

# Stars and Compass Paper 2015

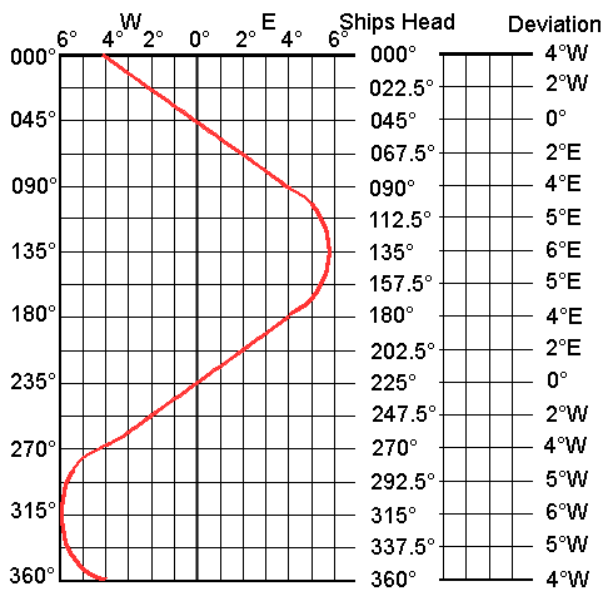
Instructions for completing paper:

- Provide answers to questions on note paper separate to this question paper.
- Points for each question are shown in brackets. i.e. (1). Total marks is out of 100.
- For each question, show workings, calculations and rationale in each answer as applicable;
- Where answer involves chartwork, attach chart excerpts that show chart working as part of your submission.

## Background

Berthed on the yacht 'Edison's Medicine' at Queenscliffe Marina on Saturday 21 March 2015, preparations are underway for a passage to Wilsons Promontory. The intention is to depart the Marina on the Saturday evening.

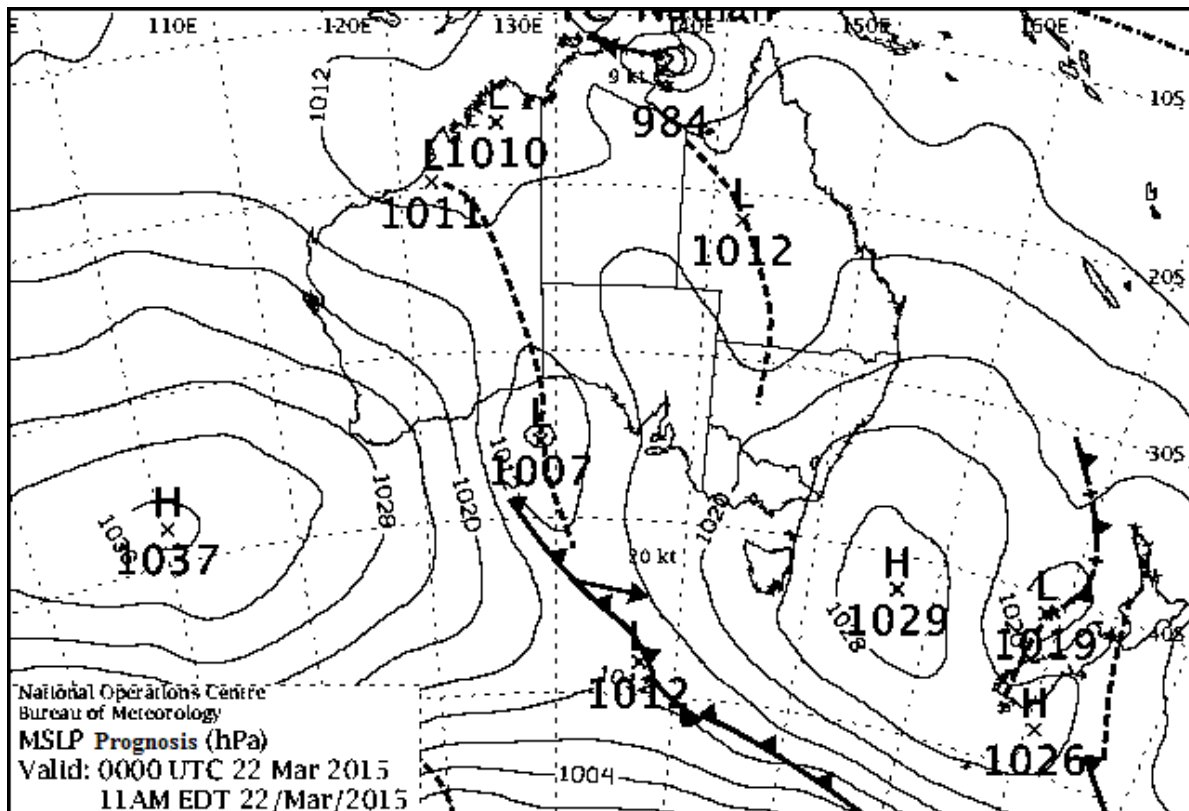
The deviation card for the yacht is included below.



Preparations include review of a range of information:

1. The Prognosis map for 22 March 2015 is shown below as Figure 1. Based on the Prognosis map:
  - a) Annotate five weather features on the map. (5)
  - b) Draw in wind arrows to show gradient wind flows expected around the main weather features on the map. (2)
  - c) Indicate the gradient wind direction expected at Melbourne, Hobart, Sydney, Adelaide and Brisbane. (2)
  - d) Based on the Prognosis map, characterise the weather expected for the passage, assuming the Saturday evening departure. (3)
  - e) Provide 4 weather sources to obtain the weather forecast for Northern Bass Strait. (2)

Figure 1 – Prognosis for 22 March 2015

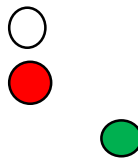


2. Wave data off Point Nepean viewed at <http://www.portofmelbourne.com/port-operations/waves-wind-and-weather> reports the following wave conditions outside Port Phillip Heads on 21 March:
  - Significant height of 1.8m
  - Maximum height of 2.6m
  - Significant period of 14 seconds
  - Maximum period of 17 seconds
  - Wave direction of 215 °M
  - a) Define each of the parameters above. (2)
  - b) Given the wave data above, and the weather information in Question 1, how can the wave conditions be broadly defined? Mark on the weather map the likely area of origin of these waves. (3)
  - c) If, under different weather conditions, the significant wave period and maximum wave period was instead 5 and 7 seconds respectively, what would this infer about the difference in origin (if any) of these waves? (2)
3. Undertake a review of tidal predictions and:
  - a) Identify a suitable time to go through Port Phillip Heads on the Saturday evening, and provide a rationale for this time. (4)
  - b) For the passage, characterise the expected moon conditions, time of sunset and sunrise and the type of tide occurring. What are the differences that can be expected for neap tides compared to spring tides? (3)
4. Briefly describe the physical features (i.e. bathymetry, topography, dimensions) of Port Phillip Heads that contributes to the tidal dynamics at the Heads. What is the significance of low and high water at Williamstown in relation to these tidal dynamics? (4)

5. For the trip out the Heads in March 2015, it is also noted from the PoMC website <http://www.portofmelbourne.com> that other activities (aside from the usual vessel movements) may also be occurring in the Heads at times that could co-incide with the yacht's transit.
- What are these activities and where can this information be found? (2)
  - What dayshape would indicate they are occurring? (1)
  - What limits need to be observed when in proximity to these activities? (1)
6. After departing Queenscliffe and motorsailing in a southerly direction, the following navigation lights are observed: For each of the two examples below, describe the lights observed and what they indicate:
- (3)



- (2)



7. A nearby yacht to port passes in a northerly direction motorsailing with its tricolour, steaming light and sidelights illuminated. How does this navigation light arrangement appear from your yacht and what are the issues (if any) with this arrangement? (3)
- Whilst heading south, the yacht's propulsion is halted to allow some shipping to go through the Heads. The light of the High Light on Shortland Bluff can be seen, along with the following lights, with bearings taken with hand bearing compass:
    - A light with six very quick flashes followed by a long flash, this sequence occurring every 10 seconds, at a bearing of 120 °M.
    - A light with a quick red flash, at a bearing of 005 °M;
    - A white light flashing every six seconds, at a bearing of 070 °M.
  - Identify each of the three lights listed above, their lat-long position, and the purpose of each light. Also, what is unique about the High Light lighthouse? (4)
  - What additional information does the chart provide for two of the three lights listed above? (2)
  - Based on the bearings to each of the lights above, draw the position lines to plot a fix for the yacht. What is the intersection of the position lines known as? What is the percentage chance (in theory) of the yacht actually being within the intersection of these position lines? (6)

- d) Based on the above, plot a fix of the yacht and note the fix co-ordinates (Fix 1). (4)
9. In March 2012, the fishing vessel 'Lady Cheryl' ran aground and subsequently sank whilst attempting to pass through Port Phillip Heads. The position of the wreck is  $38^{\circ}17'.92\text{ S}$  ;  $144^{\circ}39'.24\text{ E}$ . A report on the incident was published at:  
[http://www.dtpli.vic.gov.au/data/assets/pdf\\_file/0005/242465/Sinking-FV-Lady-Cheryl-Point-Nepean-24-March-2012.PDF](http://www.dtpli.vic.gov.au/data/assets/pdf_file/0005/242465/Sinking-FV-Lady-Cheryl-Point-Nepean-24-March-2012.PDF)
- a) Plot the position of the wreck on the chart. (2)
- b) What is the depth of the wreck at Lowest Astronomical Tide and how was this depth obtained? (2)
- c) What was the main navigational error that resulted in the grounding? (2)
- d) List 4 other contributing factors (navigational and otherwise) that contributed to the grounding. (2)
10. After clearance of shipping from the Heads, the yacht is again underway and approach is made towards Lonsdale Bay to line up the leads on Shortland Bluff with an intention to pass out the Heads via the Western Ship Channel.
- a) What are the advantages of using leads to navigate a channel? (1)
- b) Which lead lights need to be lined up in order to follow the Western Ship Channel, and what are their characteristics? (2)
- c) With the yacht on a course that shows both lead lights of the Western Ship Channel in alignment, what compass heading should I be steering? (2)
- d) During the outward passage in the Western Ship Channel, the helmsman deviates slightly from his course such that when looking from astern the lower light is now observed to be to the west of the higher light. How does the helmsman need to steer in order to come back onto the leads? (2)
- e) Whilst in alignment with the leads of the Western Ship Channel, it is noted that the white sector on Lonsdale light suddenly turns red. Plot your position fix (Fix 2) at this time and provide the lat-long position. (3)
- f) Whilst passing abeam of Lonsdale light, a green fixed light is observed on the side of the lighthouse. What does this light mean? (1)
- g) 20 minutes after Fix 2 taken above, and whilst still on the Western Ship Channel leads, Lonsdale light is observed on a bearing of  $355^{\circ}\text{M}$  using a hand bearing compass. Plot position fix (Fix 3) at this time and calculate the yacht's Speed Over Ground (SOG) between Fix 2 and Fix 3. (3)
11. Soon after taking Fix 3, the yacht's course is altered with a new course towards Cape Schanck, at a speed of 6 knots. A short time later, the navigation lights of a ship ahead are observed approaching on an apparent reciprocal course. When sighted, the ship is 4 M ahead and travelling at 20 knots.
- a) What measures can be taken to avoid a collision, and what methods can be used to monitor the risk of collision? (2)
- b) Assuming current speed and course of both our yacht and the ship is maintained, how long until a potential collision occurs? (2)
12. Returning from Wilsons Promontory in the late afternoon of 6 April 2015, the yacht is a couple of nautical miles off the Phillip Island coast, with depth sounder readings ranging 50-55m depth. Whilst sailing on a course of  $270^{\circ}\text{C}$  at 6 knots in a light-moderate southerly breeze (assume  $5^{\circ}$  leeway), at 1830 a bearing of  $308^{\circ}\text{M}$  with hand bearing compass is taken of Pyramid Rock, log reading of 7327 M. Twenty minutes later at 1850, log reading of 7329.5 M, Pyramid Rock is at a bearing of  $030^{\circ}\text{M}$ .
- a) Provide a fix for the yacht at 1850 (Fix 4). (4)

13. Shortly afterwards taking the above Fix 4, the yacht encounters an oil slick over a substantial area of water, with hydrocarbon odour, slick and sheen visible on the water surface. Which authority should be contacted in the first instance to report marine pollution at this location? (1)
14. Approaching the Nobbies, the decision is made to enter Western Port and spend a couple of days around Hastings/Yaringa. At 1900, with similar speed and heading as above, log reading of 7330.8 M, the Nobbies light is visible at a bearing of  $294^{\circ}$ M with hand bearing compass. Fifteen minutes later at 1915, log reading of 7332.7 M, the bearing to Nobbies light is  $324^{\circ}$ M.
  - a) At 1915, what is the distance off Nobbies Light? (4)
15. Later in the evening whilst steering up the Western Channel in vicinity of McHaffies Light, the No.7 and No.8 channel buoys are passed in line at 2115, with the yacht close to No.7 buoy. At this time, the yacht is running on starboard gybe at 6 knots on a course of  $050^{\circ}$ C with negligible leeway.
  - a) Based on the yacht's position at 2115 and the above information, provide an estimated position for the yacht at 2130. (5)