Program Outline: Year 7 & 8 Maths@Sea Polly Woodside Education Program – National Trust of Australia (Victoria)

Location:	2a Clarendon St, South Wharf, Melbourne
Year Levels:	7 & 8
Discipline:	Mathematics
Program Plan:	1 x week Unit - 5 Class lessons (x 50 minutes) plus Excursion Program

Program Overview

Tall ships were dependent on their crew's understanding of mathematical principles concerning area, volume, depth, speed and weight. The National Trust Maths At Sea Program provides lower secondary students with hands-on activities on board a tall ship while providing practical examples of mathematical problems.

The Polly Woodside is a deep water merchant sailing vessel built in 1885 that traded cargo around the globe from the late 19th Century. She one of only a handful of tall ships remaining in the world that reveal the story of a maritime culture that has disappeared. The Polly Woodside is a barque - two square rigged masts and a rear mast with gaff (triangular sail) rig - designed to be efficient, fast and economic. She required only a small crew to carry and load bulk cargoes like coal, timber and wheat.

The Maths@Sea program focuses on developing students' understandings of triangles and geometric shapes, area, perimeter and volume and the relationship between different systems of units of measurement. Navigation and triangulation is not covered in this unit as it is outside the curriculum for this year level.

The program has been developed with the assistance of the Mathematics Association of Victoria so it can be unpacked into a series of classes over a one week period with the Tall Ship experience as the program's highlight. Online resources for teachers, background information, extension and further investigation activities for students are included in the program.

Maths@Sea Program Breakdown matched to Year 7 & 8 Mathematics Curriculum

This program addresses Measurement & Geometry including Volumes and Areas and Units of Measurement.

This is the 5 lesson program matched to the national curriculum in mathematics for Yrs 7 & yrs 8.

The program comprises 5 lessons of 50 minute periods with lessons 1 to 3 conducted as preliominary lessons completed in the school classroom.

The final two lessons are completed as part of an excursion to the Polly Woodside in Melbourne's CBD.

Lesson 1 Tall Ship Design Class Activity (50 mins)			
Learning Area	Description	Activities	Research / Resources
Shape (ACMMG161) (ACMMG165)	Draw different views of prisms and solids formed from combinations of prisms Classify triangles according to their side and angle properties and describe quadrilaterals	• Identify main parts of a Tall Ship design • Identify various types of Tall Ship designs • Identify the various triangles and geometric shapes that you may find on a Tall Ship design	Online Resources about tall ship design, different types of ship & types and shapes of sails. Teacher Notes.include anatomy of a tallship, basic history of shipping and cargoes, rigging basics, sail types and classes of ship.

Maths@Sea Program Breakdown

Lesson 2 Volumes & Areas Class Activity			
Learning Area	Description	Activities	Research / Resources
Measuring & Geometry (ACMMG159) (ACMMG160) (ACMMG161) (ACMMG196)	Establish the formulas for areas of rectangles, triangles and parallelograms and use these in problem solving Calculate volumes of rectangular prisms Draw different views of prisms and solids formed from combinations of prisms Find perimeters and areas of parallelograms, trapeziums, rhombuses and kites	Discussion of cargo and importance of fitting cargo into a ship's hull efficiently. Identify how to determine the area, perimeter & volume of various geometric shapes that you may find on a Tall Ship design (Ship's hull / cargo space & ship's sails)	Formulas for volume and ares supplied. Sample sail shape problems requiring area solutions. Sample 3D dimensional shapes requiring volume solutions. Teacher Notes: Detailed notes on cargos and volumes of ships, measurement of tonnage

Maths@Sea Program Breakdown

Lesson 3 Units of Measurement Class Activity			
Learning Area	Description	Activities	Research / Resources
Measuring & Geometry Using units of Measurement (ACMMG195)	Choose appropriate units of measurement for area and volume and convert from one unit to another	Highlight the different types of measurement used in the days of Tall Ships. Convert the Tall Ship units of measurement to the metric system	Tables of conversions Teacher Notes: Detailed notes on special measurements that are specific to maritime culture such as knots, nautical miles, fathoms etc.

Lesson 4 Units of Measurement Excursion Activity at Ship			
Learning Area	Description	Activities	Research / Resources
Measuring & Geometry Using units of Measurement (ACMMG195)	Choose appropriate units of measurement for area and volume and convert from one unit to another	Film acitivity: Learn about the perils of being a seaman in 1904 through the film of George Andrew's Self guided gallery tour with worksheets. Students complete Gallery tasksheet to determine the dimensions of the important aspects; length, size, height, speed, tonnage, weight, etc of the Polly Woodside and convert items from the empirical system to the metric system.	Self guided gallery tour with worksheets. Teacher Notes: Detailed notes on special measurements that are specific to maritime culture such as knots, nautical miles, fathoms etc.

Maths@Sea Program Breakdown

Lesson 5 Units of Measurement Excursion Activity at Ship			
Learning Area	Description	Program Activities	Research / Resources
Measuring & Geometry (ACMMG159) (ACMMG160) (ACMMG161) (ACMMG196)	Establish the formulas for areas of rectangles, triangles and parallelograms and use these in problem solving Calculate volumes of rectangular prisms Draw different views of prisms and solids formed from combinations of prisms Find perimeters and areas of parallelograms, trapeziums, rhombuses and kites	The class is presented with a specific situation / 'Crisis' or real life Scenario (eg. As a member of the Polly Woodside's crew its is your responsibility to ensure we can transport our cargo safely and efficiently to its proposed destination – Ireland / Sth America) The class of 30x is divided into 2x smaller groups; each group is assigned a task on the ship, relating to the following 2x learning outcome areas (Triangles & Geometry and Area, Perimeter & Volume) Task 1. What is the Cargo we are transporting? Determine how much cargo we can transport. Investigate other types of cargo eg. Rum, barrels vs loose cargo. Investigate the dangers of overloading the ship, what is the Plimsol line? (worksheet/ student interaction – 10mins) Carry out Heaving Line / Shackle Line activity.	Facilitated activities onboard ship using artefacts and objects to make practical demonstrations under instruction.

		(student interaction – 10 mins) Task 2. Identify the different sails on the Polly Woodside, determine the different areas of two different shaped sails, why is this important for sailing at sea? (worksheet – 10 mins) Participate in raising & lowering various sails on board the ship (student interaction – 10 mins) Participate in the 'mock' yard arm activity unfurling & furling a sail below deck (student interaction – 10 mins)	