



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2021

NAUTICAL SCIENCE: PAPER I
MARKING GUIDELINES

Time: 3 hours

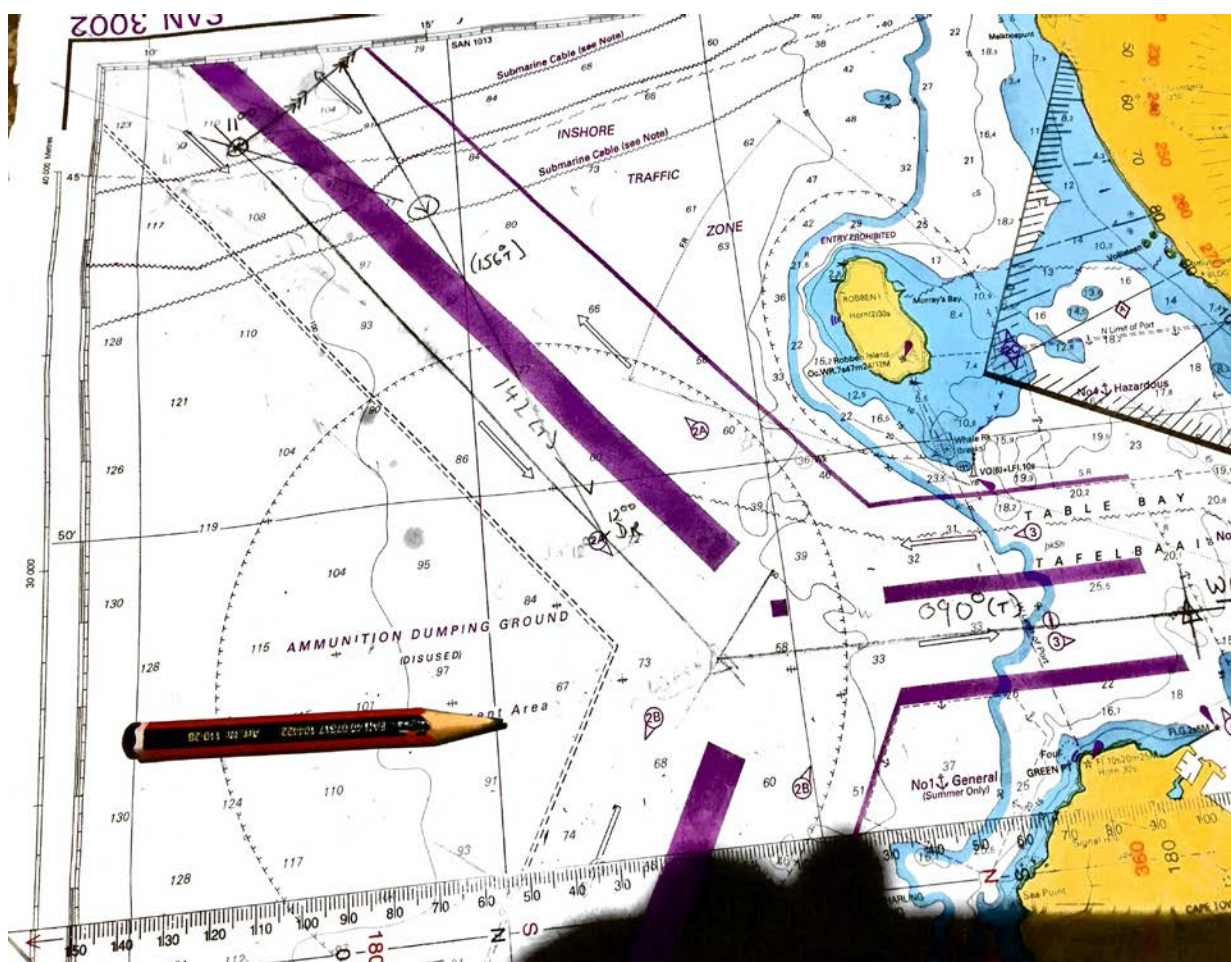
150 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

SECTION A PRACTICAL CHART WORK**QUESTION 1**

- | | | | | |
|-----|---------------------------|---|---------------------------------------|-------------|
| 1.1 | Course to make good | = | 142° (T) | |
| | Course to counter current | = | 156° (T) | |
| | Leeway | = | 3° + | |
| | Course to steer | = | 159° (T) | |
| | Variation | = | 17° (W) | |
| | Magnetic course | = | 176° (M) | |
| | Deviation | = | 3° (E) | |
| | Compass course | = | 173°(C) | Chart |
| 1.2 | Course to next A/C (WP1) | = | 090° x 6,1 miles | Chart |
| 1.3 | Distance to WP1 | = | 9,8 M | |
| | Distance WP1 – WP2 | = | 6,1 M | |
| | Distance to go | = | 15,9 M | |
| | Speed made good | = | 7,8 kts | |
| | Time | = | $15.9/7,8 \times 60 = 2,03\text{hrs}$ | 2hrs 03min |
| | | | | 11hrs 00min |
| | ETA WP2 | = | | 13hrs 03min |



QUESTION 2

Brg between Karbonkelberg & Chapman's Peak = $149^{\circ}/329^{\circ}$ (T)

Base angle $90^{\circ} - 65^{\circ}$ = 25°

Bearing from Karbonkelberg = $149^{\circ} + 25^{\circ}$ = 174° (T)

Bearing from Chapman's Peak = $329^{\circ} - 25^{\circ}$ = 304° (T)

Brg between Chapman's Peak & Slangkop Lt. = $030^{\circ}/210^{\circ}$ (T)

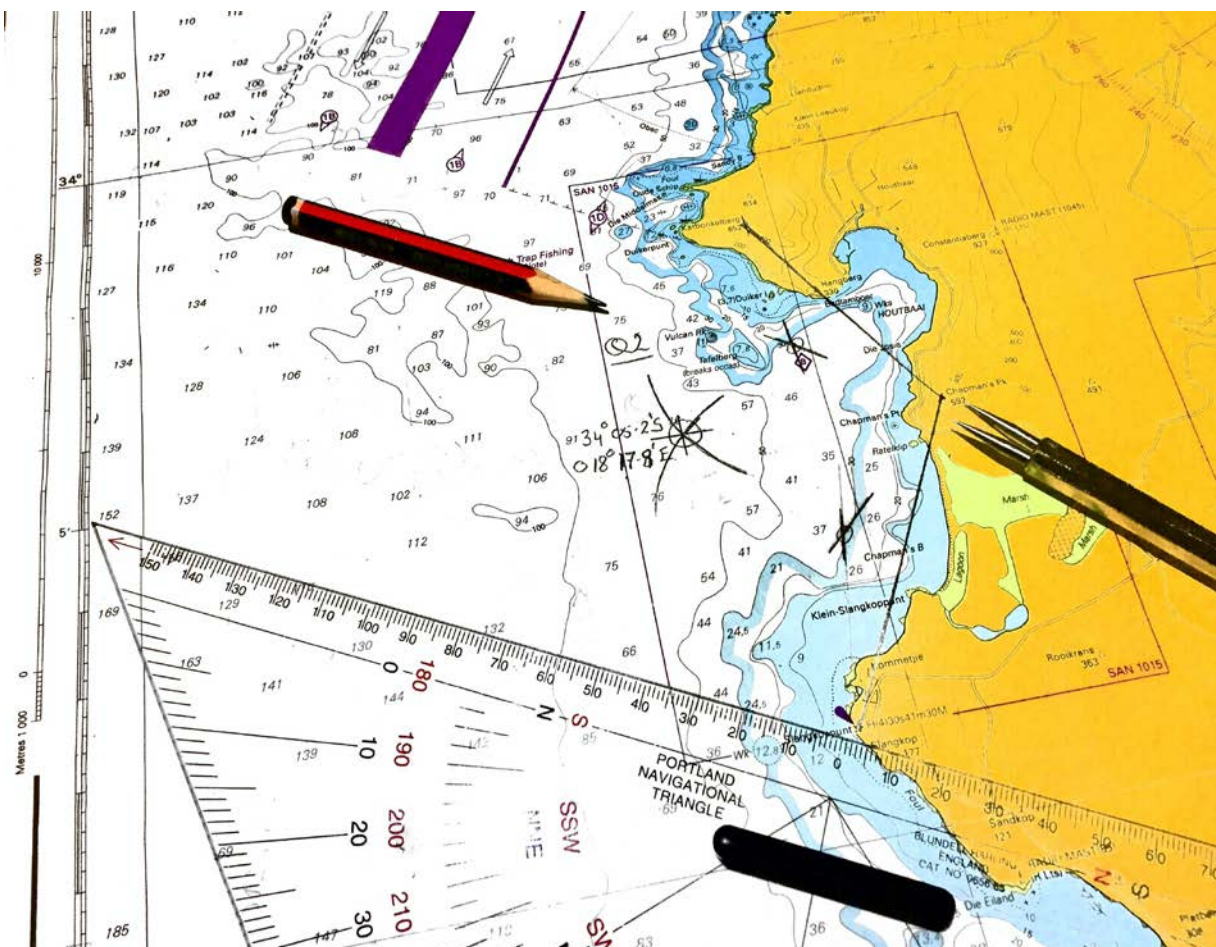
Base angle $90^{\circ} - 72^{\circ}$ = 18°

Bearing from Chapman's Peak = $210^{\circ} + 18^{\circ}$ = 228° (T)

Bearing from Slangkop Lt. = $030^{\circ} - 18^{\circ}$ = 012° (T)

Position = $34^{\circ} 05,2'S; 018^{\circ} 17,8' E$

Chart



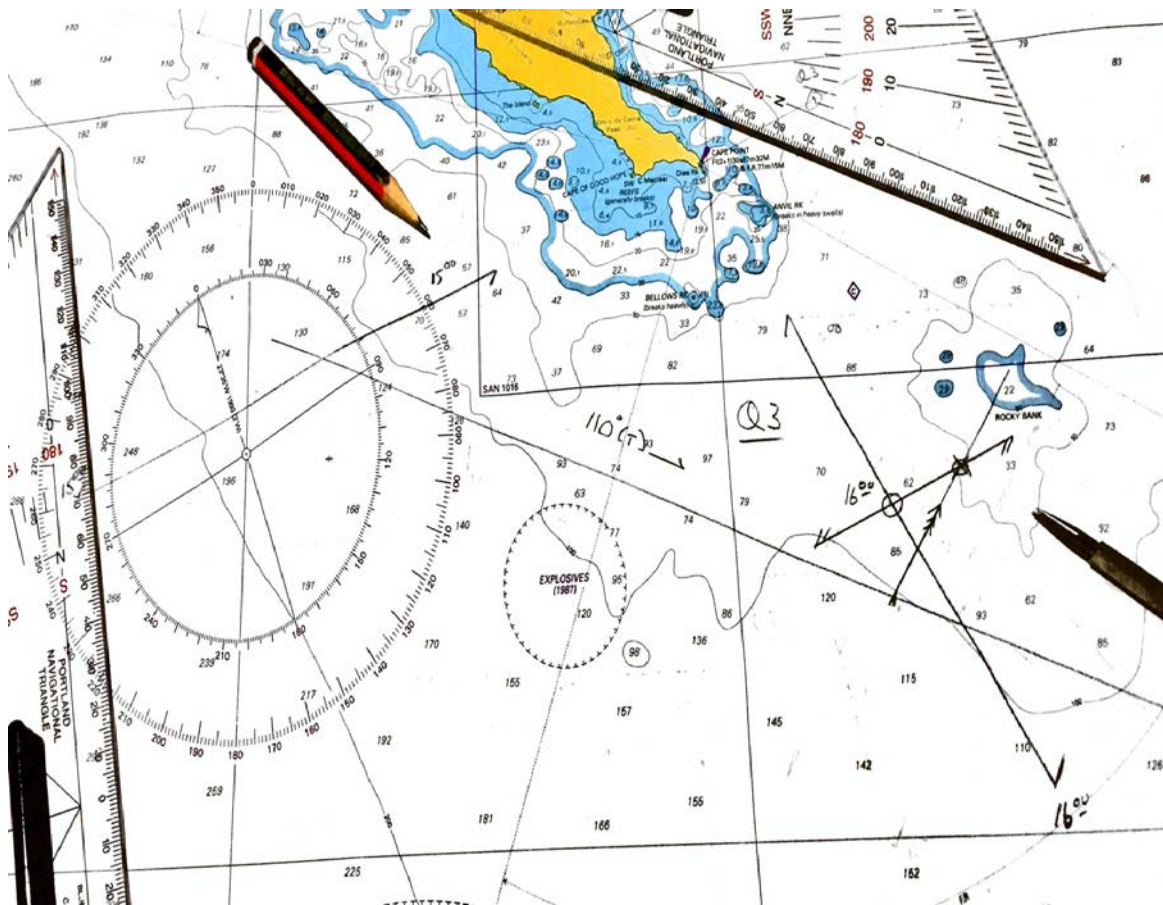
QUESTION 3

3.1

	Course	15:00 brg	16:00 brg
Compass	132° (C)	089° (C)	349° (C)
Deviation	2° (W)	2° (W)	2° (W)
Magnetic	130° (M)	087° (M)	347° (M)
Variation	17° (W)	17° (W)	17° (W)
True	113° (T)	070° (T)	330° (T)
Leeway	3		
True course	110° (T)		
Answer on the chart			

3.2 Position:

Cape Point Lt. brg. 330° (T) x 5,4 M



QUESTION 4

Draught	=	7,1 m
Under keel clearance	=	1,5 m
Total depth required	=	8,6 m
Chart depth	=	7,3 m
Required height of tide	=	1,3 m

From Tide Table earliest to cross the sandbar is 18:30 on 6 November

QUESTION 5

- 5.1 5.1.1 The characteristics of Lighthouse 1 are:
Composite group flashing white light;
Frequency flash 3 + 2 every 20 seconds;
The height of the light above MSL is 79 meters;
The nominal visible range is 24 miles.
In addition the lighthouse displays a fixed red light:
The height of the light above MSL is 65 meters;
The nominal visible range is 10 miles.
- 5.1.2 The characteristics of Lighthouse 2 are:
Long flashing red light;
The nominal visible range is 6 miles.
- 5.2 5.2.1 The audio sound of the buoy is a siren
- 5.2.2 Immediately alter course to starboard or to the East
- 5.3 The symbol indicates a sunken wreck or obstruction with 36 meters water above it.

SECTION B ASTRO-NAVIGATION**QUESTION 6**

LMT sunset 20° S		30 17 43	(30 th July 17:43)
Lat. Correction 6° 30'	(–)	10	
LMT sunset 26° 30' S		30 17 33	
Long. 140° 08' W	(+)	09 21	
GMT Sunset		31 02 54	
Zone (+9)	(–)	09 00	
Zone time of sunset		30 17 54	30 July at 17:54.

QUESTION 7

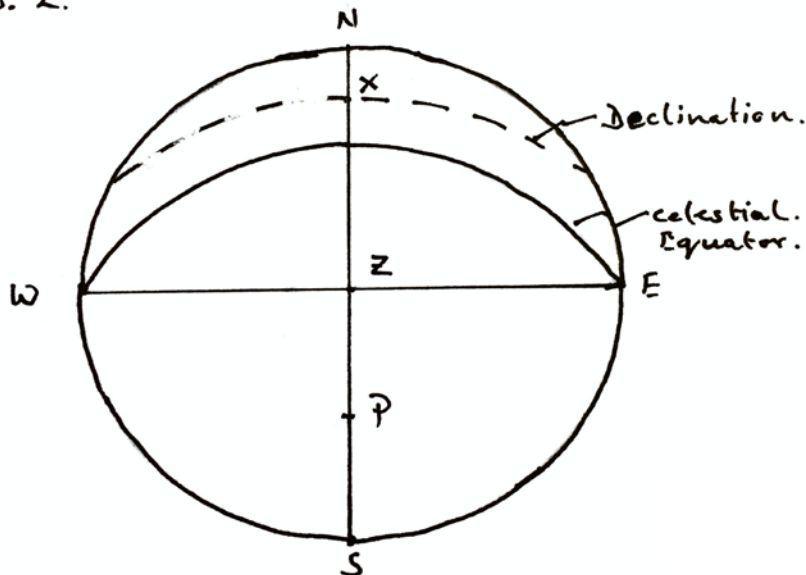
Zone time (E) 31 July 16:45		31 16 45
Zone (-5)	(–)	05 00
GMT		31 11 45
GHA 31 st 11:00		343° 24,9'
Inc. 45 min.		11° 15,0'
GHA 31 st 11:45	(+)	354° 39,9'
Long.	(+)	79° 20,0'
LHA		433° 59,9'
		360° 00,0'
LHA of Sun		<u>73° 59,9'</u>
Dec.		N 18° 11,7'
'd' (-)		0,5'
Dec. of Sun		<u>N 18° 11,2'</u>

QUESTION 8

8.1.1	LMT Mer. Pass. (1 Aug.)		12 06
	Long (042° 28' W)	(+)	02 50
	GMT Mer. Pass.		<u>14 56</u>
	Zone (+3)	(-)	03 00
	Zone time Mer. Pass		<u>11 56</u>
8.1.2	Dec. Sun at 14:00		N 17° 54,8'
	'd'	(-)	0,6'
	Dec. Sun at 14:56		N 17° 54,2'
	Sext. Alt.		36° 21,2'
	ie. off	(+)	3,2'
	Obs. Alt.		36° 24,4'
	Dip (ht. of eye 9.0m)	(-)	5,3'
	App. Alt.		36° 19,1'
	Total corr.	(+)	14,7'
	True alt.		36° 33,8'
			90° 00,0'
	ZX		53° 26,2'
	Dec.		N 17° 54,2'
	Lat. observer at Mer. Pass.		<u>S 35° 32,0'</u>

8.2 Sketch

8.2.



QUESTION 9

9.1 9.1.1 The longest day occurs in December.

9.1.2 The longest night occurs in June.

9.2 Total correction corrects the following errors:
Refraction;
Semi-diameter;
Parallax.

Total: 150 marks