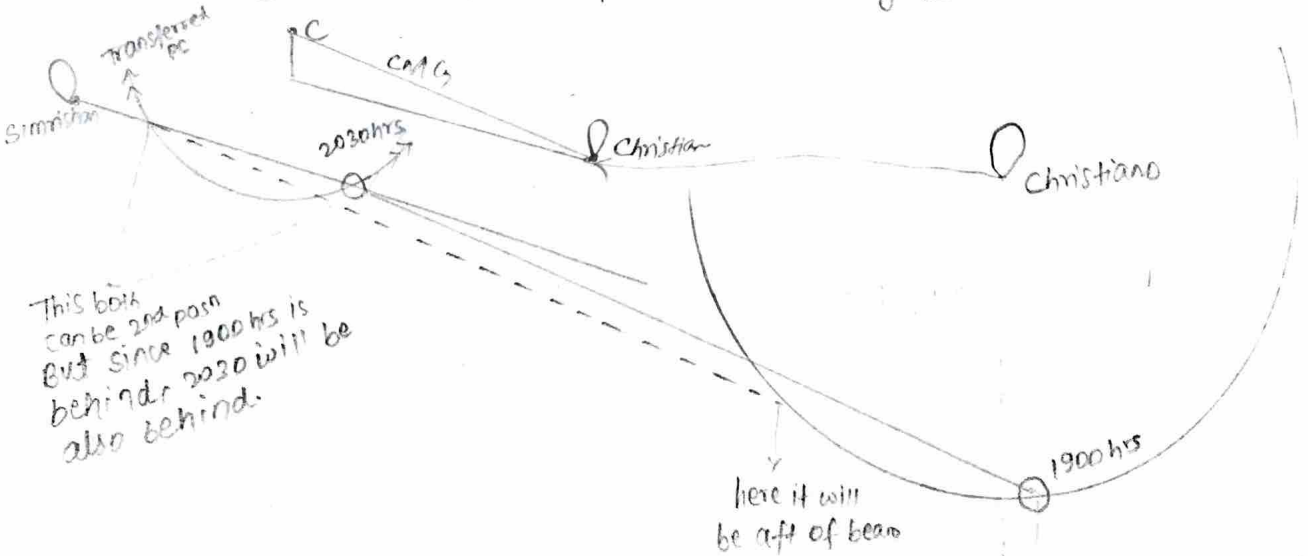


Now we got CMG i.e = 308°

SMG = $19.4 \times \frac{60}{90} = 12.9$ Kts

- from point C, transfer PC at PL.

(But it cuts at 2 point. Question say at 1900 hrs, it should be fwd of beam)



This both can be 2nd posn But since 1900 hrs is behind 2030 will be also behind.

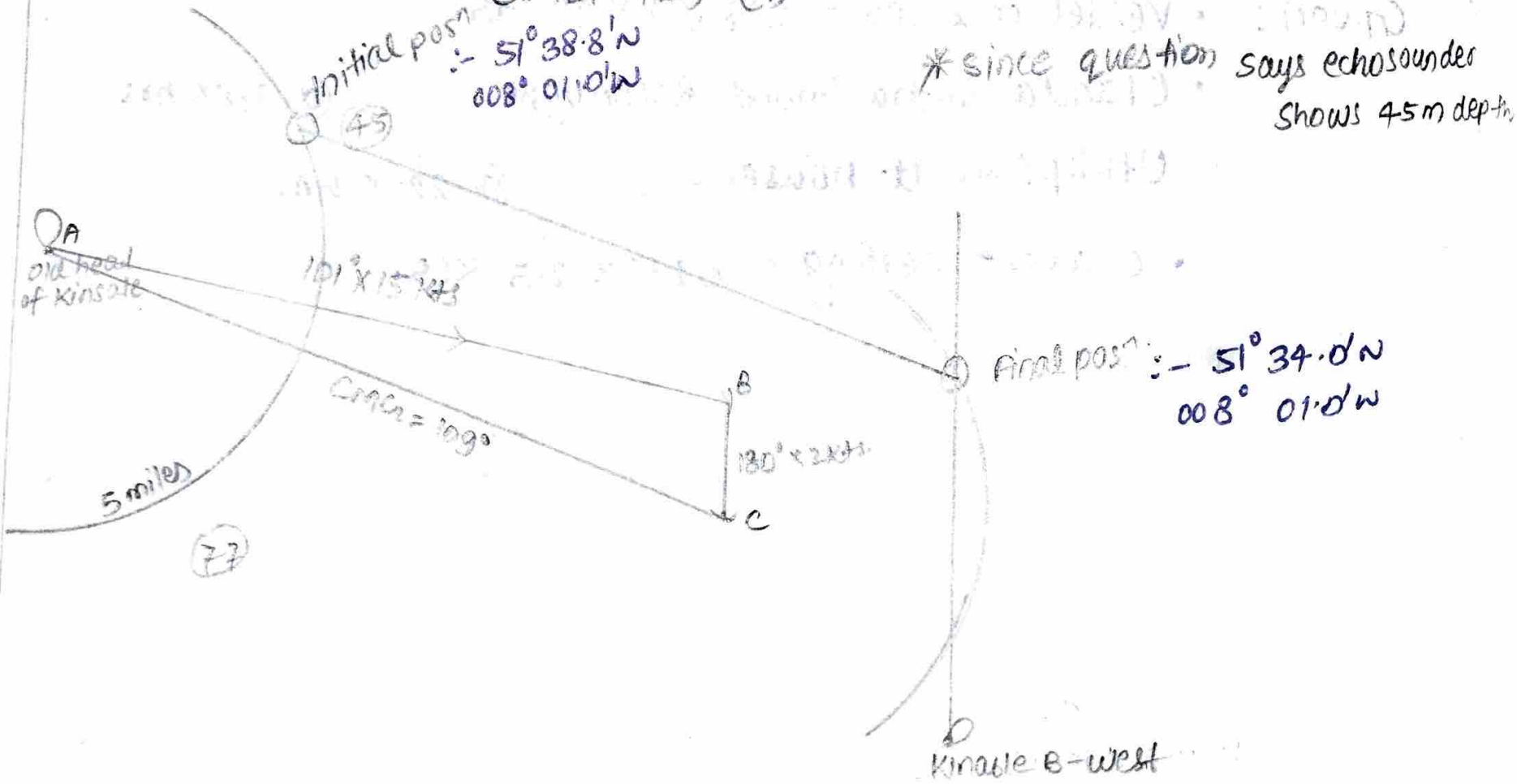
here it will be aft of beam

here it will be fwd of beam
So, this is 1900 hrs posn

4) From type ① :- July 2024 Q.2 (chart 5048)

Error = 1° (H)

Given :-
- vessel co & spd : 101°(T) X 15 Kts
- current setting : 180° X 2Kts.
- Old head of Kinsale : 5 miles off in stbd quater
  Kinable B west Lt ho : bearing 180°(T) [181 - 1° = 180°]



* since question says echosounder shows 45m depth

TYPE 2: RANGE+RANGE

* Transfer of PC with current when 2 PCs are given at different times from diff. light house also called transfer of position circles.

Steps :-

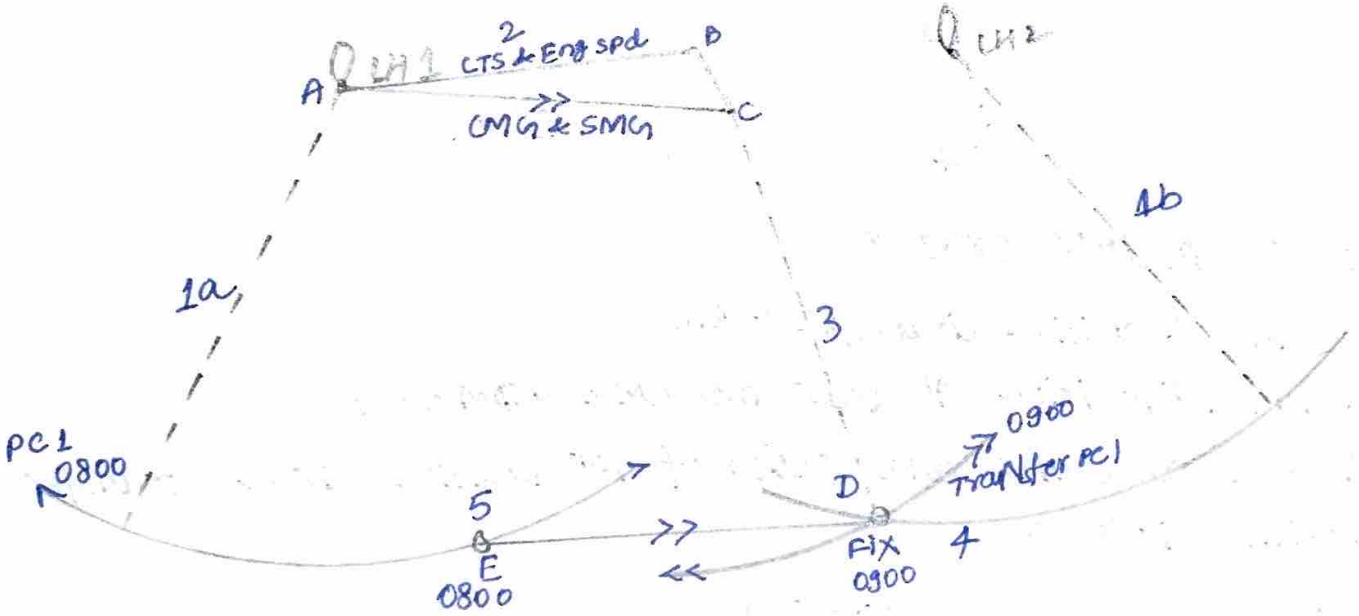
1a & 1b - Draw the 2 PCs one from each light house

2 - With the 1st Lt ho. as center, draw the current traingle

3 - From the CMGs & DMGs point 'C', transfer the 1st PC

4 - where it cuts the 2nd PC, at 'D' is the final position

5 - Work back to the 1st PC to get the 1st position.



Q) ~~November 2018, Q.No.3~~

~~Given: vessel co & speed~~

Type ②:- 1st H.ho. range + 2nd H.ho. range

For explanation, see P-59

Aug 2021, Q. No. ④

2) Given:
- Vessel Co & Spd = 077°(T) x 8 Kts.
- current setting = 315° x 2 Kts.
- Straight point - 7 miles @ 2100 hrs
  Beer head - 5 miles @ 2145 hrs.

- Draw 1st PC & 2nd PC
- Engine distance from 2100 to 2145 = 8 x 0.75
  = 6 miles.

current =
2 x 0.75
= 1.5 Kts.

By drawing current Δ at 1st H. ho.
we get CMG = 064°(T)

Posn @ 2145 hrs: 50° 36.6' N
003° 04.4' W

Posn @ 2100 hrs: 50° 34.2' N
003° 11.6' W

Type ③: First sighted/last sighted. (Chart 5072)

3) October 2024, Q.NO.④

Given:
- Vessel co. & spd = 228°(T) X 12 Kts.
- Olanda Sodra Grund Racon light = 13 miles @ 2100 hrs
  Utklippan lt. house = 14 miles @ 2200 hrs.
- current setting = 013° X 2.5 Kts.

* Find the ranges from luminous range diagram.

Nominal range is given on the chart.

" " of Olanda Sodra grund = 22 M, then from graph = 13M

" " " Utklippan lt. house = 24 M

CMG = 236.5° (T)

Posn @ 2100 hrs: 055° 58·5' N
016° 20·2' E

Posn @ 2200 hrs: 55° 53' N
016° 05·7' E

Posn when UtKlippan last sighted: 55° 43·2' N
015° 39·5' E

Time when it is last sighted = **23h 44min**

SMG = 10 Kts

(2200 to last sighted posn) DMG = 17·4 miles

= 104·4 min

= 1hr 44·4 min. + 2200

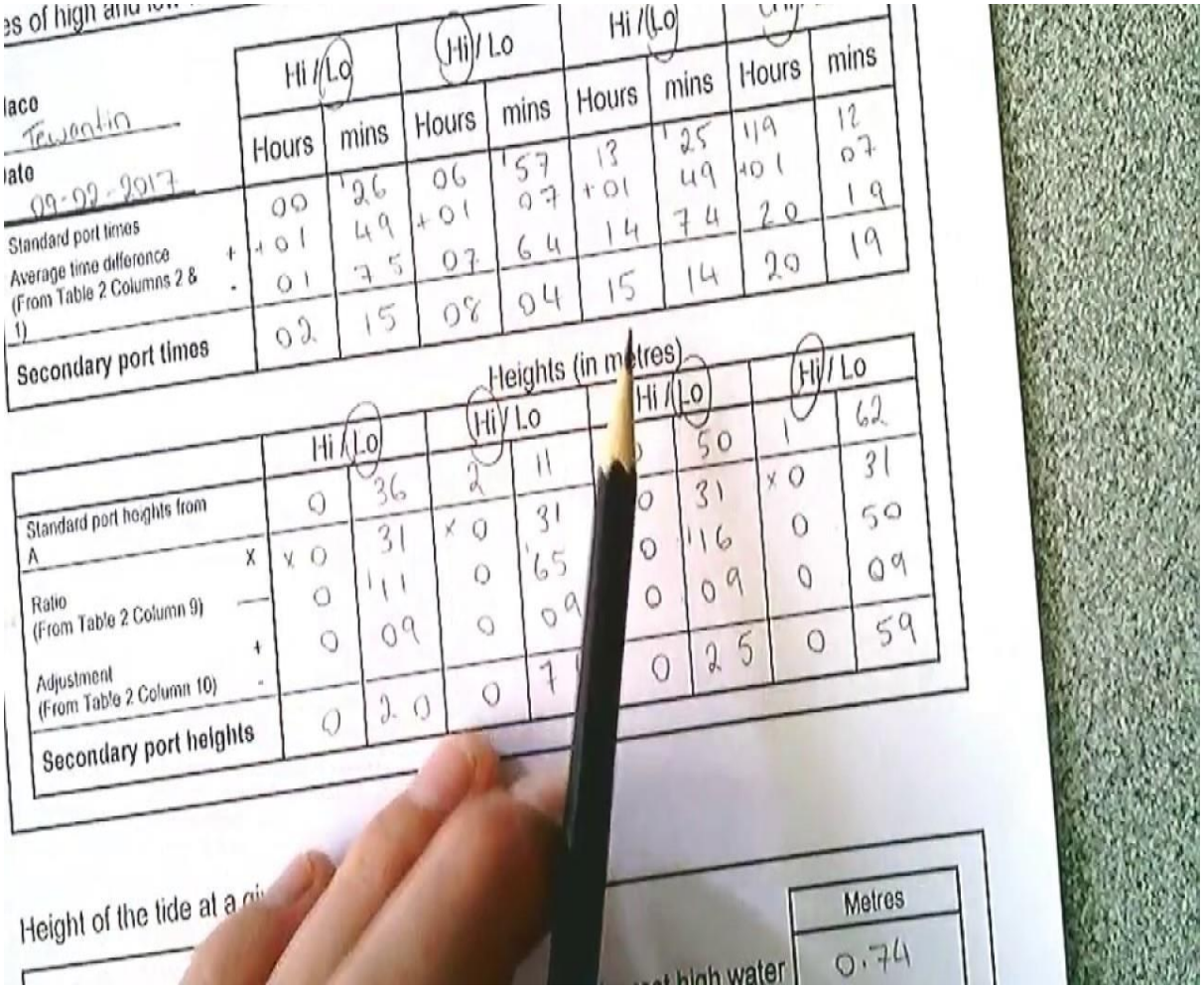
= 23 hr 44 min

10 miles 60 min

1 $\frac{60}{10}$

17·4 $\frac{60}{10} \times 17.4 = 104.4$

TIDE CALCULATION



YouTube : SMART MARINER

Prepared by : Anupam Singh Rajput

Website : marineredition.com

(For more notes: visit the website)

17.02.20

TIDES

Tides are the rise and fall of sea levels caused by the combined effects of the gravitational forces exerted by the moon and the sun and the rotation of the Earth.

Spring tides occur twice each lunar month all year long without regard to the season

Neap tides also occur twice a month, happen when sun and moon are at right angles to each other

Solar tides : The earth has a small tidal bulge due to the sun, which cause solar ocean tides.

Lunar tides : Since, moon is much closer to us than the sun, we feel the effects of lunar tides more strongly.

Double tides: A high tide in which the water rises to a certain level, recedes, then rises again.

A low tides in which the water recedes to a certain level, rises slightly, then recedes again.

E.g. Southampton, where there is a slight fall in the middle of high water & Hoek van Holland where there is a slight rise in the middle of low water.

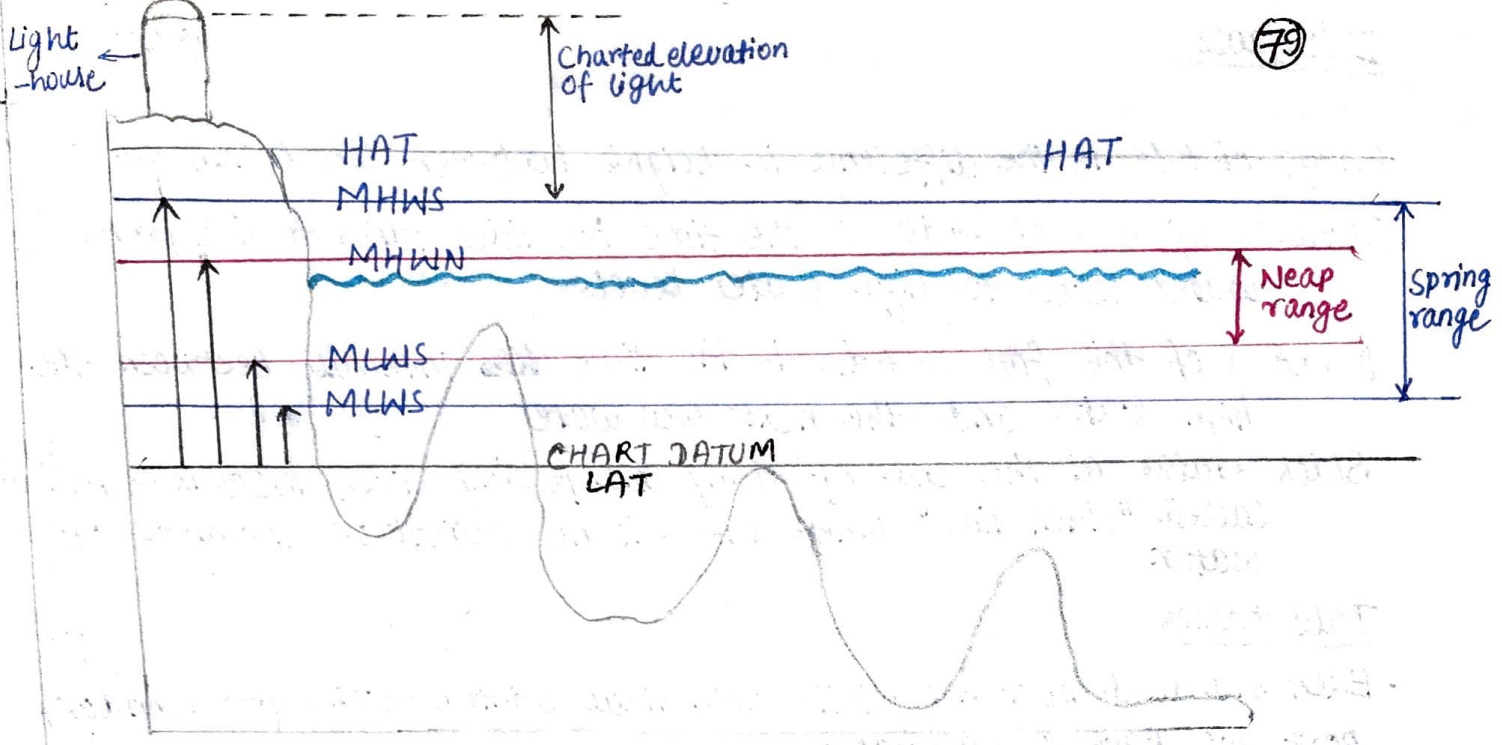
Storm surge/tidal waves: Storm tide is a coastal flood or tsunami like phenomenon of rising water commonly associated with low pressure weather system. It is the rise of water beyond what would be expected by the normal movement related to tides.

Negative storm surge :- when water is pushed away from the shore, can also occur, leading to abnormally low water levels. Though less destructive than normal storm surges, they can pose risks to water navigation (especially to deep draft vessel with min. under clearances), spread pollution & redefine the sea bottom topography.

Ebb & flow of tides

- As the tide is rising, or increasing in height, the tide is a flood tide.
- As the tide is falling, or decreasing in height, the tide is an ebb tide

Slack water is the period when there is no movement of water (between ebb & flood tides)



From the highest level to the lowest:

Highest astronomical tide (HAT): The highest tide which can be predicted to occur. State that meteorological condition may add extra height to the HAT.

Mean high water spring (MHWS): The average of the two high tides on the day of spring tides

Mean high water neap (MHWN): The average of the two high tides on the day of neap tides.

Mean sea level (MSL): This is average sea level. The MSL is constant for any location over a long period.

Mean low water neaps (MLWN): The average of the two low tides on the day of neap tides.

Mean low water spring (MLWS): The average of the two low tides on the day of spring tides.

Lowest astronomical tide (LAT) & chart datum (CD): The lowest tide which can be predicted to occur. Modern chart use this as a chart datum. Note that under certain meteorological condition, water may fall lower than this.

Range of tide is the difference in height beetween low & high water.

Duration of rise of tide is the time the tides takes to rise from low water level to high water level.

Duration of the fall of tide is the time interval beetween the high water and the next low water

Slack water at the end of rising and falling tide, there is a period called "slack tide" when there is no current or movement of water.

Tide tables

- Each standard port has got its own tidal printed, while for secondary port we have to calculate.
- In vol. 1. each standard port has its own tidal graph while table 2&3 have a common graph.

*TO find height and times for standard port

0441	1.6
0952	5.7
1704	1.6
2212	5.9

Find height of tide @ 0700 hrs?

Step ① 0441 1.6
0700 ?
0952 5.7

Step ② 0952 - 0441 = 05h 11m - Duration

Step ③ 5.7 - 1.6 = 4.1m - Range

Step ④ Determine the interval from the high water for the time in the question

0952 - 0700
= 02h 52m

Step ⑤ Plot it on the tidal graph

Note :- For which curve to use, check where the range : 4.1m falls
If greater than spring range, spring curve is used
" less " neap " , neap " " "
If beetween them, then visually interpolate

FACTOR X RANGE + HEIGHT OF L.W = HEIGHT REQUIRED

* For ranges greater than springs, the spring curve should be used
* For ranges less than Neap, Neap curve should be used.

NOTE :- Interval before H.W i.e. on rising tide, is termed minus e.g -2h 20m means 2H 20M before H.W

Interval after H.W i.e. on falling tide, is positive. e.g. + 3H 30m means 3H 30M after H.W

STANDARD PORT

1. Find the height of tide at Gibraltar on 1st January 1992 at 1200 hours

⇒ 1st JAN :- 0027 0.7
0615 0.3
1250 0.8
1849 0.2

At 1200 hours :- 0615 0.3 (L.W)
1250 0.8 (H.W)

By plotting in graph of gibraltar,

height of tide = 0.75m

(OR)

FACTOR X RANGE + HEIGHT OF L.W = height required

Height required = $0.9 \times (0.8 - 0.3) + 0.3$

$= 0.9 \times 0.5 + 0.3$

$= 0.45 + 0.3$

$= 0.75\,m$

2. Find the correction to be applied to the hand lead sounding at 1200 hours GMT at Singapore (#4718) on 6th March 1992

⇒ Since, we don't know charted depth in the question

Sounding = charted depth ± height of tide

↓ corrⁿ to apply

3. Find the height of tide at Lehavre at 1200 hours on 2nd Feb 1992

⇒ 1008 7.3 } 5.4
1710 1.9 }

At 1200 hours, height of tide = 6.45m (from graph)

(OR)

Height required = $0.85 \times (7.3 - 1.9) + 1.9$

$\Rightarrow 4.59 + 1.9 = 6.49\,m$

(5) A vessel with draft fwd 6.0m aft 8.0m, wants to cross a bar at antwerp on 21st January 1992 with an underkeel clearance of 3m. charted depth 7m. Find the earliest time in the afternoon when the vessel can do so

⇒

Maxm draft	:	8.0m
Required UKC	:	3.0m
		11.0m
Charted depth	:	7.0m
Tide required	:	4.0m

On 21st Feb, 0512 6.2
1205 -0.5
1736 6.3
} somewhere b/w this Range = 6.3 - (-0.5) = 6.8m

↓ since range is greater than spring, spring curve is used

MEAN RANGES	
Spring	5.5m
Neap	4.0m

Step ① :- plot L.W :-0.5m & HW 6.3m on graph
Step ② :- from 4m, draw a vertical line upto it touches line(-0.5 to 6.3)
step ③ :- From there, draw a horizontal line where it meets the spring curve
Step ④ :- From there, draw a vertical line downwards & determine the time

Answer :- 1615 hours UTC

(7) On 1st February 1992 at Antwerp, a vessel with draft fwd 6m, aft 7m has to cross a shoal (charted depth 5m) with an UKC of 2m. Find the earliest time in the afternoon when the vessel can do so

⇒

Maxm draft	:	7.0m
Required UKC	:	2.0m
		9.0m
Charted depth	:	5.0m
Tide required	:	4.0m

On 1st Feb, in afternoon, 0829 0.5
1416 5.3

Range = 5.3 - 0.5 = 4.8m (use to determine wheather spring, neap or b/w them curve is used)

Duration of tide = 1416 - 0829 = 05h 47m (is useful in determining which curve to use in vol II & III graph)

Step ① & step ⑪ :- same as in Q.5
Step ⑪ :- Since, range fall beetween spring & neap range i.e. 4.8m, so we need to do interpolation
Draw a horizontal line cutting neap curve upto spring curve
Measure distance b/w spring & neap on that line

i.e. 0.7cm, so we do interpolation

5.5 − 4.0 = 1.5m
for 1.5m → 0.7cm
1m → $\frac{0.7}{1.5}$ cm
4.8 − 4.0 = 0.8 → $\frac{0.7}{1.5} \times 0.8 = 0.4$ cm

Step (IV) – mark a dot from neap to 0.4cm

Step (V) – from that dot, draw the vertical line downwards & determine the time

Answer :- 1246 hours UTC

(9) A vessel intends to sail out of sheerness on 15th January 1992, with draft fwd 6.3m aft 7.28m. It is required to have an UKC of 0.8m over a shoal charted as 5m. Find the earliest time to cross the shoal.

⇒ Maxm draft : 7.28m
Required UKC : 0.80m
8.08m

Charted depth : 5.00m
Tide required : 3.08m ~ 3.1m

On 15th Jan, earliest time

0042 1.5
0713 4.9

Range of tide = 4.9 − 1.5 = 3.4m

Answer: 3.1m tide will be at 03h 53m

(10) Find the height of tide off Le-havre harbour at 1400 hours on 19th February 1992

⇒ On 19th Feb, 1123 8.2
1851 0.4

Range of tide : 8.2 − 0.4 = 7.8m
↓
which is more than spring range, so we use spring curve

Interval b/w HW & time given in question = 1400 − 1123
= 02h 37m

Plot in graph, Answer = 5.7m

(12) A vessel drawing F = 6.8m, A = 8.0m has to cross a bar marked 1.5m on the chart with UKC of 1m. Find the earliest time in the morning of 18th March 1992 when she can do so (#2864)

⇒ Maxm draft : 8.0m
Required UKC : 1.0m
9.0m
CD : 1.5m
Tide required = 7.5m

#2864, SAINT JOHN, N.B on 18th March
0504 0.4
1113 8.3

Range of tide = 8.3 − 0.4 = 7.9m
Duration of tide = 1113 − 0504 = 06h 09m
By plotting in graph,
Answer = 09h 55m

* Secondary Ports

Description	HW	LW	HW	LW
Time at standart Port				
Time difference for secondary port				
Times at Sec. Port				
Heights at Standart Port				
Seasonal correction for standard port (-)				
Correctedheight at Standart port				
Height difference for Sec. Port				
Uncorrected height at Sec. Port				
Seasonal correction for Sec. Port (+)				
Height at secondary Port				

Mean height by interpolation →

09.03.2022

Example:- Find the height of tide at 1030 hours on 16th March 1992 at Hilbre island (#461)

⇒ Step ①:- see the standard port for Hilbre island
i.e. LIVERPOOL

Step ②:- Take the extracts from ATT of standard port & also apply zone time

Extracts from ATT:-

16 MARCH :	0325	1.9
	0908	8.7
	1604	1.2
	2141	8.9

Since we have to find the height of tide at 1030 hours, so we only workout tide of 0908 & 1604 hours

Step ③:- Draw table

	HW	HW	LW	LW
Time at Standard Port :	0908	2141	0325	1604
Time difference for secondary Port: (In vol. I, we require to interpolate):	(-)0014		(see interpolation below) ←	(-)0012
Time at secondary port :	0854			1552
Height at standard port :	8.7	8.9	1.9	1.2
Seasonal corrn for standard port:	(-) -0.1			(-) -0.1
Corrected height of standard port :	8.8			1.3
Height difference at secondary port:	-0.3 →	(see interpolation below) ←		(+)0.4
Uncorrected height for secondary port:	8.5			1.7
Seasonal corrn for secondary port (add algebraically)	(+) -0.1			(+) -0.1
Height at secondary port :	8.4			1.6

0854 8.4
1030 ?
1552 1.6

* Use the curve of standard port - liverpool

By plotting to graph, Height of tide at Hilbre Island @ 1030 hrs : 7.15 m

ROUGH SPACE TO SHOW INTERPOLATION (ONLY FOR 4TT VOL. I)

* For time

	High water		Low water	
LIVERPOOL	0000 and 1200	0600 and 1800	0200 and 1400	0700 and 1900
Hilbre Island	-0015	-0012	-0010	-0015

0908: 0600 12 min; 1200 15 min
06 hr 03 min
360 min 03 min
1 min 3/360
03h 08m = 188 → 3/360 × 188 = 1.6
12 + 1.6 = 13.6
So, we can say 0014 hours

1604: 1400 10 min; 1900 15 min
05 hr 05 min
300 min 05 min
1 min 5/300
02h 04m = 124 → 5/300 × 124 = 2.1
10 + 2.1 = 12.1
i.e 0012 hrs

* For height

	MHWS	MHWN	MLWN	MLWS
LIVERPOOL	9.3	7.4	2.9	0.9
HILBRE ISLAND	-0.3	-0.2	+0.2	+0.4

8.8: 9.3 / 7.4; 0.3 / 0.2; 0.274 = 0.3
1.9; 0.1; 0.1 + 0.9
1; 0.1 × 0.5 = 0.026

1.3: 2.9 / 0.9; 0.2 / 0.4; 0.36 = 0.4
2 / 1; 0.2 / 0.2/2
1.6; 0.2/2 × 1.6 = 0.16

ATT VOL. 2

② Find the times and heights of low and high water at Jaziret Kubbar (#4261) on 6th March 1992

⇒ Standard port for Jaziret Kubbar
⇒ Mina al Ahmadi

Extracts from ATT (Mina Al Ahmadi):

0025	2.7
0631	0.8
1301	2.7
1847	1.0

Description	HW	HW	LW	LW
Time at standard port	0025	1301	0631	1847
Time difference for secondary port	−0012	−0012	−0019	−0019
Time at secondary port	0013	1249	0612	1828
Height at standard port	2.7	2.7	0.8	1.0
Seasonal corrn at standard port (substract algebraically)	−(−0.1)	−(−0.1)	−(−0.1)	−(−0.1)
Corrected height at standard port	2.8	2.8	0.9	1.1
Interpolate — Height difference for secondary port	−0.4	−0.4	0.0	0.0 (see data below)
Uncorrected height of secondary port	2.4	2.4	0.9	1.1
Seasonal corrn at secondary port	−0.1	−0.1	−0.1	−0.1
Height at secondary port	2.3	2.3	0.8	1.0

0013	2.3
0612	0.8
1249	2.3
1828	1.0

* For height difference

Standard	2.7	2.2	1.5	0.5
Secondary	−0.4	−0.3	−0.1	+0.1

→ Monitor & record UKC

② Find the tides at Navlakhi (# 4331) on 6th March 1992

⇒ Standard port for Navlakhi : BOMBAY

Extracts from ATT (06 March 1992) :

0052	4.4
0705	0.8
1315	4.2
1905	1.0

Description	HW	HW	LW	LW
Time at standard port	0052	1315	0705	1905
Time differences for secondary port	+0250	+0250	+0330	+0330
Time at secondary port	0342	1605	1035	2235
Height at standard port	4.4	4.2	0.8	1.0
Seasonal corrn at standard port (-)	0.0	0.0	0.0	0.0
Corrected height at standard port	4.4	4.2	0.8	1.0
Height diff. for secondary port	+2.8	+2.8	0.0	0.0
Uncorrected height of secondary port	7.2	7.0	0.8	1.0
Seasonal corrn for secondary port (+)	+(-0.1)	+(-0.1)	+(-0.1)	+(-0.1)
Height at secondary port	7.1	6.9	0.7	0.9

Ans:- 0342 - 7.1m
1035 - 0.7m
1605 - 6.9m
2235 - 0.9m

③ Find the correction to be applied to hand lead sounding at 1200 hours at Blackpool (#445) on 6th Feb. 1992

Ans:-

Standard port for Blackpool :- LIVERPOOL

Extracts from ATT (6th Feb 1992) :

0031	8.9
0702	1.3
1245	9.2
1926	1.2

Descriptions	HW	HW	LW	LW
Time at standard port	0031	1245	0702	1926
Time differences for secondary port		-0015	-0015	
Time at secondary port		1230	0647	
Height at standard port	8.9	9.2	1.3	1.2
Seasonal corn for standard port	0.0	(-)0.0	(-)0.0	
Corrected height at standard port		9.2	1.3	
Height difference for secondary port		-0.4	0.0	
Uncorrected height at secondary port		8.8	1.3	
Seasonal correction for secondary port		0.0	0.0	
Height at secondary port		8.8	1.3	

HW 1230 - 8.8

LW 0647 - 1.3

Plot in the Liverpool graph & get the tides at 1200 hours

i.e. 8.6m

④ Find the tides at St. Vaast (#1598) on 05.01.1992

Ans:-

Standard port for St. Vaast :- Cherbourg

Extracts from ATT: (05.01.1992)

0330	1.8
0901	6.0
1551	1.5
2126	5.9

Descriptions	HW	HW	LW	LW
Time at standard port	0901	2126	0330	1551
Time difference for secondary port	+0056	+0056	+0118	+0120
Time at secondary port	0957	2222	0448	1711
Height at standard port	6.0	5.9	1.8	1.5
Seasonal corrn for standard port	0.0	0.0	0.0	0.0
Uncorrected height at standard port	6.0	5.9	1.8	1.5
Height differences for secondary port	+0.3	+0.3	-0.2	-0.2
Uncorrected height at secondary port	6.3	6.2	1.6	1.3
Seasonal corrn for secondary port	0.0	0.0	0.0	0.0
Height at secondary port	6.3	6.2	1.6	1.3

Ans:

0448	1.6 m
0957	6.3 m
1711	1.3 m
2222	6.2 m

⑤ Find the times & height of high & low water at OKha (4335) on 6th March 1992

Ans:-

Standard port for OKHA : BOMBAY

Extracts from ATT:

0052	4.4
0705	0.8
1315	4.2
1905	1.0

Descriptions	HW	HW	LW	LW
Time at standard port	0052	1315	0705	1905
Time difference for secondary port	+0052	+0052	+0043	+0043
Time at secondary port	0144	1407	0748	1948

Height at standard port	4.4	4.2	0.8	1.0
Seasonal correction for standard port	0.0	0.0	0.0	0.0
Corrected height at standard port	4.4	4.2	0.8	1.0
Height difference for secondary port	-0.9	-0.8	-0.3	-0.4
Uncorrected height at secondary port	3.5	3.4	0.5	0.6
Seasonal corr^{n} for secondary port (+)	+(-0.1)	+(-0.1)	+(-0.1)	+(-0.1)
Height at secondary port	3.4	3.3	0.4	0.5

Ans:- 0144 - 3.4m

0748 - 0.4m

1407 - 3.3m

1948 - 0.5m

① A vessel having a draft forward 2 mtrs and aft 2.8 mtrs has to cross a sand bar marked with a depth of 1mtr on the chart with a UKC of 2.5 mtrs on 16th march 1992 in liverpool. Find the earliest time she can do so on a rising tide.

Ans:-

Max^m draft : 2.8 mtrs
UKC required : 2.5 mtrs
Depth required : 5.3 mtrs
Charted depth : 1.0 mtr
Tide required : 4.3 mtr

Extracts from ATT:

0325	1.9
0908	8.7
1604	1.2
2141	8.9

Time of low water = 0325 hrs
Time of high water = 0908 hrs

Duration of rise of tide = 0908 − 0325
= 05h 43m

Range of tide : 8.7 − 1.9
= 6.8m

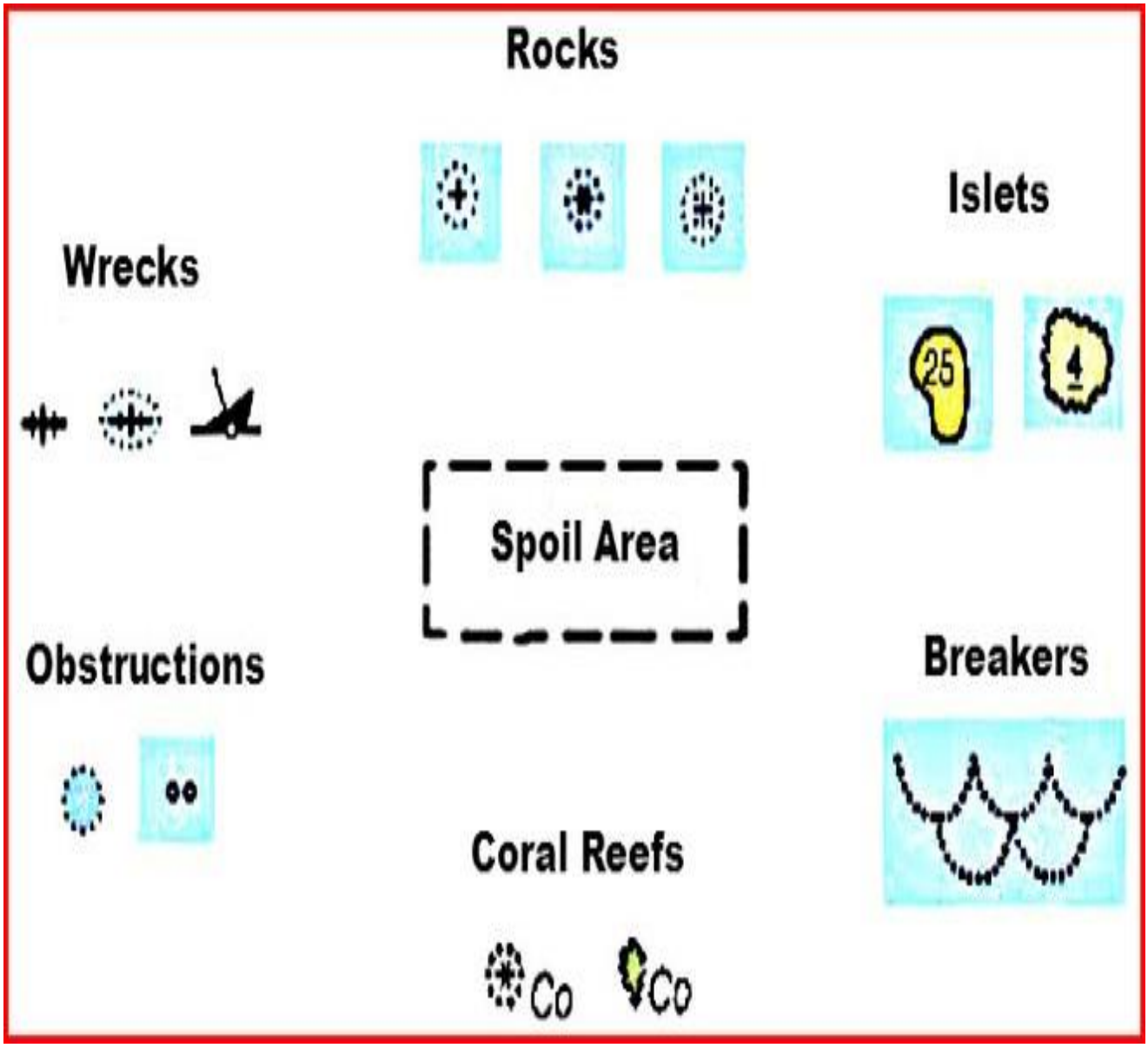
Height of tide required = 4.3 mtr.

From the graph using the duration of tide as 05h 43m and height of tide at 4.3m, we determine the time is

05h 40m

Hence at 05h 40m vessel can cross a sand bar marked with a depth of 1 mtr. on the chart with a UKC of 2.5 mtr.

CHART SYMBOLS



YouTube : SMART MARINER

Prepared by : Anupam Singh Rajput

Website : marineredition.com

(For more notes: visit the website)

* Beacons

A fixed man made navigation mark that can be recognised by its shape, colour pattern, topmark, or light character, or a combination of these.

Description of beacons

- Can carry a signal light and in this case is termed a light beacon
- If not fitted with light, it is termed as unlit beacon and provides only a day mark.
- As a leading range or conspicuos radar mark.
- It may also carry a topmark.

Colour - Any

Shape - As appropriate, including cardinal mark

Topmark - As appropriate

Light (when fitted)

Colour - White, red or green

Rhythm - As appropriate.

* Major floating aids.

Major floating aids include lightvessels, light floats and large navigational buoys.

Major floating aids are generally deployed at critical location, intended to mark approaches from offshore areas, where shipping traffic concentration are high. It may provide a platform for other aids to navigation such as racon or AIS.

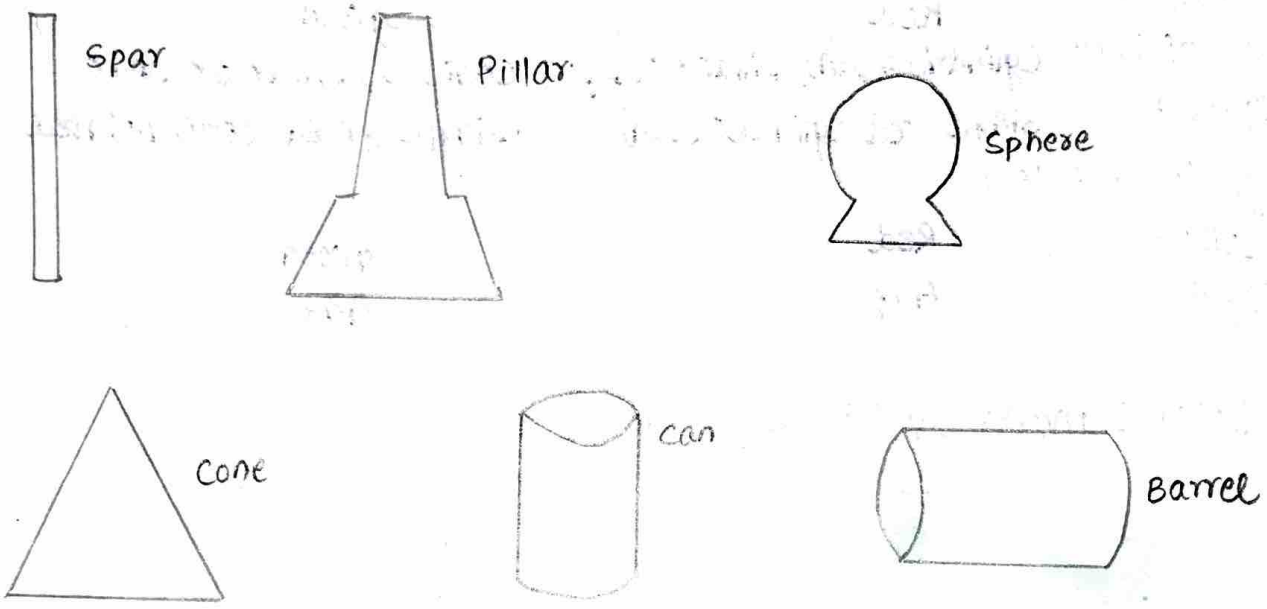
Colour:- As appropriate - predominantly red
Shape - Vessel or buoy shape with light tower
Colour - As appropriate
~~Rhythm~~
Light (when fitted) including off station light
Rhythm - As appropriate

* Maritime buoyage system

IALA Region A :- It is used by countries in Africa, most of the Asia, Australia, Europe & India

IALA Region B :- It is used by countries in North, Central & South America, Japan, Korea & Philippines

Buoy shapes



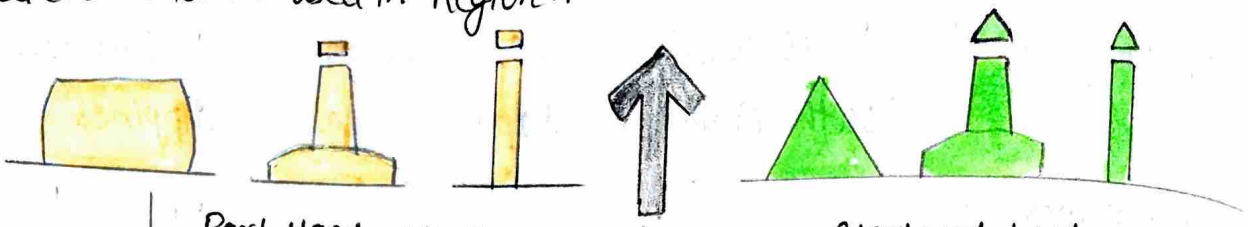
* Characteristics of light

Characteristics	Short-hand	Notes
Fixed	F	Always on
Flashing	Fl	Flashes once in a set time
Group flashing	Fl(3)	Flashes a set number of time in a set time (number of flashes in bracket)
Isophase	Iso	On for the same time as off
Occulting	Oc	On most of the time and then flashes off
Morse	Mo(A)	Morse letter shown in bracket

Short Hand Timing	Meaning
Fl·R 5s	Flashing red once every 5 seconds
Fl(4) 15s	Flashing white four times every 15 seconds
Iso 10s	White light on for 5 sec & off for 5 sec
Oc 12s	White light flashing off once every 12 sec
Mo(U)	Morse code U, white light flashing once every 2

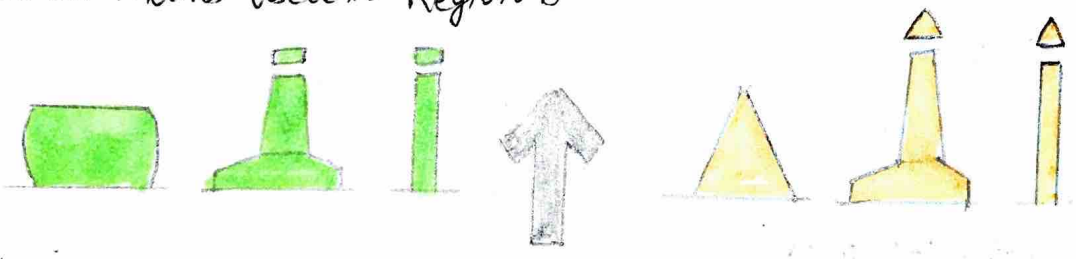
* Lateral Marks

- Lateral marks used in Region A



	Port Hand Marks	Starboard hand marks
Colour	Red	Green
Shape of buoy	Cylindrical (can), pillar or spar	Conical, pillar or spar
Topmark	Single red cylinder (can)	single green cone pointed upward
Light (when fitted)		
Colour	Red	Green
Rhythm	Any	Any

- Lateral marks used in Region B

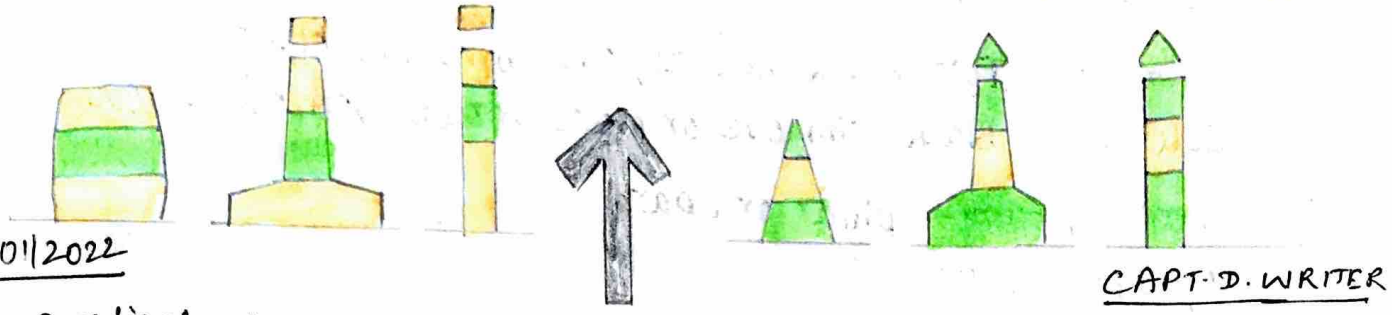


	Port Hand marks	Starboard Hand marks
Colour	Green	Red
	Cylindrical (can), pillar or spar	Conical pillar or spar
	Single green cylinder (can)	Single red cone pointed upward
Light (when fitted)		
Colour	Green	Red
Rhythm	Any	Any

Note:- The direction of buoyage (99·1· times) it is always into the harbour from the sea.

* preferred channel marks

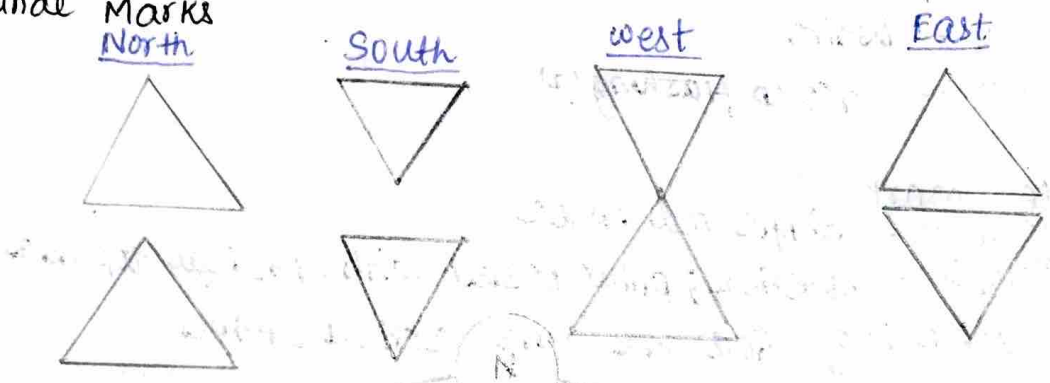
	Preferred channel to starboard	Preferred channel to port
Colour	Red with one broad green horizontal band	Green with one broad red horizontal band
Shape of buoy	Can, pillar or spar	Conical, pillar or spar
Topmark (If any)	Single red can	Single green cone, point upward
Light (when fitted)		
Colour	Red	Green
Rhythm	Composite group flashing (2+1)	Composite group flashing (2+1)

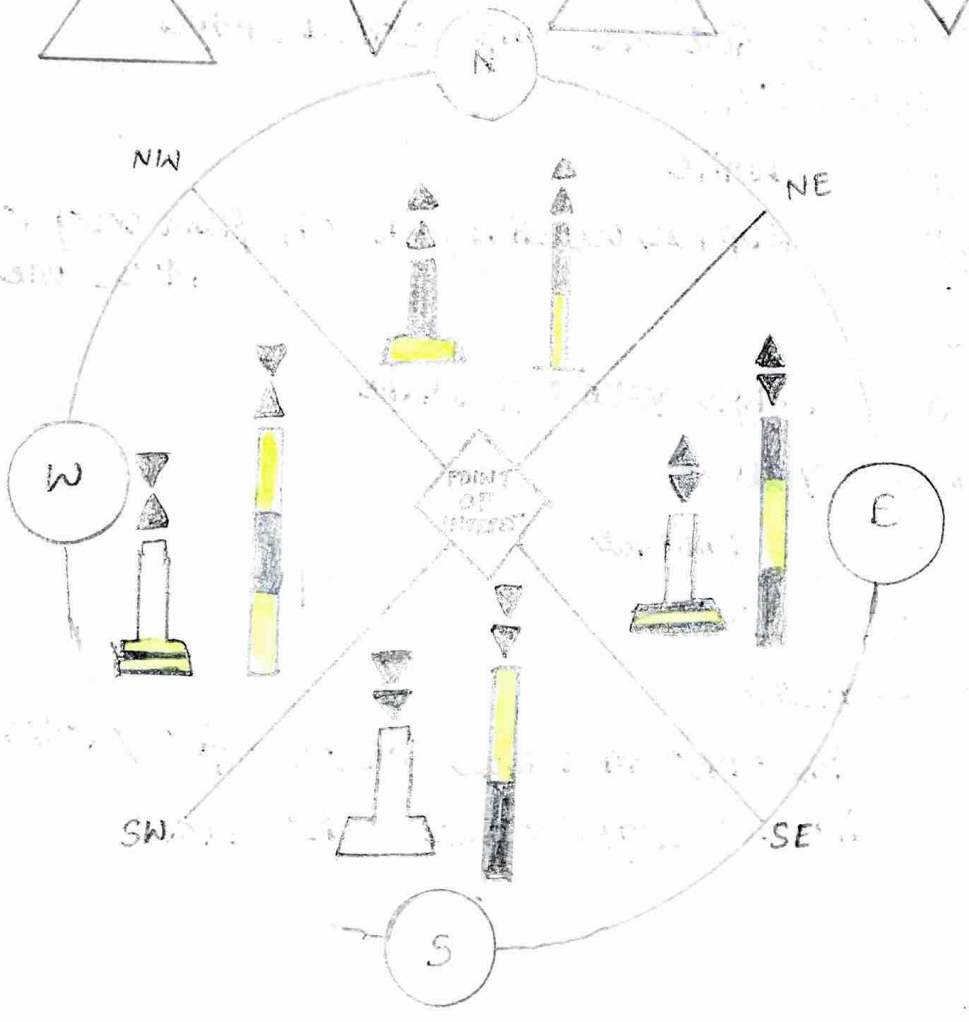


04/01/2022

CAPT. D. WRITER

* Cardinal Marks





Q - quick
VQ - very quick

Q or
VQ

(9) 9Q or
VQ

3Q or (3)
VQ

6Q+LF or
VQ+LF

(6)

see notes on cardinal buoy p-40

* Isolated danger mark

Top mark - Two black spheres, one above the other
Colour - Black with one or more broad horizontal red band
Shape of buoy - pillar or spar
Light (when fitted)
Colour - White
Rhythm - Group flashing (2)

* Safe water mark

Topmark - Single red sphere
Shape of buoy - Spherical; pillar or spar with spherical topmark
Colour - Red and white vertical stripes
Light (when fitted)
Colour - White
Rhythm - Isophase, occulting, one long flash every 10s or Morse code A

* Special mark

Topmark - Single yellow X shape
Colour - Yellow
Shape of buoy - Optional
Light when fitted
Colour - Yellow
Rhythm - Any other than those reserved for cardinal, isolated danger & safe water mark

Some examples of uses of special marks :-

(i) Ocean data acquisition system (ODAS) marks
(ii) TSS marks where use of conventional channel marking may cause confusion
(iii) Spoil ground marks
(iv) Military exercise zone marks
(v) Cable or pipeline marks
(vi) Recreation zone marks
(vii) Boundaries of anchorage areas
(viii) Structure such as offshore renewable energy installation
(ix) Aquaculture

* New danger mark

These are not on the chart. This means it is a newly discovered hazards to navigation.

Topmark - Vertical/perpendicular yellow cross
Colour - Blue/yellow vertical stripes in equal number. (min 4 or max 8)
Shape of buoy - Pillar or spar
Light (if fitted)
Colour - Yellow/blue alternating
Rhythm - One sec. of blue light & one second of yellow light with 0.5 sec of darkness in beetween.

---

* Sector light

A sector light may be used

- to provide directional information in a fairway
- to indicate a turning point, a junction with other channel
- to provide information on hazard areas that should be avoided
- In some cases a single directional light may be used.

Colour - Not applicable
Shape - None, light only
Light :- Colour - If using to mark channel limits, follow convention for IALA region. Light may have oscillating boundaries.
Rhythm - As appropriate

Sector light is a fixed aid to navigation that displays a differ... colours/rhythms over designated arcs

Sector lights are most often used for safe passage through shallow or dangerous water.

Sectors of coloured glass are placed in the lantern of these lights. The light will then show these colours when observed certain bear...

White :- this sector is in the middle of the safe channel

Red - indicates the port edge of the channel for vessels approach... the light source.

Green - indicates the starboard edge of the channel for vessel approaching the light source.

* Direction light

A light illuminating a sector of very narrow angle & intented to mark a direction to be followed.

* leading marks

leads or guide the vessel into a port

Head the light & keep entering into the port to avoid any danger.

* we can also use it for compass error by using transit bearing.

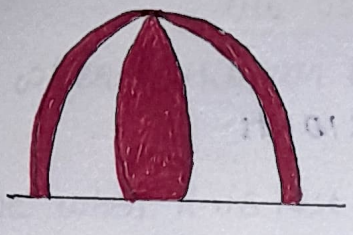
① draw a line from the light to ship's position, get a bearing like say 235°

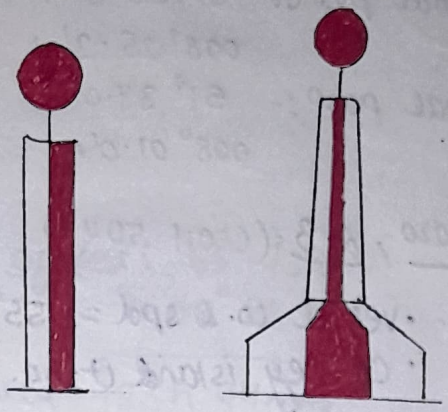
② Get a bearing from gyro repeater, like say 236°

③ So compass error is 1°(H)

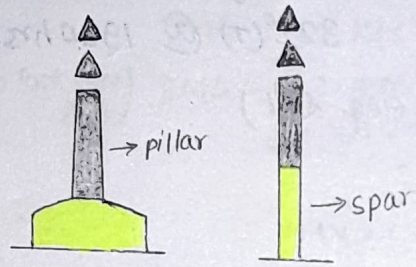
Chart Symbols

① Safe water mark



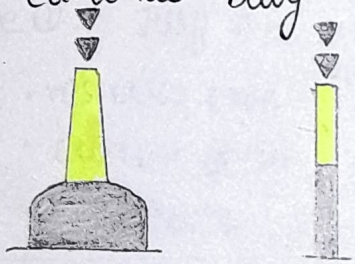


② North cardinal mark

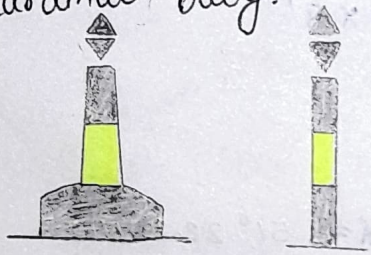


can buoy : Az Fl·Y·2 15s

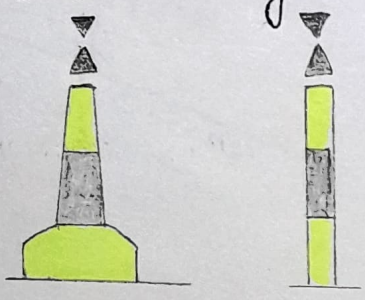
③ South cardinal buoy



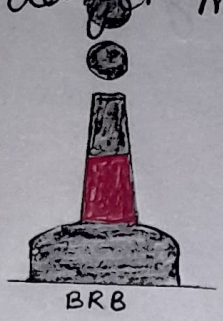
④ East cardinal buoy.



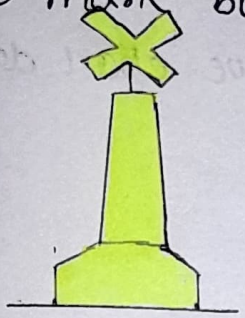
⑤ West cardinal buoy

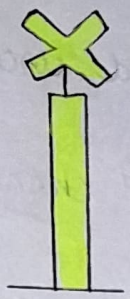


⑥ Isolated danger mark buoy.

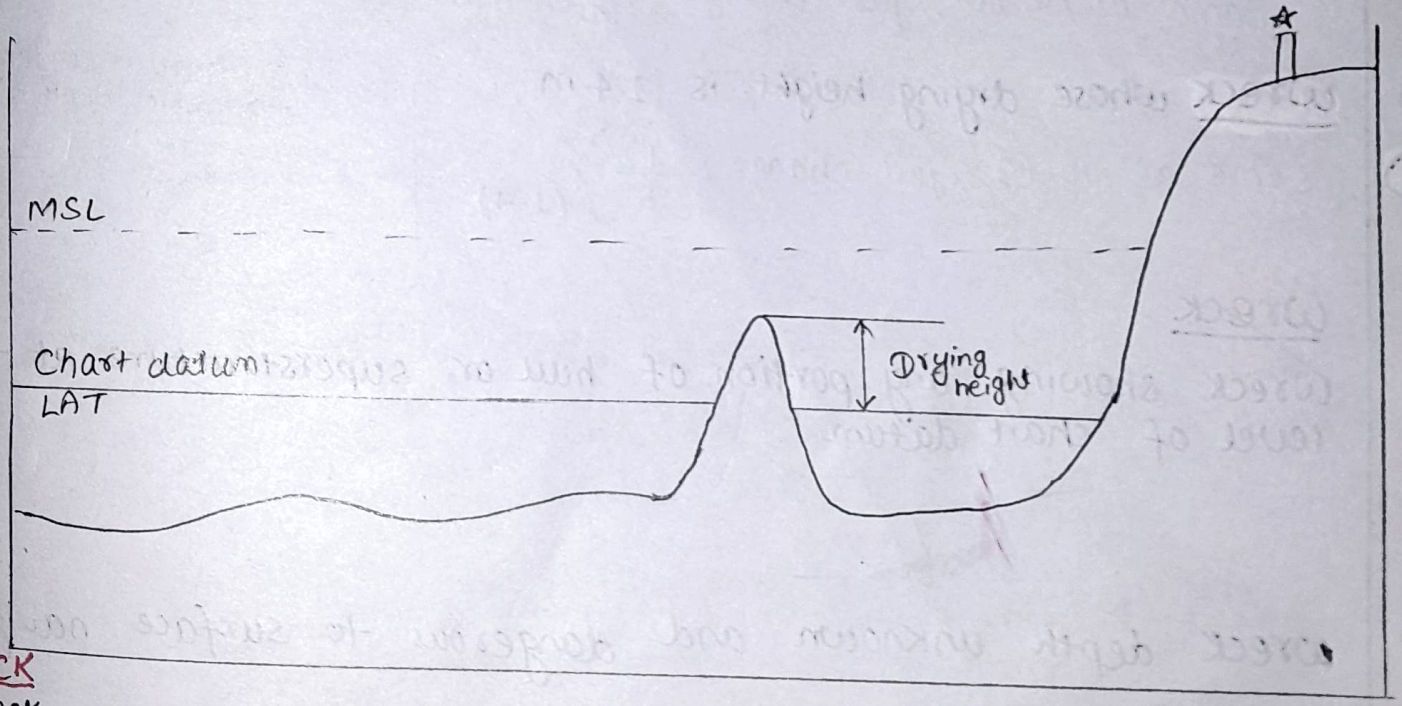


⑦ Special mark buoy.

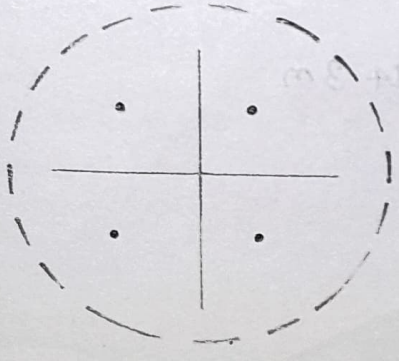




⑧ Chart datum.

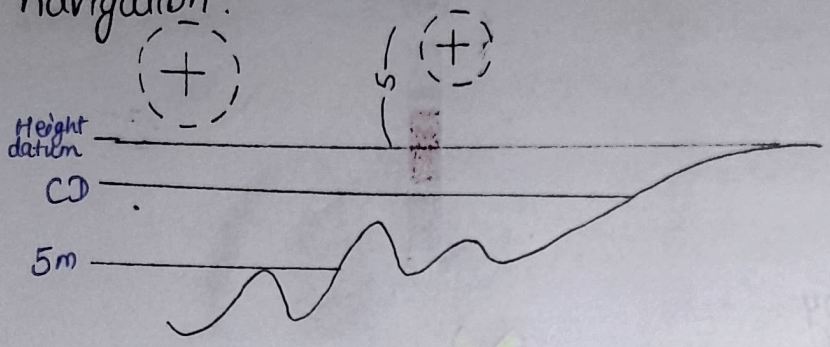


⑨ ROCK
Rock awash at level of chart datum

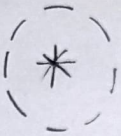


Note :- Draw same as NO. 10
Just ⊹ instead of ⊹

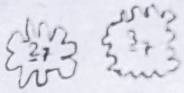
(10) Underwater rock of unknown depth, dangerous to surface navigation.



(11) Rock which covers and uncovers height above chart datum, where unknown

Same as NO. (10), just change 

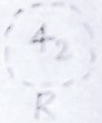
(12) Rock which dries at level of chart datum

Same as NO. (10), just change 

(13) ROCK whose drying height is 1.4 m

same as NO. (10), just change 

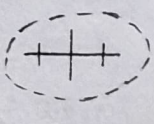
(13.b) Dangerous underwater rock over which depth is 4.2 metres



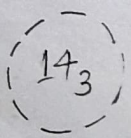
Wreck

(14) Wreck showing any portion of hull or superstructure at the level of chart datum

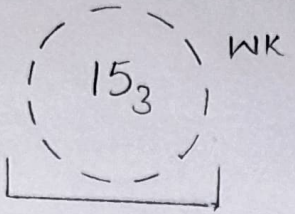
(15) Wreck depth unknown and dangerous to surface navigation



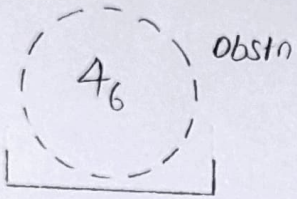
(16) Wreck over which depth is 14.3 m



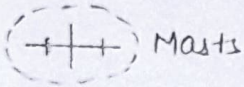
(17) wreck, depth swept by wire drag is 15·3 m



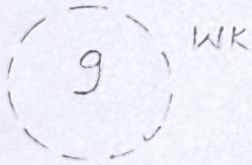
(18) Obstruction, depth swept by wire drag is 4.6m



(19) Wreck of which the mast only are visible

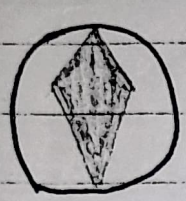


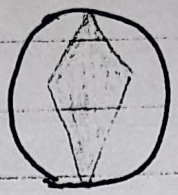
(20) Un-surveyed wreck over which exact depth is unknown, but estimated to have sawe clearance at 9m.



(21)

8) A Pilot Point

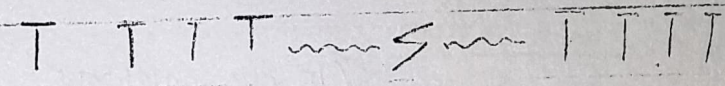




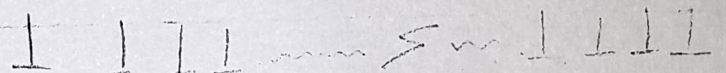
Pilot transferred by helicopter.

9.) Submarine Power Cable

Submarine Power Cable Area



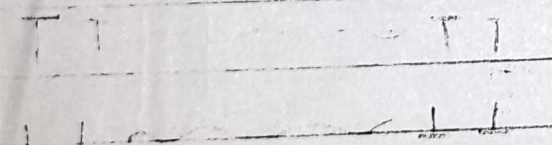
10.) Submarine Cable



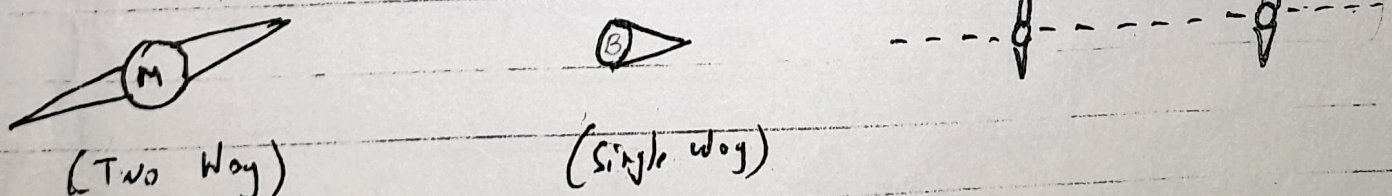
11.) Disused Submarine Cable

Page 32 of book

12) Submarine Cable Area

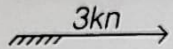
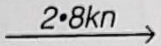
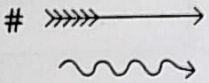
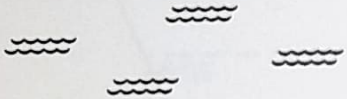
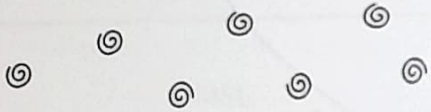


13) Radio Reporting Point P-35 of book → Radio reporting line

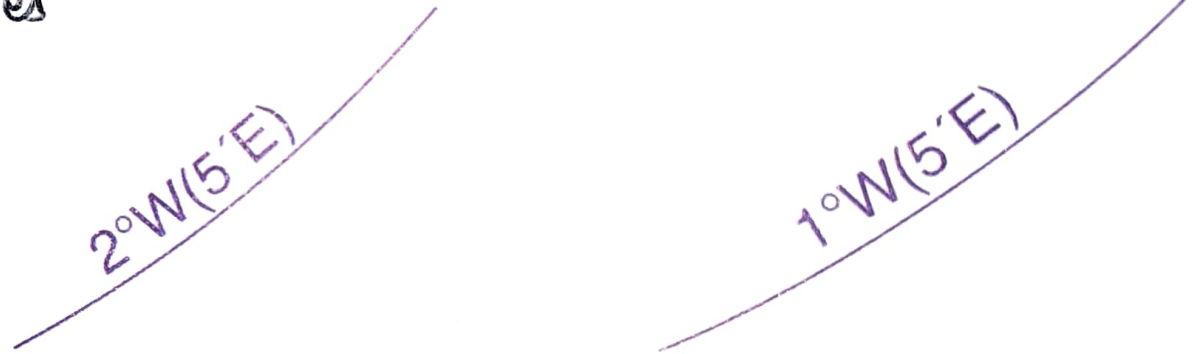


(Two Way) (Single way)

Tidal Streams and Currents

40		*Flood tide stream (with mean spring rate)*
41		*Ebb tide stream (with mean spring rate)*
42		*Current in restricted waters*
43	 *(see Note)*	*Ocean current. Details of current strength and seasonal variations may be shown*
44		*Overfalls, tide rips, races*
45		*Eddies*

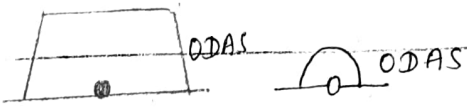
* Isogonic lines



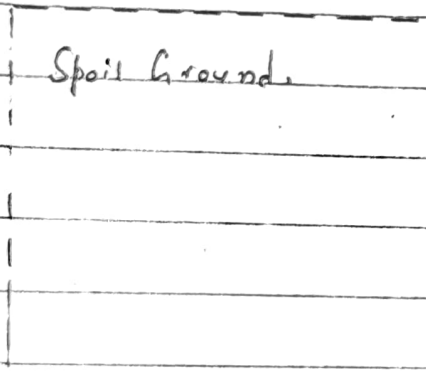
) Drying heights 3

3_2

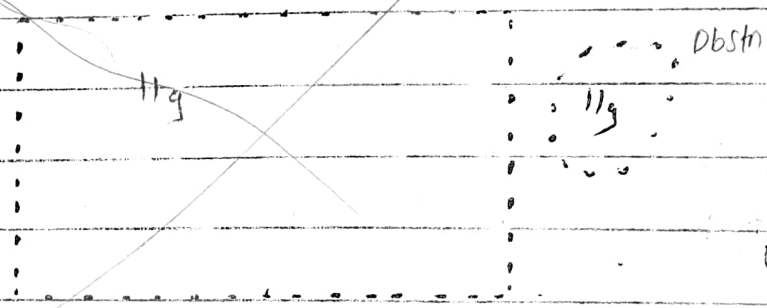
(20) DDAS Buoy. P-47 of book



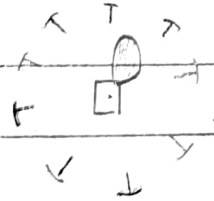
Spoil Ground



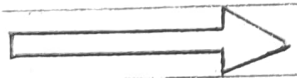
(22) Obstruction with depth 11.9m



) Limit of Safety Zone around offshore installations.



) Established Direction of Traffic in T.S.S.



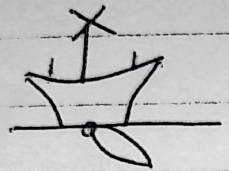
(26) Gas Supply pipeline

(27) Submarine gas pipeline.

(29) Submarine oil pipeline.

(30) oil pipeline

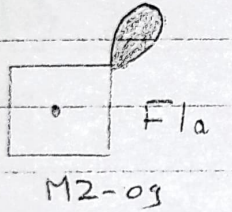
(28) Light Vessel



✓

(29) Oil production platform with flare whose identification is M2-

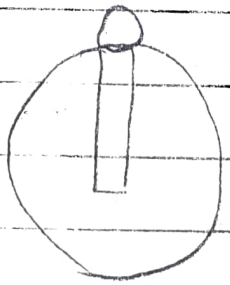
Sol

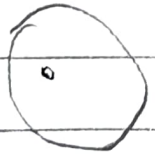


5) Radio Calling point for S.W dir" of vessel Movement.

7) Major Light float

8) Yellow pillar Buoy fitted with Radar Transponder Beacon Transmitting Morse Code "D".





38> Sounding of doubtful depth.

Sol: SD

39> Submarine Pipelines

Sol:

44> Leading Lights. (P-42 of book)

Sol:

45> Radio Tower. (BOOK P-151)

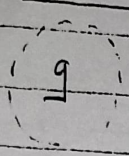
Sol:

⊙ Radio Tower.

wind mill =

53) Un-Surveyed Wreck over which depth unknown but considered to be Safe Clearance 9m.

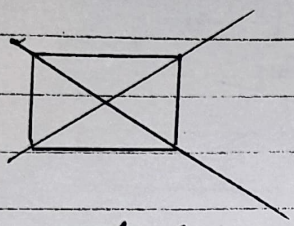
Sol:



54) Temple

MOSQUE

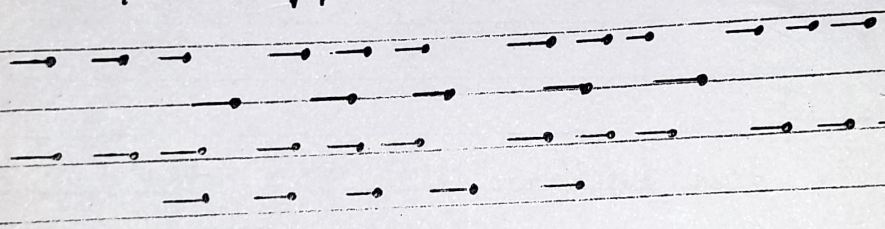
Sol:



55) Mean Sea level

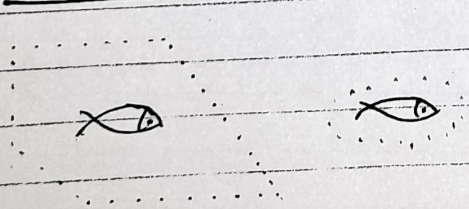
Sol: MSL

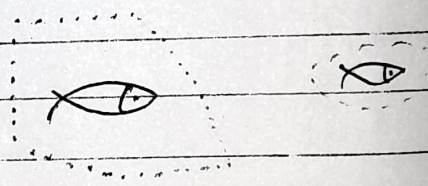
56) Disused /Unused pipeline.



57) Fish Heaven.

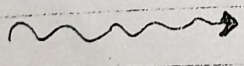
Fish heaven, with minimum dep





58) No b. Ocean Current

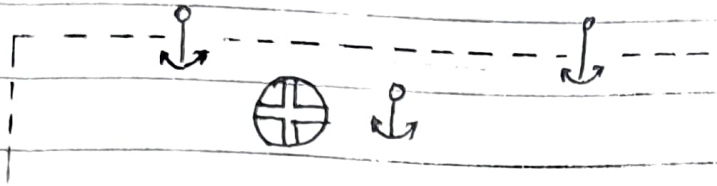
Sol:



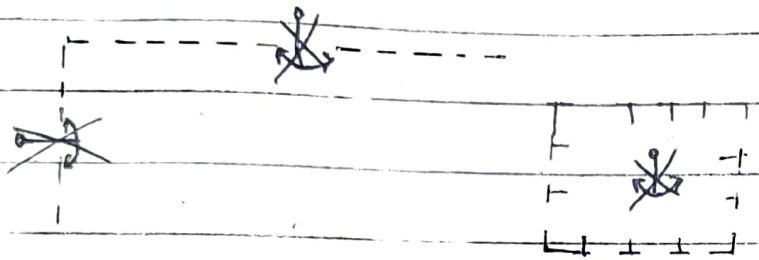
59) No bottom found until 250m depth.

250 50

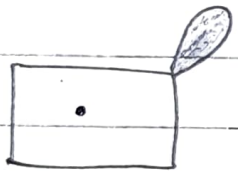
Quarantine Anchorage Area.



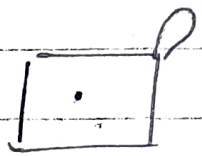
Anchoring Prohibited Area.



) Production Platform.



63) Oil Rig.



ebb Stream of 3 knots.

3kh →

65) Historic Wreck And Restricted Area.