Trainer Guide

Boat Notes is designed to assist students with the development of Language, Literacy and Numeracy (LLN) skills for maritime training. In particular, it focuses on the LLN skills in the Coxswains Grade 1 (Near Coastal) qualification. It can be used before or during vocational training. The skills and knowledge are primarily those for navigation and passage planning found in the unit 'MARH001 Plan and navigate a passage for a vessel up to 12 metres'. A document mapping Boat Notes to the MAR20313 Certificate II in Maritime Operations (Coxswain Grade 1 Near Coastal) can be downloaded from this website.

Boat Notes is structured in logical sections with videos and interactive activities for each concept. For those new to maritime training, begin with Chartwork and progress sequentially. Sections can also stand alone where there is prior knowledge. The Navigation Maths section reinforces specific numeracy concepts and is linked from relevant sections in the resource.

Login
Students should log in to the resource so that their progress is tracked. Some students may have difficulty if they are not familiar with this process so allow time to familiarise people with the login process on the device they are using to access Boat Notes.

Immediate feedback is given to activity questions and this is tracked through the login system so that students can see where they are up to at any stage. The Boat Notes Challenge in Passage Planning can be used as an assessment task. It addresses skills and knowledge developed in Boat Notes.

Videos
Short videos in each sub-section feature maritime trainers and professionals introducing concepts in plain English. Some are more comprehensive than others depending on the content area. Students should watch the video before attempting the activities that follow.

Activities
Interactive activities present content and assess skills and knowledge along the way. Immediate feedback is given to the learner so that they can change an incorrect answer as they progress. Progress is mapped when students are logged in. Students can move between sections and continue where they left off.

Practical Activities (Trainers Guide)
For any LLN training, practical tasks will cement skills and knowledge. Boat Notes is designed so that students watch a video, do some online learning and then apply the skills in context in maritime training. This guide gives some ideas for the application of the skills as they are presented on the website. They focus on activities where students use their bodies or get out of the classroom. Keep activities short and focussed. Make them fun.

Fact Sheets

The important concepts for each section are identified in downloadable and printable fact sheets. These can be used by a learner as a quick reference guide after and by a trainer to identify the important content and focus areas for activities.

Students can move between sections if required. For instance, if students are having difficulty rounding numbers in the Speed Distance Time section, there is a link to Rounding Numbers in the Navigation Maths section. Students can complete this then return to 'Speed Distance Time'.

As with any training, familiarise yourself as trainer or facilitator with the content that you are delivering, the context in which you are working and the specific needs of your learner group. Adapt and change these materials to suit your students.

Different ways to use Boat Notes.

Boat Notes is designed to be accessed online. It can be used on PC, tablet or smart phone. For full benefit, students should login to track their progress. This encourages accountability and ensures that key skills and knowledge are practised and understood.

Each section is broken into smaller sub sections. For example the section on Tides is broken into 'How Tides Work', 'Tide Charts' and 'Tide and Depth'. Each sub-section (for example 'Tide Charts') has a video, activity and fact sheet. Students login, watch the video, do the activity and map their progress. The fact sheet can be used as a reference for further maritime study. Students can revisit the course to revise content at any stage.

Boat Notes should wherever possible be integrated with real and practical examples of how the knowledge and skills apply to a student's experience, culture or work. There are suggested activities below for a trainer to use or adapt. Any learner needs a variety of interesting and varied activities to engage with and apply concepts from training. Get people up and moving, go outside, head out on a boat and put navigation with a chart into practise. Make fun activities, games and spot quizzes. Be creative.

It is expected that trainers or facilitators will have access to charts of the local area and the training chart Aus 252 Whitsunday Group as well as some navigations tools- pencils, compass (drawing), dividers and parallel rule. A compass to measure direction is useful too- a smart phone or tablet compass can be used in the absence of a magnetic compass. The text 'NP5011 - Symbols and Abbreviations used on Admiralty Charts' or app 'Marine Chart Symbols' by Imray is a useful reference for the Chartwork section.

<u>Individual progression</u>
A student logs in and works their way through the course until the end with minimal support. This requires some independent learning and IT skills.

<u>Groups</u>
Groups can work through the course together. Watch the video, discuss the content then log-in to their own device to complete each activity with support from a trainer.

Boat Notes can also be used with only one device presented by the trainer. Plug a laptop into a larger TV, display or projector. Groups can answer each question together or individually and then discuss the answer together.

Suggested practical activities below can be integrated into each section either before or after each online activity.

Revision
Following maritime training or preceding oral license assessment, students can use Boat Notes as a revision tool. This can be done with individual sections or sub-sections as required. For example, buoyage and light patterns can be revised several times as a rote learning technique.

As needed
Use specific sections or sub-sections of Boat Notes as a group or individually to brush up on a skill or concept.

Offline. The entire resource can be downloaded for offline use on a PC. The log-in facility is not available offline.

Practical and Applied Activities

Provide plenty of opportunity for a learner to practise and use skills in simulated or real life situations. Make your own simple activities based on familiar places for the learner group. Keep it relevant and applied wherever possible. Here are some suggestions.

Chartwork

Marine Chart

Look a variety of marine charts with the learner group. Use local and unfamiliar charts. Find known locations and features. It is important that the trainer is not the expert in this activity and allows students time to think about and discuss the marine chart. If a student asks you a question 'What does that mean?' ask the question back and see if they can answer it. Charts are read intuitively to some extent and the process of talking and working things out is important to comprehension.

Locate symbols and abbreviations on a chart, discuss what they might mean. The symbols on a chart look like the objects they represent. For instance the whirlpool symbol is a spiral. Initials and abbreviations are also used for instance M for Mud. Have people take a guess about an element of the chart then look them up using the Marine Symbols reference book. Explain the terms 'abbreviation' (shortened word: Co. for coral), acronym (first letters: YBY for Yellow Black Yellow) and 'symbol' using examples from a chart. Recall of these terms is not important. Focus on an understanding of the different ways that they are used to

describe elements of a chart so that students can use these to interpret chart symbols and abbreviations.

Look at the structure of a chart and discuss how it has information for people on boats, not land. Don't go into too much detail at this stage. Boat Notes will look more closely at concepts in further activities.

Depth

Find a large clear rectangular container. Draw a simple scale in metres on the side with 0 at about the middle of the container. Put some washed rocks inside of varying heights. Make one higher than the depth of the container as an island. Fill with water to the 0 mark. Simulate tide coming in and out by filling and emptying water. Measure depth, drying height, elevation as tide goes in and out. Ask students to write the depth, drying height or elevation using the correct method (underlined for drying height, dot for elevation. Ensure to include Chart Datum (Lowest Astronomical Tide LAT). Use this again for tides.

Latitude and Longitude

Before the video:
Use some examples of grid reference systems from a street directory or simple map. Explain that marine charts have a grid reference system to locate a boat's position called latitude and longitude.

After the video or activity:
Use a globe to show lines of latitude and longitude. Find the equator and the poles. Look how degrees of latitude are marked north and south of the equator. Discuss longitude and the location of Greenwich as the 0 point for degrees.

Locate familiar or famous places and read out coordinates. Make a quiz- give coordinates and ask students to find the town or feature at that point. Try to make these close to the printed lines of latitude and longitude so that students don't have to estimate between lines if they are not familiar with this concept.

Use balloons and markers to draw lines of lat/long on a balloon- include poles, equator. Mark and label 20°, 40°, 60°, etc. Mark Greenwich and date line (180°) etc.

Use Google Earth with the grid turned on. Make sure that Google Earth is set to degrees and decimal minutes (DD MM.MMM). Zoom in and out to familiar locations. Note the degrees of latitude and longitude. Find coordinates for the MCG or other familiar places.

Look at a chart- locate lines of latitude and longitude to the nearest degree and find this on Google Earth or the globe.

Lie on the ground with head to the north and feet to the south. Ask students to 'feel' the line of longitude passing through them and toward the poles. Ask students to spread their

arms to the sides. Ask them to feel the line of latitude going all the way around the earth from one arm to the other.

Cut an apple in half to illustrate latitude and longitude and how they are measured.

If students are not familiar with the concept of degrees as a measurement of angles then complete those exercises first (see 'Degrees' in the Navigation Maths' section below).

Chart Scale and GPS position

Ensure students have lots of practise using charts to locate coordinates- competitive group quiz. For example, using Aus 252:
What is located at S 20° 21.4' E 149° 01.6' ? (Answer 'Surprise Rock)
What is the GPS position of Petrel Islet, East of Whitsunday Island ? (Answer S 20 11.8' E 149° 07')

Ask students to read coordinates out aloud, this is an important skill for radio transmission and makes sure that degrees and minutes are differentiated. Say each number on it's own and use 'decimal' for the decimal place eg S 20° 21.4' is said "south two zero degrees two one decimal 4 minutes'

Marine Chart Battleships- students have two identical charts. Spread them out on table away from each other's view. Teams mark 5 battleships on the chart in water more than 10 metres deep with an X. The groups take turns in reading out coordinates of a bomb. If the bomb is within 2.5 miles of an opposition battleship, this is a hit. Use a compass with a radius of 2.5 miles to mark the area as a circle. Teams must mark their own bombs with a 5 mile range (use a compass) and the word 'Hit' or 'Miss'. They must also mark the bombs from the other team with 'Bomb'.

For students unfamiliar with chart scale, do this as a group activity. Take turns to use the chart scale to identify coordinates, and plot bombs on the chart. Encourage students to double check with others in the group, they will make mistakes- discuss how an error can lead to danger and that checking and double checking your coordinates is important to ensure safety. Students must write and say coordinates to each other. The trainer observes to make sure that the scale is read correctly when reading or plotting coordinates and that coordinates are said using degrees and minutes as well as South and East.

This game can continue through the sub-sections Direction and then Distance. Introduce the concepts of range and bearing. The trainer can add in intercepted radio transmissions in the form of a bearing, range or one part of the coordinate to give the other team a clue. Students plot the bearing or range on the chart. In a group activity, rangers take turns in writing and reading coordinates.

Make a treasure hunt. Students navigate to each given coordinate using a GPS unit.

Reading chart scale to read or plot coordinates requires lots of practice. Revisit this over several days and give ongoing practical activities to help bed this down.

Direction

Students make a compass rose in the sand and mark degrees and cardinal points (see the example on video).

Outside or in a room, use cardinal points and degrees to explain the relative position of people to each other. “Trevor is north west of the door” “Kevin is on a bearing of 190° from Damon”

Practise defining wind direction (wind blows *from*) and bearings (*to)*. With practise ask students to give their relative position using both degrees and cardinal marks.

Use the three-digit bearing and say each number individually.

Use a compass to take a bearing from an object. Phones and iPads have compasses.

If students are unfamiliar with reading the scale on a compass, complete the ‘Reading Gauges and Scales’ section.

Distance

Practise measuring distances to and from points on the chart.

Use charts with different scales and note the way that the intervals of the marks of latitude change.

If students are unfamiliar with reading the scales and determining intervals, complete the ‘Reading Gauges and Scales’ section.

Fix

X marks the spot- Split the group into pairs. Find a large outside area like an oval, yard or quiet carpark. Each pair finds a location away from the others and places a coin on the ground. Using a compass (phone or magnetic), pairs take two bearings from recognizable landmarks to locate the coin. Write the bearing and a name for the landmark on a piece of paper. Swap the pieces of paper- other groups locate the coin using the written bearings. Support pairs that need help but allow plenty of time for them to come up with their own solutions.

Meet and discuss the activity afterwards. How did you use the bearings? Were the bearings accurate? Why not? What problems did you encounter? How accurate is a fix using bearings? Were there differences between compasses?

Use a compass to plot a fix using a map or chart. Be aware of variation and deviation however don’t do the calculations until people are comfortable with plotting a fix. Where landmarks are visible, this activity can be undertaken from the shore.

Compass Error

A very difficult concept to teach because it combines concepts of the measurement of degrees, fractions, decimal numbers and the abstract notion of formula. Students must understand the concept of variation and deviation altering the compass and then correcting this to a true reading by adding or subtracting degrees before attempting calculations using the formula.

Reinforce the concept of deviation by demonstrating the influence of a magnet or metal on a compass reading. Magnets are in marine radios, mobile phones can deviate a compass reading too.

Once deviation is demonstrated this can be related to changes in the earths magnetic field having a similar effect on a compass.

Demonstrate the correction of compass error by showing deviation with a magnet or metal then correcting east or west by adding or subtracting the error.

Only after students are comfortable with this concept can the abstract formula be introduced.

Buoys

Print buoy cards from the template on this website. Set up large maps with chalk or on sand. Place the buoys around. Ask rangers to guide the boat through them according to the rules. Alternative- blindfold one learner. Others have to guide him throughout the course verbally using port, starboard, ahead etc. Students can set up a course for others once they gain confidence.

Buoyage Codes and Symbols

Tape cellophane to some simple torches to simulate lights. Find light patterns on a chart or in the 'Symbols and Abbreviation' book. Students demonstrate the light patterns to each other and write down the codes.

Course

Plotting a course requires the synthesis of many skills identified in Boat Notes. It is a primary activity of passage planning. For this exercise, ignore tides and weather as this will be dealt with in these sections and in the passage planning section.

Give students a start and end point on a marine chart. Ask them to plot a course to take them from start to end through deep water. Use the template 'Course Activity Template' to record each waypoint, coordinate and legs. For each leg record the distance and use variation to find the course to steer (magnetic). Note buoys, lights and hazards marked on the chart along the course.

Time

24 hour time

On sand or using chalk on concrete, make a timeline with both 12 and 24 hour scales. Mark significant daily activities on it eg lunch, dinner etc). Students write 12 and 24 hour time for each. Note especially the time after midday and midnight. See if the students can come up with their own rules for converting 12 and 24 hour time both ways.

Only use 24 hour time during all training activities. Note the conventions for speech as identified in the fact sheet and video.

Adding and Subtracting Time

Set some problems on the board based on daily activities. Contextualise these in a maritime context wherever possible.

Model, and then have students practise, the column method for adding and subtracting. They can do the hours or minutes first depending on preference.

Throughout daily activities and training use problems based on the training schedule for students to solve. How many hours to lunch? How many hours to knock-off?

Decimal Time

Print out the fact sheet. Ask students to rote learn the common decimal conversions (half and hour and 15 minutes, 6 minute increments). Have a quiz in groups or individually to see who can remember them.

Practise using a calculator to convert hours and minutes to decimal time. Where rounding is required see the section in Navigation Maths.

Remember that the hours stay the same.

As above, throughout daily activities and training use problems based on the training schedule for students to solve. How many hours to lunch? How many hours to knock-off? Convert these to decimal time.

Speed Distance Time

Speed Distance Time

Discuss the concept of a rate where one thing relates to another. Use examples from everyday life eg kilometres per hour (see fuel consumption). Language warning: reinforce that ‘per’ means ‘in every’ when used with rates.

Use number lines to illustrate concepts (see video). Students need to be familiar with the concepts using the number line before progressing to the formula.

Fuel consumption

Place a one litre bottle on the table. Ask students how many of these they would need to drink during a hot days work. Determine the rate and then the amount of water need for one person for one day. Express this as a rate.

Apply the calculation of fuel consumption in a practical exercise. Fill a tank, record the time taken during a days motoring, fill the tank on return and make the calculation. Do this at every opportunity.

Tides

How Tides Work

Demonstrate Gravity. Drop an object and let it fall to the floor. Explain that the moon and the sun use the same force to pull liquid water away from the solid earth. The water gets pulled away from different parts as the earth spins and these are tides.

Tide Charts

Ask students to use a tide chart to identify local times of high and low tides on given days, apply this in passage planning.

Discuss the various ways of finding the tide and look them up on the internet. Note the reporting of tides in 24 and 12 hour time on different websites.

Align the spring and neap tides with the phases of the moon as identified by symbols on Tide Charts. What is the rule?

Tide and Depth

See Depth exercise. Use this further with tide and depth.

Calculate the depth of the water by adding low and high tides. Ask students for examples from local areas. Repeat with drying heights. Factor in draft and under keel clearance. Draw diagrams to illustrate.

Privilege local knowledge in this discussion- ask students to give examples of tides that allow access to certain areas. Do the calculation as a non-local using tide charts to compare.

Weather

Synoptic Chart

Relate synoptic charts to topographic maps. Isobars are like contour lines. When they are close together the ground is steep- air rushes down the mountain- the winds are stronger when isobars are close together.

Ask students to be a weather forecaster using a sample synoptic chart. Students read the weather to each other in small groups.

Record the TV weather report and analyse their references to synoptic charts.

Use a blank synoptic chart- label the parts.

Discuss:
How does the synoptic chart influence your local weather?
What is the difference in weather between northern and southern Australia as shown on a synoptic chart?

If there is a Meteorological Office nearby, arrange a tour. Discuss what you are studying and how this can be built in to the experience.

Marine Forecast

Demonstrate fetch, wave period and height, difference between sea and swell.
Fill one large surface area container and one small surface area container with water. Blow across the small container. You will notice small ripples form on the surface and hit the far edge. The fetch distance is the distance across the container and wind speed is the force of your blow. If you blow at the same strength over the larger area of water the ripples will become larger when they hit the far side of the bowl as there is more distance and thus more time for your breath to impart energy onto the water to create the larger ripples. The greater the fetch, the bigger the waves. Note how the waves become organized and spread out over longer distance. This illustrates the difference between seas and swell. Seas occur over a shorter distance, swell over a longer distance. You can simulate seas and swell coinciding from different directions with help from your students.

Beaufort Scale

Discuss the effect that wind has on land and water as its speed increases. What are the signs of increasing wind speed? Relate this to the Beaufort Scale- signs of the wind's effects on the water can be categorized. Ask students to tell stories about being out in strong winds- what did they see, estimate the wind speed from the Beaufort Scale.

Navigation Maths

Fraction Decimal Percent

Use graph paper to illustrate percent as a fraction out of 100 and a decimal number to two decimal places. Ask students to draw various fractions on a 100 grid (10 x 10) then count the squares to write down a percent and a decimal number.

Make place value columns on a white board or in the sand. Include three whole number places and two decimal places. Write a number in the columns eg 135.47 [illustrate] Look at what each number represents eg 3 is 3 x 10, 1 is 1 x 100 etc. Numbers get bigger (greater value) in one direction and smaller (less value) in the other direction. Decimal multiplies or divides by 10. Decimal numbers are fractions that keep getting smaller as the place value moves away from the decimal place. Illustrate place value increasing in whole numbers by a factor of 10 and decreasing by a factor of ten.

Make a quiz on common decimal percent fractions.

Rounding Numbers

Why round numbers? Discuss and give examples. Use shopping and money. If the total is $9.55 this is close to 10, round up to $10.

Rounding makes calculations easier. When adding up prices, round to the nearest dollar. Look in a catalogue and estimate costs of several items by rounding.

Demonstrate rounding in terms of place value with examples. Round to the nearest dollar, round to the nearest hundred, round to the nearest ten etc.

Practice rounding numbers to various place values.

Degrees

There are 360 degrees in a circle. This may have originated from the passage of the sun around the earth in 365 days.

Students make the shapes of common angles with their hands/arms (see video). Where do these angles exist in the built and natural environment? Discuss. Find examples of angles in their environment- go for a walk.

Draw and label angles in the sand.

Turn to face different directions based on angles e.g. 360 (turn around), 180 (turn opposite direction), 90 (turn to the right or left), 45 etc.

Measure angles with protractors.

Estimate angles then measure them with a protractor. Make a game- who can get the closest.

Gauges and Scales

Look around a boat, dashboard of a car, kitchen or workshop. Find examples of gauges and scales (eg compass scales, chart scales, ruler, tape measure, measuring cup, fuel tank, pressure gauges etc.) Discuss each scale- why is it divided up like that? What are the beginning and end points, what is the unit of measurement? Discuss how to read each scale, the marking intervals and estimation. Reinforce the concept that you can't write every number down or it will be unreadable. Give students plenty of time to come up with their own ideas and talk about them before explaining concepts.

Students write scales on paper, chalk or sand. Make different scales at different intervals.

Ratios

Use small containers (bottle lids, small cups) with water and cordial to practice measuring ratios. Come up with the best ratio for cordial according to peoples taste.

Use a Yamaha fuel mix container to work out quantities.

Use large buckets, measuring cups and cordial to practice using multiple quantities to make a mix e.g. 10 litres needs 200 ml so 20 litres uses 2 x 200 = 400 ml.

Make a cheat sheet using the formula to show common quantities- laminate and attach to boat/container 50:1

Volume

Find some boxes or other rectangular prisms. Measure them in centimetres and use the formula.

What does a cubic metre look like? Make several cubic metres out of sticks. 1 m3. 1 x 1 x 1. Put two next each other 1 x 1 x 2 = 2 m3 and so on. Estimate the volume of a room in m3 using the cube. Relate the measurement of the cube back to the formula.

Stress that you can spread the volume of a cubic metre out as long as it takes up the same space.

Passage Planning

Use the passage plan template on this website to write a real passage plan using skills and concepts from Boat Notes. Note that this is a sample only and there are many other factors that can be entered into a passage plan.

Boat Trip

Put all of the concepts in Boat Notes into practice. Make a passage plan for a trip on the final day of training. Include fuel and SDT calculations, waypoints from the chart can be entered into a GPS, courses steered on a compass, bearings and fixes taken, position plotted (compare to the GPS to see how close you can get), identify buoys and landmarks on the chart and in real life, estimate fuel consumption, identify tide lines and currents, record information in a log book, relate local knowledge to information on the chart and so on. Take the time to get everyone involved and allow people to discuss the process at every stage.