



NATIONAL SENIOR CERTIFICATE EXAMINATION  
NOVEMBER 2013

**NAUTICAL SCIENCE: PAPER II**  
**MARKING GUIDELINES**

Time: 3 hours

Marks: 150

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**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.**

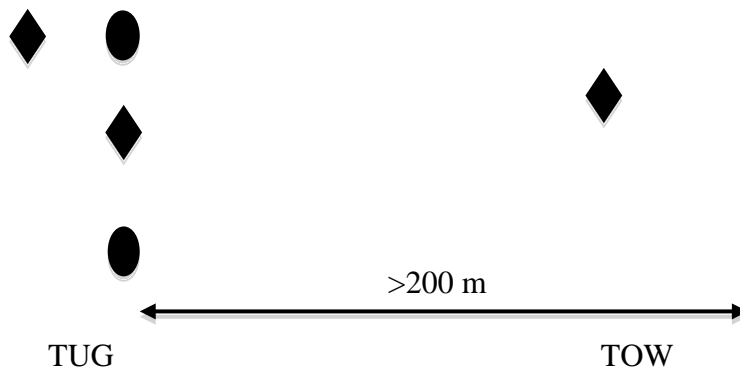
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**SECTION A SEAMANSHIP**

**QUESTION 1**

1.1 A sailing vessel underway shall keep out of the way of a vessel restricted in her ability to manoeuvre (Rule 18 b (ii)). The sailing vessel should stop and wait for the tug and tow to pass clear, or she should alter course to pass astern of the tow. (5)

1.2 A power-driven vessel when towing and the length of tow exceeds 200 metres, will exhibit a diamond shape where it can best be seen (Rule 24 a (v)). (2)  
 A vessel or object being towed when the length of tow exceeds 200 metres shall display a diamond shape where it can best be seen (Rule 24 e (ii)). (2)  
 A vessel restricted in her ability to manoeuvre, except a vessel engaged in mine clearance operations, shall exhibit three shapes in a vertical line where they can best be seen. The highest and lowest of these shapes shall be balls and the middle one a diamond (Rule 27 b (ii)). (3)



(10)

1.3 1.3.1 The term 'sailing vessel' means any vessel under sail provided that propelling machinery, if fitted, is not being used (Rule 3 c). (2)

1.3.2 The term 'vessel engaged in fishing' means any vessel fishing with nets, lines, trawls, or other fishing apparatus which restrict manoeuvrability, but does not include a vessel fishing with trolling lines or other fishing apparatus which do not restrict manoeuvrability (Rule 3 d). (8)

1.4 It means that the vessel sounding the signal fails to understand the intention or actions of the other vessel, or is in doubt whether sufficient action is being taken by the other vessel to avoid collision (Rule 34 d). (5)

**[30]**

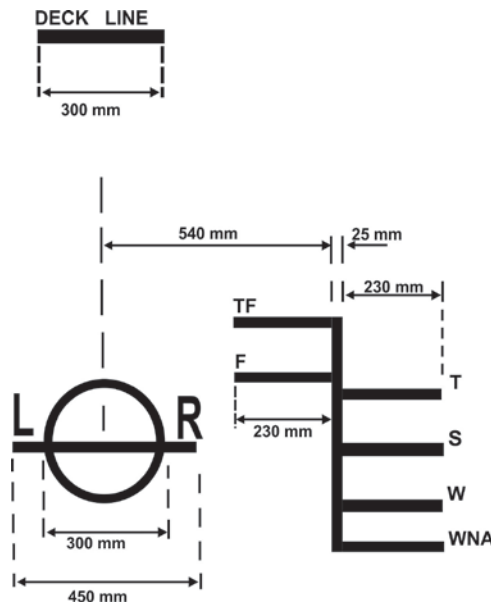
**QUESTION 2**

1. Note the present weather and sea state as well as the upcoming forecasts for the area. (1)
2. Prepare the line throwing equipment and the plan of action for the launching and recovery station. (1)
3. Reparation of scrambling nets, ladders and the best most suitable rescue zone. (1)
4. Preparation of the Fast Rescue Boat and/or lifeboats. (1)
5. Preparation of a crane and suitable basket or recovery rig. (1)
6. Preparation of the hospital or medical facility on board, dry blankets and clothes, and hot food/drinks. (1)
7. Accommodation for survivors or trauma centre. (1)
8. Posting extra lookouts. (1)
9. Search light and over-side lights. (1)
10. Communications with shore station, owners and other search vessels in the area. (1)

**[10]**

**QUESTION 3**

3.1

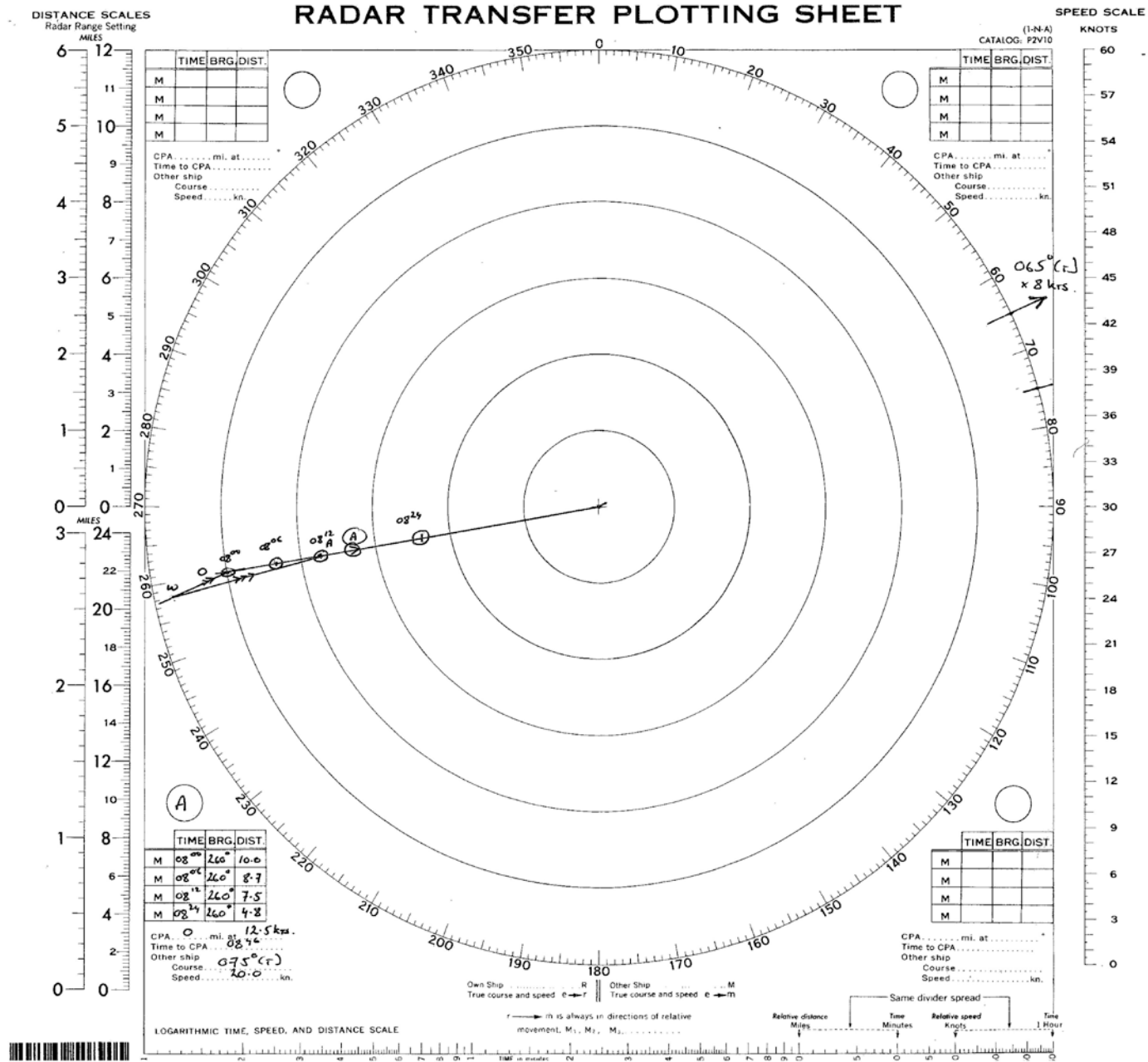


1  
1  
1  
1  
1  
1  
1  
2  
**(10)**

- 3.2 The freeboard of a ship at any time is the vertical distance from the waterline or draft to the upper edge of the deck line. (2)
- 3.3 Gross Tonnage is the internal volume of all enclosed spaces of a ship measured in cubic metres. (4)
- 3.4 The deadweight of a ship is the total weight of the cargo, stores, fresh water, fuel and crew when loaded to the summer loadline, and measured in tonnes weight. (4)
- [20]**

**QUESTION 4**

- 4.1 See the attached plotting sheet. (5)
- 4.2
- |    |                              |                |                             |             |
|----|------------------------------|----------------|-----------------------------|-------------|
| 1. | Contact ID                   | 'A'            | see attached plotting sheet |             |
| 2. | Time of 1 <sup>st</sup> plot | 08:00          |                             | 1           |
| 3. | Initial range                | 10 miles       |                             | 1           |
| 4. | Heading of target            | 075° (T)       |                             | 3           |
| 5. | Speed of target              | 20 knots       |                             | 3           |
| 6. | CPA                          | 0 M. Collision |                             |             |
| 7. | TCPA                         | 08:46          |                             | 2           |
|    |                              |                |                             | <b>(10)</b> |
- 4.3 The target is abaft the beam on a converging course.  
To avoid a close quarter situation and avoid collision, own vessel should either stop until the danger has passed clear, or alternatively make a bold alteration of course to port onto a Northerly course until the danger has passed clear.  
(Rule 19) (5)
- [20]**



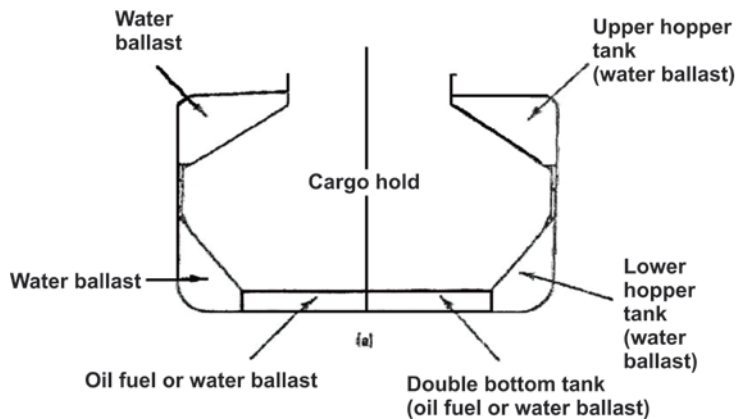
**QUESTION 5**

5. Bulk carriers are single deck, multi-hold (4 – 9 hatches/holds) designed to carry normally one commodity, (e.g. iron-ore, coal, grain, etc.) loaded in bulk. The holds are designed with large hatch openings through which the cargo is tipped or poured into the hold, and discharged using grabs or in some cases for light cargoes (grain) by evacuators or suction.

The holds are designed for easy loading, self-trimming and minimum man-power or mechanical stowage. On discharge, grabs or conveyor systems remove almost all the cargo with minimum man-power (shovelling) or mechanical (bob-cats) for final sweeping or cleaning.

The vessel may be 'geared' or 'gearless' meaning it will either be equipped with cranes and grabs for loading/discharge, or it will have no equipment and rely entirely on terminal equipment to handle the cargo.

The vessel will be designed to have a comprehensive ballast system for trim and stability purposes. The ballast will also be used to manage the draft and air-draft requirements at the ports and terminals.



[10]

**90 marks**

**SECTION B COMMUNICATIONS AND METEOROLOGY****QUESTION 6**

- 6.1 EPIRB stands for 'Emergency Position Indicating Radio Beacon'.  
This is used to alert search and rescue services to an emergency.  
It does so by transmitting a coded message on the emergency frequency 406 MHz.  
This can be activated automatically.  
Full global cover is provided by INMARSAT and COSPAS-SARSAT satellite systems which establish the vessel's or EPIRB's position.  
If the EPIRB has an interface with the ship's navigation system, it is able to transmit the position directly. (10)
- 6.2
- Transmission of ship-to-shore distress alerts by at least two separate and independent means.
  - Reception of shore-to-ship distress alerts.
  - Transmission and reception of ship-to-ship distress alerts.
  - Transmission and reception of search and rescue coordinating communications.
  - Transmission and reception of on-scene communications.
  - Transmitting and reception of signals for locating (SART & EPIRB).
  - Transmission and reception of Maritime Safety Information (MSI).
  - Transmission and reception of general radio communications to or from shore-based radio system networks.
  - Transmission and reception of bridge to bridge communications.
- Any five of the above. (5)

**[15]****QUESTION 7**

7. During the day the land is heated by the sun and the air above it will be heated by conduction. The warm air rises and the pressure falls. (2)  
The sea temperature remains relatively constant and the pressure will be high compared to the land. (2)  
The pressure gradient is sufficient for air to flow from the sea to the land, resulting in a 'sea breeze'. (3)  
This wind normally starts mid-morning and increases by midday through to mid-afternoon. In very warm weather it may start earlier and go on for longer. It will die away towards sunset. (3)
- In the evening the land cools rapidly, and the air above it will also cool and become more dense resulting in an increase in pressure. (2) The temperature of the sea does not change as much, and consequently the pressure over the sea is lower than the land. (2)  
The situation is therefore reversed, and the pressure gradient causes a 'land breeze' to blow from the land to the sea. (3)  
The cooler air from the land gravitates down the slope of the land to the sea. The air over the sea is displaced by the land breeze and forced upwards. Higher up it flows back towards the land completing the circle.  
The land breeze is generally weaker than the sea breeze. (3)

**[20]****35 marks**

**SECTION C SAILINGS**

**QUESTION 8**

8.1	<b>Lat.</b>	<b>M.P.</b>	<b>Long.</b>				
	Cape Town 33° 45' S	2140.41	018° 15' E				
	R. Plata 35° 30' S	2267.43	055° 00' W				
	Dif. 1° 45' S	127.02	73° 15' W				
	105' S		4,395' W		6		
	Tan Course = D'Long/DMP		Distance =	D'Lat/Cos Co.			
	= 4395/127.02		=	105/Cos 88 <sup>0</sup>			
	= 34.601		=	3,008.6 miles			
	Course = S88 <sup>0</sup> W				6		
	= 268 <sup>0</sup> (T)				8 (20)		
8.2	<b>Month</b>	<b>Day</b>	<b>Hour</b>	<b>Min.</b>	Steam Time =	Dist./Spd.	
	ETD Cape Town	02	02	14	00	= 3008.6/19	
	Zone Time			- 01		= 158.45 hrs	
	GMT	02	02	13	00	= 6d 14h 27 m 2	
	Steaming time		06	14	27		
	ETA R. Plata	02	09	03	27		
	(GMT)						
	Zone time			- 04			
	ETA R. Plata LT	02	08	23	27	Feb. 8 <sup>th</sup> at 23:30.	
							3 (5)
							<b>[25]</b>

<b>25 marks</b>
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**Total: 150 marks**