

## MYP unit planner

Teacher(s)		Subject group and discipline	Mathematics		
Unit title	Geometry	MYP year	2	Unit duration (hrs)	15

### INQUIRY: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Form	Space Quantity	Globalization and sustainability
<b>Statement of inquiry</b>		
Using finite resources responsibly must be taken into consideration when designing structures		
<b>Inquiry questions</b>		
<p>Factual</p> <ul style="list-style-type: none"> <li>What are the appropriate units of measurements to use when measuring quantities?</li> <li>How does volume of a quantity differ from area?</li> </ul> <p>Conceptual</p> <ul style="list-style-type: none"> <li>How much is too much?</li> <li>Can the same thing be worth more in different parts of the world? Why is estimation useful?</li> </ul> <p>Debatable</p> <ul style="list-style-type: none"> <li>Would conserving water in Hong Kong help conservation in Africa?</li> </ul>		

Objectives:	Summative assessment	
<p>Criterion C—Communicating</p> <p>Criterion D—Applying mathematics in real-life contexts</p>	<p><b>Outline of summative assessment task(s) including assessment criteria:</b></p> <p>Students are to imagine they are living in a village in a developing country. They are given the task of designing a container to transport water from a well to their village situated one kilometre away. Students are to write a report justifying their design and detailing how much water they need to transport.</p>	<p><b>Relationship between summative assessment task(s) and statement of inquiry:</b></p> <p>This task provides students with the opportunity to reflect both on the importance of estimation and having an understanding of quantity. It also provokes thoughts regarding the idea that value is relative given the importance of water in certain parts of the world and the need to consider water conservation as part of a sustainable environment.</p>
Approaches to learning (ATL)		
<p>Students will develop:</p> <p>Thinking: Creative thinking skills—<i>Create novel solutions to complex problems</i>. Students will design containers to transport water</p> <p>Self-management: Reflection skills—<i>Consider ethical, cultural and environmental implications</i>. Students will reflect upon the value of water in different parts of the world</p> <p>Thinking: Transfer skills—<i>Make connections between subject groups and disciplines</i>. Students will also carry out a task in individuals and societies linked to a field trip and a task carried out in mathematics where they have to create a brochure for a charity highlighting the need for effective transportation of water in developing countries</p> <p>Communication: Communication skills—<i>Use appropriate forms of writing for different purposes and audiences</i>. Students will write a mathematical report as their summative assessment</p> <p>Social: Collaboration skills—<i>Manage and resolve conflict and work collaboratively in teams</i>. Students will work collaboratively during a field trip to a charitable organization. Here they will carry out simulations involving transporting water for use with cooking, washing, drinking and so on.</p>		

## ACTION: Teaching and learning through inquiry

Content	Learning process
<p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• Understand units of measurement</li> <li>• Convert units of measurement</li> <li>• Read scales</li> <li>• Measure length</li> <li>• Calculate perimeter of shapes</li> <li>• Calculate area of shapes</li> <li>• Calculate area of composite shapes</li> <li>• Find volume of 3D shapes</li> <li>• Find capacity of objects</li> </ul> <p><b>Lesson 1</b></p> <p>“Gummy Bears” taken from Dan Meyer’s site <a href="http://hk13.mrmeyer.com">http://hk13.mrmeyer.com</a>. Elicit questions from students regarding problem. Aiming for something like “How many regular gummy bears are there in a giant gummy bear?” Reinforce the idea that we need a universal measuring system.</p> <p><b>Lesson 2</b></p> <p>Measurement systems</p>	<p><b>Learning experiences and teaching strategies</b></p> <p>Students begin unit with “Gummy Bears” problem from Dan Meyer’s site. This is an open-ended task that is accessible and engaging for all abilities. It provokes thought on the ideas of quantity and how to measure it.</p> <p>Midway through the unit, students go on a field trip to Crossroads. This is a not-for-profit charity which raises funds and awareness of issues in developing countries. Students carry out tasks involving transporting water. These simulations are to highlight a typical day for a child in a developing country where they have to spend a lot of time transporting water.</p> <p>All assessments will include relevant published criteria. Teacher feedback on all tasks will be provided to ensure clarity on how to achieve the highest levels of the criteria assessed.</p> <p>Resources used will support students’ knowledge acquisition.</p> <p>A mix of text/software/real-life resources used to deliver the unit.</p> <p>Individual, pair (“Gummy Bears”) and group (Crossroads) can be used for the unit content.</p> <p>Assessment criteria and the nature of the main assessment (Water task) provide access to content for all abilities.</p> <p><b>Formative assessment</b></p> <p>This would be seen through activity work on measuring, and the circular objects task. Classroom discussion and students creativity in the “Gummy Bears” task will also provide useful information on students understanding and engagement.</p> <p>Myimaths used for homework tasks and games on perimeter, area and volume and measurement.</p> <p>Quick quizzes and “exit passes” to snapshot information on student understanding and progress.</p>

Content	Learning process
<p><b>Lesson 3</b></p> <p>Using and converting metric lengths</p> <p>Activity—Students use measuring tapes, metre rulers and trundle wheels to measure five objects. Students estimate beforehand and then a class discussion on appropriate units of measurement for different situations—book, basketball court, distance from school to home, and so on.</p> <p><b>Lesson 4</b></p> <p>Perimeter</p> <p><b>Lesson 5</b></p> <p>Areas and rectangles, area of a triangle review, area of a parallelogram review</p> <p><b>Lesson 6</b></p> <p>Area of composite shapes</p> <p><b>Lesson 7</b></p> <p>Volume of rectangular prisms</p> <p><b>Field trip</b>—Students carry out different water simulations tasks at a local charity <a href="http://www.crossroads.org.hk">www.crossroads.org.hk</a> They have to transport water from different locations in order to use it for cooking, washing, irrigation, and so on. The aim is to get them to understand that in many countries access to water is not easy and is time consuming.</p> <p><b>Lesson 8</b></p> <p>Introduce Water task (Criteria C and D). Students work on this with guidance in the lesson. Deadline approximately 10 days from issue. Students work in class and at home. This should pose more questions for follow on lessons.</p> <p><b>Lesson 9</b></p> <p>Circumference and Area of a circle</p> <p>Activity—Develop relationship between circumference and radius by measuring the circumference and radius of circular objects and tabulating results</p>	<p><b>Differentiation</b></p> <p>See learning process above. “Gummy Bears” task and Water task should provide engagement and challenge for all abilities. In addition, the unit is rich for extension into volume of other 3D shapes for the more able.</p> <p><a href="http://www.nrich.maths.org">www.nrich.maths.org</a> has lots of activities on area, perimeter and volume which provide support for less able students.</p> <p>Use of tangible shapes and real-life objects provide support for transitioning from concrete to abstract.</p> <p>myimaths provides support and consolidation work on basic concepts.</p> <p>Heterogeneous grouping for group work to allow for students of all abilities to be challenged.</p>

Content	Learning process
<p><b>Lesson 10</b> Volume of a cylinder</p> <p><b>Lesson 11</b> Another lesson devoted to Water task</p> <p><b>Lesson 12</b> Capacity</p> <p><b>Lesson 13</b> Complete Water task</p> <p><b>Lesson 14</b> Review</p> <p><b>Lesson 15</b> Unit test (Criterion A)</p>	
Resources	
<p>Maths Quest text and Essential Maths</p> <p>Geometer's Sketchpad/Geogebra</p> <p>Crossroads Field Trip</p> <p>MyiMaths website—<a href="http://www.myimaths.co.uk">www.myimaths.co.uk</a></p> <p><a href="http://www.nrich.maths.org">www.nrich.maths.org</a></p> <p>Dan Meyer Task "Gummy Bears" see <a href="http://hk13.mrmeyer.com">http://hk13.mrmeyer.com</a></p>	

## REFLECTION: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit
<p>Will students be able to effectively transfer and apply skills and concepts linked to the summative assessment task? Theoretical to real life.</p> <p>An open-ended summative task could be challenging for some students. Although the nature of the task should be engaging for all abilities.</p>	<p>Culminating task introduced prior to end of the unit. This was to try to develop a “research” approach in the students, that is, if they didn’t know, how would they find out? This has a variable result as some students need support with the idea of transferring knowledge.</p>	<p>Follow up meeting with Individuals and societies teacher(s) is yet to take place. Many students see the value in links and developing a better understanding of quantity. This is evidenced in the culminating task which provided opportunities for the students to think critically about measuring and estimating quantities and generated some interesting conversations on how heavy water is!</p>