NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2023

# NAUTICAL SCIENCE: PAPER II

## MARKING GUIDELINES

Time: 3 hours 150 marks

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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

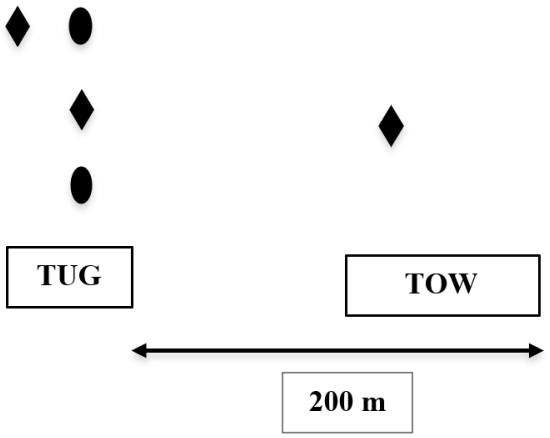
1.1 A sailing vessel underway shall keep out of the way of a vessel restricted in her ability to manoeuvre (Rule 18 b (ii)).

The sailing vessel should stop and wait for the tug and her tow to pass clear, or she should alter course to pass astern of the tow.

1.2 A power-driven vessel underway when towing, and the length of tow exceeds 200 m, will exhibit a diamond shape where it can best be seen (Rule 24 a (v)).

A vessel or object being towed, when the length of tow exceeds 200 m, shall display a diamond shape where it can best be seen (Rule 24 e (ii)).

A vessel restricted in her ability to manoeuvre, except for 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)).




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).

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).

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).

## QUESTION 2

1. Note the present weather and the sea state as well as the upcoming forecasts for the area.

2. Prepare the line-throwing equipment and the plan of action for the launching and recovery station.

3. Preparation of the scrambling nets, ladders and the best, most suitable rescue zone.

4. Preparation of the fast rescue boat and/or lifeboats.

5. Preparation of crane or derrick and suitable basket or recovery rig.

6. Preparation of the hospital or suitable medical facility on board, together with dry blankets and clothes, and hot food/drinks.

7. Accommodation for survivors or a trauma centre.

8. Posting extra lookouts.

9. Search light and over-side lights.

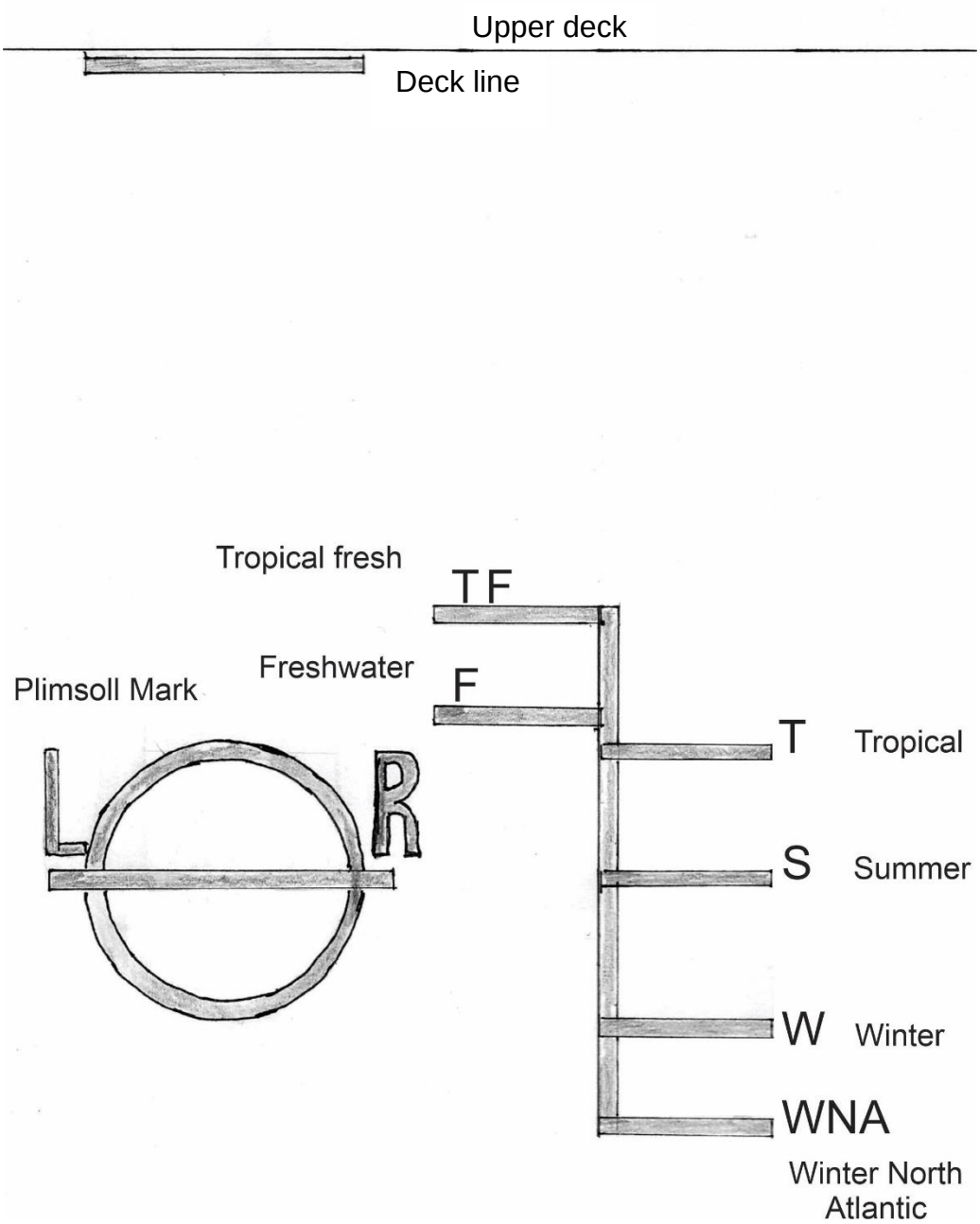
10. Communication with shore station, coast guard, rescue and coordination centre, as well as with owners and other search vessels in the area.

*OR any other suitable and relevant activities that may be listed.*

## QUESTION 3

3.1




3.2 The freeboard of a ship at any time is the vertical distance from the waterline or draught to the upper edge of the deck line.

The summer freeboard, for example, is the vertical distance from the summer load line (Plimsoll line) to the deck line.

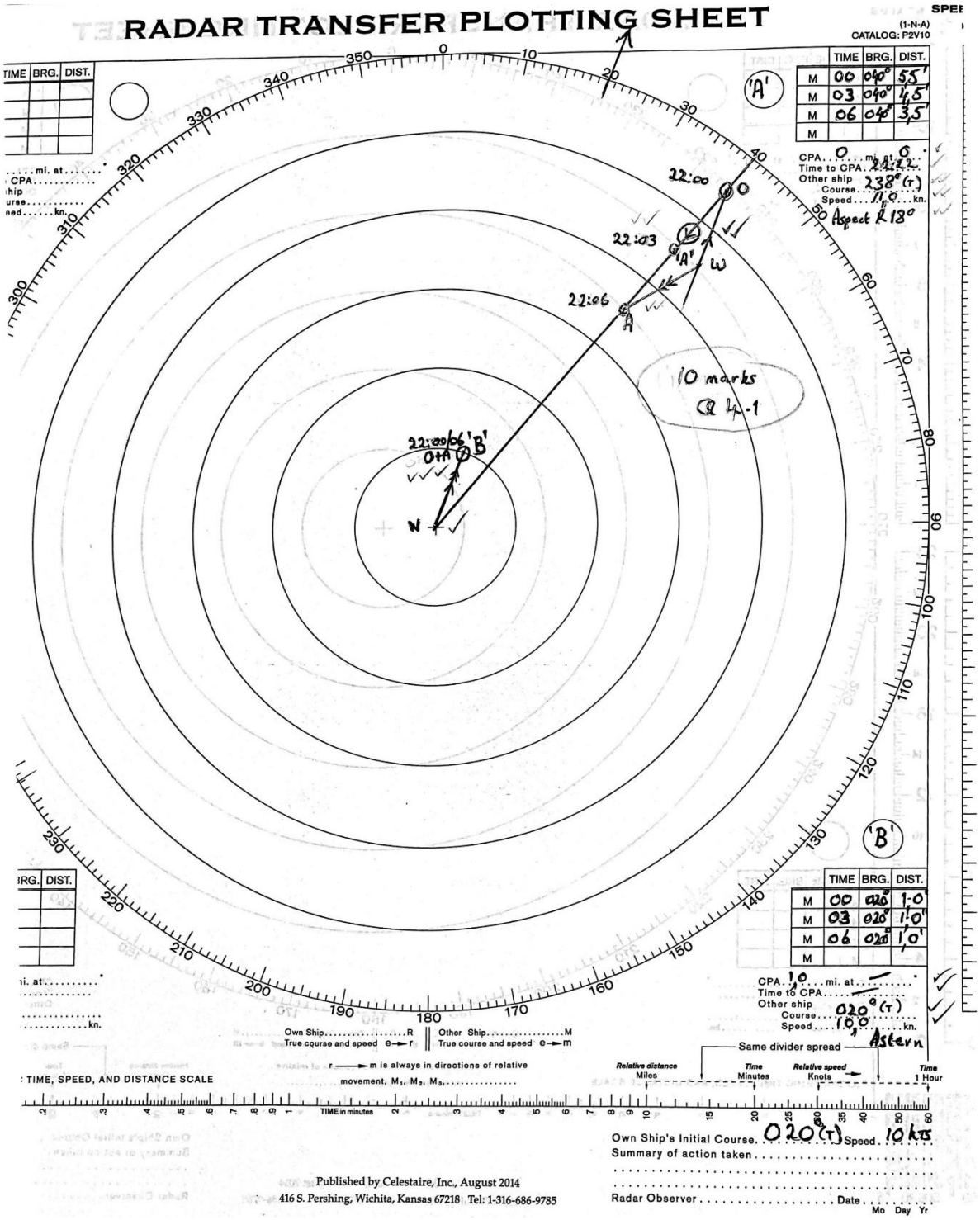
3.3 The gross tonnage (GT) is the internal volume of all enclosed spaces of a ship measured in cubic metres.

3.4 The dead weight of a ship is the total weight of cargo, stores, fresh water, fuel and crew/personnel when loaded to the summer load line. It is measured in tons weight.

## QUESTION 4

4.1



4.2

| **Target A** | | **Target B** | |
|---|---|---|---|
| Initial plot 22:00, 040° × 5,5 miles | | Initial plot 22:00, 040° × 5,5 miles | |
| CPA | 0 miles | CPA | ---- |
| TCPA | 22:17 | TCPA | ---- |
| Heading of 'A' | 238° (T) | Heading of 'A' | 020° (T) |
| Speed of 'A' | 11,0 kts | Speed of 'A' | 10,0 kts |
| Aspect | R18° | Aspect | Astern |

4.3 Target 'A' is the greatest hazard to your vessel as it is on a collision course.

4.4 To avoid a close-quarters situation immediately reduce speed to minimum steerage and continue to monitor Target 'A' till the vessel is past and clear.

Continue to plot or monitor both targets, and if the alteration of speed alone does not achieve the desired effect, then make a bold alteration of course to port and navigate with caution.

## SECTION B COMMUNICATIONS AND METEOROLOGY

## QUESTION 5

5.1 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 an emergency frequency 406 MHz. This can be activated automatically.

Full global coverage is provided by INMARSAT (1.6GHz or 1626.5–1660.5MHz) and COSPAS-SARSAT (406MHz) satellites 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.

5.2
- 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.
- Transmission and reception of signals for locating SART and EPIRBs.
- 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/deck communications (on-board comms).

Answer may contain any five of the above or other relevant answer.

## QUESTION 6

During the day the land is heated by the sun and the air above the land will be heated by conduction. The warm air rises and the pressure falls.

The sea temperature remains relatively constant, and the pressure will be high compared to the land.

The pressure gradient is sufficient for air to flow from the sea to the land, resulting in a 'sea breeze'.

This wind will normally begin mid-morning and increase 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.

In the evening the land cools rapidly, and the air above it will cool and become denser resulting in an increase in pressure.

The temperature of the sea does not change as much, and consequently the pressure over the sea is lower than on the land.

The situation is therefore reversed, and the pressure gradient causes a 'land breeze' to blow from the land to sea.

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 to the land completing the circle.

The land breeze is generally weaker than the sea breeze.

## SECTION C SAILINGS

## QUESTION 7

7.1

| | Lat. | M.P. | Long. |
|---|---|---|---|
| Pos. Cape Town | 33° 45' S | 2 140,41 | 018° 15' E |
| Pos. Rio Plata | 35° 30' S | 2 267,43 | 055° 00' W |
| Dif. | 1° 45' S | 127,02 | 73° 15' W |
| | 105' S | | 4 395' W |

| | | |
|---|---|---|
| Tan Course | = | D'Long /DMP |
| | = | 4 395/127,02 |
| | = | 34,601 |
| Course | = | S 88,34554° W |
| **Course** | = | **268° (T)** |

| | | |
|---|---|---|
| Distance | = | D'Lat/Cos Co. |
| = | | 105/Cos 88,34554° |
| **Distance** | = | **3 634,6 miles** |

| | | |
|---|---|---|
| Steaming time | = | Dist./speed |
| | = | 3 634,6 /19 |
| | = | 191,295 hrs. |
| | = | $7^{D}$ $23^{H}$ $18^{m}$ |

7.2

| | Month | Day | Hour | Minute |
|---|---|---|---|---|
| ETD Cape Town | 02 | 02 | 14 | 00 |
| Zone time 'B' | | | – 2 | |
| GMT | 02 | 02 | 12 | 00 |
| Steaming time | | 07 | 23 | 18 |
| ETA R. Plata GMT | 02 | 10 | 11 | 18 |
| Zone time 'Q' | | | – 4 | |
| ETA local time | 02 | 10 | 07 | 18 |

**Rio Plata ETA = 07:18 10th February**

**Total: 150 marks**