NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2015

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.

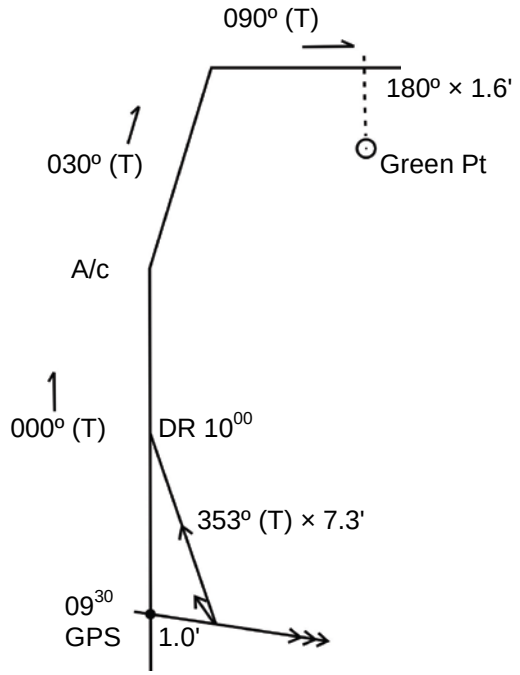
The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there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

SECTION A

QUESTION 1 PRACTICAL CHART WORK

1.1	Course to make good	000º (T)	
	Course to counter current	353º (T)	
	Leeway (NW)	5º	
	Course to steer	348º (T)	
	Variation	23º W	
	Magnetic course	011º (M)	
	Deviation	5º E	
	Compass course	006º (C)	(5)

1.2



(10)

1.3	Dist. made good ½ hour	7,3 miles	
	Speed made good ½ hour	14,6 knots	
	Dist. to go to A/c	19,0 miles	
	A/c to next A/c	9,9 miles	
	A/c to pilot	2,7 miles	
	Total distance to go at 09:30	31,6 miles	
	@ 14,6 knots	2 h 10 m	
		09 h 30 m	(7)
1.4	ETA Pilot	11 h 40 m	(3)

[25]

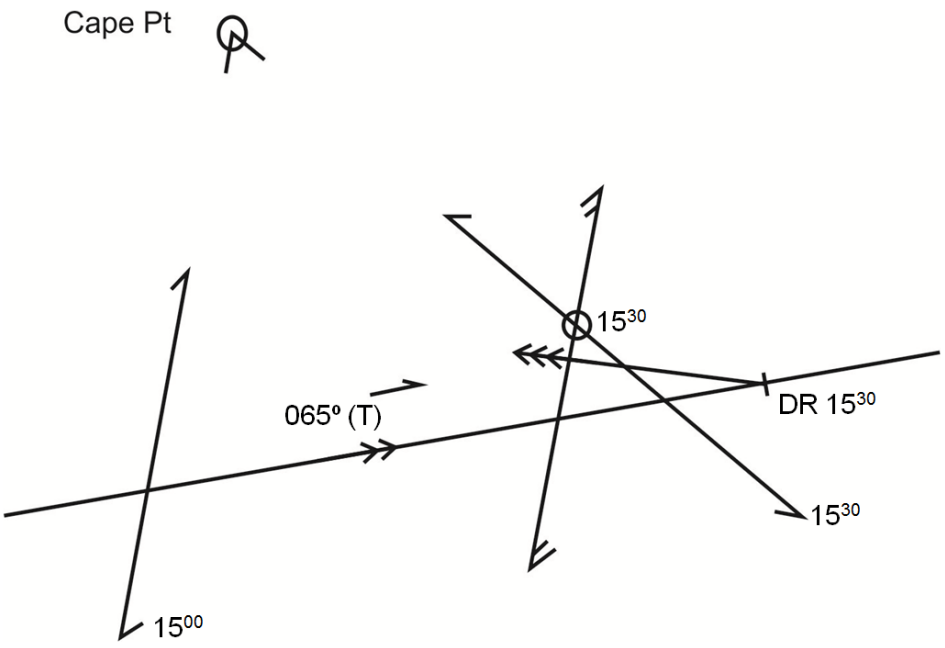
QUESTION 2

Range in Nautical Miles 1,856 × height of object (m) ÷ vertical sextant angle
1,856 × 270 ÷ 200
2,5 nautical miles

[15]

QUESTION 3

	V/l Heading	**Bearing at 15:00**	**Bearing at 15:30**	
Compass	092º	042º	352º	
Deviation	4º W	4º W	4º W	
Magnetic	088º	038º	348º	
Variation	23º W	23º W	23º W	
True	065º	015º	325º	(10)



(10)

Position at 15:30 Cape Point Lt. bearing 325º (T) × 2,9 miles

Lat. 34º 23,7' S; Long. 018º 31,8' E.

[20]

QUESTION 4

4.1 Height of tide required = Draught + min. clearance – chart depth

Draught	7,9 m
Min. Clearance	2,5 m
Depth	- 8,8 m
Rqd tide ht.	1,6 m

(13)

4.2 4.2.3 – Depths on a chart are measured from Chart Datum. (1)

4.3 Ebb tide is the name given to the falling tide or outgoing tidal stream. (2)

4.4 (1) Variations in atmospheric pressure cause the level of the sea to change by approximately 1 cm per millibar. (2)

(2) Generally a strong onshore wind will pile up the water, while an offshore wind will lower it. (2)

OR (3) Storm surges along the coast can cause variation from the predicted tide levels.

[20]

QUESTION 5

5.1 5.1.1 Flash green light every 2 seconds.
Nominal visibility of 5 miles. (3)

5.1.2 White light, sequence 6 very quick flashes followed by one long flash at intervals of 10 seconds. (4)

5.1.3 White light, sequence 3 quick flashes at 10 second intervals.
Sounding a bell. (3)

5.2 Cape Point light will show a fixed red light. (5)

5.3 One nautical mile. (3)

5.4 1 045 metres. (2)

[20]

100 marks

SECTION B ASTRO-NAVIGATION

QUESTION 6

6.1

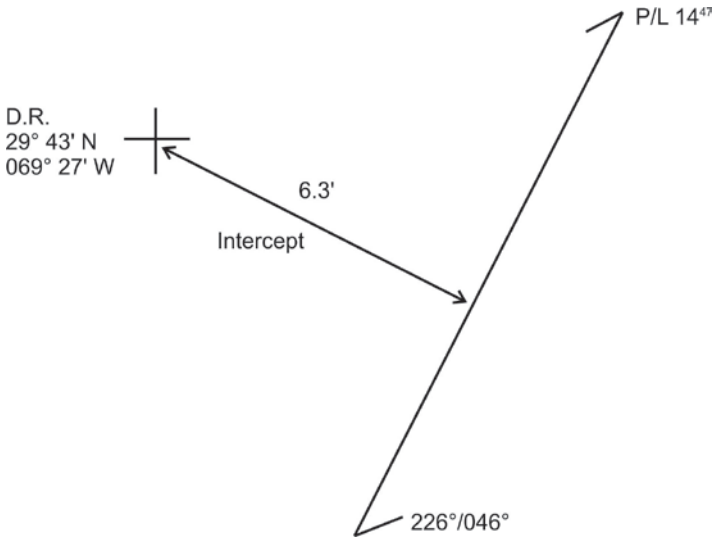
Chron.	14 h 42 m 48 s	GHA 14:00	26º 47,8'	Dec	8º 24,4' S	
Error	24 s -	Inc 42' 24"	10 36,0	'd'	,6' -	(1)
GMT @ obs.	14 h 42 m 24 s	GHA14:42:24	37º 23,8'	Dec	8º 23,8' S	(1)
		Long. W	69º 27,0'			(2)
		LHA	327º 56,8'			

$\sin\theta^{\circ}$ = Cos LHA × Cos Lat × Cos Dec ± Sin Lat × Sin Dec
= Cos 327º 56,8' × Cos 29º 43' × Cos 8º 23,8' ± Sin 29º 43' × Sin 8º 23,8' (2)
= 0,728 – 0,072
= 0,656
θ° = 40º 59,8' (Calculated alt.)

Sext. alt.	40º 41,8'
Index error (off)	1,0' +
Observed alt.	40º 42,8'
Dip	4,4' –
Apparent alt.	40º 38,4'
Total correction	15,1' +
True alt.	40º 53,5'
Calculated alt.	40º 59,8'
Intercept towards	6,3' (6)

A = 0,911 +
B = 0,289 +
C = 1,200 +
Az. = S44º E = 136º
Position line = **226º / 046º** (8)

6.2



(5)
[25]

QUESTION 7

7.1	LMT sunset 20º S	18 h 26 m		
	Lat. correction 6º S	13	+	
	LMT sunset 26º S	18 39		
	Long. 11º E	44	–	
	GMT sunset	17 55		
	Zone	1 00	+	
	Zone time	18 55		(8)

7.2	Dec 17:00 2 Dec	21º 57,0' S		
	'd'	0,3	+	
	Dec 17:55	21º 57,3' S		

Sin amp. = Sin Dec / Cos Lat
= Sin 21º 57,3' / Cos 26º = 0,739/0,8988
= 0,41599
Amp = W 24½º S

True brg.	245½º	
Compass brg.	300 º	
Compass error	54½º W	(11)

7.3	Variation	22½ W	
	Deviation	17º E (on heading 145° (C)	(3)

7.4	Compass course	145º (C)	
	Error	54½º W	
	True course	090½º (T)	(3)

[25]

50 marks

Total: 150 marks