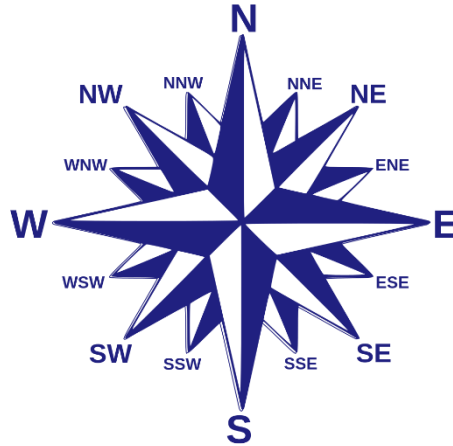


Stars and Compass

2019



Stars and Compass Paper 2019

Introduction

The Stars and Compass trophy has been donated for annual competition with a view to maintaining an interest in traditional methods of navigation.

No answers are to include the use of modern computer based devices such as GPS or software such as Navionics chart software.

General Instructions

Please:

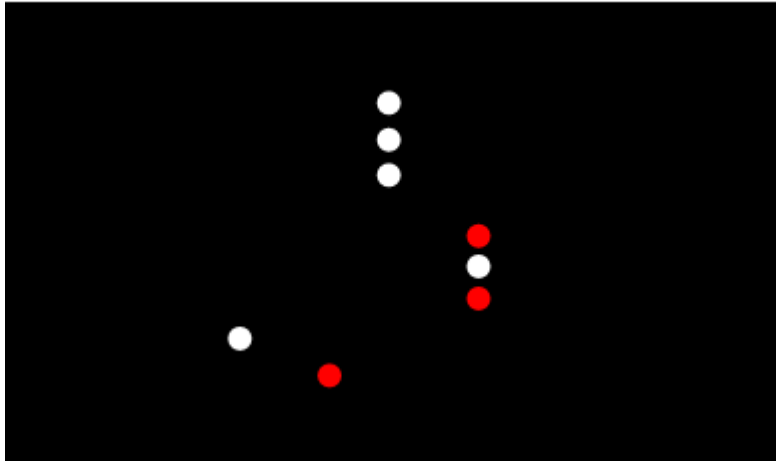
- Number all of your pages and ensure that your name is also on each page
- Show all calculations
- Provide copies of any plots and illustrations, with appropriate notations that you use in preparing your answers
- Make explicit any assumptions that you have used
- Begin each main question on a new sheet
- Sub-questions such as 1(a), 1(b) for example should start on a new line
- If your answers are prepared on a computer then use at least 1.5 line spacing and a 10 point font or larger
- Enjoy the challenge

Notes:

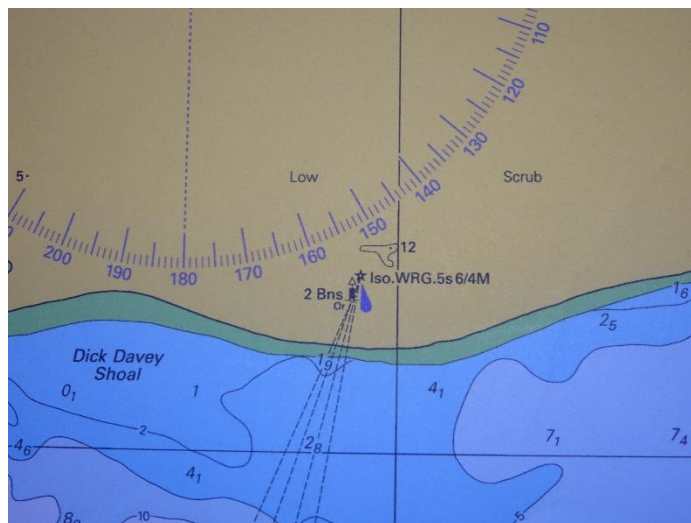
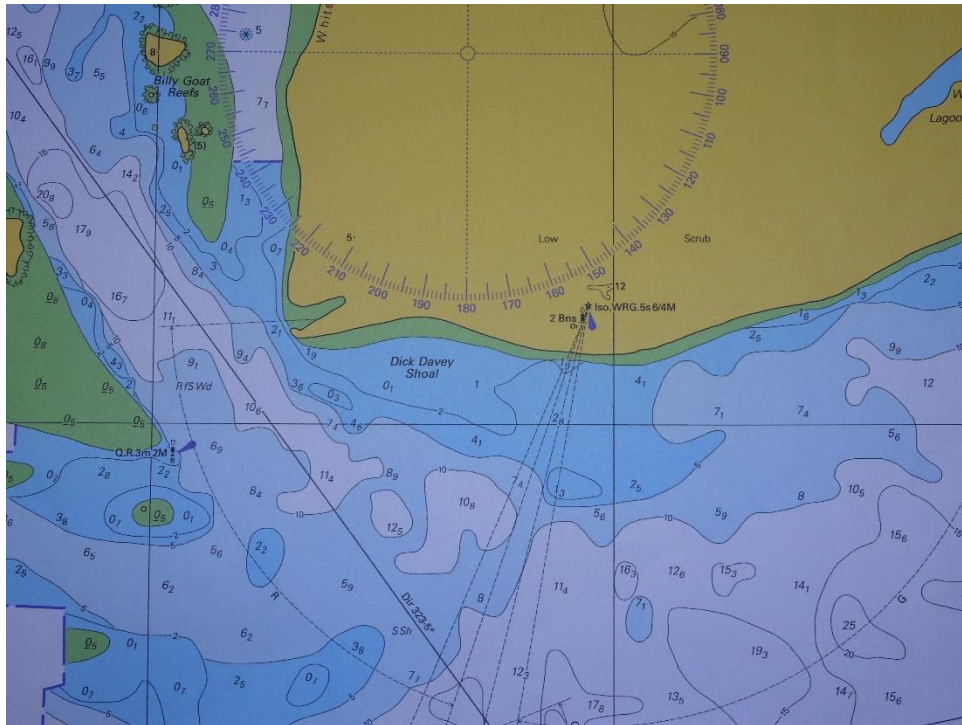
1. Access to charts AUS 143 and AUS 150 is required.
2. The BOM / AHO tables for tides are to be used. They are available from the BOM website, AHO publications, the State transport authorities. Any data used from the tables should be listed in your answers.
3. Use the Deviation Card supplied on p6 when required.
4. A copy of the Standard Curves Tide Graph has been supplied for your use.

1. **General**

- a. You are planning a cruise amongst the Pacific islands and have been given a stack of charts. Before using them to plot positions from your GPS onto the charts what do you need to know? Where will you find this information on the charts? (3)
- b. While sailing in a murky night in Bass Strait you see this set of lights – what do they indicate? Having seen these – what do you do look for next?



- c. A beacon with a charted height of 10m is situated on a sandbank shown as drying 2m. If MHWS is 5m what is the height of the beacon above the sand? Use a diagram to explain your answer. (3)
- d. A portion of the chart for the entrance to Lady Barron, Flinders Island is overleaf showing the navigation mark at Dick Davey Shoal. You are approaching it from a southerly direction. What would you expect to see: (5)
 - i. At night?
 - ii. During daylight?



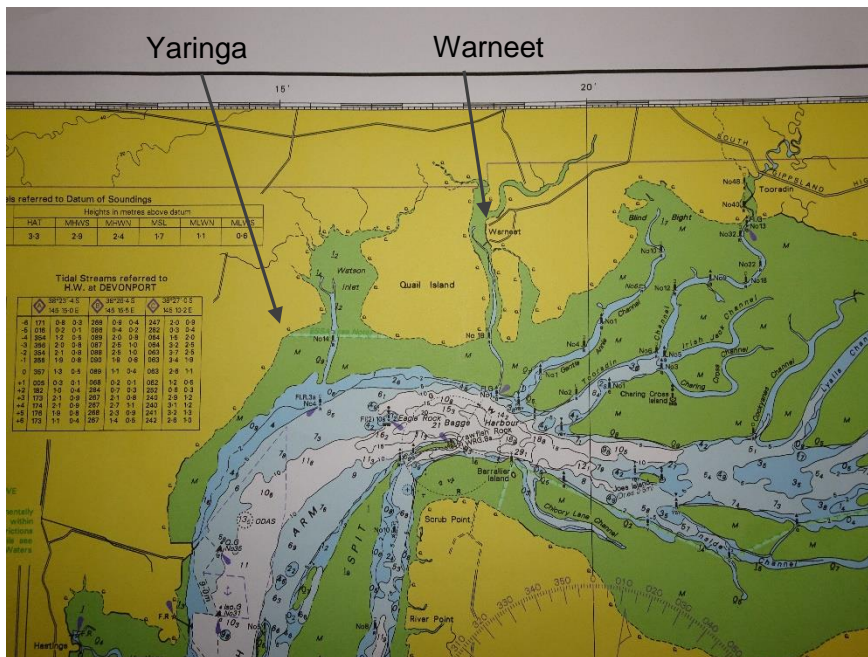
2. Tidal Height Calculations

Your friend has asked to take his boat up the Yaringa Channel to the boat yard that shows a minimum charted depth of 1.6m. The boat draws 2.6m. You are to take it to Yaringa on 24 April 2019 and you want to do it in daylight. Yaringa is at the northern end of Western Port as shown below on the extract from AUS 150.

- During which times would it be possible to safely take the boat up the Yaringa Channel? HW at Warneet Pier is 25 minutes later than Stony Point. Allow a safety margin of 0.5m under the keel. Either submit the tidal height chart that was provided showing your working, or evidence of the method you have chosen to determine the tidal heights during that day. Note: Downloading the tidal chart from Navionics, willyweather or other electronic sources as evidence will not earn marks.

(8)

- b. Having stepped on board of your friend's boat you notice that it has a full set of electronic navigation instruments including a 9" chart plotter in the cockpit. Apart from the location of the On/Off switch for the instruments, what is the single most important piece of information that you need to know about the instruments before setting out on the trip towards Yaringa? (2)
- c. There have been two days of gale force northerly winds prior to the trip to Yaringa. What influence does this have on your calculations? (2)



Extract from AUS 150 showing Yaringa and Warneet at the northern end of Western Port.

3. Passage Plan
Prepare a passage plan take the boat from Queenscliff Harbour to Yaringa to arrive within the safe times calculated in Question 2. The strong northerlies are forecast to abate to 15-20kts prior to a SW change occurring in the early hours of 24 April, also of 15-20kts. This boat sails comfortably at 7kts when the wind is abeam or abaft. (8)
4. Lights and Shapes
On AUS 143 what charted items are located at the following locations? (5)
- 38° 17.9'S 144° 55.9' E – Describe clearly the colour and pattern of the top shape and the light characteristics. What is the significance for the pilot on vessels sailing towards Melbourne. (5)
 - 38° 17.9'S 144° 53.9' E – Describe clearly the colour and pattern of the top shape and the light characteristics. What is the significance for the pilot on vessels sailing from Melbourne. (5)
 - 38° 21.02'S 144° 46.1' E – Describe clearly the light characteristics. (It is located near the Blairgowrie Marina.) (3)
5. Tidal Streams
On 24 March 2019 you are the navigator on *Sprite* that is racing between Hastings and Cowes in Western Port and keeping close to the shoreline of French Island to

avoid the worst of the flood tidal stream. At 1800 you reach the West Cardinal Buoy at $38^{\circ} 25.6'S$ $145^{\circ} 15.1' E$ leaving it to starboard and are heading to the finish line at the Cowes jetty. The boat's log is showing 5kts. The competition is tight and seconds count.

- a. What compass course will you instruct the helm to steer across the East Arm to minimise the crossing time? (11)
- b. What do you suggest to the helm so that a steady course can be maintained without watching the compass continuously? (1)
- c. What is the estimated SOG and the estimated time required to cross between the West Cardinal Buoy and the end of Cowes jetty? (1)

6. On Passage Navigation

You are on a passage from Wyndham Harbour to Martha Cove with enough west in the southerly breeze to be able to make it in one leg. Your steering compass has been professionally adjusted and deviation is less than 1° on all headings. You take a set of bearings with a hand bearing compass to plot your position. The readings are:

Water Tower at Werribee	304°
Entrance to Richards Channel	249°
Prince George	221°

- a. What is your position? (3)
- b. How far are you from the rhumb line between Wyndham Harbour and Martha Cove? (1)
- c. What is a possible reason for this difference? (1)
- d. Using this information what is the recommended course to steer for the remainder of the trip? (Bonus mark if you recommend a sensible course to steer) (3)

7. Star Sights - General

When approaching land after a long ocean passage in the days before GPS it was good practice to obtain a '5 star fix' in the morning before land was expected to be seen, particularly when approaching coral atolls and the land had no dominant landmarks.

- a. What is a '5 star fix' (2)
- b. Why did navigators seek it? (2)

8. Celestial Basics

On passage between Brisbane and Noumea your estimated position (EP) is:

$23^{\circ} 54'S$ $161^{\circ} 12' E$

At the time of your sun sight the GHA of the sun is $321^{\circ} 37'$. On the celestial sphere what are:

- a. The declination of your EP? (1)
- b. The LHA of your EP? Provide a sketch showing the GHA, your longitude and your LHA using approximate angles (nearest 10°). (4)

