

# COXSWAIN NAV. EXERCISES AUS197 (Inc M24 Supplement)

NAME:

A [deviation card](#) is supplied at the end of this workbook. Check the [answers](#)

Validates to TDMMH1207B and MARH001 Plan and navigate a passage for a vessel up to 12 metres

Validates with supplement to MARH004 Plan and navigate a passage for a vessel up to 80 metres

## EXERCISE NO. 1

## CHART INFORMATION

### Question 1 (Validates to TDMMH1207B Element 1a)

The Chart information of [AUS 197](#) indicates that:

(Circle the correct answer.)

a. Chart Datum is approximately the level of LAT.

TRUE

FALSE

b. Depths and Heights are in measures of fathoms and feet.

TRUE

FALSE

c. INWARD bound vessels must not enter AREA C

TRUE

FALSE

d. All positions are related to WGS 1984 survey datum.

TRUE

FALSE

### Question 2 (Validates to TDMMH1207B Element 1a)

When and what were the Chart's most recent *small corrections*?

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**Question 3** (Validates to TDMMH1207B Element 1a)

*Small corrections* for charts are published in the:

- a. Australian Notices to Mariners.
- b. Marine Orders.
- c. National Tide tables.
- d. Australian Marine Notices.

**Question 4** (Validates to TDMMH1207B Element 1a)

What is the purpose of a *compass rose* on the chart?

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**Question 5** (Validates to TDMMH1207B Element 1a)

Use Chart AUS 197 to identify a minute of latitude (i.e. distance of one nautical mile)  
Compare one minute of latitude to one minute of longitude. Why is longitude not used  
to measure distance?

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**Question 6** (Validates to TDMMH1207B Element 1a)

Name three nautical publications (additional to Qu. 3) of use in planning a passage.

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## EXERCISE NO. 2

## CHART SYMBOLS AND ABBREVIATIONS

### Question 1 (Validates to TDMMH1207B Element 1a)

Use Chart AUS 197 to name the position of any:

- a. steep coast, cliffs.
- b. lighthouse with obscured sector.
- c. rock that covers/uncovers.
- d. tower.
- e. sandy shore.
- f. wreck.

### Question 2 (Validates to TDMMH1207B Element 1a)

South East of Macquarie is a chart symbol, *S.Sh.* What does it mean?

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### Question 3 (Validates to TDMMH1207B Element 1a)

Describe the lighting characteristics of Macquarie Lt

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### Question 4 (Validates to TDMMH1207B Element 1a)

What does the magenta coloured rectangle between Sydney Heads signify?

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### Question 5 (Validates to TDMMH1207B Element 1a)

East of Cape Solander is a chart symbol, *FL.Y. 5s.* What is it?

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### Question 6 (Validates to TDMMH1207B Element 1a)

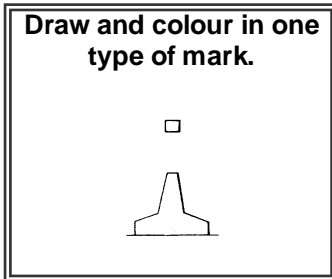
What is the function of the light at Port Hacking, Oc. WR. 3s 12/9M?

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### EXERCISE NO. 3

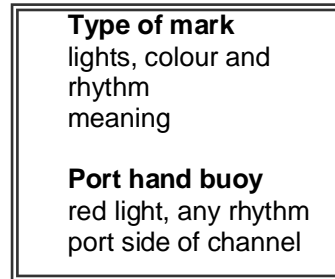
### BUOYAGE

To assist you in learning the IALA buoyage system it is recommended that you make a series of palm cards. [Link to print cards.](#)



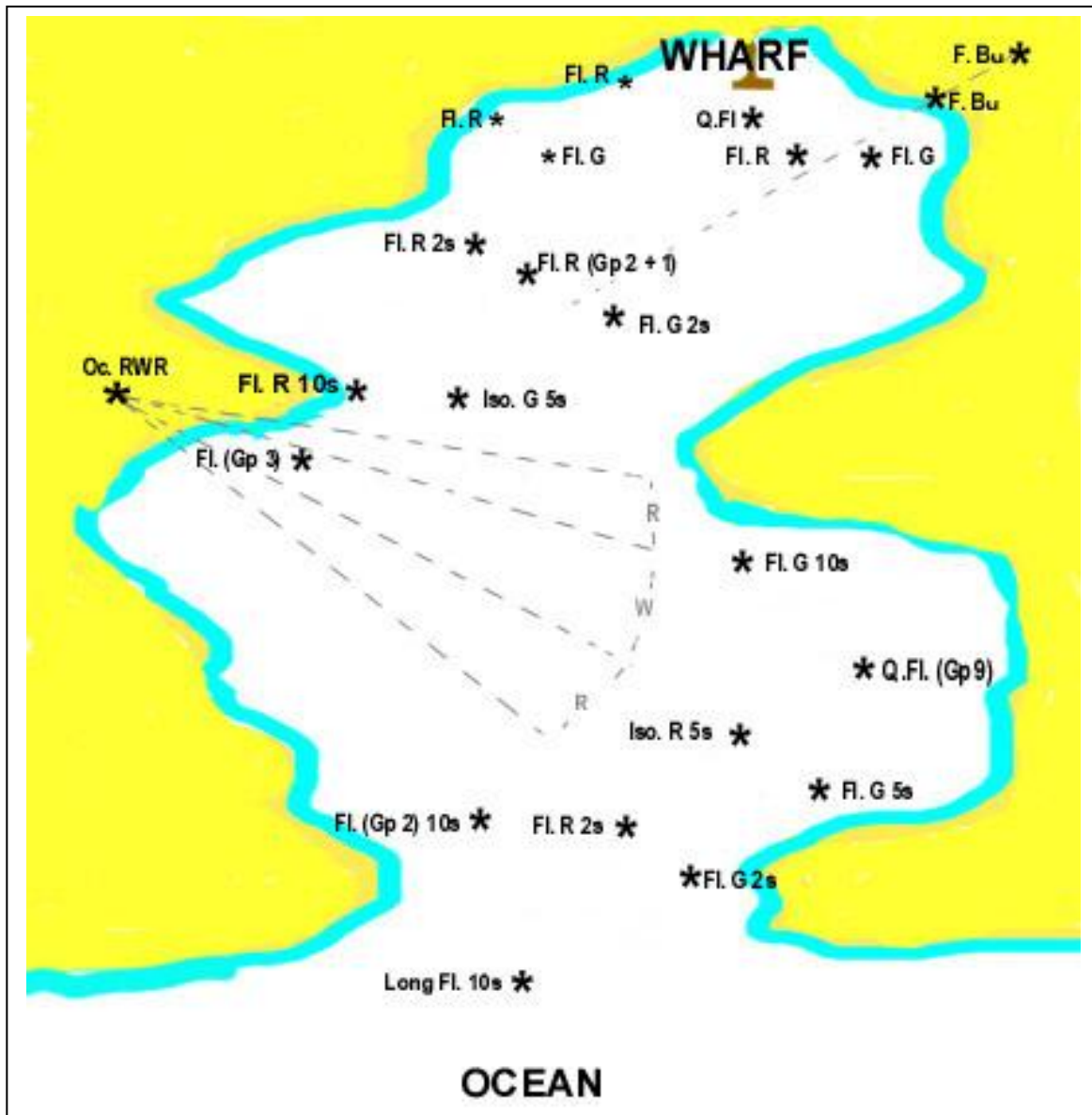
*Front of Card*

*Back of Card*



**Question 1** (Validates to TDMMH1207B Element 1a)

Draw the safe buoyed course from the ocean to the wharf upriver:



## EXERCISE NO. 4

## POSITION - DISTANCE - DIRECTION

### Question 1 (Validates to TDMMH1207B Element 1a)

Identify the place names from following GPS derived positions.

- a.  $34^{\circ} 00'.0S$   $151^{\circ} 15'.0E$
- b.  $33^{\circ} 46'.1S$   $151^{\circ} 18'.1E$
- c.  $33^{\circ} 55'.5S$   $151^{\circ} 15'.9E$
- d.  $33^{\circ} 49'.4S$   $151^{\circ} 18'.0E$

Find the geographical position of the following.

- e. Barrenjoey Head Lt.
- f. Mt. Pleasant (112) near Woy Woy
- g. Wreck in depth of 48 mtrs 2.3 nm east of Avalon

### Question 2 (Validates to TDMMH1207B Element 2a)

What is the distance in nautical miles between Box Head and Barrenjoey Lt?

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### Question 3 (Validates to TDMMH1207B Element 2a)

What is the distance in nautical miles between North & South Head Lts?

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### Question 4 (Validates to TDMMH1207B Element 2b)

Find the distance and true directions between the following features /GPS positions.

	FROM	TO
a.	Centre of south compass rose.	Macquarie Lt.
b.	$34^{\circ} 00'.0S$ $151^{\circ} 20'.0E$	$33^{\circ} 50'.0S$ $151^{\circ} 30'.0E$
c.	Bluefish Point (near Sydney)	Boora Point (near Botany)
d.	$33^{\circ} 36'.3S$ $151^{\circ} 19'.6E$	$33^{\circ} 35'.7S$ $151^{\circ} 34'.5E$

## EXERCISE No.5

## SPEED DISTANCE AND TIME

### Question 1 (Validates to TDMMH1207B Element 4d)

- a. At a speed of 9 knots, how far will a vessel travel in 4 hours?
- b. What speed will a vessel require to travel 27nm in 3 hours?
- c. How long will a vessel take to travel 32nm at 8 knots?

### Question 2 (Validates to TDMMH1207B Element 4d)

- a. At a speed of 9 knots, how far will a vessel travel in 3 hours 15 minutes?
- b. What speed will a vessel require to travel 13.5 nm in 2 hours 42 minutes?
- c. How long will a vessel take to travel 23 nm at 8 knots?

### Question 4 (Validates to TDMMH1207B Element 4d)

A vessel departs Pittwater at 09:25 and steams eastward at 10 kts to cross the 100 mtrs sounding contour at 11:00. What distance should she have travelled?

### Question 5 (Validates to TDMMH1207B Element 4d)

A south bound vessel off Diamond Bay ( $33^{\circ} 51'.9S$ ) sees a Water Tower (129)  $\emptyset$  with a beacon. Twelve minutes later she sees a Tower (R Lts) in transit ( $\emptyset$ ) with a Vent. If there are 1852 mtrs to a nautical mile, what speed is she achieving?

### Question 6 (Validates to TDMMH1207B Element 4d)

At 14:00 a vessel departing Port Hacking reads 24mtrs on the echo sounder. Travelling at 7 kts, she rounds a special marker buoy and continues on to anchor in Long Bay in a depth of 3 mtrs. What will be the time of arrival?

### Question 7 (Validates to TDMMH1207B Element 4d)

At 05:45, a vessel departs from  $34^{\circ} 04'.55S$   $151^{\circ} 38'.00E$  (SE of Port Jackson in 500 mtrs) inbound (steering  $311^{\circ} T$  at 6.75 kts) to rendezvous with an outbound vessel (4.5 kts) departing with North Head Lt. 0.6 nm abeam in 30 mtrs on a reciprocal course. When and where will they meet if they maintain their speeds and courses?

## EXERCISE No.6 COMPASS ERROR - VARIATION AND DEVIATION

### Question 1 (Validates to TDMMH1207B Element 1b)

Obtain chart AUS 197 to find the following:

- the value of the magnetic variation and its name (east or west).
- the year to which that amount of variation refers
- any annual change (increasing/decreasing/steady) in 'minutes'

### Question 2 (Validates to TDMMH1207B Element 1b)

Courses and bearings are plotted on the chart as:

- magnetic.
- all of the choices.
- compass.
- true.

### Question 4 (Validates to TDMMH1207B Element 1b)

Complete the table below:

If the error is **east** the compass reads **least**. (the magnetic needle is deflected clockwise)

If the error is **west** the compass reads **best**. (the magnetic needle is deflected anticlockwise)

TRUE VARIATION	108° 4° W	TRUE VARIATION	004°	TRUE VARIATION	358° ½° W
MAGNETIC		MAGNETIC	003°	MAGNETIC	

TRUE VARIATION	095° 5° E	TRUE VARIATION		TRUE VARIATION	357° 4° W
MAGNETIC		MAGNETIC	188°	MAGNETIC	

TRUE VARIATION	005° 10° E	TRUE VARIATION		TRUE VARIATION	147° 1° W
MAGNETIC		MAGNETIC	232°	MAGNETIC	

**Question 5** (Validates to TDMMH1207B Element 1b)

Complete the table below:

If the error is **east** the compass reads **least**. (the magnetic needle is deflected clockwise)

If the error is **west** the compass reads **best**. (the magnetic needle is deflected anticlockwise)

True	Variation	Magnetic
090°	13° E	
090°	13° W	
	6° E	281°
	10° W	100°

000°	13° E	
353°	10° W	
012°		358°
347°		360°

**Question 6** (Validates to TDMMH1207B Element 1b)

Deviation of the compass is caused by:

- magnetic influences within the vessel.
- the earth's magnetic field.
- friction in the compass.
- the moon's gravitational influence.

**Question 7** (Validates to TDMMH1207B Element 1b)

Compass error refers to:

- a mistake when taking an azimuth with a peloris.
- the error between a gyro compass reading and the earth's magnetic field.
- the resultant effects of variation and deviation on a magnetic compass.
- a deviation of the magnetic compass dependant on latitude.



**Question 8** (Validates to TDMMH1207B Element 1b)

**Do not use** the chart or deviation card supplied to complete the tables below:

True (Charted)	Variation	Magnetic (Hand bearing)	Deviation	Compass (Ships)	Error
020°	5° E	015°	5° W	020°	0°
138°	5° W		3° E		2° W
241°	11° E		10° E		
	9° W		2° W	340°	
	9° W		4° E	160°	

T	V	M	D	C	Error
110°	13° E	097°		100°	
134°	13° W		1° E	146°	
	3° E	348°	2° W		
199°	9° W		6° E	202°	
060°		056°		060°	

**Question 9** (Validates to TDMMH1207B Element 1b)

**Use** the variation for chart AUS 197 (round up to whole degrees) and **use** the deviation card supplied with this workbook to complete the tables below:

T	V	M	D	C	Error
009°	13° E				
	13° E			250°	
080°	13° E				
	13° E			020°	
252°	13° E				

## EXERCISE No.7      FIXING A POSITION

### Question 1 (Validates to TDMMH1207B Element 4d)

From a position South East of Port Jackson, Grotto Point Lt. Ø South Head Lt., when the vessel is in 100 mtrs sounding. Fix the position of the vessel.

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### Question 2 (Validates to TDMMH1207B Element 4d)

From a position in approximately 38 mtrs soundings off Little Reef, a vessel notices that the Barrenjoey Lt. becomes obscured while its radar range is 5 nm. Fix the position of the vessel.

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### Question 3 (Validates to TDMMH1207B Element 4d)

By radar range, the seaward edges of Barrenjoey Lt. and Box Head are 2 nm distant. Lion Island is 2.7 nm distant. Fix the position of the vessel.

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### Question 4 (Validates to TDMMH1207B Element 1b)

Fix the position of the vessel using the magnetic bearings that were sighted.

	T	V	M	The bearings of these coastal features were taken with a hand bearing compass.
Pt. Hacking Pt.			228°	
Cape Banks			256°	
Wedding Cake Is.			309°	
Position is:				

### Question 5 (Validates to TDMMH1207B Element 1b)

Fix the position of the vessel using the magnetic bearings that were sighted.

	T	V	M	The bearings of these coastal features were taken with a hand bearing compass.
Bangalley Hd. (117)			311°	
Turimetta Hd. (59)			237°	
Collaroy Twr. (128)			220°	
Position is:				

## EXERCISE No. 8 DIRECTION RELATIVE TO A SHIP'S COURSE

Radar or an azimuth circle (mounted over a ship's compass) or a peloris (dumb compass) may provide bearings relative to the heading (direction steered). If sighting bearings over a ship's compass, the deviation to apply is that tabulated in the deviation card for the ship's compass (at that heading).

### Question 1 (Validates to TDMMH1207B Element 1b)

Calculate true bearings from those relative to a vessel heading 020° Compass (D=5° W)

Relative to heading	T	V	M	D	C
Course		13° E		5° W	020°
Abeam to stb. 090° Relative					
Abeam to port 270° Relative					

### Question 2 (Validates to TDMMH1207B Element 1b)

Vessel is steaming off the Southern City Beaches, steering 040° Compass (D= 6° W).

SHU Radar relative to heading	T	V	M	D	C
Water Tk. La Perouse 198° Relative + 040°C = 238°C					
Blue fish Pt. 291° Relative + 040°C = 331°C					
Waverley Tr. (184) 246° Relative + 040°C = 286°C					
Fix the position:					

### Question 3 (Validates to TDMMH1207B Element 1b)

A hand bearing compass cannot be used in this steel ship so bearings are taken with an azimuth circle over the ship's compass (steering 180° C) off the Northern Beaches.

Azimuth Circle sighted over compass	T	V	M	D	C
Long Reef Pt. 208° C = Sighted over compass					
Temple (196) 239° C = Sighted over compass					
Box Hd. 308.5° C = Sighted over compass					
Fix the position:					

### Question 4 (Validates to TDMMH1207B Element 1b)

Vessel is inbound experiencing strong SE winds, steering 280° by Ship's Compass. How reliable is each bearing from a small vessel in a seaway? Justify your answer.

Mixed methods relative to heading	T	V	M	D	C
Mt Etalong Tk. Ø Box Hd. Observed ahead					
Barrenjoey Hd. (LHE) by radar 297° Rel +280°C -360° = 217°C					
Lion Island by azimuth circle 254° C = Sighted over compass					
Fix a position of safety:					* LHE = left hand edge

## EXERCISE NO. 9 CHECKING THE COMPASS

Navigators never overlook the opportunity to check the accuracy of their steering compass.

**Question 1** Validates to TDMMH1207B Element 4)

You are rolled beam on by a rogue wave. After recovery, dead ahead you see the eastern edge of Barrenjoey Hd. Ø centre of Lion Island. You suspect error in your compass as you are steering 341° C.

T	V	M	D	C	Error
				341° C	

(Your given deviation tables will not help you here).

- a. Calculate the new deviation of the compass on this heading.

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- b. What is the new compass error on this heading?

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- c. Is the deviation different from the deviation card?

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- d. If yes, explain why and the action to take.

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## EXERCISE No.10

## TIDES

Note the moon's phases, springs and neaps in the tide tables. Use the "Rule of Twelfths" or the "Tidal graph" attached to this workbook for your calculations.

### Question 1 (Validates to TDMMH1207B Element 3b)

Find the local times and heights of high and low waters at Sydney on:

22nd June		
	Times	Heights
HW		
LW		
HW		
LW		

24th December <small>(daylight saving Time)</small>		
	Times	Heights
HW		
LW		
HW		
LW		

### Question 2 (Validates to TDMMH1207B Element 3b)

The tide tables give the following data for Sydney on a particular date:

HW 15:00; 1.7 metres                      LW 21:00; 0.5 metres

What are the HW and LW depths in Sydney Heads at (22.8 datum)

\_\_\_\_\_

### Question 3 (Validates to TDMMH1207B Element 3b)

The tide tables give the following data for Manly on a particular date:

HW 09:30; 2.0 metres                      LW 15:45; 0.2 metres

What are the HW and LW depths over Manly Rock (3.9 datum)

\_\_\_\_\_

### Question 4 (Validates to TDMMH1207B Element 3b)

The tide tables give the following data for a place on a particular date:

LW 1306; 0.3 metres                      HW 1936; 2.7 metres

At what time will the height of tide be at least 2.5 metres?

\_\_\_\_\_

**Question 5** (Validates to TDMMH1207B Element 3b)

The tide tables give the following data for Long Bay on a particular date:

HW 1450; 1.7 metres                      LW 2050; 0.5 metres

Find the depth in Long Bay (3.0 datum) at 1850. \_\_\_\_\_

**Question 6** (Validates to TDMMH1207B Element 3b)

The tide tables give the data for Fort Denison.

LW 0740; 0.5 metres                      HW 1350; 2.3 metres

Find the time when there is 5 mtrs over a 3.0 mtrs charted position at Gladesville.

\_\_\_\_\_

**Question 7** (Validates to TDMMH1207B Element 3b)

A vessel drawing 2.3 meters passes over a reef with a charted depth of 3.1 meters. What would be the under keel clearance if the height of tide was 1.6 meters?

\_\_\_\_\_

**Question 8** (Validates to TDMMH1207B Element 3b)

The charted depth of a shoal is 2 metres. What would be the clearance beneath the keel of a yacht drawing 1.5 metres at LW using the Tide Tables shown.

HW 1117; 6.7 metres

LW 1720; 3.1 metres

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**Question 9** (Validates to TDMMH1207B Element 3b)

A vessel drawing 4.1 meters waits to enter a river bar with a charted depth of 2.6 meters. What is the earliest time for minimum under keel clearance?

LW 0937 0.3m

HW 1514 1.9m

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## EXERCISE No.11

## WEATHER.

**Question 1** (Validates to TDMMH1207B Element 3a)

List four sources of weather information.

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**Question 2** (Validates to TDMMH1207B Element 3a)

a. Define a “sea breeze”.

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b. Define a “strong wind” warning.

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c. Define a “pressure gradient”.

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**Question 3** (Validates to TDMMH1207B Element 3a)

Describe what an aneroid barometer does and how to take readings from it.

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**Question 4** (Validates to TDMMH1207B Element 3a)

Detail the typical weather associated with cold fronts on the NSW East Coast below.

	Before the front	At the front	Behind the front
Wind direction and strength			
Barometric Pressure			
Temperature			

## EXERCISE NO. 12      PASSAGE MAKING

Use chart AUS 197, the [deviation card](#) and extract tidal and meteorological information from the passage planner supplied overleaf.

### Question 1 (Validates to TDMMH1207B Element 4)

Departing from Port Hacking in  $34^{\circ} 04'.5S$   $151^{\circ} 09'.3E$ , plot a passage through the waypoints below to anchor in Botany Bay.

What are the compass courses to steer (CCTS) through each waypoint?

GPS Waypoint 1,  
 $34^{\circ} 03'.8S$   $151^{\circ} 18'.9E$

GPS Waypoint 2  
 $33^{\circ} 59'.8S$   $151^{\circ} 14'.0E$

GPS Waypoint 3  
 $33^{\circ} 59'.5S$   $151^{\circ} 14'.0E$

\_\_\_\_\_

Identify the characteristics of the six principle lights that you will encounter.

\_\_\_\_\_

\_\_\_\_\_

Your vessel cruises at 7kts and uses 8 ltrs of fuel per hour. How long will it take to reach your destination, and how much fuel is required (including 20% in reserve)?

\_\_\_\_\_

What weather conditions do you anticipate (use the passage planner forecast)?

\_\_\_\_\_

To reach your destination at high tide on the evening of 24/08/2009, what will be your planned departure time?

\_\_\_\_\_

To anchor at your planned destination (7 mtrs chart datum), how much chain (minimum) may you require and what lights shall you display?

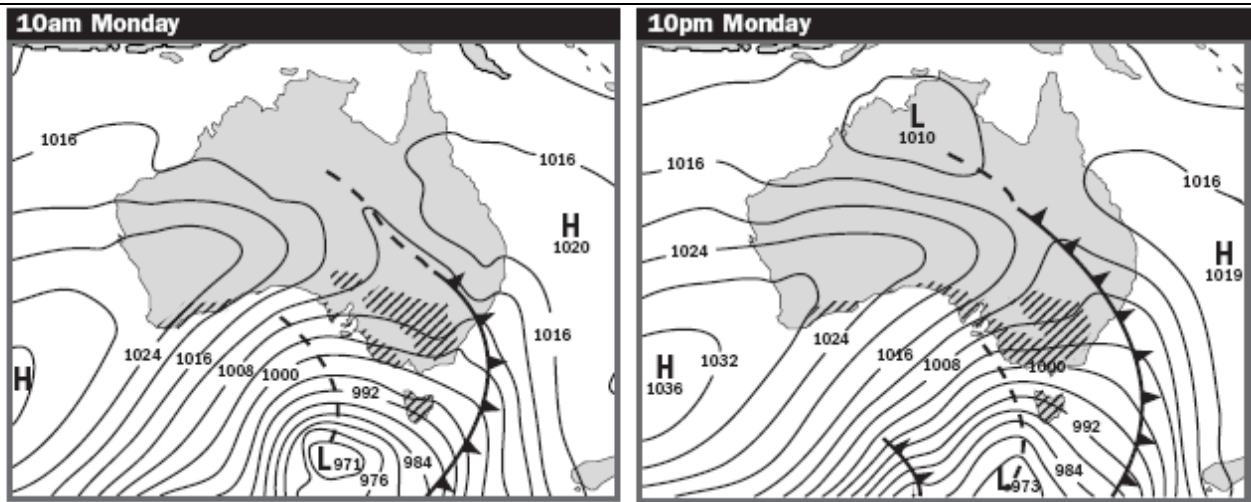
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**Question 1**

**Passage Mon Evening 24/08/2009**

**Port Hacking to Botany**



**PLAN:**

Wind:	LW: 0444	0.26	Secondary port
Wave:	HW: 1102	1.60	
Precipitation:	LW: 1715	0.36	
Barometer and Trend:	HW: 2316	1.45	

**VESSEL PREPARATION:**

OK	Documentation ok? Safety gear audit ok?	Brief list.
OK	Pre-departure checks ok? Enough fuel ok?	Brief list.

**NAVIGATION PLAN: (INCLUDE ADVERSE CONDITIONS CONTINGENCIES OVERLEAF)**

Wpt	Time	Position / Bearing / Speed / ETA	T	V	M	D	C
		Complete your passage details here.		13°E			
		Anticipated lights					
		Complete your passage details here.		13°E			
		Anticipated lights					
		Complete your passage details here.		13°E			
		Anticipated lights					
		Complete your passage details here.		13°E			
		Anticipated lights					
		Anticipated lights					
		Anticipated lights					
		Notes					

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**Question 2** (Validates to TDMMH1207B Element 4)

Use chart AUS 197, the [deviation card](#) and extract tidal and meteorological information from the passage planner supplied overleaf. Appraise forecast given.

From position 33° 49'.5S 151° 20'.0E at 06:00, plan a north bound passage to pass Long Reef Point (rocks to clear by 2 nm). What is the (CCTS)?

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At 06:45 the Hospital behind Mona Vale Beach bears 277° M, Turimetta Hd (59) bears 268° M and the Water Tower (128) at Collaroy bears 232° M. What is your position at this Waypoint (1) and speed over the ground (SMG) between 06:00 & 06:45?

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Shortly after, a severe squall with torrential rain and lightning hits. When visibility returns you see dead ahead (steering 250° C) the Hospital Ø Temple 196. Has the deviation of your compass been appreciably affected in this event?

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At 0700 Barrenjoey Light is first observed, while radar ranges confirm:

Turimetta Head	3.0 nm distant
Isolated rock pinnacle off Bungan Hd.	2.4 nm distant

What is the Latitude and Longitude of the vessel at this Waypoint (2)?

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Plot a course from Waypoint 2 to a Waypoint 3 (three cables west of Box Head in 15 mtrs). What is the CCTS and ETA to Wpt 3 (speed 10 kts). ?

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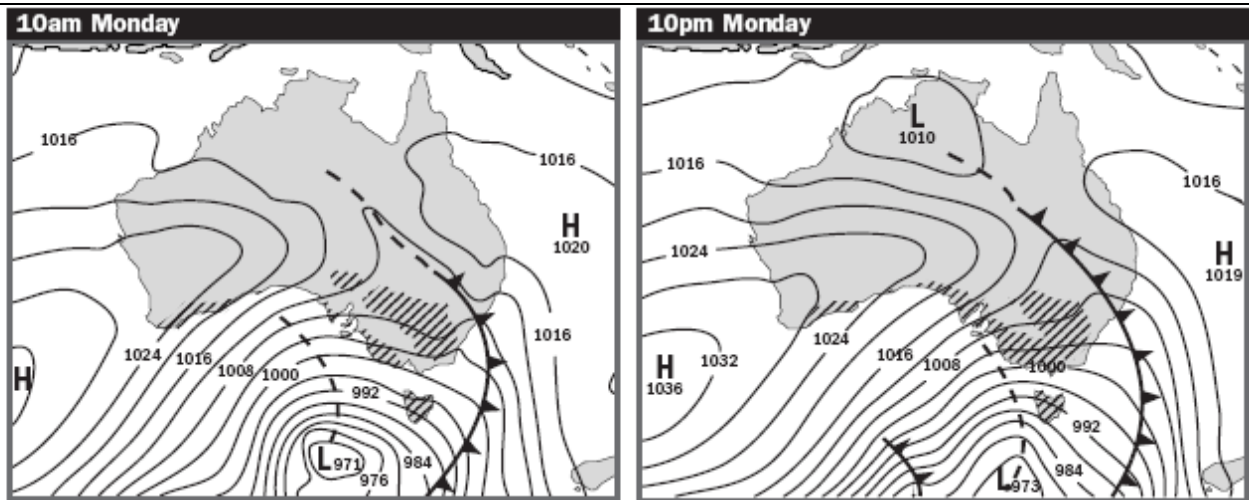
Using the tidal information in the passage planner supplied, what is the earliest time could you clear a 0.7 mtrs (chart datum) sand bank at the entrance to Brisbane Water (your vessel's draft is 2 mtrs).

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**Question 2**

**Passage Monday Morning 24/08/2009**

**Port Jackson to Broken Bay**



**PLAN:**

Wind:	LW: 0444	0.26	Secondary port
Wave:	HW: 1102	1.60	
Precipitation:	LW: 1715	0.36	
Barometer and Trend:	HW: 2316	1.45	

**VESSEL PREPARATION:**

OK	Documentation ok? Safety gear audit ok?	Brief list.
OK	Pre-departure checks ok? Enough fuel ok?	Brief list.

**NAVIGATION PLAN: (INCLUDE ADVERSE CONDITIONS CONTINGENCIES OVERLEAF)**

Wpt	Time	Position / Bearing / Speed / ETA	T	V	M	D	C
		Complete your passage details here.		13°E			
		Anticipated lights					
		Complete your passage details here.		13°E			
		Anticipated lights					
		Complete your passage details here.		13°E			
		Anticipated lights					
		Complete your passage details here.		13°E			
		Anticipated lights					
		Anticipated lights					
		Notes					

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**Question 3** (Validates to TDMMH1207B Element 4)

Use chart AUS 197, the [deviation card](#) supplied. Find tidal and meteorological information current for a passage today.

You are the Master of a 9 metre vessel named 'Simulated One'.

She is in 2C survey for 9 passengers and 2 crew. Plan a night passage from Patonga Jetty to Rose Bay. Considering the specifications below, determine the requirements for a safe voyage including planning for contingencies in the case of deteriorating weather conditions.

Single 4/71 GM 120 kW

Cruise speed 10 knots.

Total Fuel Consumption 9 ltrs/hr

Draft 1.5 meters

GPS, radar, steering compass, hand bearing compass.

MF/HF, VHF radios.

**Question 4** (Validates to TDMMH1207B Element 4)

Use chart AUS 197, the [deviation card](#) supplied. Find tidal and meteorological information current for a passage today.

You are the Master of a 12 meter vessel named 'Simulated Two'.

She is in 1C survey for 25 passengers and 2 crew. Plan a day passage from Manly to Bundeena. Considering the specifications below, determine the requirements for a safe voyage including planning for contingencies in the case of deteriorating weather conditions.

Twin 6/71 GM 160 kW each

Cruise speed 20 knots.

Total Fuel Consumption 15 ltrs/hr (each engine)

Draft 2.1 meters

GPS, radar, steering compass, hand bearing compass.

MF/HF, VHF radios.

## SUPPLEMENT AUS197 (MASTER 5)

### EXERCISE NO. 13 SET, RATE AND DRIFT

Use chart AUS 197, the [deviation card](#) supplied.

#### Question 1 (Validates to TDMMH807B Element 4.a)

At 12:00 a vessel departs from position  $33^{\circ} 50'.0S$   $151^{\circ} 30'.0E$  steering  $350^{\circ} C$  at a speed of 5 kts. Plot the dead reckoning position at 14:00.

At 14:00 the following bearings were taken:

	T	V	M	
Barrenjoey Hd. Lt. $292^{\circ} M$				
North Hd. Lt. $222^{\circ} M$				
Plot the fix position at 14:00:				

From 12:00-14:00 what was the:

Current set		Total Drift		Current rate	
Course made good (TCMG)		Speed made good (SMG)			

#### Question 2 (Validates to TDMMH807B Element 4.a)

Allowing for a current ( $125^{\circ} T$  @ 1.5 kts.) and vessel speed of 6 kts, plan a course departing at 15:00 from position  $33^{\circ} 40'.0S$   $151^{\circ} 35'.0E$  to  $33^{\circ} 30'.0S$   $151^{\circ} 35'.0E$ .

What will be the :

	T	V	M	D	C
CCTS					
ETA		SMG			
At what time will the FAD (FI Y 5 s.) be abeam to port	Note: sighted abeam from the vessel.				

#### Question 3 (Validates to TDMMH807B Element 4.a)

At 06:00 a vessel departs from position  $34^{\circ} 00'.1S$   $151^{\circ} 16'.3E$  steering  $068^{\circ} C$  at a speed of 16 kts. At 06:15 (Wpt 1) the buoy FI Y 5s bears  $340^{\circ} M$  at 0.6nm distant. Determine the set, rate and drift and plot a course to the next buoy FI Y 5s (Wpt 2).

	T	V	M	D	C
06:00 CCTS Wpt 1					$068^{\circ} C$
Bearing to FI Y 5s			$340^{\circ} M$		
Current set		Total Drift		Current rate	
06:15 CCTS Wpt 2					
ETA		SMG since 06:00			

## EXERCISE NO. 14 COMMON NAVIGATIONAL SOLUTIONS

### Question 1 (Validates to TDMMH807B Element 4.a)

A vessel close to Long Reef is feeling its way in thick fog, steering  $357^\circ$  C at a speed of 2.5 kts. The following soundings (reduced to datum) are recorded against the distance as logged for an hour. What is the approximate final position?

The distances as logged in miles and the soundings taken in metres.																												
Miles	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5		
Metres	30	23				20			15.4	20	22			20		13				10				7.4	10	20	24	30
Approximate final position																												

### Question 2 (Validates to TDMMH807B Element 4.a)

From position  $33^\circ 43'.7S$   $151^\circ 19'.65E$ , what would be the minimum clearance bearing to maintain sailing northward to pass the rock off Little Reef by at least 1 nm.

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### Question 3 (Validates to TDMMH807B Element 4.a)

At 06:00 a vessel steering  $168^\circ$  C at a speed of 8 kts sights Bungan Head (103) as  $045^\circ$  Relative. At 06:30 the same hill is abeam to starboard. What is the distance off Bungan Head (103) and the position?

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### Question 4 (Validates to TDMMH807B Element 4.a)

At 15:00 a vessel steering  $244^\circ$  C at a speed of 15 kts sights Box Head as  $277^\circ$  M. Six minutes later the bearing doubles to  $307^\circ$  M. What is the 15:06 distance off Box Head and the position?

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### Question 5 (Validates to TDMMH807B Element 4.a)

At 21:00 a vessel steering  $358^\circ$  C at a speed of 6 kts sights the Flare Chimneys near Kurnell as  $287^\circ$  M. After maintaining that course and speed until 22:00 they bear  $222^\circ$  M. What were the 21:00 and the 22:00 positions by the running fix method?

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### Question 6 (Validates to TDMMH807B Element 4.a)

At 12:15 a vessel steering  $200^\circ$  C at a speed of 8 kts sights the TANK at Terrigal  $\emptyset$  First Point. After maintaining that course and speed Barrenjoey Lt. bore  $283^\circ$  M at 12:50. What were the 12:15 and the 12:50 positions?

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## ANSWERS TO EXERCISES

(Accuracy- Bearings/courses + or – 2°, Times + or – 5mins, Speeds + or – 0.5 kts)

### EXERCISE NO. 1 CHART INFORMATION

Question 1

- a. TRUE
- b. FALSE
- c. FALSE
- d. TRUE

Question 2

This correction is found at the bottom left of your chart

Question 3

- a. Australian Notices to Mariners.

Question 4

Determination of true direction

Question 5

In a Mercator projection the distance between longitudes is dependent on the latitude.

Question 6

Admiralty Sailing directions of Australian Pilots, List of Lights, List of Radio Signals, etc.

### EXERCISE NO. 2 CHART SYMBOLS AND ABBREVIATIONS

Question 1

See Symbols & Abbreviations

Question 2

Sand & shell

Question 3

Flashing twice every 10 seconds, height of centre of light 105 mtrs, nominal visibility 25 nm.

Question 4

Traffic separation system

Question 5

Special marker buoy, flashing yellow every 5 seconds

Question 6

Marks safe entry and shoals in approach

### EXERCISE NO. 3 SEE BUOYAGE

### EXERCISE NO. 4 POSITION - DISTANCE - DIRECTION

Question 1

- a. Cape Banks
- b. Dee Why Head
- c. Wedding Cake Island
- d. North Head Lt.
- e. 33° 34'.8S 151° 19'.8E
- f. 33° 28'.5S 151° 20'.6E
- g. 33° 38'.4S 151° 22'.65E

Question 2

2.1 nm

Question 3  
1.15 nm

- Question 4  
 a. 7.5 nm 299° T  
 b. 13 nm 040° T  
 c. 9.9 nm 192° T  
 d. 12.5 nm 087° T

**EXERCISE No.5 SPEED DISTANCE AND TIME**

- Question 1  
 a. 36nm  
 b. 9 kts  
 c. 4hrs

- Question 2  
 a. 29.25  
 b. 5 kts  
 c. 2hrs 52.5 mins

- Question 4 15.83 nm      Question 5 6.95 kts      Question 6 15:16      Question 7 07:46 33 55'.75S 151 25'.80E

**EXERCISE No.6 COMPASS ERROR - VARIATION AND DEVIATION**

- Question 1  
 a. 12° 40'E  
 b. 2009  
 c. 0'

- Question 2  
 d. true.

Question 4

TRUE	108°	TRUE	004°	TRUE	358°
VARIATION	4° W	VARIATION	1° E	VARIATION	½° W
MAGNETIC	112°	MAGNETIC	003°	MAGNETIC	358½°

TRUE	095°	TRUE	180°	TRUE	357°
VARIATION	5° E	VARIATION	8° W	VARIATION	4° W
MAGNETIC	090°	MAGNETIC	188°	MAGNETIC	001°

TRUE	005°	TRUE	237°	TRUE	147°
VARIATION	10° E	VARIATION	5° E	VARIATION	1° W
MAGNETIC	355°	MAGNETIC	232°	MAGNETIC	148°



Question 5

True	Variation	Magnetic
090 <sup>0</sup>	13 <sup>0</sup> E	077 <sup>0</sup>
090 <sup>0</sup>	13 <sup>0</sup> W	103 <sup>0</sup>
287 <sup>0</sup>	6 <sup>0</sup> E	281 <sup>0</sup>
090 <sup>0</sup>	10 <sup>0</sup> W	100 <sup>0</sup>
000 <sup>0</sup>	13 <sup>0</sup> E	347 <sup>0</sup>
353 <sup>0</sup>	10 <sup>0</sup> W	003 <sup>0</sup>
012 <sup>0</sup>	14 <sup>0</sup> E	358 <sup>0</sup>
347 <sup>0</sup>	13 <sup>0</sup> W	360 <sup>0</sup>

Question 6

a. magnetic influences within the vessel.

Question 7

c. the resultant effects of variation and deviation on a magnetic compass.

Question 8

True (Charted)	Variation	Magnetic (Hand bearing)	Deviation	Compass (Ships)	Error
020 <sup>0</sup>	5 <sup>0</sup> E	015 <sup>0</sup>	5 <sup>0</sup> W	020 <sup>0</sup>	0 <sup>0</sup>
138 <sup>0</sup>	5 <sup>0</sup> W	143 <sup>0</sup>	3 <sup>0</sup> E	140 <sup>0</sup>	2 <sup>0</sup> W
241 <sup>0</sup>	11 <sup>0</sup> E	230 <sup>0</sup>	10 <sup>0</sup> E	220 <sup>0</sup>	21 <sup>0</sup> E
329 <sup>0</sup>	9 <sup>0</sup> W	338 <sup>0</sup>	2 <sup>0</sup> W	340 <sup>0</sup>	11 <sup>0</sup> W
155 <sup>0</sup>	9 <sup>0</sup> W	164 <sup>0</sup>	4 <sup>0</sup> E	160 <sup>0</sup>	5 <sup>0</sup> W
T	V	M	D	C	Error
110 <sup>0</sup>	13 <sup>0</sup> E	097 <sup>0</sup>	3 <sup>0</sup> W	100 <sup>0</sup>	10 <sup>0</sup> E
134 <sup>0</sup>	13 <sup>0</sup> W	147 <sup>0</sup>	1 <sup>0</sup> E	146 <sup>0</sup>	12 <sup>0</sup> W
351 <sup>0</sup>	3 <sup>0</sup> E	348 <sup>0</sup>	2 <sup>0</sup> W	350 <sup>0</sup>	1 <sup>0</sup> E
199 <sup>0</sup>	9 <sup>0</sup> W	208 <sup>0</sup>	6 <sup>0</sup> E	202 <sup>0</sup>	3 <sup>0</sup> W
060 <sup>0</sup>	4 <sup>0</sup> E	056 <sup>0</sup>	4 <sup>0</sup> W	060 <sup>0</sup>	0 <sup>0</sup>

Question 9

T	V	M	D	C	Error
009 <sup>0</sup>	13 <sup>0</sup> E	356 <sup>0</sup>	4 <sup>0</sup> W	000 <sup>0</sup>	9 <sup>0</sup> E
270 <sup>0</sup>	13 <sup>0</sup> E	257 <sup>0</sup>	7 <sup>0</sup> E	250 <sup>0</sup>	20 <sup>0</sup> E
080 <sup>0</sup>	13 <sup>0</sup> E	067 <sup>0</sup>	3 <sup>0</sup> W	070 <sup>0</sup>	10 <sup>0</sup> E
028 <sup>0</sup>	13 <sup>0</sup> E	015 <sup>0</sup>	5 <sup>0</sup> W	020 <sup>0</sup>	8 <sup>0</sup> E
252 <sup>0</sup>	13 <sup>0</sup> E	239 <sup>0</sup>	9 <sup>0</sup> E	230 <sup>0</sup>	22 <sup>0</sup> E

**EXERCISE No.7      FIXING A POSITION**

Question 1  
33° 54'.6S 151° 22'.6E

Question 2  
33° 39'.55S 151° 21'.55E

Question 3  
33° 34'.27S 151° 22'.33E

Question 4

	T	V	M	
Pt. Hacking Pt.	241 <sup>0</sup>	13 <sup>0</sup> E	228 <sup>0</sup>	
Cape Banks	269 <sup>0</sup>	13 <sup>0</sup> E	256 <sup>0</sup>	
Wedding Cake Is.	322 <sup>0</sup>	13 <sup>0</sup> E	309 <sup>0</sup>	
Position	34° 00'.0S		151° 20'. 0E	

Question 5

	T	V	M	
Bangalley Hd. (117)	324 <sup>0</sup>	13 <sup>0</sup> E	311 <sup>0</sup>	
Turimetta Hd. (59)	250 <sup>0</sup>	13 <sup>0</sup> E	237 <sup>0</sup>	
Collaroy Twr. (128)	233 <sup>0</sup>	13 <sup>0</sup> E	220 <sup>0</sup>	
Position	33° 40'.36S		151° 22'. 96E	

**EXERCISE No. 8      DIRECTION RELATIVE TO A SHIP'S COURSE**

Question 1

	T	V	M	D	C
Course	028 <sup>0</sup>	13 <sup>0</sup> E	015 <sup>0</sup>	5°W	020 <sup>0</sup>
Abeam to stb 090 <sup>0</sup> Relative	118 <sup>0</sup>	13 <sup>0</sup> E	105 <sup>0</sup>	5°W	110 <sup>0</sup>
Abeam to port 270 <sup>0</sup> Relative	298 <sup>0</sup>	13 <sup>0</sup> E	285 <sup>0</sup>	5°W	290 <sup>0</sup>

Question 2

	T	V	M	D	C
Water Tk. La Perouse	245 <sup>0</sup>	13 <sup>0</sup> E	232 <sup>0</sup>	6 <sup>0</sup> W	238 <sup>0</sup>
Blue fish Pt.	338 <sup>0</sup>	13 <sup>0</sup> E	325 <sup>0</sup>	6 <sup>0</sup> W	331 <sup>0</sup>
Waverley Tr. (184)	293 <sup>0</sup>	13 <sup>0</sup> E	280 <sup>0</sup>	6 <sup>0</sup> W	286 <sup>0</sup>
Fix the position	33° 56'.0S		151° 22'. 07E		

Question 3

	T	V	M	D	C
Long Reef Pt.	227 <sup>0</sup>	13 <sup>0</sup> E	214 <sup>0</sup>	6 <sup>0</sup> E	208 <sup>0</sup>
Temple (196)	258 <sup>0</sup>	13 <sup>0</sup> E	245 <sup>0</sup>	6 <sup>0</sup> E	239 <sup>0</sup>
Box Hd.	327.5 <sup>0</sup>	13 <sup>0</sup> E	314.5 <sup>0</sup>	6 <sup>0</sup> E	308.5 <sup>0</sup>
Fix the position	33° 39'.4S		151° 25'. 75E		

Question 4

	T	V	M	D	C
Mt Etalong Tk. Ø Box Hd.	287 <sup>0</sup>				
Barrenjoey Hd. Radar bearing	233 <sup>0</sup>	13 <sup>0</sup> E	220 <sup>0</sup>	3 <sup>0</sup> E	217 <sup>0</sup>
Lion Is. (the centre)	270 <sup>0</sup>	13 <sup>0</sup> E	257 <sup>0</sup>	3 <sup>0</sup> E	254 <sup>0</sup>
Fix a safe position	33 <sup>0</sup> 33'.3S		151 <sup>0</sup> 22'. 6E		

**EXERCISE NO. 9 CHECKING THE COMPASS**

Question 1

T	V	M	D	C	Error
330 <sup>0</sup>	13 <sup>0</sup> E	317 <sup>0</sup>	24 <sup>0</sup> W	341 <sup>0</sup> C	11 <sup>0</sup> W

c. Yes

d. Altered metallic or electrical configuration. Re-swing compass soon.

**EXERCISE No.10 TIDES & TIDAL PREDICTIONS**

Question 1

22nd June	Times	Heights
HW	0434	1.32
LW	1028	0.51
HW	1709	1.70
LW	2352	0.51

24th Dec	Times	Heights
HW	0116	1.28
LW	0657	0.69
HW	1301	1.36
LW	1939	0.49

Question 2 HW 15:00; 24.5 metres

LW 21:00; 23.53 metres

Question 3 HW 09:30; 5.9 metres

LW 15:45; 4.1 metres

Question 4 18:20

Question 5 3.8 mtr

Question 6 1220

Question 7 2.4 mtrs

Question 8 3.6 mtrs

Question 9 13:20

**EXERCISE No.11 WEATHER.**

Question 1 Radio, TV. Internet, Local VMR. Tc.

Question 2

a. Afternoon onshore wind caused by local heating of land during the day.

b. 25Kts

c. The closeness of isobar spacing indicating the likely of wind strength.

Question 3

Measures barometric pressure. Tap glass before reading.

Question 4

	Before	At the front	After
Wind direction and strength	Backing NE-NW -SW Light -increasing	Backing S Strong blow	Backing SE - NE Easing
Pressure	Falling	Sudden Rise	Rising Slowly
Temperature	Steady	Sudden Drop	Rising Slowly

**EXERCISE NO. 8 PASSAGE MAKING**

Question 1

	T	V	M	D	C
To wpt 1	085 <sup>0</sup>	13 <sup>0</sup> E	072 <sup>0</sup>	2 <sup>0</sup> W	074 <sup>0</sup>
To wpt 2	314 <sup>0</sup>	13 <sup>0</sup> E	301 <sup>0</sup>	1 <sup>0</sup> E	300 <sup>0</sup>
To wpt 3	000 <sup>0</sup>	13 <sup>0</sup> E	347 <sup>0</sup>	3 <sup>0</sup> W	350 <sup>0</sup>
Identify the characteristics of the six principle lights that you will encounter.					
Oc.WR. 3s 12/9M		Fl (4) 16s 55m 13M		Fl.Y.5s	
Iso. WR.2s7/5M		Oc. WR. 3s 7M & F Bu		F. WRG. 13 & F.RG	
Duration & fuel 14/2 = 2 hours      2 hours x 8 = 16 + 20% = 16 + 3.2 = 19.2 ltr.					
Forecast weather conditions P.M. 24/08/2009 – Early strong SW moderating to W, NW, high swell offshore, moderate inshore occasional heavy showers, barometric pressure rising slowly.					
Planned departure time? 23: 16 – 2 hrs = 21:16					
To anchor 7mtr + 1.45 mtr = 8.45 x 3 = 25.35 mtrs      All around white Lt.					

Question 2

	T	V	M	D	C
To wpt 1	011 <sup>0</sup>	13 <sup>0</sup> E	358 <sup>0</sup>	4 <sup>0</sup> W	002 <sup>0</sup>
Mona Vale Hospital	290 <sup>0</sup>	13 <sup>0</sup> E	277 <sup>0</sup>		
Turimetta Hd	281 <sup>0</sup>	13 <sup>0</sup> E	268 <sup>0</sup>		
Water twr 128	245 <sup>0</sup>	13 <sup>0</sup> E	232 <sup>0</sup>		
What is your new position at 06:45 (Wpt 1) and SMG? 33 <sup>0</sup> 42'.15S 151 <sup>0</sup> 21'.67E      7.5 nm/0.75 hrs = 10kts					
Forecast weather conditions A.M. 24/08/2009 - Southerly change in early morning, squalls & heavy showers, high swell, conditions improving after the passage of the front, becoming W to NW.					
Has the deviation of your compass been appreciably affected by this event? No					
Deviation as per card 2	269.50 <sup>0</sup>	13 E	256.5 <sup>0</sup>	7 E	249.5 <sup>0</sup>
What is your new position at 07:00 (Wpt 2)? 33 <sup>0</sup> 41'.2S 151 <sup>0</sup> 22'.1E					
	350 <sup>0</sup>	13 E	337 <sup>0</sup>	3 W	340 <sup>0</sup>
What is ETA at (Wpt 3)? 7:50.4					
Required 0.7 + 1.3 = 2.0 mtrs = approx 09:00					

**EXERCISE NO. 13 SET, RATE AND DRIFT**

Question 1

	T	V	M	D	C
Barrenjoey Hd. Lt. 292 <sup>0</sup> M	305 <sup>0</sup> T	13 <sup>0</sup> E	292 <sup>0</sup> M		
North Hd. Lt. 222 <sup>0</sup> M	235 <sup>0</sup> T	13 <sup>0</sup> E	222 <sup>0</sup> M		
Plot the fix position at 14:00: 33 <sup>0</sup> 41'.6 S 151 <sup>0</sup> 31'.4E					
Current set	143 <sup>0</sup> T	Total Drift	2 nm	Current rate	1Kt.
TCMG	008 <sup>0</sup> T		SMG		8.5/2 = 4.25 kts

Question 2

	T	V	M	D	C
CCTS	348 <sup>0</sup> T	13 <sup>0</sup> E	335 <sup>0</sup> M	02 <sup>0</sup> W	337 <sup>0</sup> C
ETA	17:00	SMG		5 kts	
At what time will the FAD (FI Y 5 s.) be abeam to port	5.4nm/6kts = 0.9hrs x 60 = 54mins + 13:00 = 13:54				

Question 3

	T	V	M	D	C
Initial CCTS	078 <sup>0</sup> T	13 <sup>0</sup> E	065 <sup>0</sup> M	03 <sup>0</sup> W	068 <sup>0</sup> C
Bearing to FI Y 5s	353 <sup>0</sup> T	13 <sup>0</sup> E	340 <sup>0</sup> M		
Current set	175 <sup>0</sup> T	Total Drift	0.6 nm	Current rate	2.4 kts
Second CCTS	078 <sup>0</sup> T	13 <sup>0</sup> E	065 <sup>0</sup> M	03 <sup>0</sup> W	068 <sup>0</sup> C
ETA	4.75/4 = 1.2 x 15 = 17.8 + 16:15 = 16:33		SMG since 06:00	8.75nm/0.55hrs = 5.9 kts	

**EXERCISE NO. 14 COMMON NAVIGATIONAL SOLUTIONS**

Question 1

Soundings reduced to datum	T	V	M	D	C
	006 <sup>0</sup>	13 <sup>0</sup> E	353 <sup>0</sup>	04 <sup>0</sup> W	357 <sup>0</sup>
Approximate final position	33° 43'.7S 151° 19'.65E				

Question 2

	T	V	M	D	C
Clearance bearing	018 <sup>0</sup>	13 <sup>0</sup> E	005 <sup>0</sup>	4.5 <sup>0</sup> W	009.5 <sup>0</sup>

Question 3

	T	V	M	D	C
Course	186 <sup>0</sup>	13 <sup>0</sup> E	173 <sup>0</sup>	05 <sup>0</sup> E	168 <sup>0</sup>
045 <sup>0</sup> Relative	231 <sup>0</sup>				
090 <sup>0</sup> Relative	276 <sup>0</sup>				
Double the angle on the bow-distance run = distance off=4 nm	33° 40'.32S 151° 23'.7E				

Question 4

	T	V	M	D	C
Course	260 <sup>0</sup>	13 <sup>0</sup> E	247 <sup>0</sup>	03 <sup>0</sup> E	244 <sup>0</sup>
030 <sup>0</sup> Relative	290 <sup>0</sup>	13 <sup>0</sup> E	277 <sup>0</sup>		
060 <sup>0</sup> Relative	320 <sup>0</sup>	13 <sup>0</sup> E	307 <sup>0</sup>		
Double the angle on the bow-distance run = distance off=1.5 nm	33° 34'.00S 151° 21'.9E				

Question 5

	T	V	M	D	C
Course	007 <sup>0</sup>	13 <sup>0</sup> E	354 <sup>0</sup>	04 <sup>0</sup> W	358 <sup>0</sup>
21:00 bearing	300 <sup>0</sup>	13 <sup>0</sup> E	287 <sup>0</sup>		
22:00 bearing	235 <sup>0</sup>	13 <sup>0</sup> E	222 <sup>0</sup>		
21:00 Position	34° 03'.65S 151° 18'.23E		22:00 Position	33° 57'.70S 151° 19'.10E	

Question 6

	T	V	M	D	C
Course	221 <sup>0</sup>	13 <sup>0</sup> E	208 <sup>0</sup>	08 <sup>0</sup> E	200 <sup>0</sup>
12:15 bearing	352 <sup>0</sup>				
12:50 bearing	296 <sup>0</sup>	13 <sup>0</sup> E	283 <sup>0</sup>		
12:15 Position	34° 32'.00S 151° 27'.30E		12:50 Position	33° 35'.55S 151° 23'.65E	

<b>DEVIATION CARD 2 COASTAL NAVIGATION</b>		
<b>Magnetic Heading</b>	<b>Deviation</b>	<b>Ships Head By Compass</b>
356°	4°W	000°
015°	5°W	020°
034°	6°W	040°
056°	4°W	060°
078°	2°W	080°
099°	1°W	100°
121°	1°E	120°
143°	3°E	140°
164°	4°E	160°
186°	6°E	180°
208°	8°E	200°
230°	10°E	220°
248°	8°E	240°
266°	6°E	260°
283°	3°E	280°
301°	1°E	300°
319°	1°W	320°
338°	2°W	340°
356°	4°W	360°
<b>Study example only - Not for navigation</b>		