

PROFESSIONAL YACHTMASTER TRAINING USA

Master of Yachts 200 Tons Limited



Answer Booklet



WORLDWIDE

NAVIGATION EXERCISES

ANSWERS

PROFESSIONAL YACHTMASTER TRAINING
NAVIGATION EXERCISES: MOY LIMITED

Use sample deviation card attached and variation 24°W

SECTION A: Variation and Deviation; Latitude and Longitude.

1) Fill in the missing spaces in the following table. Use the Deviation Card on pg 4.

TRUE	VARIATION	MAGNETIC	DEVIATION	COMPASS
100°	23°W			
002°	3°E			
	14°W			356°
	9°E			045°

COMPASS ERROR CHECK

158°	24°W			180°
158°	24°W			184°

- 2) During a compass swing a compass adjuster steers 085°C by ship's compass on two landmarks in transit having a bearing of 060°T. What is the deviation for this heading if the variation in the area is 19° W?
- 3) State the latitude and longitude of the following landmarks on chart SAN 135:
- Mouth Tongati River
 - Umhlanga Rocks Lighthouse
 - Bluff Signal Tower
 - Mouth Mlazi River cutting
 - Green Point Lighthouse

SECTION B: Three Bearing Fixes

Plot your position given hand bearing compass bearing on the following landmarks.

- | | |
|-----------------------------------|--------|
| 1) Beacon 117 at Sheffield Beach | 350° M |
| Building at Ballitoville | 310° M |
| Mouth Tongati River | 273° M |
|
 | |
| 2) Mouth Tongati River | 004° M |
| La Mercy Water Tower | 320° M |
| Umhlanga Rocks Light | 274° M |
|
 | |
| 3) Umhlanga Rocks Light | 344° M |
| Prominent Building on Mgeni River | 292° M |
| Bluff Signal Tower | 266° M |
|
 | |
| 4) Mouth Mlazi River Cutting | 008° M |
| Nyoni Rocks | 302° M |
| Mouth Lovu River | 270° M |

SECTION C: Estimated Position.

Plot your E. P. at the given time using the following information.

State the speed made good in each case.

Question Number	Start Position	Start Time	Ship's Head	Wind Direction	Leeway	Boat Speed	EP Time	Current Set	Current Rate
1	29°30'S 31°15'E	0900	150°C	SW	6°	6kts	1000	000°	2kts
2	29°45'S 31°15'E	1200	265°C	SE	8°	5kts	1400	190°	1.8kts
3	29°38.8'S 31°17.4'E	1530	298°C	NE	3°	4kts	1700	215°	3kts
4	30° S 31° E	2320	110°C	NE	10°	6.8kts	0100	215°	4kts

SECTION D: Course to Steer

Find the compass course to steer given the following information.

State speed made good and estimated passage time where applicable.

Question Number	Start Position	Destination	Current Set	Current Rate	Boat Speed	Wind Direction	Leeway
1	29° 45' S 31° 15' E	Wreck off Umhlanga	030°	2kts	5kts	NE	5°
2	29° 50' S 31° 20' E	Dbn Port Entrance	215°	3kts	4.5kts	N	8°
3	30° S 31°15'E	Fairway Buoy	215°	4kts	6.2kts	SW	5°

SECTION E: Running Fixes

Question Number	Landmark	First Reading		Second Reading		Course Steered
		Bearing	Log	Bearing	Log	
1	Green Point Light	321° M	000	261° M	005	016° C
2	Lovu River Mouth	346° M	486	274° M	496	036° C
3	Cooper Light	295° M	299	351° M	306	263° C

SECTION F: Exam Revision

A vessel leaves Durban Harbour at 0900 on a course of 150°C at a speed of 6.8 kts. A NE wind is causing leeway of 5° and she is expected to be affected by a current setting 215° @ 2.2 kts.

- a) Plot the vessel's EP at 1100 and state the speed made good.
- b) At 1100 the following bearings are taken:

Bluff Signal Tower	004°M
Mlazi River Cutting	332°M
Nyoni Rocks	301°M

Fix the vessel's position at 1100 and state the coordinates.
- c) Determine the actual set, drift and rate of the current that affected the vessel during this time.
- d) Find the compass course to steer in order to make good a course of 208°T and state the speed made good if the boat speed is expected to be 8.2kts.

SECTION G: Ready for a Challenge?

Note: These exercises should only be attempted by students who feel that they have mastered the principles of the Three Bearing Fix, Estimated Position, Course to Steer and Running Fix.

- 1) From $30^{\circ}15' \text{S}$, 31°E with a log reading of 684 at 16h00, plot your position at 17h30 when the log reads 693. Your course is 358°C and the wind is fresh NE giving leeway of 8° . The current is setting 215° at 4.5kts. State speed made good.
- 2) Under power, you fix your position at 19h30 with Green Point Light bearing 222°T and Nyoni Rocks 291°T . Your course is 170°C at a speed of 7kts. Plot your E.P at 21h30 if a current of 3.5kts setting 215° affects you only between the 200m and 500m depth contours. State your average speed made good.
- 3) A boat is 110°T three nautical miles from Nyoni Rocks. What course must be steered to make good a ground track of 060°T . Boat speed is 4.0 kts, the tidal stream is 344° at 0.7kts and the wind SE with leeway 10° .
- 4) On a passage from a waypoint 10 M due east of the wreck on Aliwal Shoal to the Isipingo Single Buoy Mooring, a yacht experiences wind from the west and leeway of 8° . Boat speed is 6.2 kts and there is a tidal stream setting 072° at 2 kts for the first hour and 095° at 3.2 kts for the second hour. Thereafter the tide is slack. What compass course must be steered during the first two hours?
- 5) At 0500 a power boat leaves Durban Harbour for a rendezvous at $30^{\circ} 00' \text{S}$ $31^{\circ} 11.2' \text{E}$. Boat speed is 7kts. Determine the CTS if current is 200° at 2.2 kts.
- 6) On a course of 292°C , boat speed 6.2 kts you take a bearing of 346°M on Umhlanga Rocks Light at 19h30. At 20h30 the light bears 024°M . Plot your position.
- 7) Bearings taken on the Mdloti River mouth are 315°M and 270°M at 15h30 and 16h15 respectively. Course steered between these times is 040°C at an average boat speed of 6 kts. What is your position at the time of the second bearing?
- 8) The bearings on the prominent building north of Ballitoville are 352°M at log reading 463 and 282°M when the log reads 468 one hour later. Your course of 074°C is influenced by a leeway of 8° from an easterly wind. There is also a current setting 215° at 2.5 kts. Plot your position at the time of the second bearing. What is the speed made good?

ANSWERS

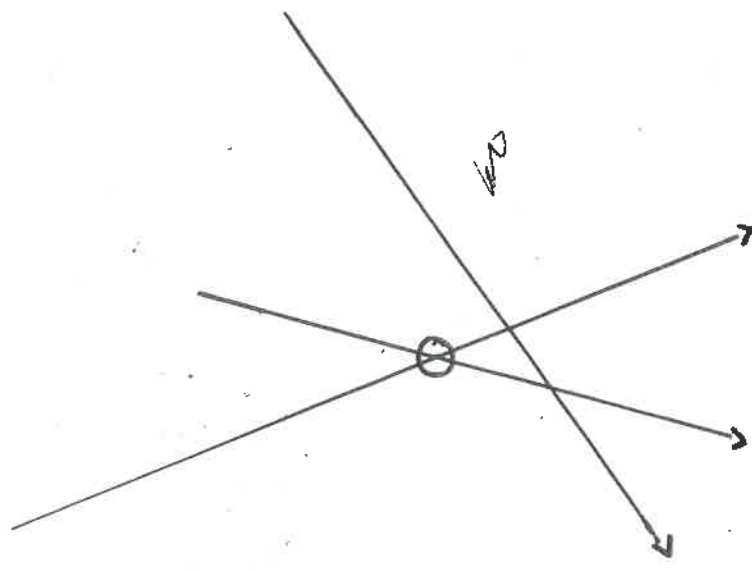
SECTION F

- a) 7.5 kts b) 30° 04.4'S 031° 08.3'E c) Set = 238° Drift = 7.4M Rate = 3.7 kts
d) 227°C 11.2 kts

Sample Deviation Card

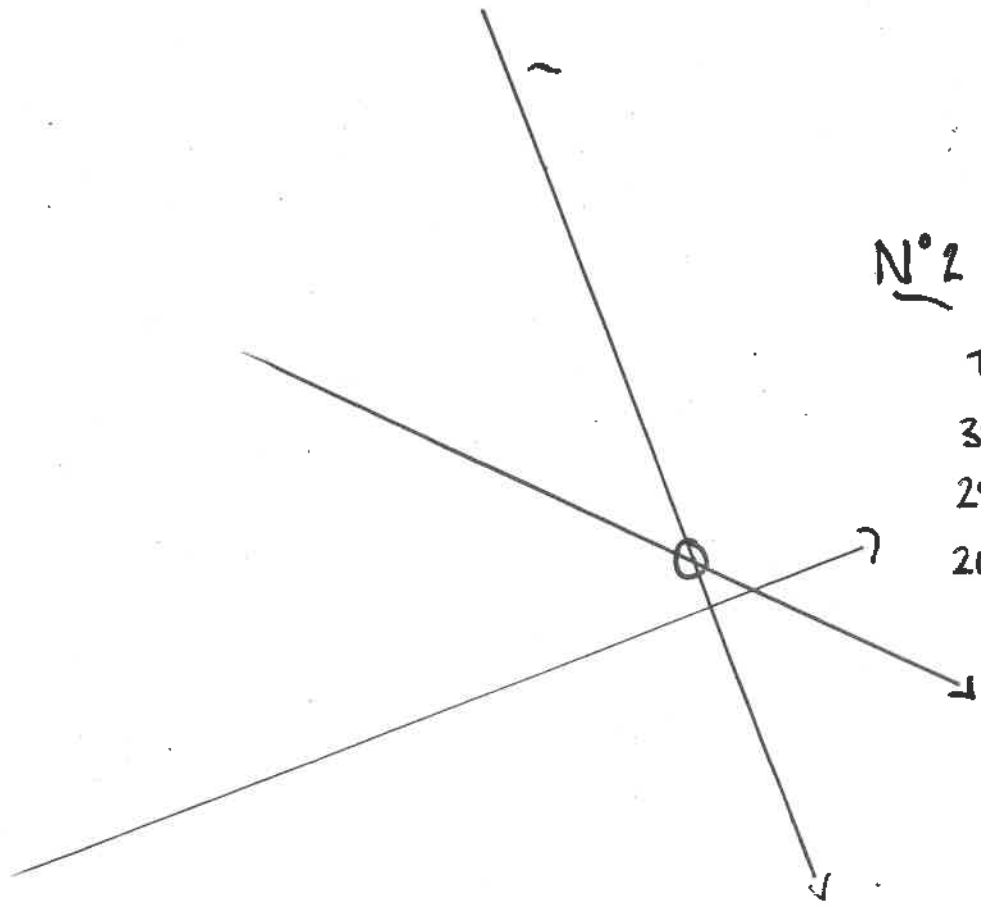
Ship's Head	Deviation	Magnetic Bearing	Ship's Head	Deviation	Magnetic Bearing
000	6E	006	180	6W	174
010	7E	017	190	7W	183
020	7E	027	200	7W	193
030	8E	038	210	8W	202
040	8E	048	220	8W	212
050	8E	058	230	8W	222
060	8E	068	240	8W	232
070	7E	077	250	8W	242
080	7E	087	260	8W	252
090	7E	097	270	8W	262
100	7E	107	280	7W	273
110	6E	116	290	6W	284
120	5E	125	300	5W	295
130	4E	134	310	4W	306
140	4E	144	320	3W	317
150	0	150	330	2W	328
160	2W	158	340	0	340
170	3W	167	350	3E	353

3-BOAKINO FIX
 N° 1 & 2 25°W



N°1

T	V	M	D	C
325	25W	350		
285	"	310		
248	"	273		



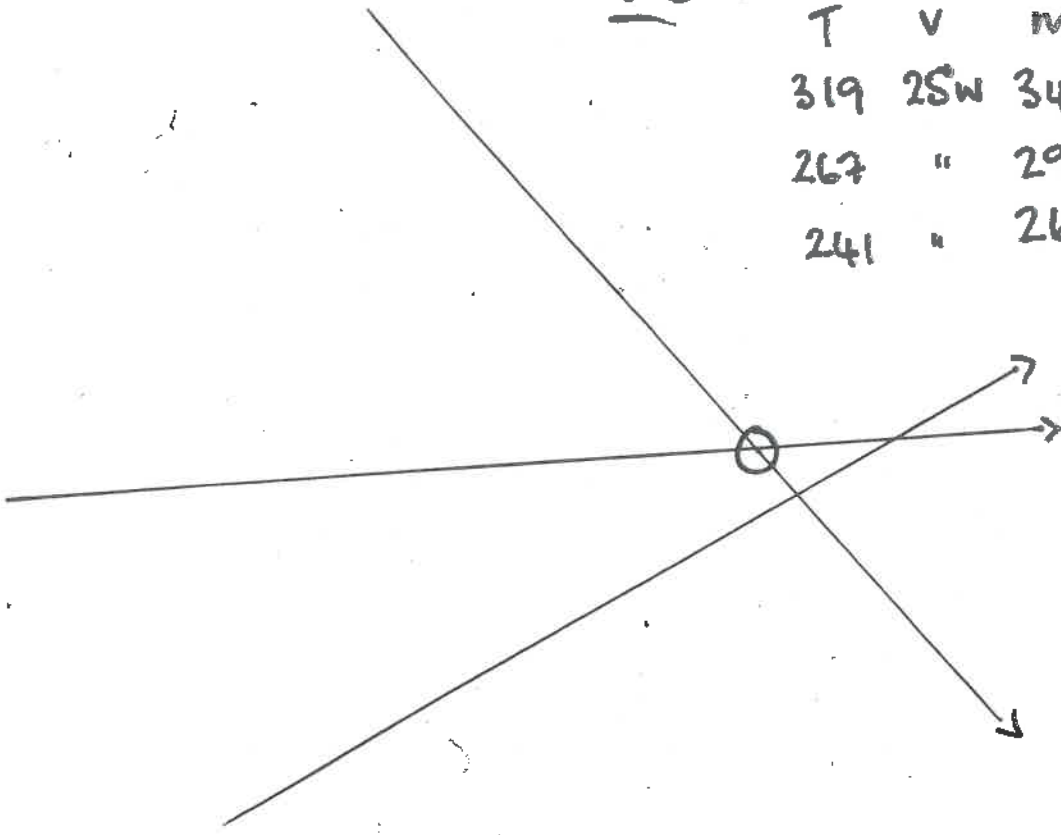
N°2

T	V	M	D	C
339	25W	004		
295	"	320		
249	"	274		

N° 3 & 4 25°W

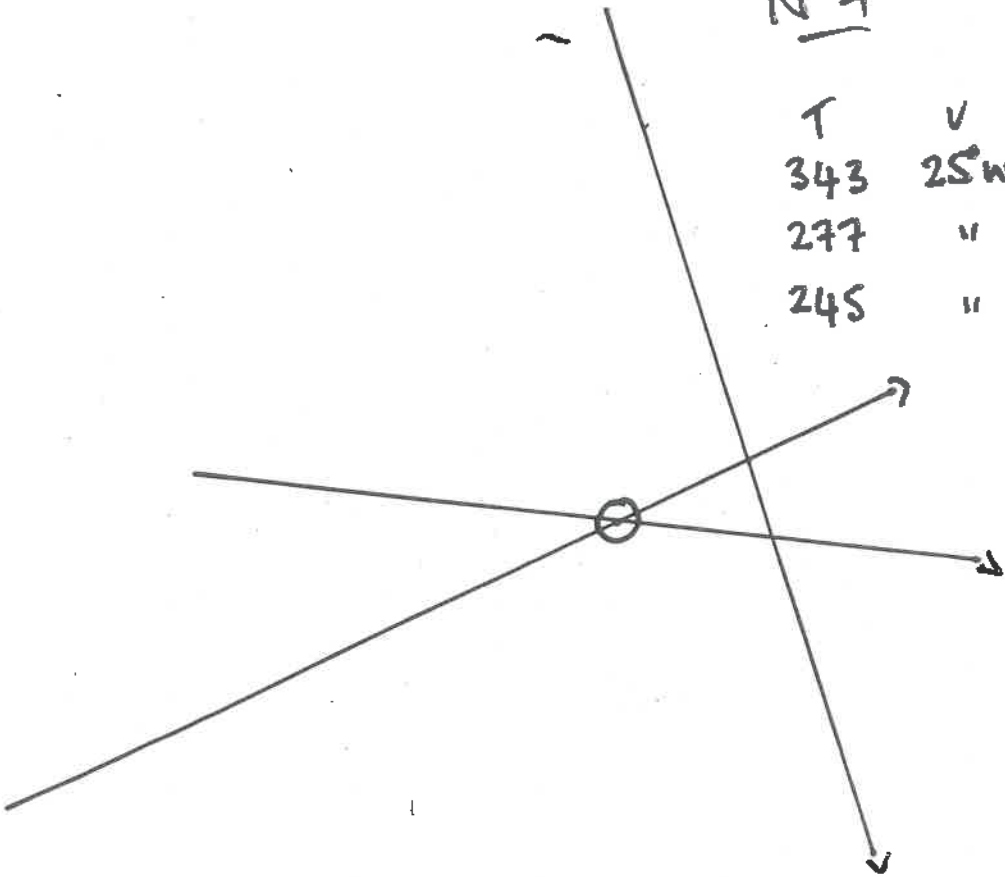
N° 3

T	V	M	D	C
319	25°W	344		
267	"	292		
241	"	266		



N° 4

T	V	M	D	C
343	25°W	008		
277	"	302		
245	"	270		



Steps For E.P (Estimated position)

1. Take given **Compass** course and convert to **True** using TVMDC and plot with a short line



2. Apply Leeway (**downwind**),
3. Plot with **Long** line and this is your water track which is marked with single arrow



4. Measure given boat speed (speed through the water) on water track



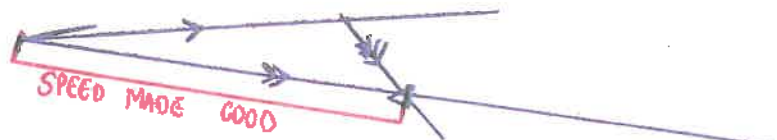
5. Apply current **set** and **rate** from plotted boat speed on water track and mark as E.P- current shown by three arrows



6. Join starting point and E.P and this is your **Ground Track** and marked with two arrows on the line



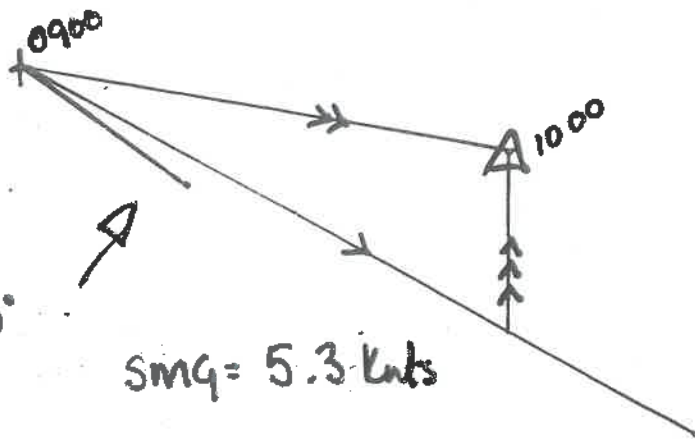
7. Your SMG (speed made good) is measured on your ground track



N° 1 2 25°W

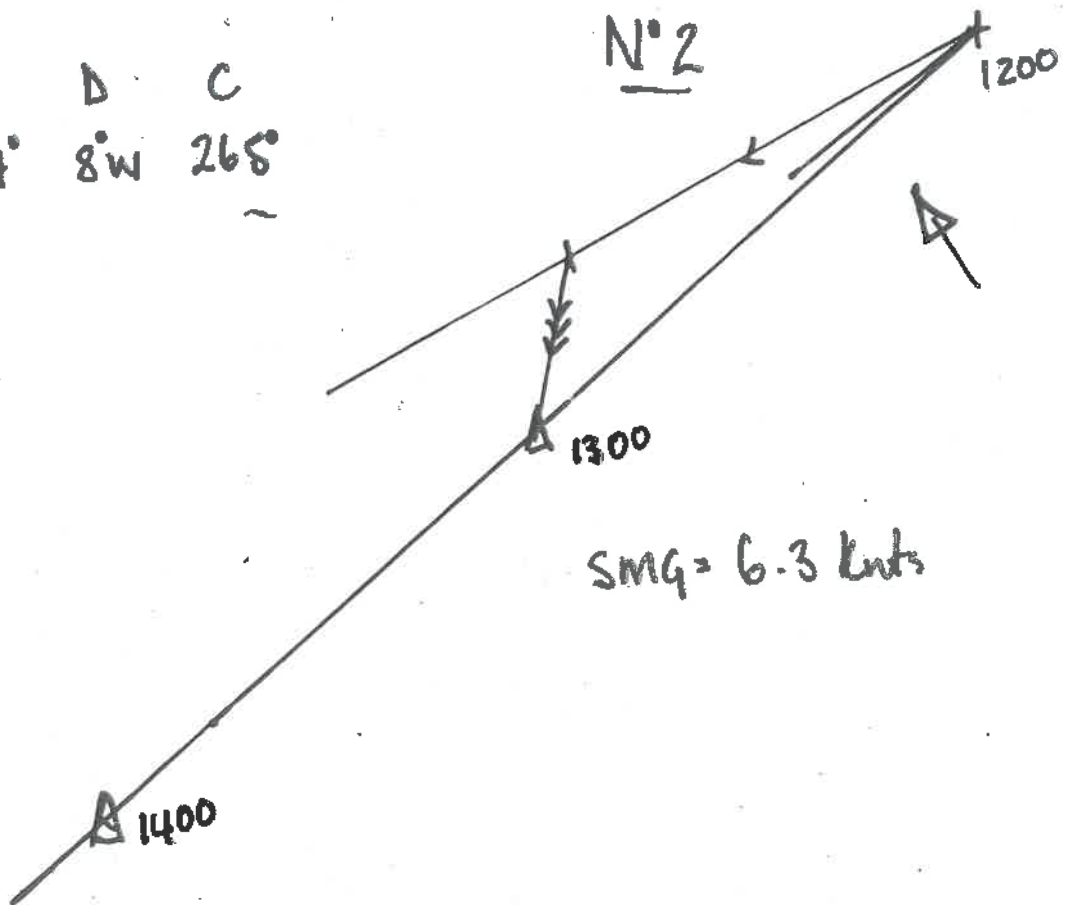
N° 1

T	V	M	D	C
12S	25W	150°	0	150°



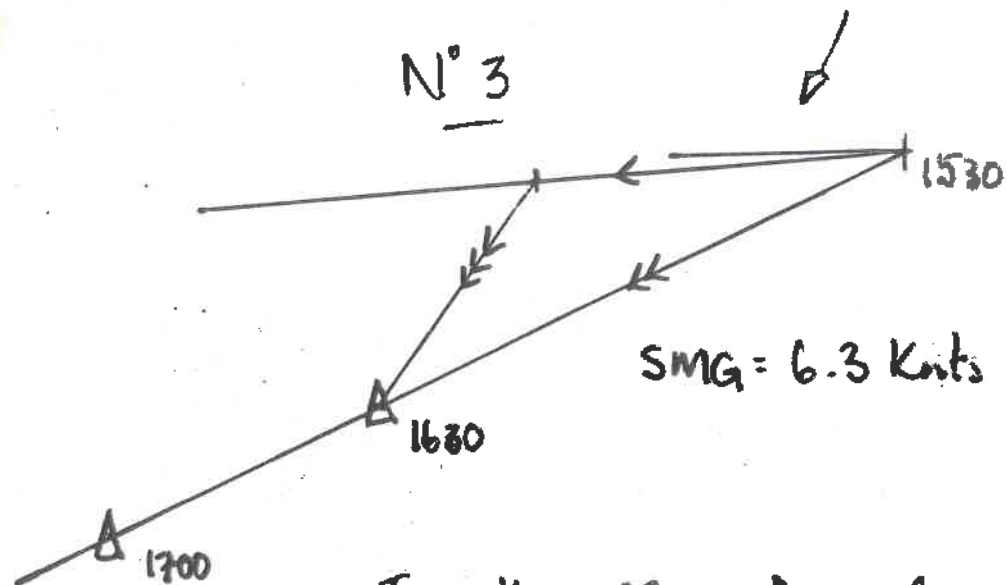
T	V	M	D	C
232°	25W	257°	8W	265°

N° 2

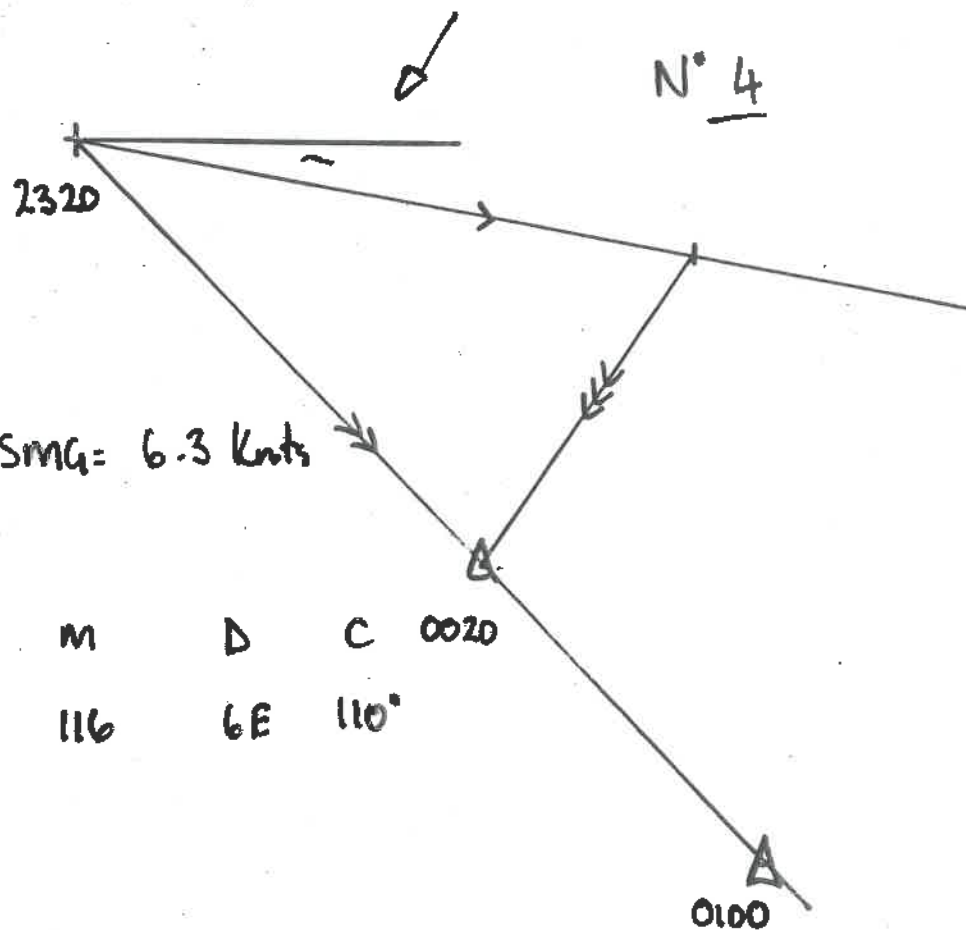


ESTIMATED POSITION

N° 3 3/4 25° W



T	V	M	D	C
268	25° W	293	5° W	298



T	V	M	D	C	0020
091°	25°	116	6E	110°	

Steps for C.T.S (Course to Steer)

1. Plot ground Track wanting to achieve and mark with 2 arrows



2. Plot the set and rate of the current from the starting point



3. Measure given boat speed from the current set and rate onto ground track



4. Join end of current rate and set with boat speed on ground track and this is the vessels water track- mark with single arrow



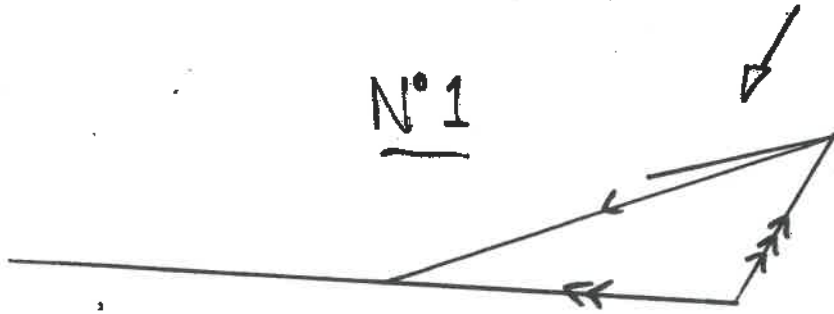
5. Apply leeway to your water track (upwind)- this is your True course to steer



6. Convert True C.T.S to compass using TVMD

C.T.5

N° 1 $\frac{1}{2}$ 2 25°W

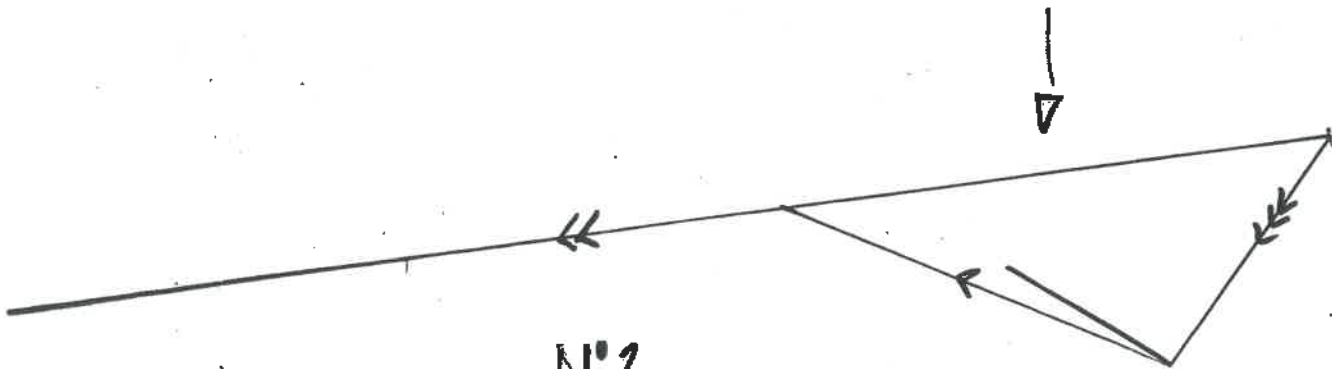


T	V	M	D	C
257°	25°W	282°	6°W	288°

SMG = 3.8 Kts

EPT = $7.8 \div 3.8$
= 2.1

= 2 hours 6 min



N° 2

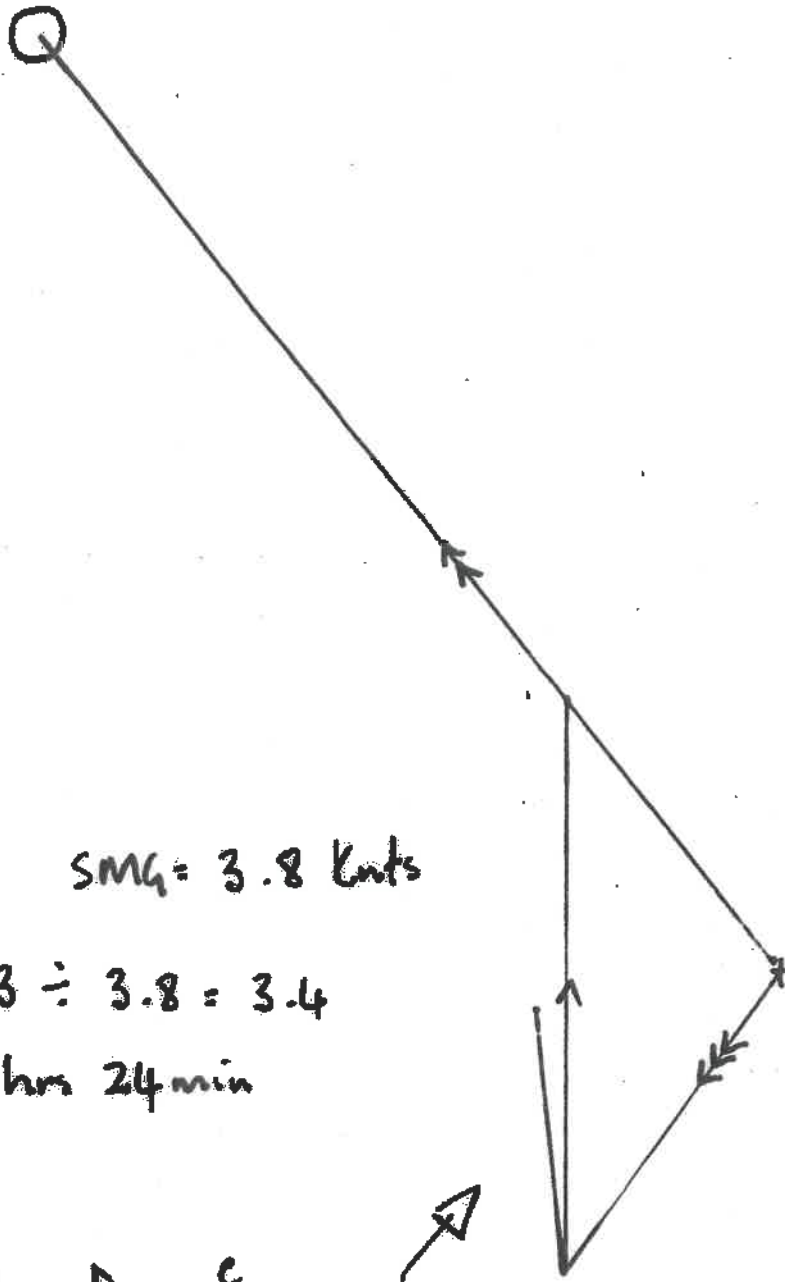
T	V	M	D	C
300	25°W	328°	2°W	327°

SMG = 6 Kts

EPT = $14.3 \div 6$
= 2.4

C.T.S

N° 3 25° W



$$SMG = 3.8 \text{ Knts}$$

$$EPT = 13 \div 3.8 = 3.4$$
$$= 3 \text{ hrs } 24 \text{ min}$$

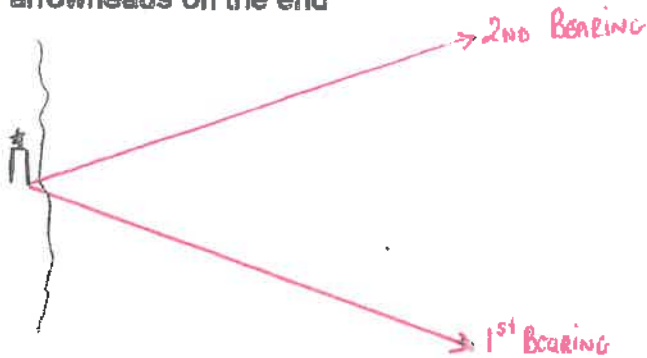
T	V	M	D	C
354	25W	019	7E	<u>012</u>

Steps for a Running Fix

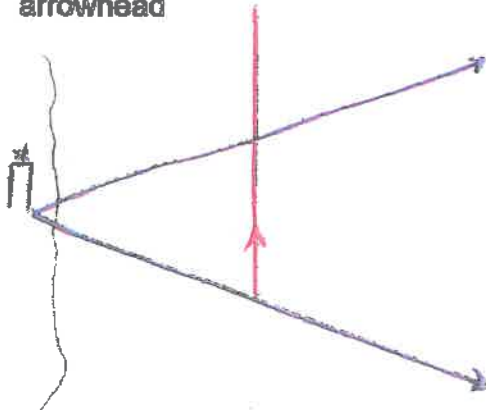
1. Convert all bearings from magnetic to true

T V M

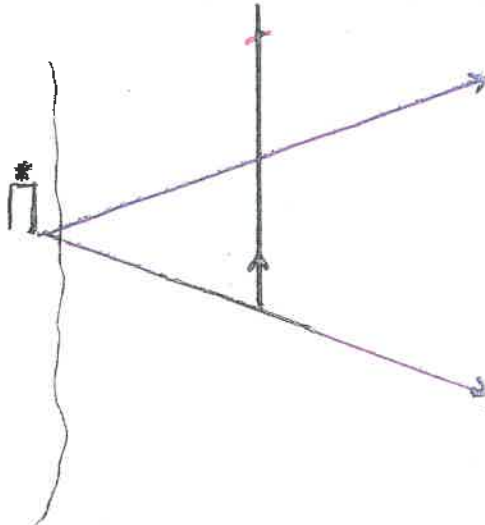
2. Plot 1st and 2nd bearings on the chart as a line of position with single arrowheads on the end



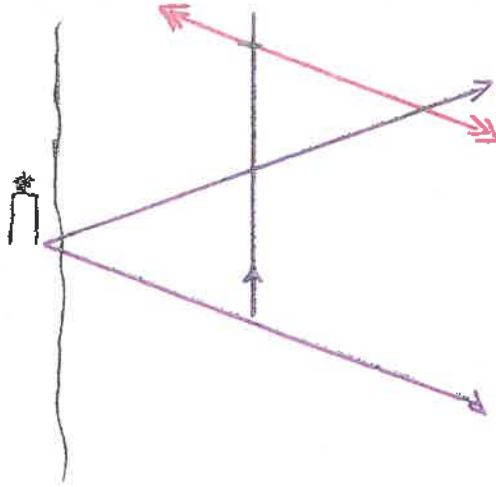
3. Convert compass course to true course and plot it anywhere on the 1st line of position and this is your water track and is shown with a single arrowhead



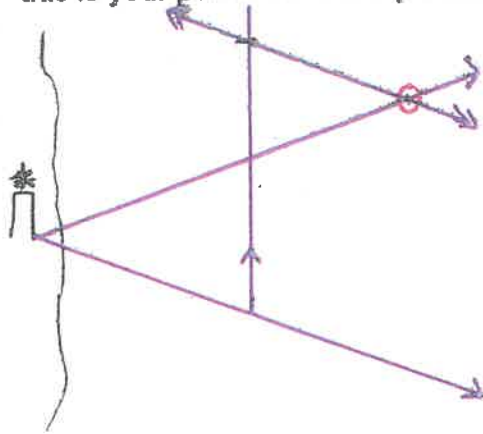
4. Work out the distance the vessel achieved between the 1st and 2nd bearing by using either the difference between the given log readings or using the $D=S \times T$ formula. Measure the distance and plot it on your water track.



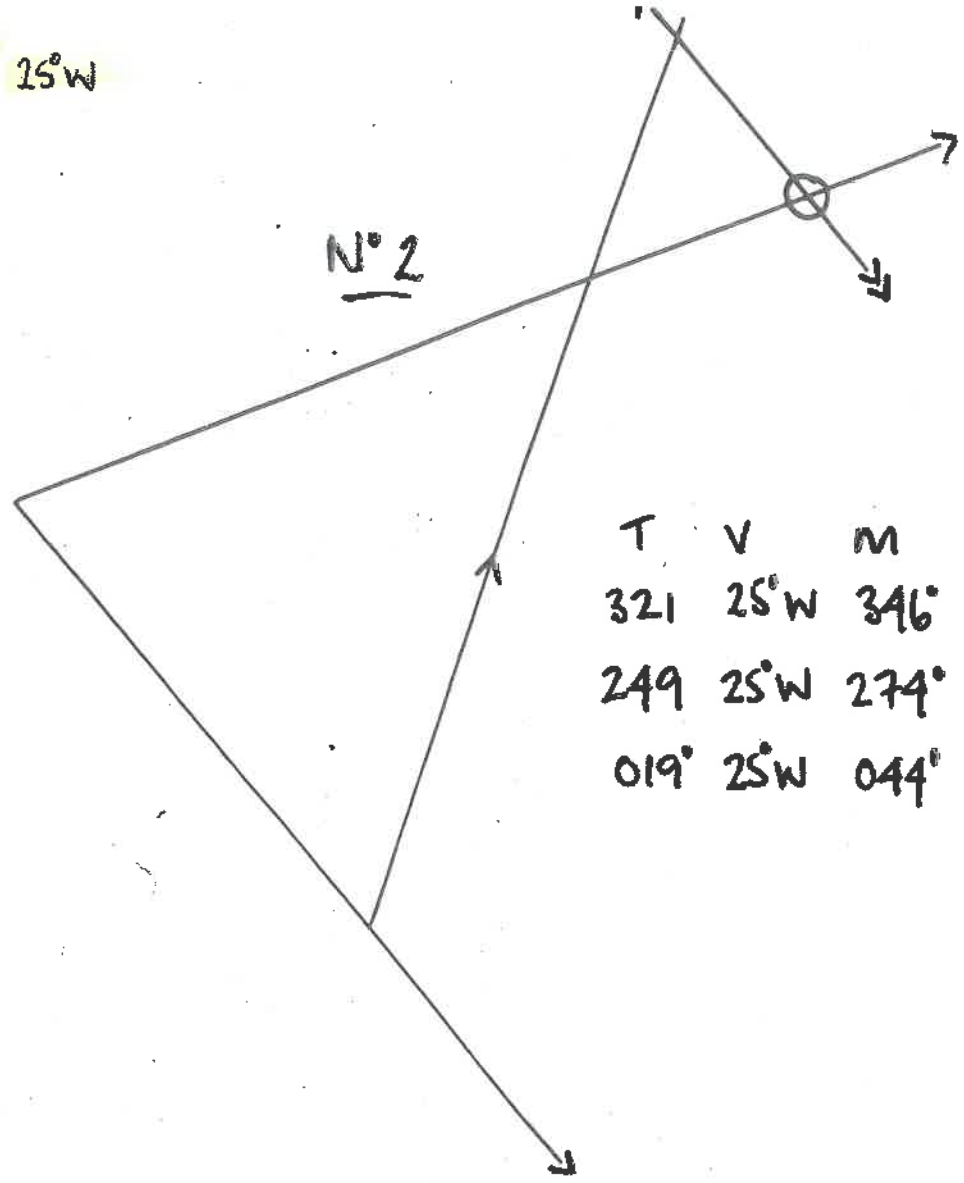
5. Using your parallel rules transfer the 1st line of position through the plotted distance on the water track, this is called the transferred position line and is shown with double arrowheads at the end of the line



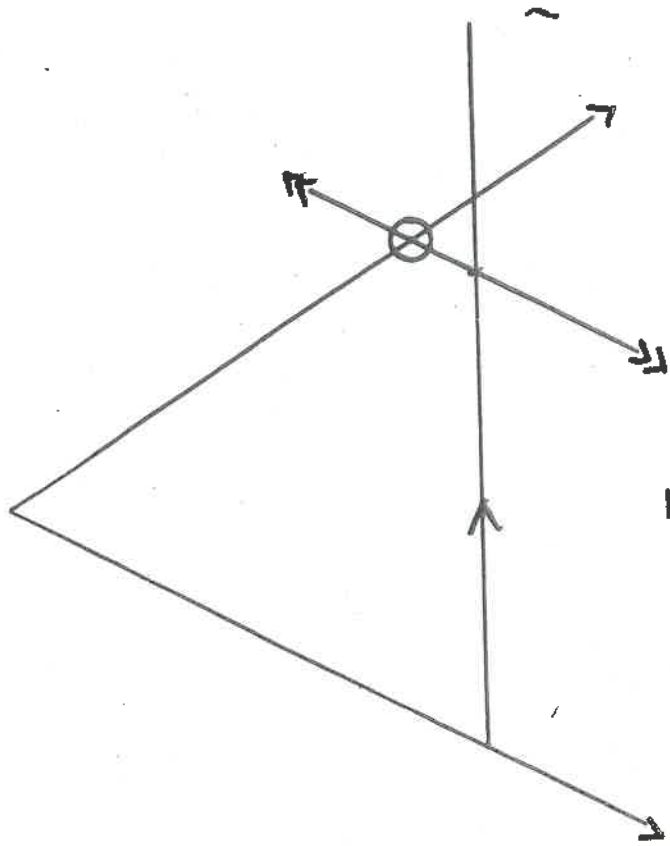
6. Where your transferred position line intersects your 2nd line of position, this is your position and is plotted by a fix



N° 1 & 2 25°W

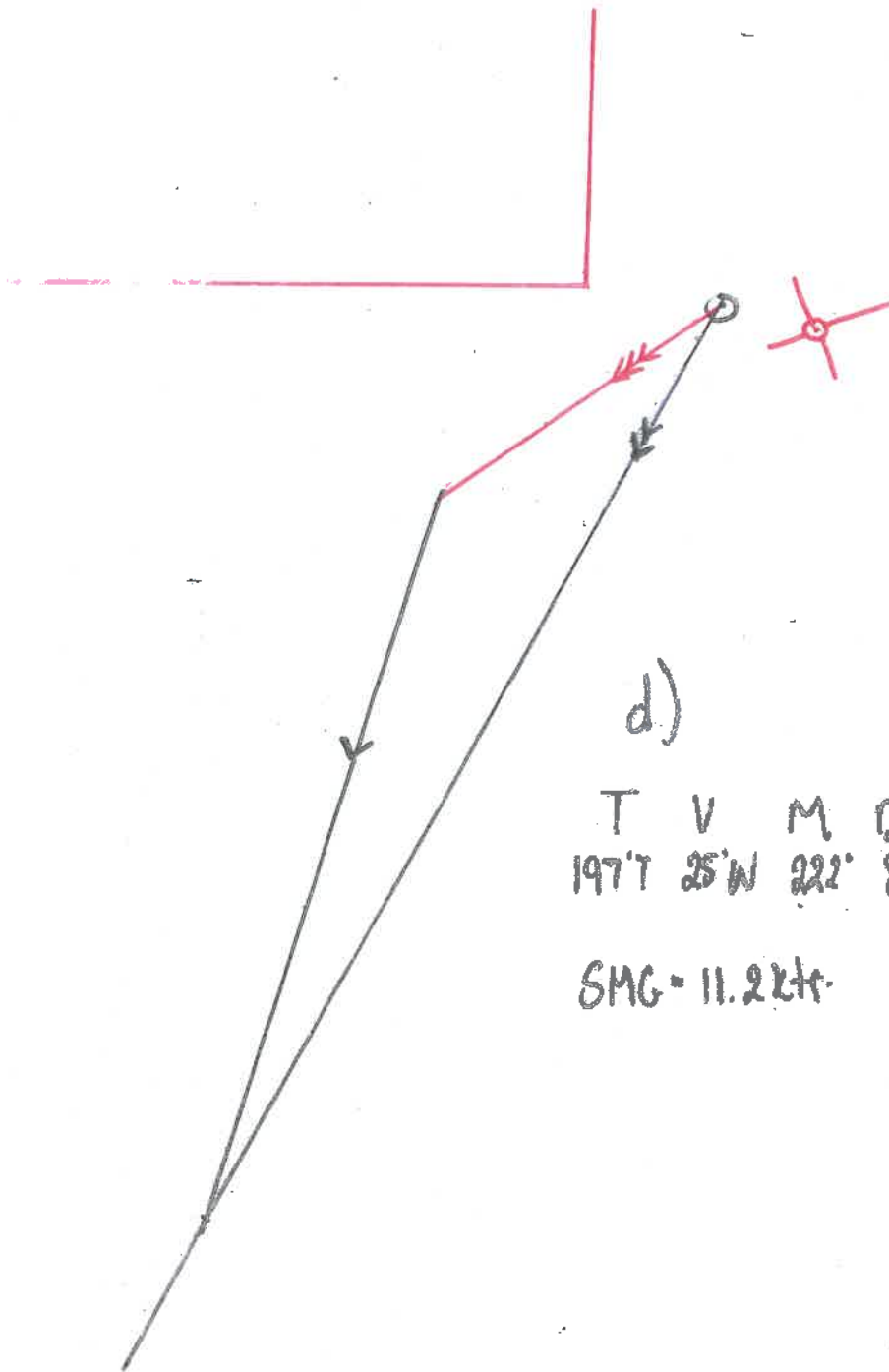


T	V	M	D	C
321	25°W	346°		
249	25°W	274°		
019°	25°W	044°	8°E	036°



T	V	M	D	C
296°	25°W	321		
236°	25°W	261		
358°	25°N	023°	7°E	016°

Section F d



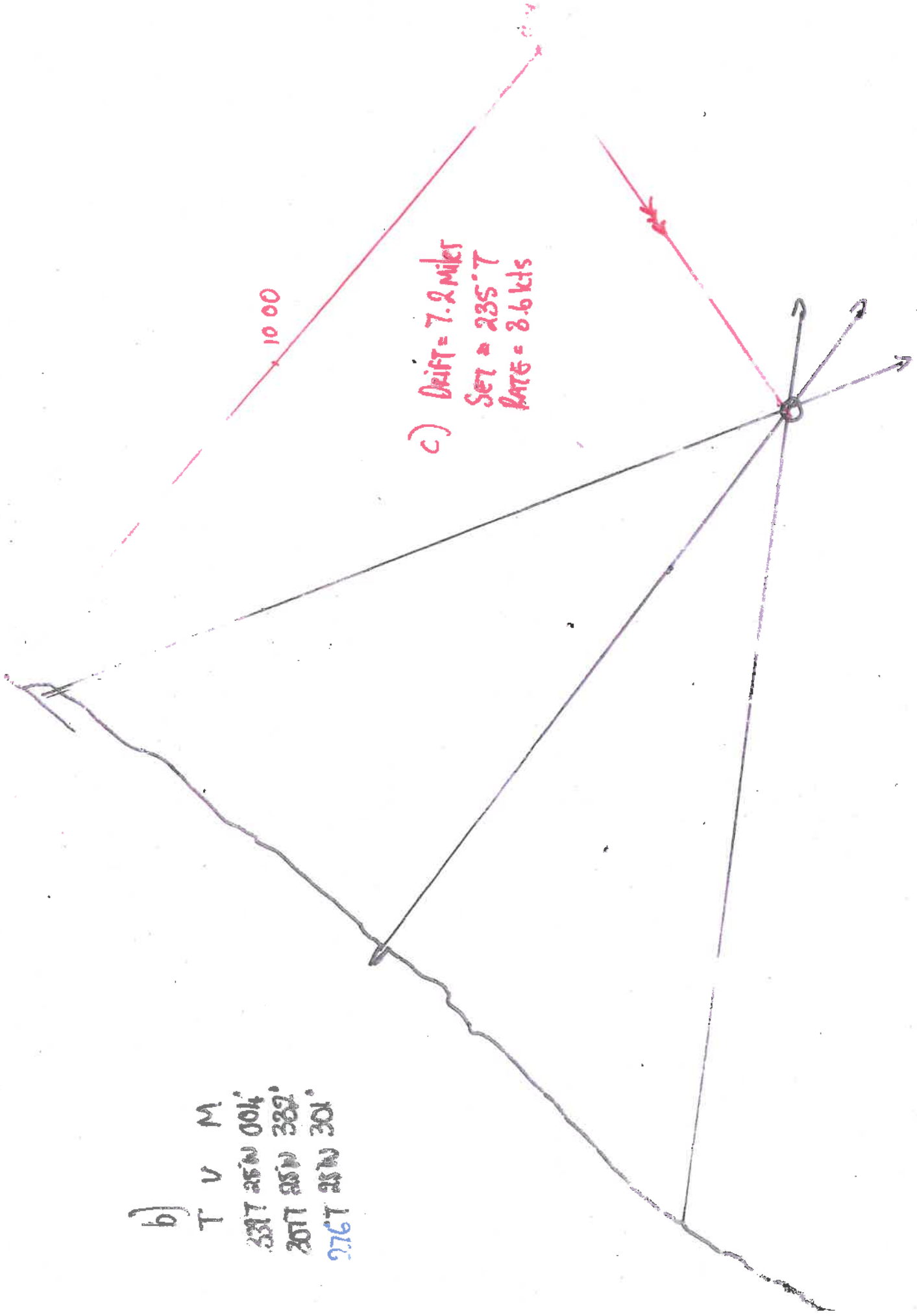
d)

T	V	M	D	C
1977	25'W	222'	8W	220'C

SMG = 11.2kt

SECTION I - D/C

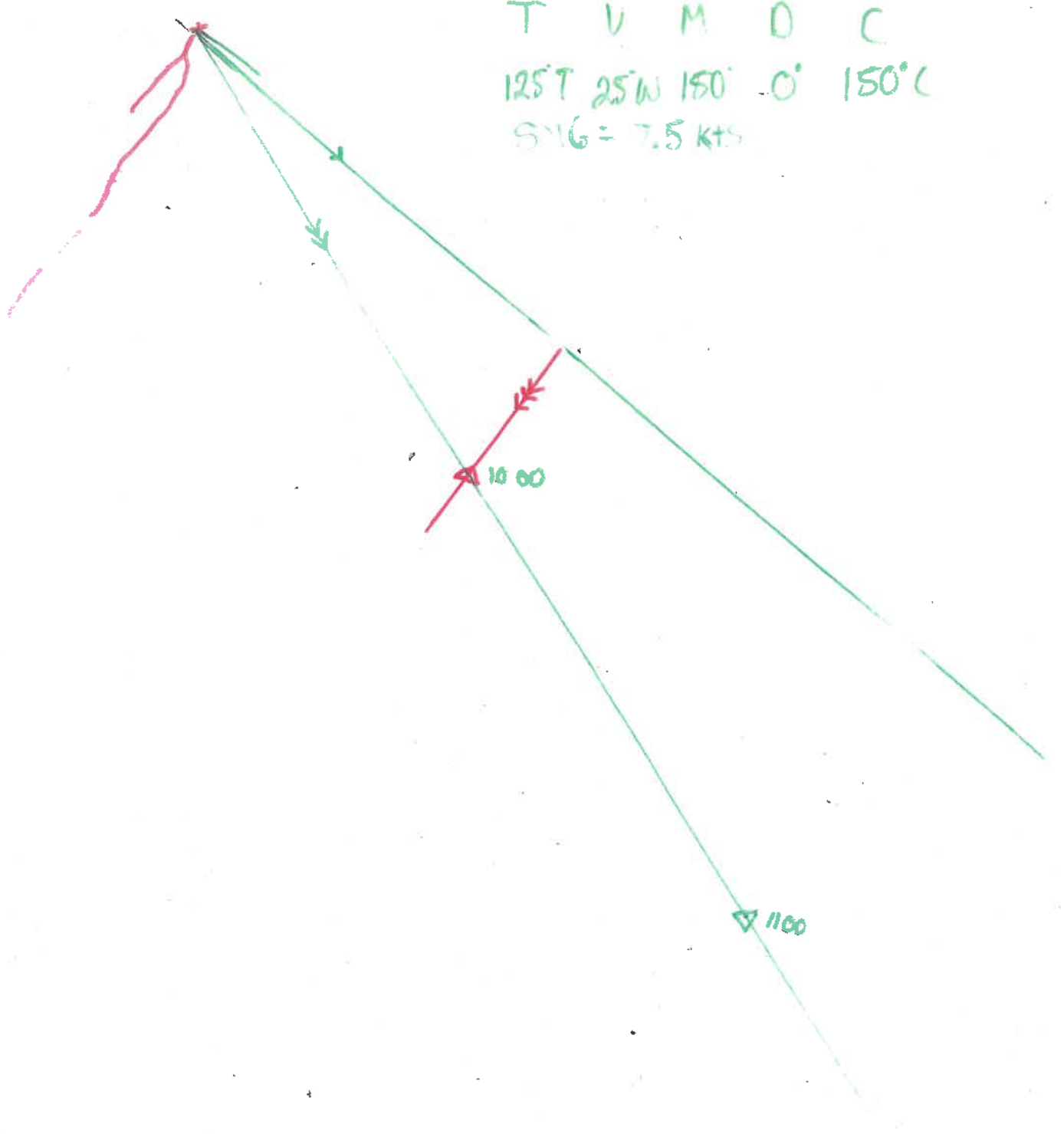
b) T V M
3317 25°N 004°
2017 25°N 382°
2767 25°N 301°



c) Drift = 7.2 miles
Set = 235° T
Rate = 8.6 kts

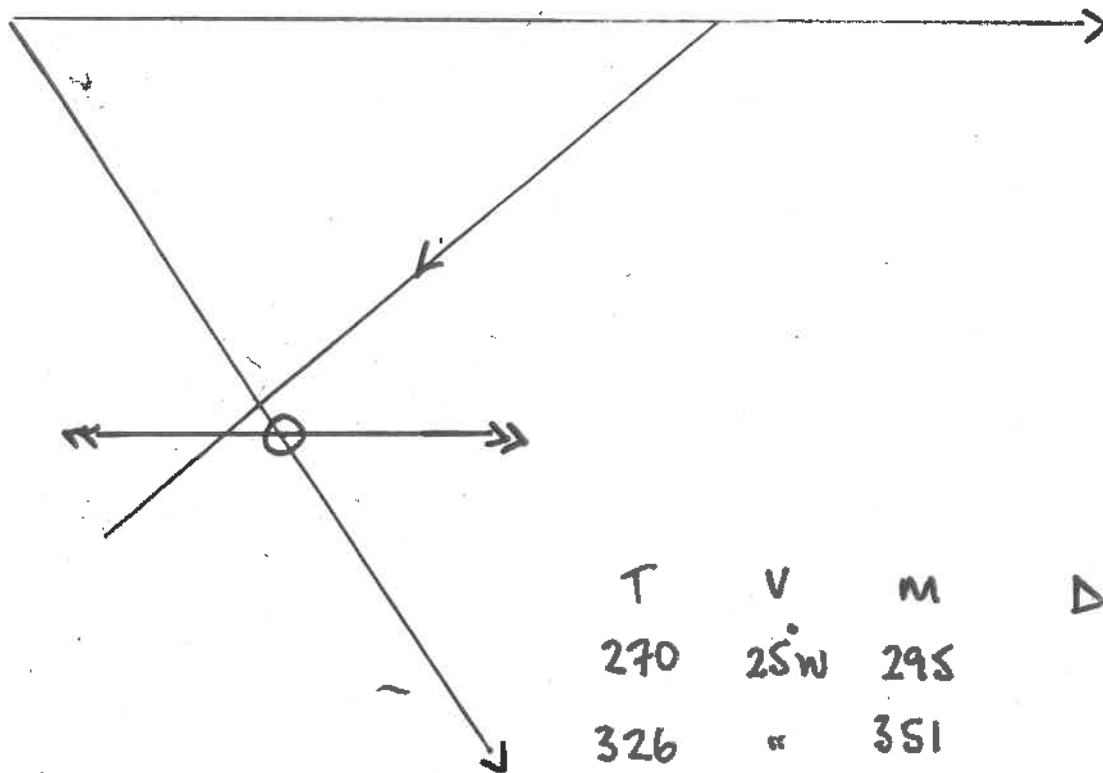
SECTION F a)

T V M D C
125T 25W 150° 0° 150° C
SNG = 7.5 KTS



N° 3 25°W

N° 3



T	V	M	D	C
270	25°W	295		
326	"	351		
230	"	255	8°W	263

ADDITIONAL NAVIGATION

ANSWERS

MASTER of YACHTS LIMITED REVISION

Chart SAN 135

USE VARIATION 25°W and attached Deviation Card where applicable.

Note that Questions 1, 2, 3 and 4 refer to the same vessel on one passage.

Question 1.

At 1000 a yacht's known position is 29° 35.0'S; 31° 25.0' E. She is heading on a course of 264° at a boat speed of 6kts and is experiencing a current setting 310° @ 1.6 knots. Plot the yacht's estimated position at 1200.

Question 2.

At 1200 bearings were taken on the following landmarks:

Umhlanga Rocks Lighthouse	254° M
Mdloti River mouth	292° M
Tongati River Mouth	198° M

Find the yacht's position at 1200 and state the Latitude and Longitude of the fix.

Question 3.

From Question 1 above and the fix in Question 2 above, determine the actual set, drift and rate of the current from 1000 to 1200. (Assume no other influences such as leeway etc. affected the yacht during this time).

Question 4.

Using the set and rate of the current found in Question 3 above, determine the following:

- The course to steer from the yacht's position at 1200 to the Durban Harbour Entrance. The yacht is expected to average 7 knots and no leeway is experienced.
- The yacht's expected speed over ground.
- The estimated time of arrival at the Harbour Entrance.

Question 5.

In checking the compass error of the steering compass, the navigator of a yacht motoring towards the entrance of Durban Harbour sees two lights off the bow in range with each other. One light is Fl.G.15M and the other is Fl(2)18M. With the yacht lined up on this range the steering compass reads 281°C. What is the error of the steering compass on this heading?

Question 6.

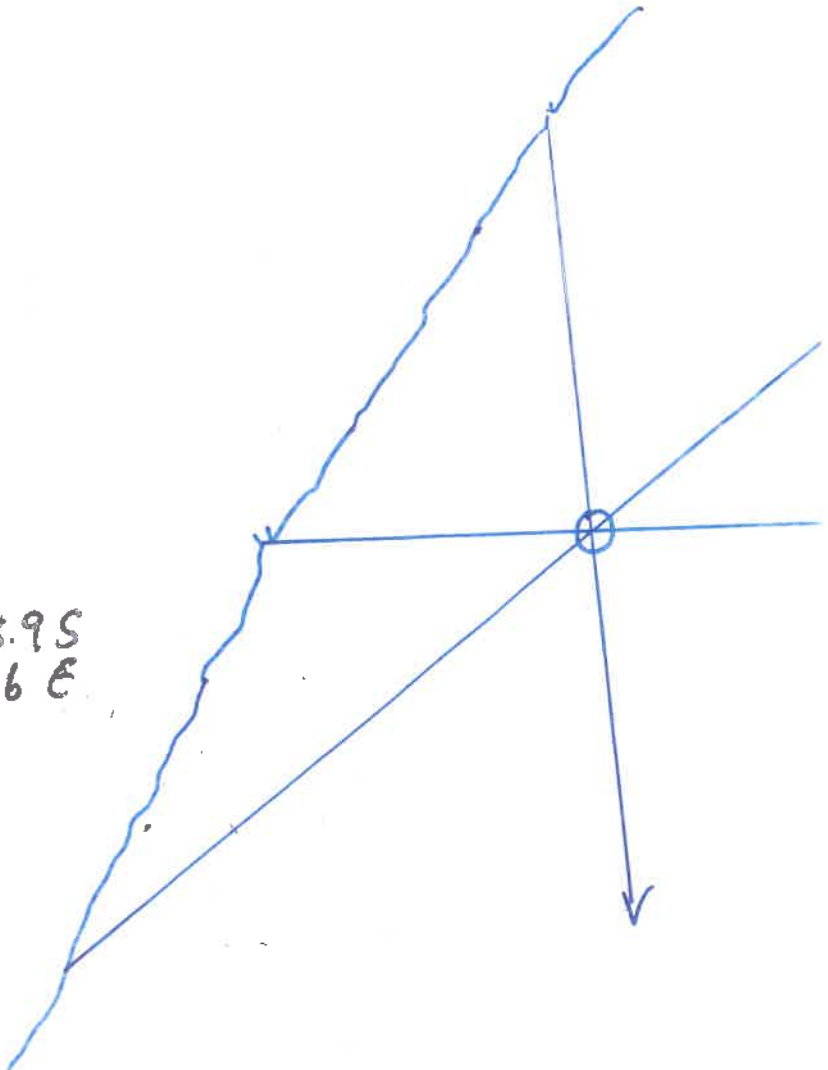
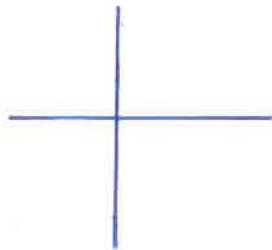
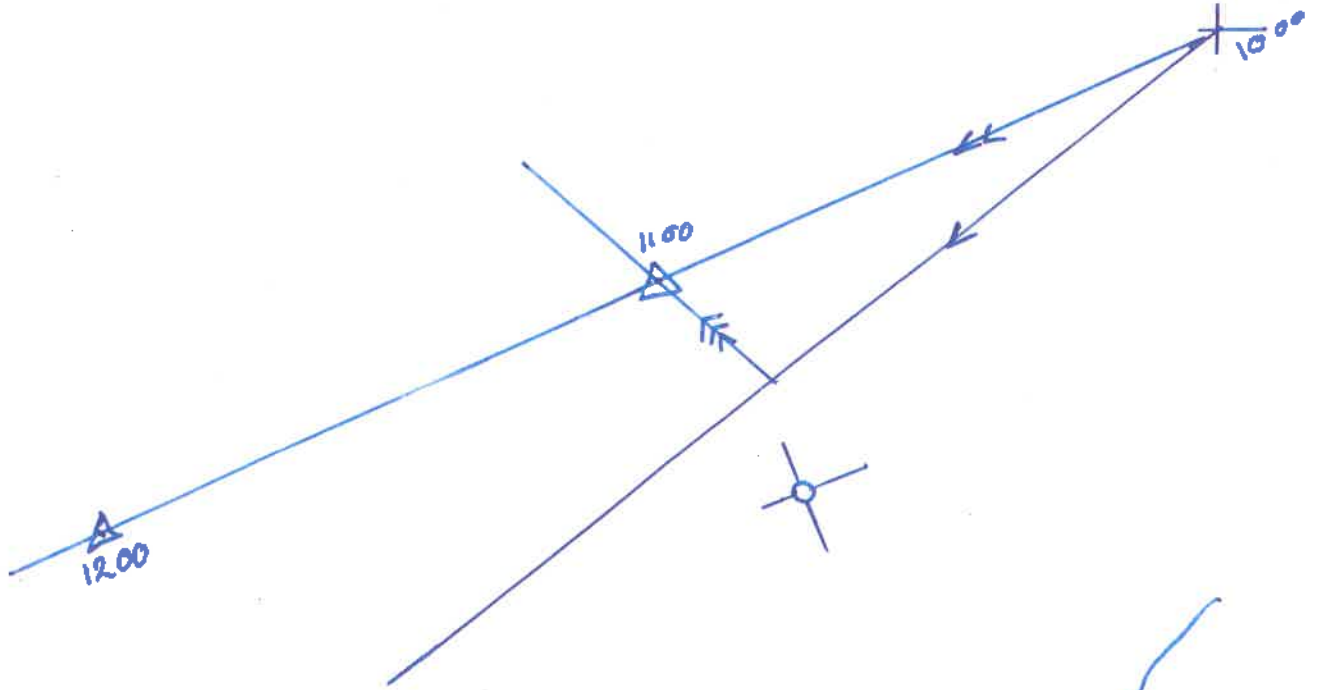
While on a course of 051° C over the ground, the bearing of the Cooper Light, Fl.10s 133m 26M by hand bearing compass is 357° from a powerboat making good a speed of 12 kts. Thirty minutes later the bearing is 284°. Plot the vessel's position.

Deviation Card

Ship's Head	Deviation	Magnetic Bearing	Ship's Head	Deviation	Magnetic Bearing
000	6E	006	180	6W	174
010	7E	017	190	7W	183
020	7E	027	200	7W	193
030	8E	038	210	8W	202
040	8E	048	220	8W	212
050	8E	058	230	8W	222
060	8E	068	240	8W	232
070	7E	077	250	8W	242
080	7E	087	260	8W	252
090	7E	097	270	8W	262
100	7E	107	280	7W	273
110	6E	116	290	6W	284
120	5E	125	300	5W	295
130	4E	134	310	4W	306
140	4E	144	320	3W	317
150	0	150	330	2W	328
160	2W	158	340	0	340
170	3W	167	350	3E	353

QUESTION LAND 2

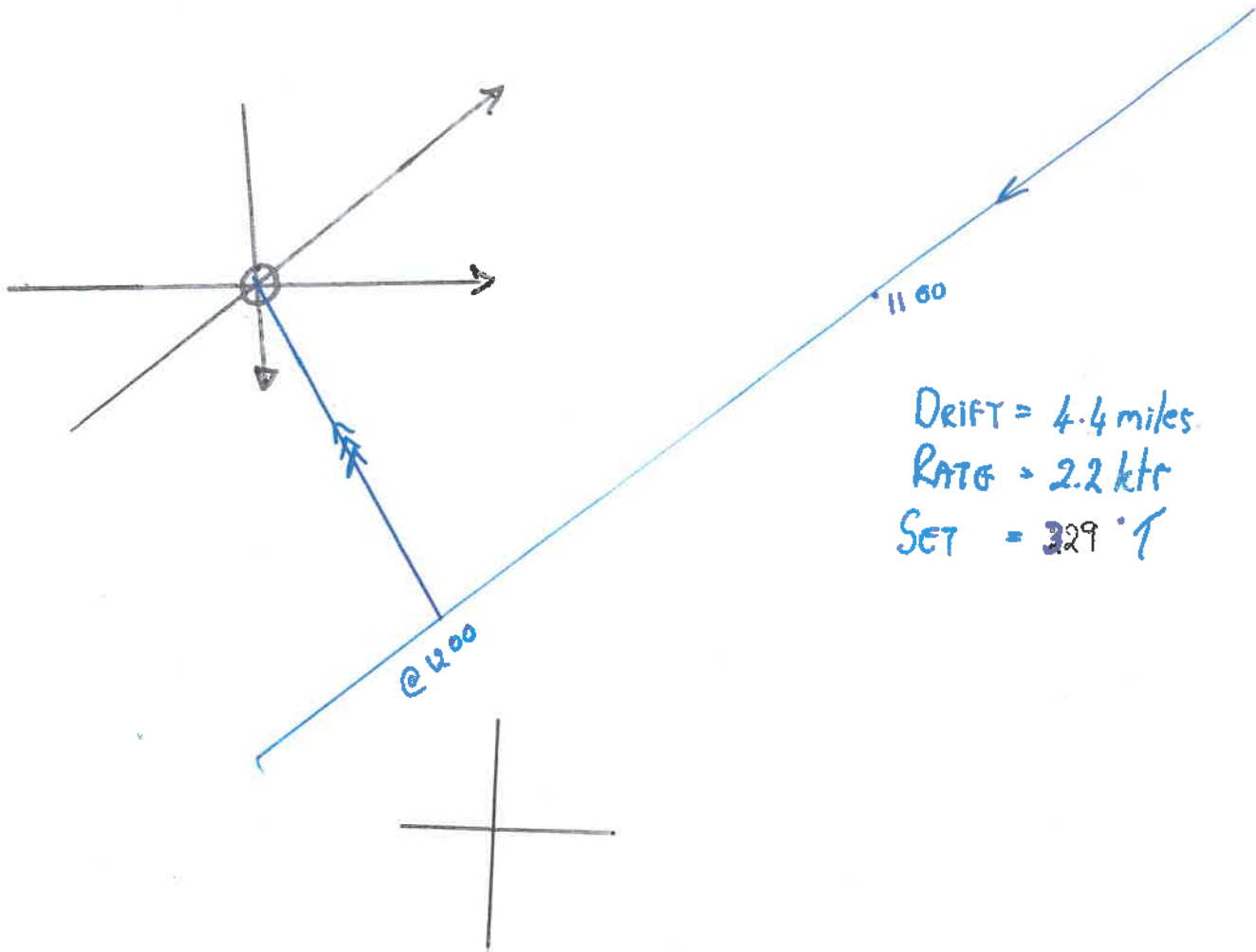
T 231° V 25'W M 256 D 8'W C 264°



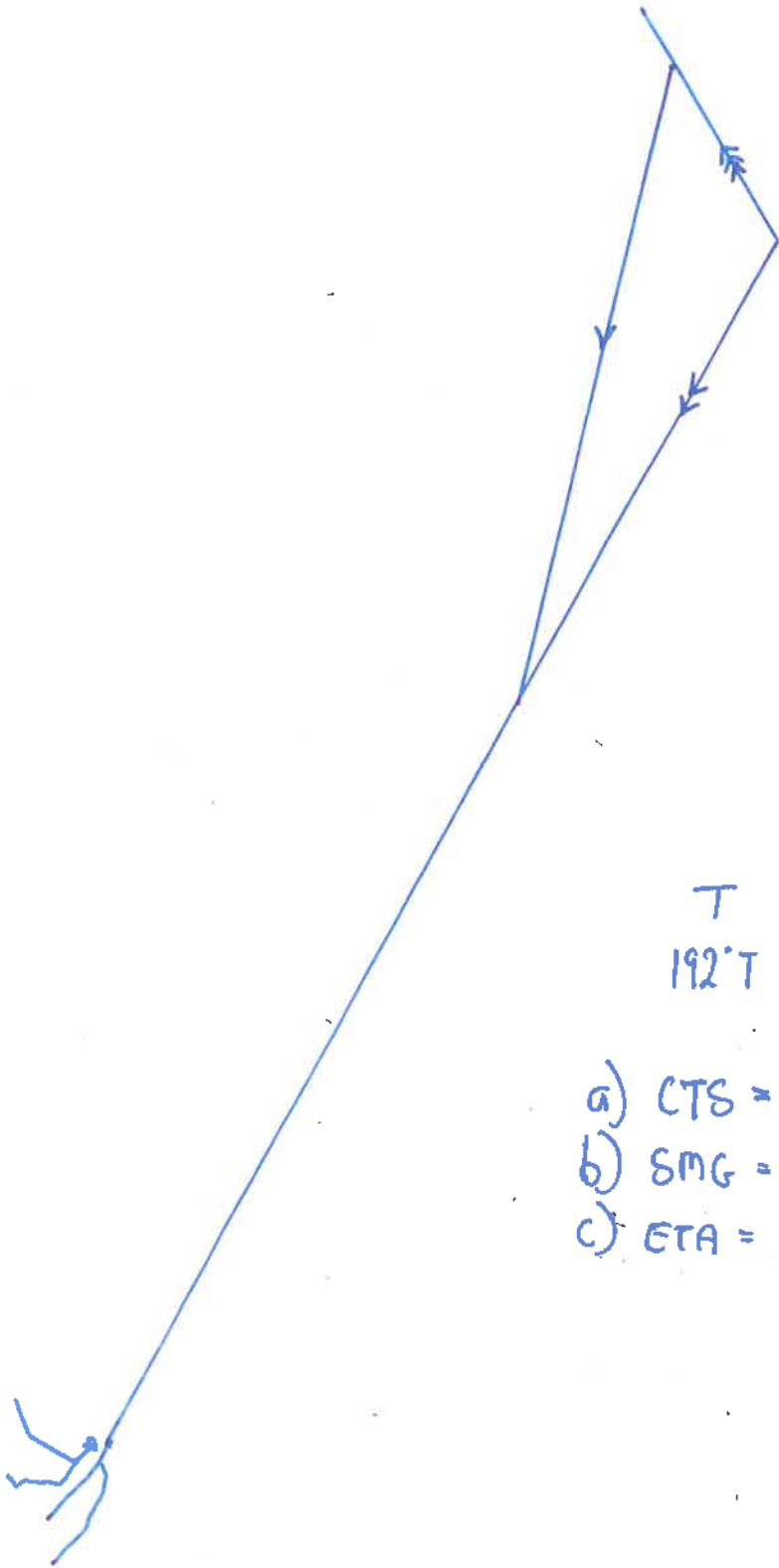
29° 38.9 S
31° 11.6 E

	T	V	M
WIMBANKA ROCKS LIGHTHOUSES	229°	25'W	256
UMDLOTI RIVER MOUTH	267°	25'W	292°
TONGATI RIVER MOUTH	173°	25'W	198°

QUESTION 3



QUESTION 4



T	V	M	D	C
192°T	25'W	217	8'W	225°C

- a) CTS = 225°C
- b) SMG = 5.8 kts
- c) ETA = $\frac{14.8 \text{ miles}}{5.8 \text{ kts}} = 2. \text{ hrs}$
= 2 hrs 33 min

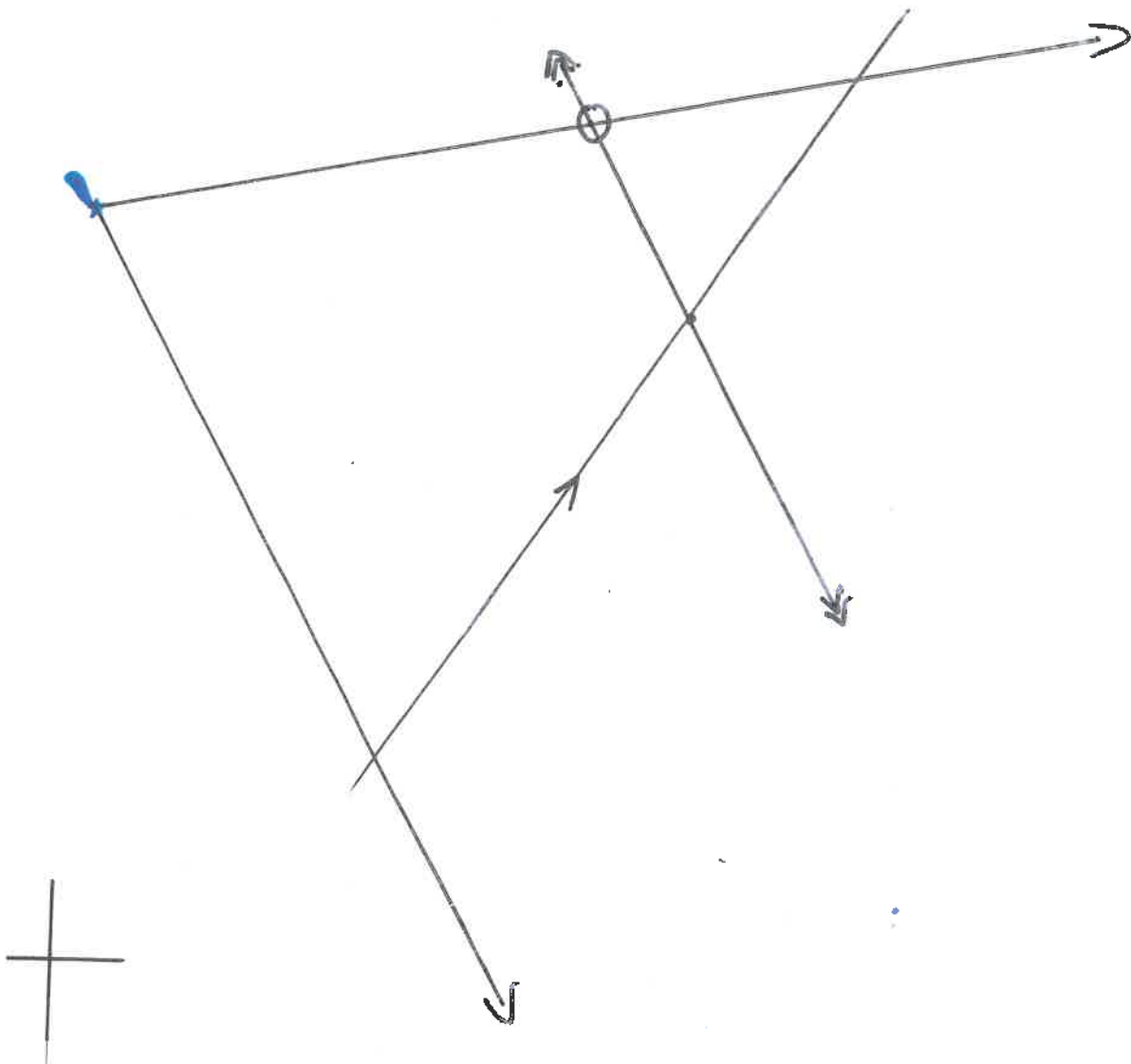
∴ ETA = 14 33 →

QUESTION 5

T	V	M	D	C
252°	25'W	277	4'W	281

QUESTION 6

	T	V	M	D	C
Course	034°	25°W	059	8°E	051°C
1st BEARING	332°	25°W	357		
2nd BEARING	259	25°W	284		



STANDARD PORT

ANSWERS

USE 2001 TABLES

Times are BST where applicable (April to October)

N.B. BST = GMT + 1 hour

Section A: Standard Ports

1. On 16 February at Margate:
 - a) Find the times and heights of all high and low tides.
 - b) At what time on morning falling tide will the tidal height be 2.5m?
 - c) When on the afternoon rising tide will the above tidal height again be available?
2. At Margate on the 29th April:
 - a) What will the tidal height be at 0600 BST?
 - b) When next will this height be available?
3. Find the actual depth of water off Dover on 8 April at 1015 BST in a place where the Charted Depth is 1.3 metres.
4. On the 28th April at Margate, a yacht wishes to cross a sandbar shown on the chart as having a drying height of 0.5m. The yacht's draft is 1.8m and she requires a UKC of 0.5m. What is the latest time on the morning falling tide, when this will be possible?
5. On the 19th July at Dover a yacht with a draft of 3m wishes to cross a sandbar shown on the chart as having a charted depth of 1m. A UKC of 0.5m is to be allowed for. What is the earliest time on the afternoon rising tide that this will be possible?

Section B: Secondary Ports

1. Find the times (BST) and heights of all high and low waters at:
 - a) Broadstairs (102a) on 10 July
 - b) Hastings (85) on 11 April
2. Find the height of tide at Whitstable Approaches (105) at 1300 BST on 11 July.
3. Find the height of the tide at Broadstairs (102a) at 12:00 on 26 November.
4. Find the earliest time in daylight on 24 August on a falling tide that the height of tide will reach 5.0m off Hastings (85).
5. Find the latest time on the morning falling tide on 1 September that a vessel drawing 2.9m can cross a sandbar off Broadstairs (102a) with a charted depth of 0.8m allowing 0.5m clearance under the keel.
6. Off Folkstone (88) on 19 January a vessel drawing 3.1m requires to cross a sandbar shown on the chart as having a drying height of 0.1m. If 0.5m clearance under the keel is to be allowed for, what is the earliest time that this will be possible?

Section C: Need a Challenge?

Note: Not required for examination purposes. Requires full set of Tide Table extracts

1. At Ballycrovane Harbour (731) a vessel is to cross an area shown on the chart as having a drying height of 0.6m. Find the earliest time on the afternoon rising tide of 23 February that the vessel can cross allowing for draft 1.8m and UKC 0.5m.
2. For Le Touquet (1573), find the tidal window in daylight on 20 August during which a vessel drawing 3.3 metres will be able to cross a shoal patch with a charted depth of 0.2 metres allowing 0.5 metres clearance under the keel.
3. A rock off Wissant (1571) is charted as 'dries 0.6m'. Find the actual depth of water over the rock at 2000 local time on 10 September.

Using Standard Port Graphs.

You use a standard port graph to find either the time of a certain height of tide or a height of tide at a certain time.

1) Find correct Graph.

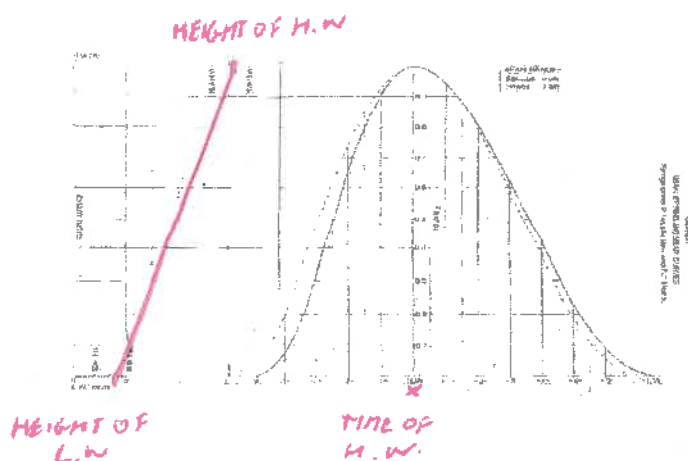
2) $BST = GMT + 1 \text{ Hour}$

$GMT = BST - 1 \text{ Hour}$

ALWAYS WORK IN GMT

3) Find height of high tide, height of low tide, and time of high tide.

Apply to graph and join height of high and low tide with a straight line.



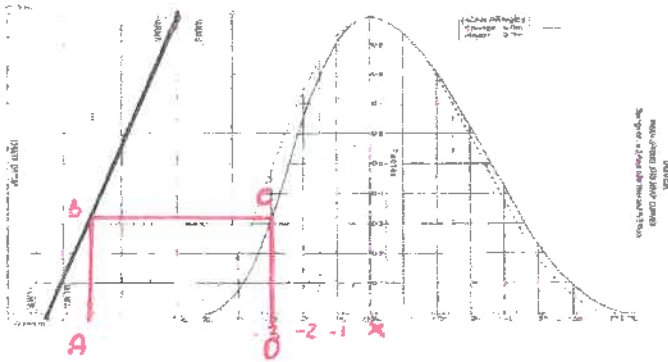
4) Work out range of tide, difference between high and low tide.

5) Find mean ranges on curve spring and neap. To find halfway add together and divide by two. If the range is within 0.3 of halfway mean range then it is halfway. Above this and it is Springs, below this and it is Neaps.

To find the time of a certain height:

1) Find height on Scale (a)

- 2) Draw a vertical line to where it joins the line between high and low tide heights. (point b)
- 3) Draw a horizontal line from point b to where it hits the tidal curve springs neaps or halfway. (Point C)
- 4) Draw a vertical line from point C to the time scale point D



- 5) Work out the time by subtracting or adding the time from the time of high tide.
- 6) Adjust for BST if necessary.

To Find Height of Tide At A Certain Time:

- 1) Do the same as above but in reverse, start at the time in question, draw a line up to the curve, then across to the height line and down or up to the scale.
- 2) The number you read off is the height of tide.

Answers

Section A

1. a) HW 0546 4.1m LW 1221 1.2m HW 1824 3.8m
b) 0902 c) 1520

2. a) 3.8m b) 1526 BST

3. 5.6m 4. 0629 BST 5. 1933 BST

Section B

1. a) HW 0328 4.1m LW 0947 1.0m HW 1526 4.2m LW 2223 0.8M
b) HW 0152 7.7m LW 0900 0.4m HW 1412 7.5m LW 2109 0.7M
(Times are BST)

2. 2.25m 3. 1.9m 4. 0610 BST 5. 1450 BST 6. 0335 BST

Section C

1. 1510 2. 0759-1550 ZT 3. 4.6m

UK Tides Exercises

Section A - Standard Ports

1a) 16th FEBRUARY 2001 MARGATE

HW - 05 46 LW - 12 21 HW - 18 24
4.1m 1.2m 3.8m.

b) 16th FEBRUARY MORNING falling Tides of 2.5m @ MARGATE.

HW	LW	RANGE = 4.1m
05 46	12 21	- 1.2m
4.1	1.2m.	2.9m.

Cureos Interpolation = SPRINGS - 4.3m
NEAPS - 2.5m
∴ USE NEAPS →

2.5m @ 09 02 →

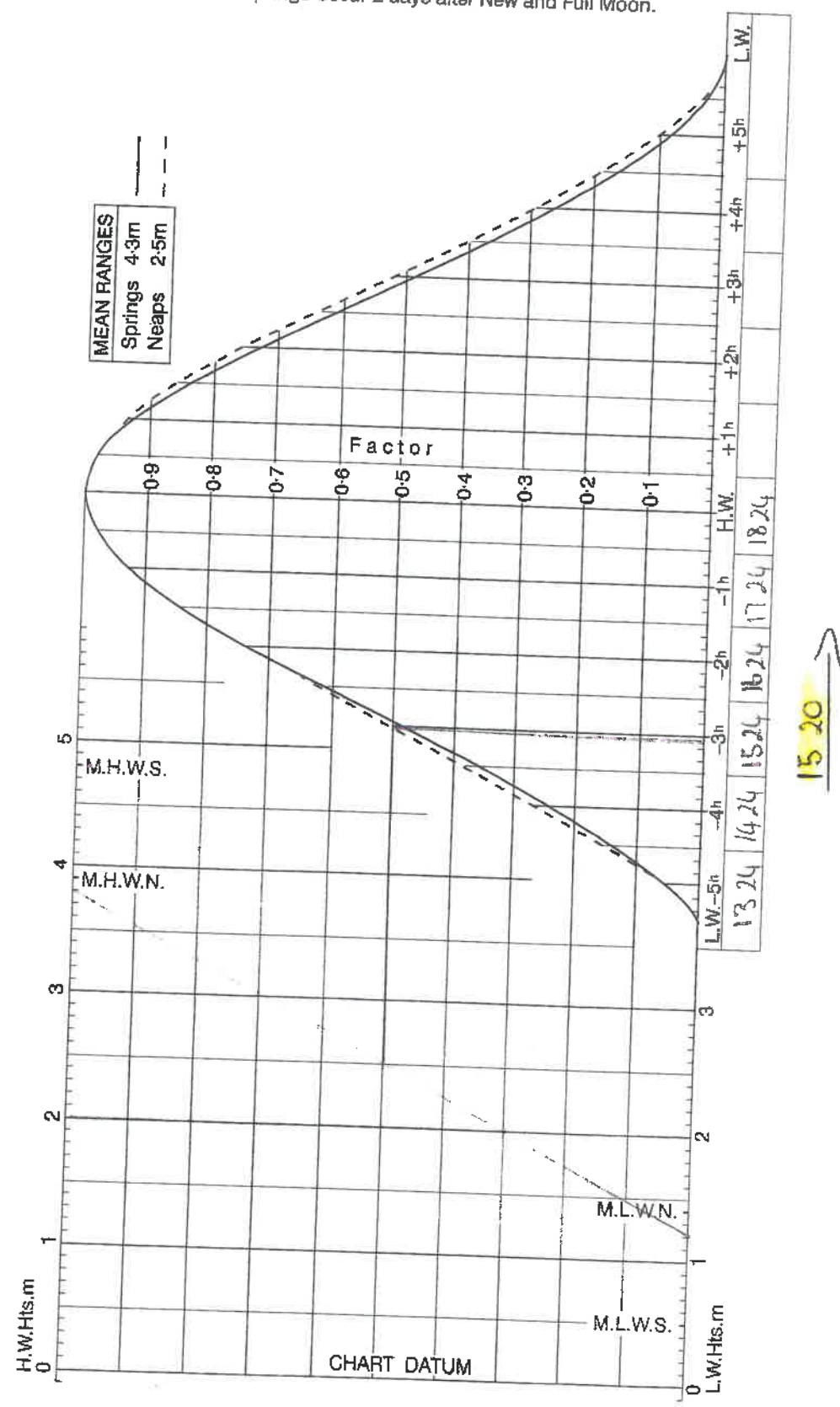
c) LW - 12 21 HW - 18 24
1.2m 3.8m.

2.5m is NEXT AVAILABLE @ 15 20 →

Question 1(c)

Section A

MARGATE
MEAN SPRING AND NEAP CURVES
Springs occur 2 days after New and Full Moon.



Section A

Question 2

a) Margate on 29th April @ 06 00 **BST !!**

HW - 03 28	LW - 09 40	HW - 15 46	LW - 22 16
4.4	1.0	4.2	0.9



Curve Interpolation : 4.3m - Springs
2.5m - Neaps

Range : 2.4
- 1.0

3.4m

3.4m is halfway \therefore use middle

\therefore GMT = BST - 1 hour = 06 00 - 1 hour
= 05 00 ON CURVE

Height @ 06 00 BST = 3.8m \rightarrow

b) LW - 09 40 HW - 15 46
1.0m 4.2m

3.8m is @ 14 26 GMT

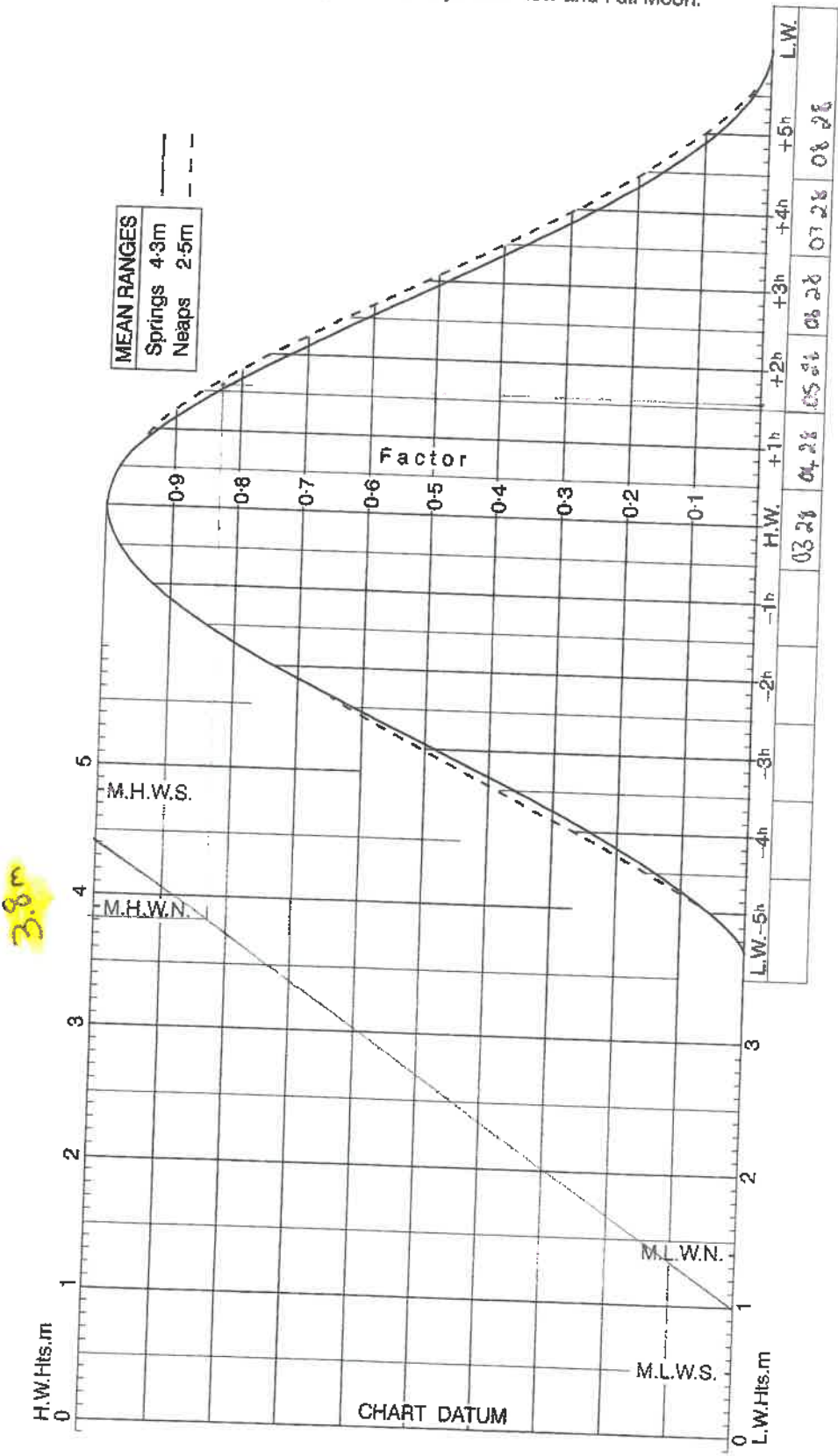
\therefore is @ 15 26 BST \rightarrow

Question 2 (a)

Section A

MARGATE

MEAN SPRING AND NEAP CURVES
Springs occur 2 days after New and Full Moon.

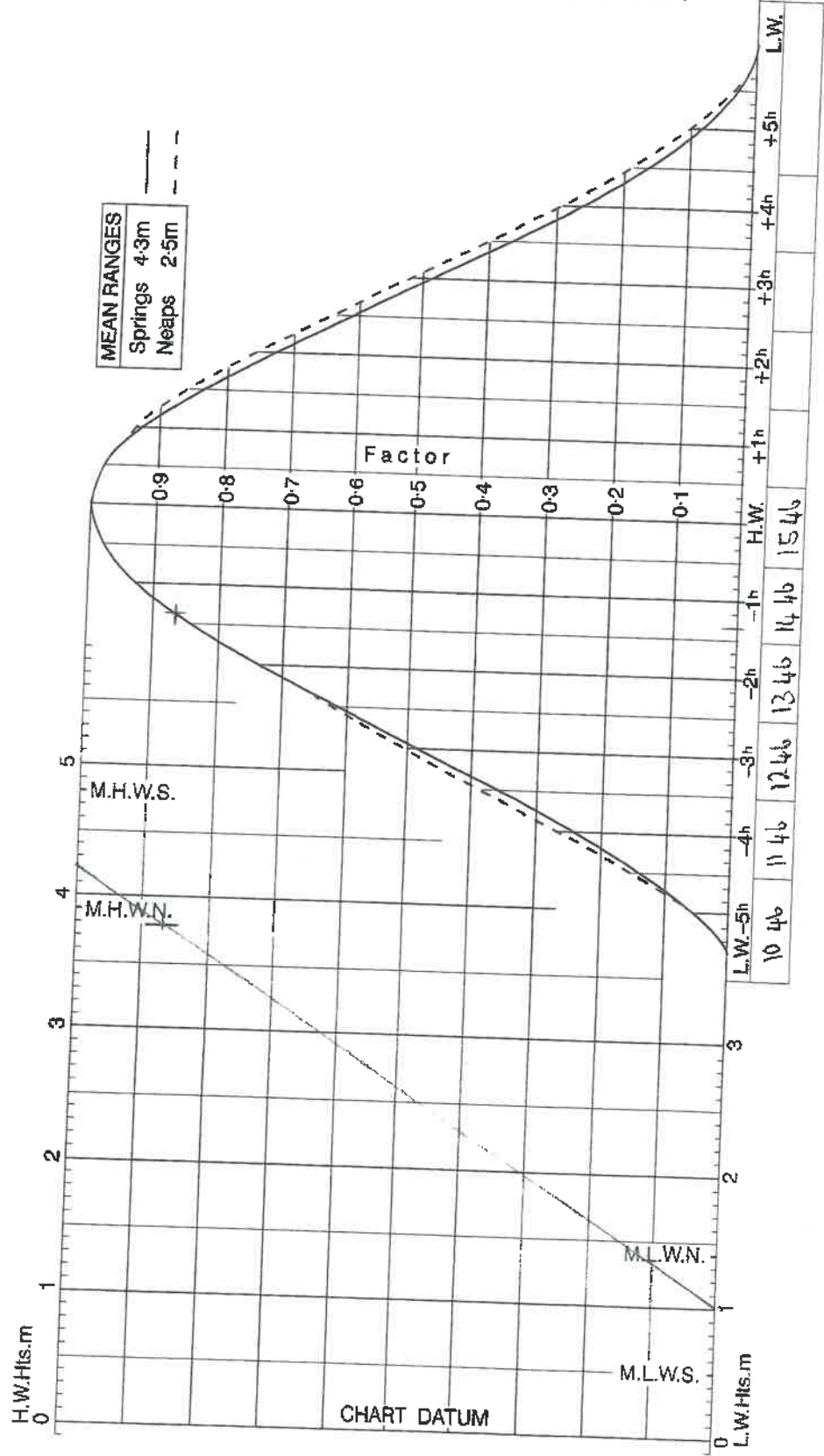


3.8m

MARGATE

MEAN SPRING AND NEAP CURVES

Springs occur 2 days after New and Full Moon.



1426 GMT
 ∴ 15.26 BST →

Section A

Question 3

Dover 8th April (BST) @ 10 15
Charted Depth is 1.3 m

LW - 06 34
0.4 m

HW - 11 23
6.8 m

Range - 6.8 m
- 0.4
6.4 m.

Lowest Interpolation - 6.0 m - Springs
3.2 m Neaps

∴ use Springs →

GMT = BST - 1 hour
= 10 15 - 1 hour

∴ use 09 15 on Lowest

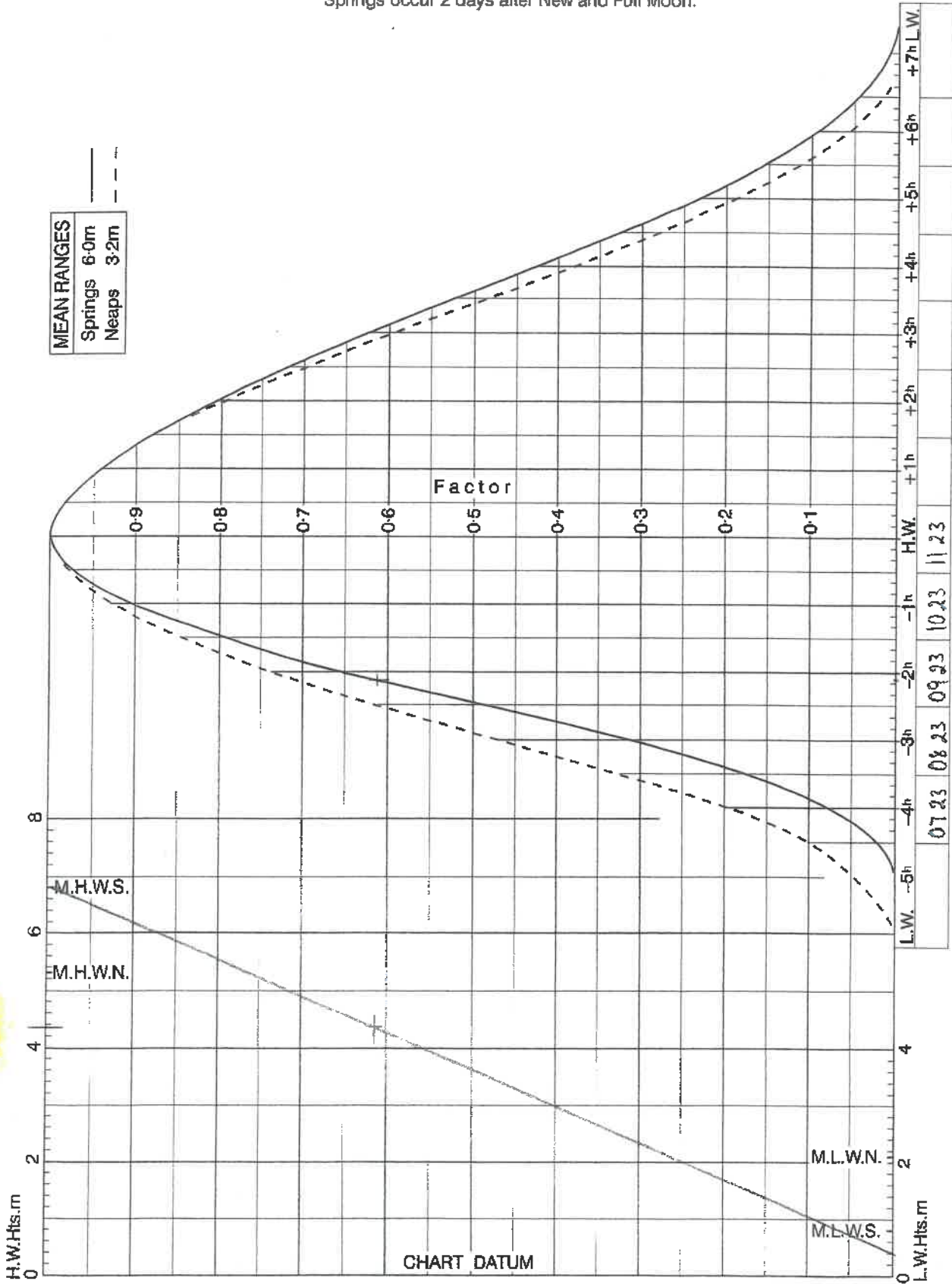
∴ @ 10 15 BST height is = 4.3 m
+ Charted Depth of + 1.3 m

5.6 m →

DOVER

MEAN SPRING AND NEAP CURVES

Springs occur 2 days after New and Full Moon.



Section A

Question 4

Maegate on 26th April (BST)

$$\begin{aligned}\text{Tide Clearance} &= \text{Draught} + \text{UKC} + \text{Oeying height} \\ &= 1.8 + 0.5 + 0.5 \\ &= \underline{2.8 \text{ m}} \rightarrow\end{aligned}$$

Latest on the falling tide

$$\begin{aligned}\text{HW} &= 02 \ 39 \\ &4.5 \text{ m}\end{aligned}$$

$$\begin{aligned}\text{LW} &= 08 \ 53 \\ &0.8 \text{ m}\end{aligned}$$

$$\begin{aligned}\text{Range} &= 4.5 \text{ m} \\ &- 0.8 \text{ m} \\ &\hline &\underline{3.7 \text{ m}} \rightarrow\end{aligned}$$

$$\begin{aligned}\text{Cuevs Interpolation} &= 4.3 \text{ m} - \text{Springs} \\ &2.5 \text{ m} \cdot \text{Neaps}\end{aligned}$$

3.7m Range is closer to halfway \therefore use middle of cuevs

$$\begin{aligned}2.8 \text{ m} & @ 05 \ 29 \ \text{GMT} \\ &= \underline{06 \ 29 \ \text{BST}} \rightarrow\end{aligned}$$

Section A

Question 5

Over on the 19th July (BST) for EARLIEST time on AFTERNOONS
RISING TIDES

$$\begin{aligned}\therefore \text{Tide Required} &= \text{DRAFT} + \text{UKC} - \text{CHARTED DEPTH} \\ &= 3\text{m} + 0.5\text{m} - 1\text{m} \\ &= \underline{2.5\text{m required}} \rightarrow\end{aligned}$$

LW - 16 57
1.2m

HW - 21 53
6.4m

Range is - 6.4m
- 1.2m

5.2m

Curves Interpolation = 6.0m - Springs
3.2m - Neaps

\therefore use Springs \rightarrow

2.5m @ 18 38 GMT

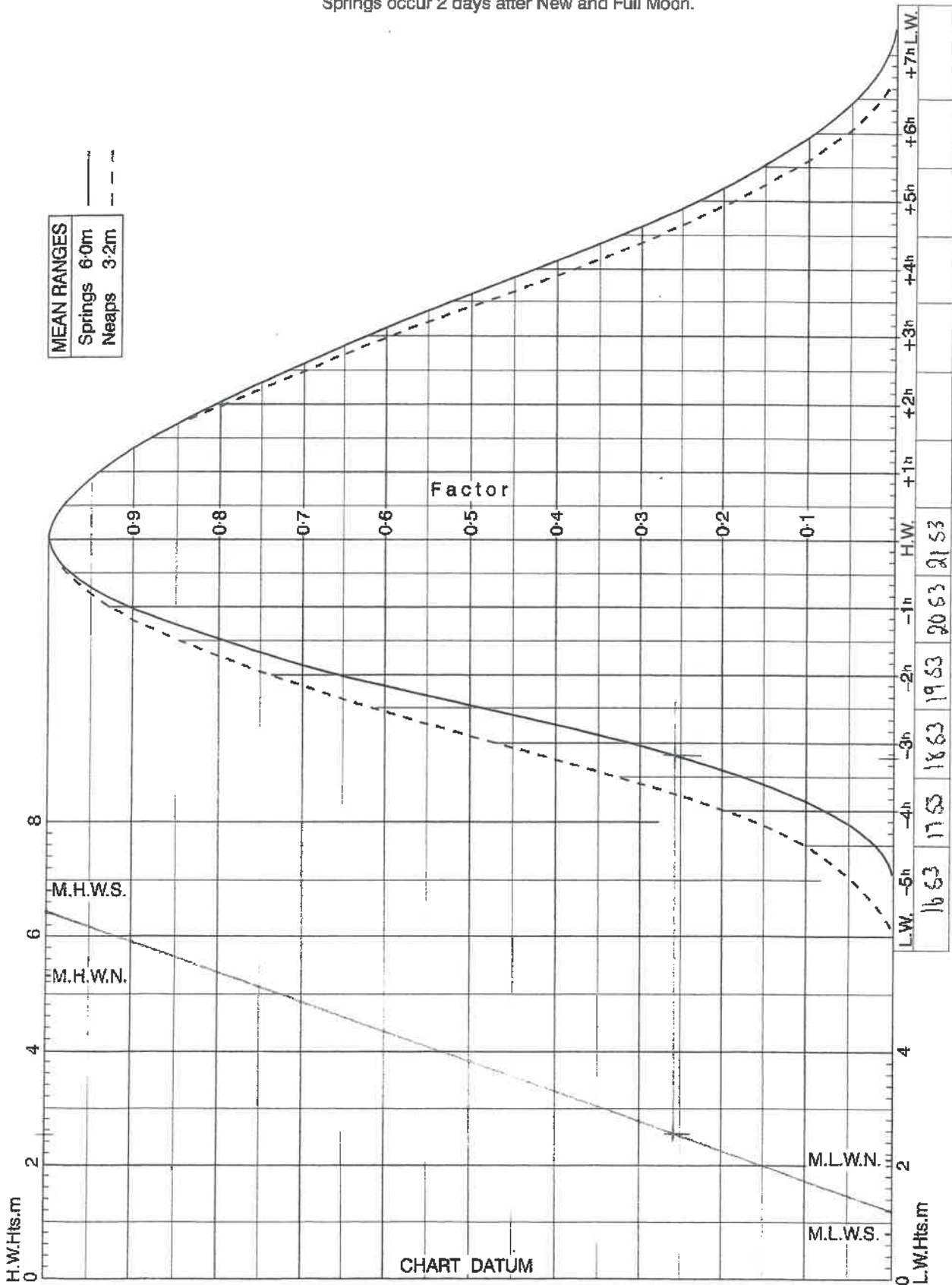
\therefore 19 38 BST \rightarrow

Question 5

Section A

DOVER

MEAN SPRING AND NEAP CURVES
Springs occur 2 days after New and Full Moon.



19.53 GMT
∴ ADD 1 hour for BST
= 19.58 BST

**SECONDARY
PORT - BY DIVISION
ANSWERS**

Secondary Ports:

With Secondary Ports we are adjusting tide heights and times in order to be able to use a standard port curve.

- 1) Identify the standard port and collect information from the table. i.e height of high and low tide, time of high and low tide.
- 2) Calculate the range of the tide to see if it is Springs, Neaps or halfway.

For Height Calculations:

- 1) Look for height differences in the tide tables.
- 2) If it is Springs or neaps, make adjustments for low water and high water.
- 3) If it is halfway, add the adjustment for springs to the adjustment for neaps and divide by 2. Then Make the adjustments.

For Time Calculations by Mathematics:

- 1) Look for the time allocation of the standard port e.g.

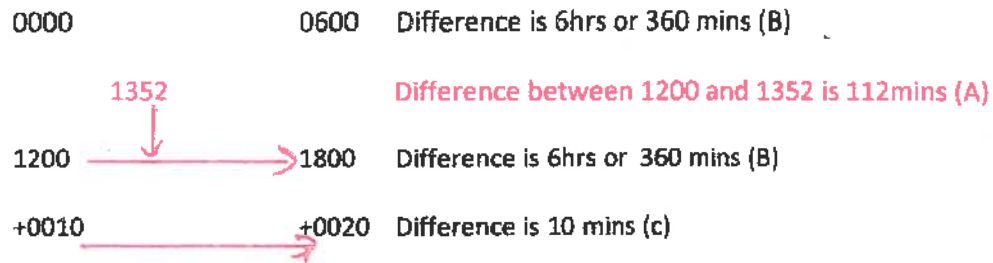
0000 0600

1200 1800

Find the time adjustment that relates to these times. E.g.

+0010 +0020

2) Apply the time in question e.g.



3) Use this calculation:

$$\frac{\text{Time diff A in Mins} \times \text{Time diff C in mins}}{\text{Time Diff B in mins}} = \text{time past 10 mins}$$

$$\frac{112 \times 10}{360} = 3.1 \text{ mins or 3 mins and 6 seconds past 10 mins.}$$

Therefore +10 mins plus 3 mins equals +13 minutes.

4) The time in question was 1352, we need to add 13 minutes. So the time of high water is 1365 which is 1405.

5) The time of H.W. at the secondary port is 1405.

6) We can now use the Standard port curve using the adjusted height and time thus making it the secondary port curve.

SECTION B (SECONDARY PORTS)

QUESTION 1

A. BROADSTAIRS ON JULY 10TH (B.S.T.)

∴ USE MARGATE AS STANDARD PORT

MARGATE ON JULY 10TH

H.W	L.W	H.W.	L.W
0244	0838	1443	2114
4.3	1.1	4.4	0.9.

RANGE = 4.3 m

- 1.1 m

3.2 m

CURVE INTERPOLATION 3.7

SPRINGS 4.3 m 3.6

HALF WAY → 3.4

NEAPS 2.5 m 3.3

3.2

3.1

∴ USE HALFWAY ON CURVES.

CORRECTIONS FOR BROADSTAIRS.

H.W.		L.W.	
0100	0700	0100	0700
AND	AND	AND	AND
<u>1300</u>	<u>1900</u>	<u>1300</u>	<u>1900</u>
- 0020 min	- 0008 min	+ 0007 min	+ 0010 min

H.W @ 0244: 0244
 0100 ———→ 0700
 1300 1900

- 20min ———→ -8min
 12min DIFFERENCE

TIME IN MINS

BETWEEN 0100 & 0244 = $\frac{104 \text{ min}}{360 \text{ min}} \times 12 \text{ min (TIME DIFF)}$
 TIME BETWEEN 0100 & 0700 = 360 min
 = 3.4 min = 3 mins.

3mins GOING FROM -20min TOWARDS -8min = -17 minutes

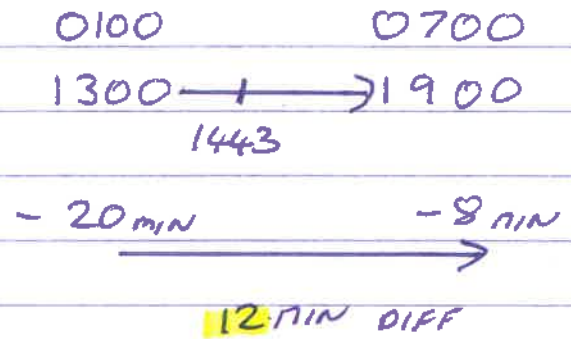
L.W. @ 0838 0838
 0100 ———→ 0700
 1300 ←——— 1900

+ 7mins + 10mins
 ←———
 3min DIFF

TIME BETWEEN 0700 & 0838 = $\frac{98}{360} \times 3$ (TIME DIFF)
 TIME BETWEEN 0700 & 1300 = 360
 = 0.81 min = 1 min.

1 min GOING FROM +10min TOWARDS +7min = +9 minutes

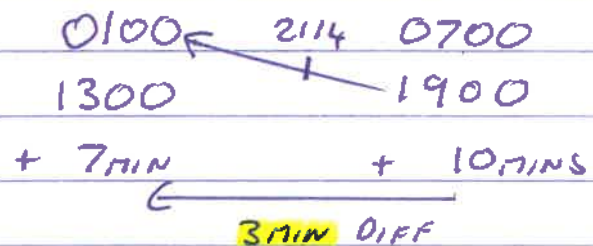
H.W. @ 1443



$$\begin{aligned} \text{TIME BETWEEN } 1300 \text{ \& } 1443 &= 103 \text{ mins} \times 12 \text{ (mins DIFF)} \\ \text{TIME BETWEEN } 1300 \text{ \& } 1900 &= 360 \text{ mins} \\ &= 3.43 \text{ min} = 3 \text{ mins.} \end{aligned}$$

3 mins going from -20 mins towards -8 mins = -17 mins

L.W. @ 2114.



$$\begin{aligned} \text{TIME DIFFERENCE } 1900 \text{ \& } 2114 &= 134 \text{ mins} \times 3 \text{ mins} \\ \text{TIME DIFFERENCE } 1900 \text{ \& } 0100 &= 360 \text{ mins} \\ &= 1.12 \text{ mins} = 1 \text{ min} \end{aligned}$$

1 min going from +10 mins towards +7 mins = +9 mins

CORRECTIONS FOR HEIGHT:

H.W.	4.3 m	L.W.	1.1 m	H.W.	4.4 m	L.W.	0.9 m
	- 0.2 m		- 0.1 m		- 0.2 m		- 0.1 m
	<u>4.1 m</u>		<u>1.0 m</u>		<u>4.2 m</u>		<u>0.8 m</u>

H.W.	0244	L.W.	0838	H.W.	1443	L.W.	2114
	- 17 m		+ 9 m		- 17 min		+ 9 m
	<u>0227</u>		<u>0847</u>		<u>1426</u>		<u>2123</u>
BST	+ 1 HR		+ 1 HR		+ 1 HR		+ 1 HR
	<u>0327</u>		<u>0947</u>		<u>1526</u>		<u>2223</u>

HIGH & LOW WATER TIMES AND HEIGHTS FOR BROADSTAIRS JULY 10TH

H.W.	L.W.	H.W.	L.W.
<u>0327</u>	<u>0947</u>	<u>1526</u>	<u>2223</u>
<u>4.1 m</u>	<u>1.0 m</u>	<u>4.2 m</u>	<u>0.8 m</u>

SECTION B

QUESTION 1

B) HASTINGS ON 11TH APRIL 2001 (B.S.T.)

∴ USE DOVER AS STANDARD PORT

DOVER 11TH APRIL 2001

H.W.	L.W.	H.W.	L.W.
0054	0830	1314	2039
6.9m	0.5m	6.7m	0.8m

		<u>CURVE INTERPOLATION</u>	
RANGE = 6.9m		SPRINGS - 6.0m	4.9
- 0.5m			4.8
<u>6.4m</u>		HALF WAY →	4.7
		NEAPS - 3.2m	4.6
			4.5
			4.4
			4.3

∴ USE SPRINGS

CORRECTIONS FOR HASTINGS.

H.W.		L.W.	
0000	0600	0100	0700
AND	AND	AND	AND
<u>1200</u>	<u>1800</u>	<u>1300</u>	<u>1900</u>
0000 min	-0010 min	-0030 min	-0030 min

H.W. @ 0054

0054
0000 ———→ 0600
1200 1800

0 MIN ———→ -10 MIN
10 MIN'S DIFFERENCE

TIME IN MINUTES

BETWEEN 0000 AND 0054 = 54 MINS × 10 MINS (TIRE OFF.)
BETWEEN 0000 AND 0600 = 360 MINS

= 1.5 MINS. = 2 MINS

2 MINUTES GOING FROM 0 MINS → -10 MINS = -2 MINUTES

0054 - 2 MINS = 0052

L.W. @ 0830 THE CORRECTION IS -30 MINS

0830 - 30 = 0800

CORRECTION FOR HEIGHT

USING SPRINGS

H.W	L.W	H.W	L.W
6.9m	0.5m	6.7m	0.8m
<u>+0.8m</u>	<u>-0.1m</u>	<u>+0.8m</u>	<u>-0.1m</u>
7.7m	0.4m	7.5m	0.7m

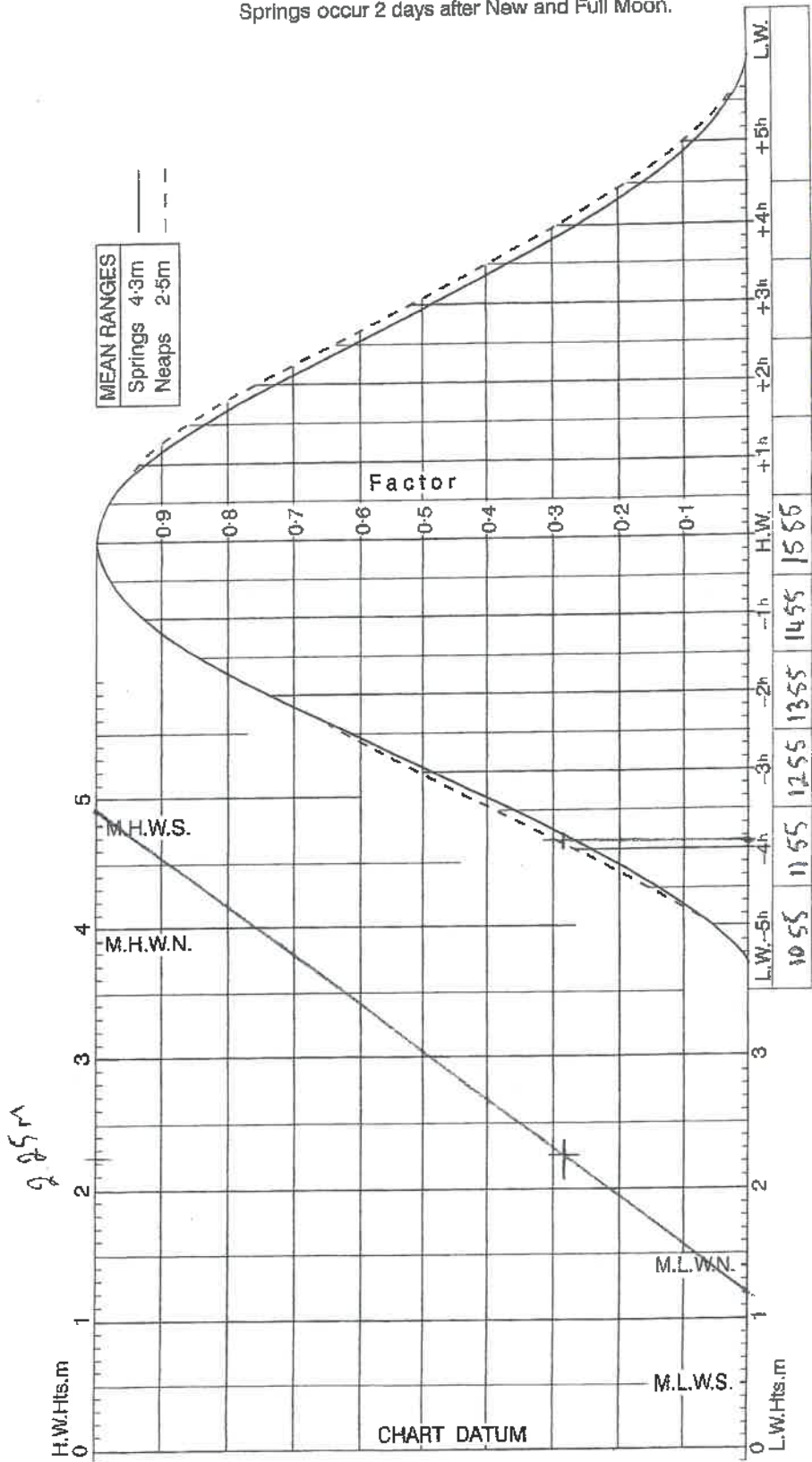
CORRECTED HW & LW TIMES & HEIGHTS FOR MASTINGS 11TH APRIL

	H.W.	L.W	H.W.	L.W.
	0054	0830	1314	2039
	<u>- 2</u>	<u>- 30</u>	<u>- 2</u>	<u>- 30</u>
	0052	0800	1312	2009
BST	+1 HR	+1 HR	+1 HR	+1 HR
	<u>0152</u> →	<u>0900</u> →	<u>1412</u> →	<u>2109</u> →
	7.7m	0.4m	7.5m	0.7m

Question 2

MARGATE

MEAN SPRING AND NEAP CURVES
Springs occur 2 days after New and Full Moon.



BST = GMT - 1 hour

Look @ 12.00 GMT

W 5.8 m

SECTION B

QUESTION 2

HEIGHT AT WAITSTABLE APPROACHES @ 1300 (BST) 11TH JULY 2001

∴ STANDARD PORT = MARGATE

MARGATE ON 11TH JULY

L.W	M.W
0916	15.18
1.1 m	4.3 m

RANGE = 4.3 m - 1.1 m 3.2 m	CURVE INTERPOLATION		3.7
	SPRINGS	4.3	3.6
	HALF WAY	→	3.5
			3.4
	NEAPS	2.5	3.3
		3.2	
		3.1	

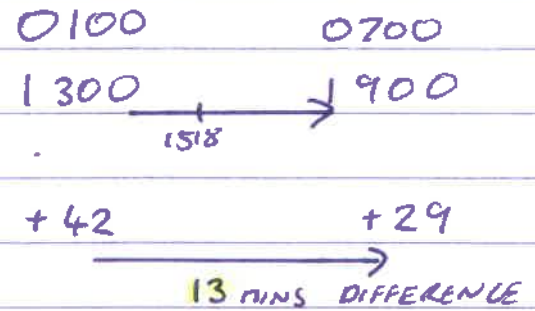
∴ USE HALFWAY.

TIM CORRECTION REQUIRED FOR M.W. ONLY

M.W.

0100	0700
AND	AND
<u>1300</u>	<u>1900</u>
+ 0042	+ 0029

H.W. @ 1518



TIME IN MINUTES

$$\frac{\text{BETWEEN 1300 AND 1518}}{\text{BETWEEN 1300 AND 1900}} = \frac{138 \text{ MINS} \times 13 \text{ MINS (DIFF)}}{360 \text{ MINS}}$$
$$= 4.98 \text{ MINS} = 5 \text{ MINS.}$$

MINUTES GOING FROM +42 MIN → +29 MIN = +37 MINUTES

$$\begin{array}{r} \text{HW} = 1518 + \\ \quad \quad 37 \\ \hline 1555 \end{array}$$

CORRECTION FOR HEIGHT (HALFWAY)

M.H.W.S	M.H.W.N	M.L.W.N	M.L.W.S.
+0.6	+0.6	+0.1	0.0

∴ HALFWAY = +0.6

$$\begin{aligned} \text{HALFWAY} &= (-0.1 + 0.0) \div 2 \\ &= 0.05 \\ &= +0.1 \text{ m} \end{aligned}$$

1

L.W.	H.W.
1.1 m	4.3 m
+ 0.1 m	+ 0.6 m
<u>1.2 m</u>	<u>4.9 m</u>

AT WHITSTABLE APPROACHES

L.W.	H.W.
1.2 m	4.9 m
	1.55

HEIGHT OF TIDE AT WHITSTABLE APPROACHES @ 1300 (BST)
 \therefore LOOK @ 1200 G.M.T ON CURVE

AT 1300 BST ON 11TH JULY 2001 HEIGHT OF TIDE = 2.25 m

SECTION B

QUESTION 3

HEIGHT OF TIDE AT BROADSTAIRS AT 1200 ON 26TH NOV. 2001

STANDARD PORT = MARGATE

H.W.	L.W.
0824	1458
3.9m	1.2m

	CURVE INTERPOLATION	3.7
RANGE = 3.9m	SPRINGS. 4.3m	3.6
- 1.2m	HALFWAY —	3.5
<u>2.7m</u>	NEAPS 2.5m	3.4
		3.3
		3.2
		3.1

∴ USE NEAPS

TIME CORRECTION FOR H.W.

0100	0700
AND	AND
<u>1300</u>	<u>1900</u>
- 0020	- 0008

H.W. @ 0824

0100 ← 0700
1300 ← 0824 1900

- 20 ← - 8
12 MIN DIFFERENCE

TIME IN MINUTES

BETWEEN 0700 AND 0824 = $\frac{84 \text{ MINS}}{360 \text{ MINS}} \times 12 \text{ MIN}$

= 2.8 MINS = 3 MINS.

3 MINS GOING FROM - 8 MINS → - 20 MINS = - 11 MINUTES

H.W. @ BROADSTAIRS = 0824

- 11
0813

CORRECTION FOR HEIGHT (USE NEAPS)

H.W	L.W
3.9 m	1.2 m
<u>- 0.2 m</u>	<u>- 0.1 m.</u>
3.7 m	1.1 m

AT 1200 ON 26TH NOV 2001 HEIGHT OF TIDE = 1.95
= 2 m

Question 3

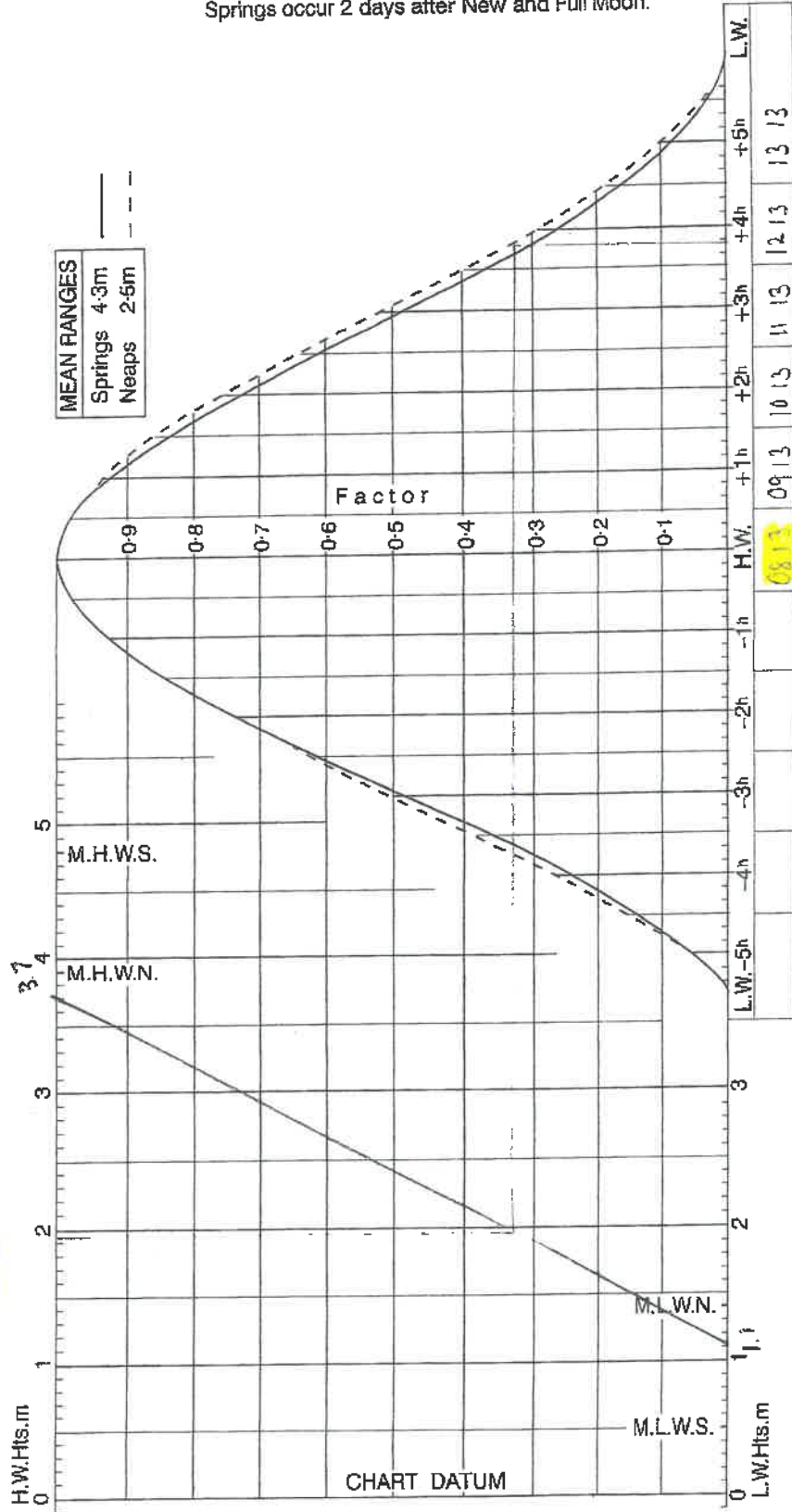
Section B

MARGATE

MEAN SPRING AND NEAP CURVES
S Springs occur 2 days after New and Full Moon.

@ 12.00

1950



SECTION B

QUESTION 4

HASTINGS 24TH AUGUST (B.S.7) FALLING TIDE FOR HEIGHT OF 5.0m

∴ USE DOVER AS STANDARD PORT

DOVER 26TH AUG. MORNING FALLING.

H.W.	L.W.
0226	0953
6.5m	0.9m

CURVE INTERPOLATION.

RANGE = 6.5m
- 0.9m

5.6m

SPRINGS. 6.0m	4.9
	4.8
	4.7
HALFWAY —————→	4.6
	4.5
NEAPS 3.2m	4.4
	4.3

∴ USE SPRINGS.

TIME CORRECTION FOR H.W.

0000	0600
AND	AND
<u>1200</u>	<u>1800</u>
0000	-0010

H.W. @ 0226

0000	0226	0600
1200		1800

0 mins -10 mins
 $\xrightarrow{\hspace{10em}}$
 10 mins DIFFERENCE

TIME IN MINUTES.

BETWEEN 0000 AND 0226 = $\frac{146}{360} \times 10 \text{ min (diff)}$
 BETWEEN 0000 AND 0600

= 4.1 mins = 4 mins

4 MINUTES GOING FROM 0 mins \rightarrow -10 mins = -4 MINUTES

H.W. = 0226

$- \quad 4 \text{ mins}$
0222

CORRECTION FOR HEIGHTS. USE SPRINGS.

H.W. 6.5m	L.W. 0.9m
+ 0.8m	- 0.1m
<u>7.3m</u>	<u>0.8m</u>

SM @ 0512 (G.M.T) + 1HR
 = 0612 (BST)

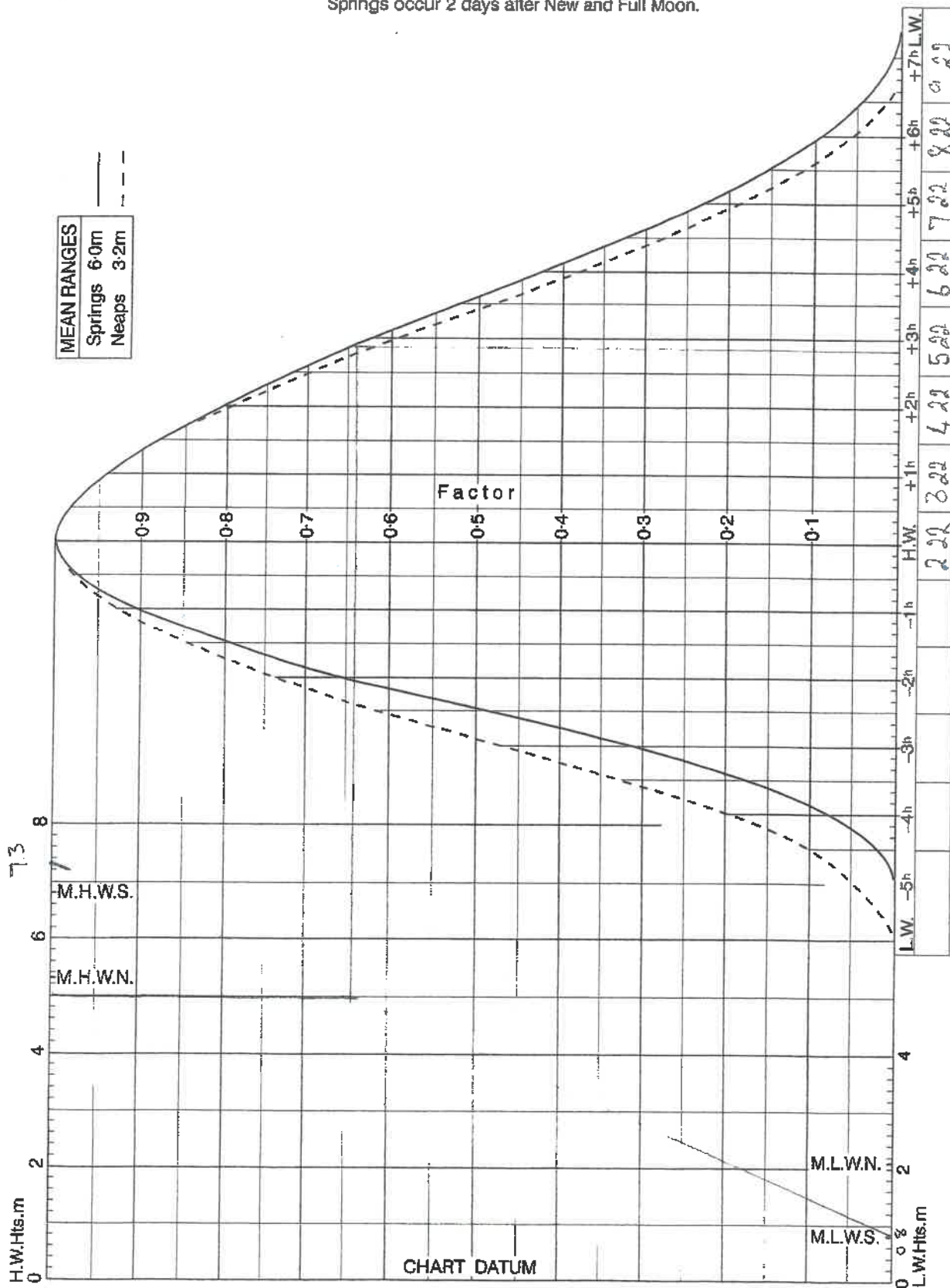
Question 4

SECTION B

DOVER

MEAN SPRING AND NEAP CURVES

Springs occur 2 days after New and Full Moon.



Sm 05 12 GMT

06 12 BST

SECTION B

QUESTION 5

LATEST TIME ON MORNING FALLING TIDE ON 1ST SEPTEMBER (BST)
BROADSTAIRS.

$$\begin{aligned}\text{TIDE REQUIRED} &= \text{DRAFT} + \text{V.K.C.} - \text{CHANNEL DEPTH} \\ &= 2.9\text{m} + 0.5\text{m} - 0.8\text{m} \\ &= \underline{2.6\text{m}}\end{aligned}$$

STANDARD PORT MARGATE

H.W	L.W
11 17	17 40
4.5m	0.8m

CURVE INTERPOLATION

$$\begin{aligned}\text{RANGE} &= 4.5 \\ &- 0.8 \\ &\underline{3.7}\end{aligned}$$

SPRINGS 4.3m	3.6
	3.5
HALFWAY	→ 3.4
NEAPS 2.5m	3.3
	3.2
	3.1

∴ USE $\frac{1}{2}$ WAY

CORRECTION FOR H.W. TIME

0100	0700
AND	AND
<u>1300</u>	<u>1900</u>
- 0020 min	- 0008 min

H.W. @ 1117

0100
1300 ← 1117 0700
1900

-20 ← -8

12 MINS DIFFERENCE

TIME IN MINUTES

BETWEEN 0700 AND 1117

$$\frac{257 \text{ MIN}}{360 \text{ MIN}} \times 12 \text{ MIN} = 8.6 \text{ MIN}$$

BETWEEN 0700 AND 1300

360 MIN

= 9 MINUTES

9 MINUTES GOING FROM -8 MINS → -20 MINS = -17 MINUTE

H.W. 1117

- 17

1100

CORRECTIONS FOR HEIGHT

USE HALFWAY

N.H.W.S

N.H.W.N

N.L.W.N

N.L.W.S

-0.2m

-0.2m

-0.1m

-0.1m

HALFWAY = -0.2m

-0.1m

H.W.

L.W.

4.5

0.8

-0.2

-0.1

4.3m

0.7m

2.6m IS @ 1354 G.M.T + 1 HOUR

= 1454 B.S.T

SECTION B

QUESTION 6

FOLKSTONE 19TH JANUARY EARLIEST TIME ?

$$\begin{aligned}\text{TIDE REQUIRED} &= \text{DRAFT} + \text{UKC} + \text{DRYING HEIGHT} \\ &= 3.1\text{m} + 0.5\text{m} + 0.1\text{m} \\ &= \underline{3.7\text{m}}\end{aligned}$$

STANDARD PORT IS DOVER

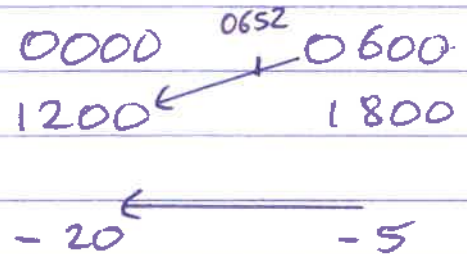
DOVER 19 TH JAN	L.W	H.W
	0124	0652
	2.1m	5.6m

RANGE = 5.6m	CURVE INTERPOLATION	
- 2.1m	SPRINGS. 6.0m	4.9
<u>3.5</u>	HALFWAY →	4.8
	NEAPS 3.2m	4.7
		4.6
		4.5
		4.4
		4.3

∴ USE NEAPS

CORRECTIONS FOR H.W. =	0000	0600
	AND	AND
	<u>1200</u>	<u>1800</u>
	- 0020	- 0005

H.W. @ 0652



DIFF 15 MINS.

TIME IN MINUTES.

$$\frac{\text{DIFFERENCE BETWEEN 0600 AND 0652} = 52 \times 15}{\text{DIFFERENCE BETWEEN 0600 AND 1200} = 360}$$

$$= 2.2 = 2 \text{ MINUTES.}$$

$$2 \text{ MINS GOING FROM } -5 \text{ MINS} \rightarrow -20 \text{ MINS} = -7 \text{ MINS.}$$

$$\begin{array}{r} \text{H.W. } 0652 \\ - \quad 7 \\ \hline 0645 \end{array}$$

CORRECTION FOR HEIGHT USE NEAPS.

L.W.	H.W.
2.1	5.6
<u>-0.0</u>	<u>+0.4</u>
2.1m	6.0m

3.7m HEIGHT IS AVAILABLE @ 0335

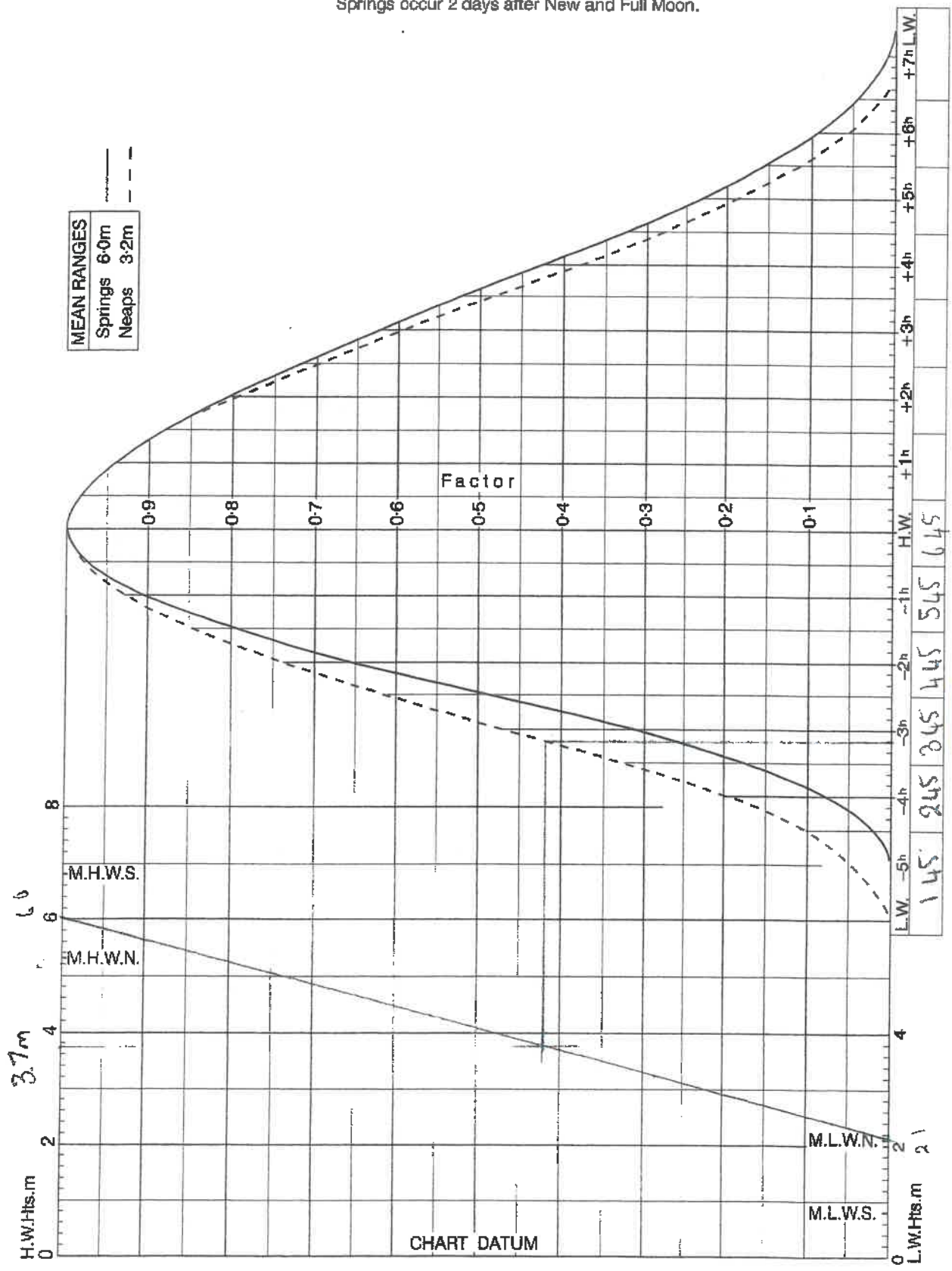
Question 6

Section B

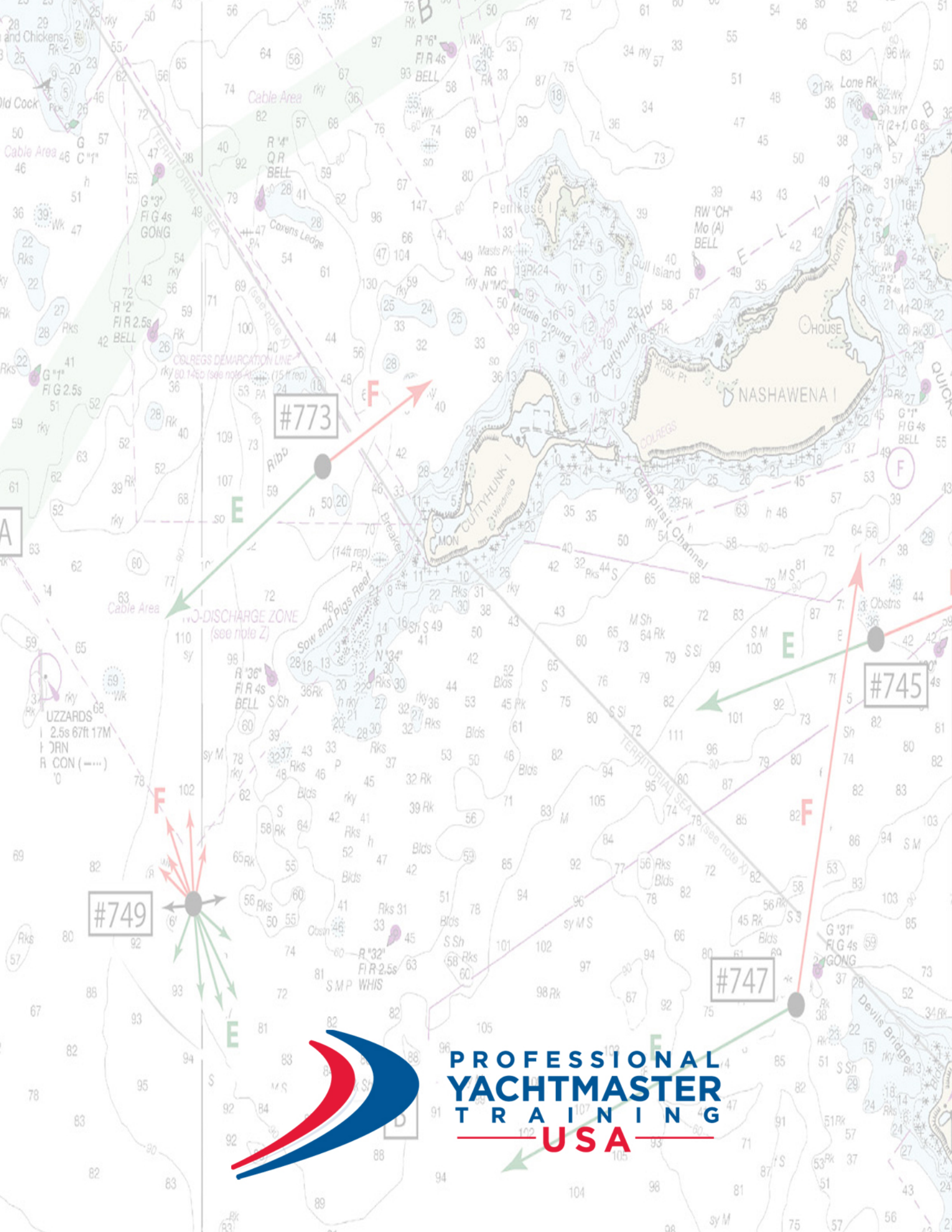
DOVER

MEAN SPRING AND NEAP CURVES

Springs occur 2 days after New and Full Moon.



0.2 2.0



#773

#745

#749

#747



**PROFESSIONAL
YACHTMASTER
TRAINING
USA**