Math Assignment 1 - Lesson Plan

Version 2 18/03/2010 *Lesson Plan mod3.doc*

This work has been done with equal input by the following three students ...

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and is entirely our own work and effort.

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<table>
<tr><td>Unit :</td><td>Measurement : Instruments, technologies, strategies and formulas are used to estimate, compare and calculate measures and derived measures, including rate, area, duration and Australian time zone differences</td><td>Date :</td><td>29/03/2010</td></tr>
<tr><td>Year :</td><td>Year 9 Mathematics</td><td>Duration :</td><td>55 minutes</td></tr>
<tr><td>Lesson / Title :</td><td colspan="3">Area : How to measure the surface area of a cylinder.</td></tr>
<tr><td>Rationale :</td><td colspan="3">· <u>A rationale</u> that clearly states the importance of the activity specifically as it relates to students of the selected year level, makes links to statements from the literature, mathematics curriculum/syllabus documents and/or other relevant documents, and outlines and justifies the teaching approaches to be used in implementation of the teaching episode.

The importance of this lesson is ...
• it builds on prior knowledge, to extend mathematical content in measurement, data collection, data analysis, estimation, prediction and understanding of mathematics as a way of thinking
• it is important as the next step in the student understanding of 2D shapes, their properties as the shapes become progressively more complex
• it reinforces skills of prediction, measurement, data collection, analysis, and summation
• it builds on the concept of <u>relational learning</u> as opposed to direct instrumental instruction
• it aligns very well with the year 9 unit of measurement

This lesson aligns well with the following aspects of the ways in which students are expected to work..
• conduct hands-on activities and investigations using procedures to relate properties of cylinders and rectangles
• estimate and then verify estimations
• use their estimations to propose hypothesises of relationships
• evaluate their own thinking on their perception of relationships in measurements
• communicate their think on mathematical concepts
• reflect on their learning
• identify key mathematical features of area, rectangles and cylinders

There is good alignment with learning and assessment focus in the following ...
• students build on their existing knowledge of squares and rectangles
• students need to apply existing knowledge to analyse and solve real world problems
• students will encounter a complex shape, and use mathematical investigations to develop ways of mathematical thinking

In order to accomplish these objectives, the lesson uses a combination of teaching strategies as follows
• whiteboard work with explanation
• hands-on student activities with paper, ruler, scissor and calculator</td></tr>
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	• student explanation of understandings • key question and discussion sessions • direct teacher observation of individuals during activities • one-on-one direction where deemed necessary • revision and consolidation of findings and content • **Why do students need to be able to determine the surface area of a cylinder ?** Having learnt about surface area of simpler 2D shapes such as rectangles, the progression is to more complex 3D shapes such as a bent rectangle ie a cylinder.
Content :	*Content: This is a statement that relates to the subject-matter content. The content may be a concept or a skill. Phrase this as follows: I want my students to: (be able to [name the skill]) OR (I want my students to understand [a description of the concept]). Often times, this content is predetermined or strongly suggested by the specific curriculum you are implementing through your teaching.* --- I want my students to investigate the relationship between the surface area of a curved cylindrical surface, and that of a flat rectangle.
Key concepts:	*How this relates to syllabus / curriculum key learnings* --- 1. area of rectangle 2. area of curved cylindrical surface 3. length, height and area 4. how to use this knowledge to solve real world problems
Learning objectives:	*Instructional Objective: Indicate what is to be learned - this must be a complete objective. Write this objective in terms of what an individual student will do, not what a group will do. Limit your objective to one behavioral verb. The verb you choose must come from the list of defined behavioral verbs on my web site. Make sure your objective relates to the content statement above.* --- Each student will undertake a series of hands on tasks, including measurement, data collection and tabulation. Use this data to hypothesis, and solve real world problems. The student will be required to demonstrate mathematical thinking, estimation, prediction, hypothesizing, and problem-solving around the central concept of area, as an extension to their existing knowledge of more simpler shapes eg square and rectangle. Students will learn to evaluate complex shapes, in a simpler way.
Prior knowledge Needed ... **Future work based on this :**	*Prerequisites: Indicate what the student must already know or be able to do in order to be successful with this lesson. (You would want to list one or two specific behaviors necessary to begin this lesson). Some research indicates that up to 70% of what a student learns is dependent on his or her possessing the appropriate prerequisites.* --- This work follows from the units on investigating linear and area measurements on rectangles and squares. It leads on to the lesson of deriving a way to determine the area of a circle, using prior knowledge of rectangles, and then to a mathematical derivation for the area of a circle, using work done in this lesson. ie. area = πr^2

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Materials needed:	Each student will use the attached worksheet to complete this lesson. Each students will need • 3 cylindrical cans • a 30cm ruler • 3x A4 paper and pen • a 30cm length of string • a scissor • a calculator
Comments on lesson plan :	*Eg. If it's based on some other plan; the version number; etc.* --- The work in this lesson is all our own work. The work in the follow-up lesson on deriving the formula for the area of a circle, is based on the work in this lesson and content from section 4 (Investigating the area of circles) of document EDUC6645.

Sequence of content:	**Teaching activities:**	**Learning activities:**	**Resources required: Goal / Aims**	**Time allocated**
1. Introduction	**Show slide 1 with unit title and lesson name and explain their meanings.** - unit title, lesson title - explain how this fits into the scheme of the Unit Measurement - explain what the students need to learn in this lesson and how they will be assessed	**Students listen and gain perspective of where the lesson is situated in the curriculum, and what they need to learn and how they will be assessed.**	**power point slide** **Goal :** provide a framework of where this lesson fits in the course, and what it is the students are expected to know and be able to do at the end of the lesson. Also explains how the students will be assessed on this section.	**5 minutes**
2. Review prior knowledge needed for this lesson	**After inviting students to comment on their understands of the prior knowledge needed, I use whiteboard and direct instruction to go over properties of squares and rectangles, as required.** **Followed by discussion of the more complex 3D shape of a cylinder.**	**Students contribute to the discussion by providing feedback on their understandings of length, breadth and area of 2D shapes, such as rectangles and squares.** **Thereafter students listen and take revision notes if needed.**	**whiteboard and pens** **Goal :** To make sure all students have the knowledge and understandings with which to build on, in this lesson.	**5 minutes**
3. Students complete step 1 of their worksheet	**I spend a minute describing the activity, and what I expect them to do.** **I walk around the class observing student activity - giving guidance as needed.** **After 4 minutes I ask for feedback, and if there are any questions or observations they want to raise.**	**Students estimate the curved surface of a can in terms of area, and record their estimate.**	**the 3 cans, and their worksheet.** **Goal :** to start the thinking processes of "on what basis would I use to estimate curved area – is there a way to simplify the problem? "	**5 minutes**
4. Students complete step 2	**I observe and keep students focused on the activity and on track with relevant questions.**	**Students cut the paper sheets to the height of the cans, then to the circumference of the can.**	**the cans, worksheet, pen, paper, scissor and ruler** **Goal :** to demonstrate that a more complex 3D shape of a cylinder can be reduced to a	**10 minutes**

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		They measure the dimensions of the paper and record the values.	simpler 2D shape, such as a rectangle.	
5. Students complete steps 3 and 4	**I observe and keep order and focus, all the time asking probing questions as what and why students are doing what they are doing.**	**Students analyse, think and record measurements, all the time thinking of 'other' ways that may be used to measure this area – with particular reference to their estimated method of assessment.**	**worksheet and a pen** **Goal :** to get students to compare the estimated vs calculated values, and validate, or not, their method of estimation and their hypothesis.	**5 minutes**
6. Students complete the assigned problems	**I walk around the class and observe, helping where help is requested.**	**Students use the knowledge gained in this class to complete the assigned problems on area**	**worksheet, pens and calculator** **Goal :** to aid teacher assessment of student achievement in the lesson aims.	**15 minutes**
9. Planned Key questions We discuss cylinders, rectangles, area and the lesson.	**I pose key questions and inquire as to the students appreciation of the lesson**	**Students volunteer answers to questions on topics, and the value of the lesson to them**	**no resources needed** **Goal :** to get feedback on the success in delivering this lesson, or where the lesson failed to achieve.	**5 minutes** **TOTAL 55 minutes**

Closure / Conclusion

How you plan to bring the lesson to an orderly and conclusive ending (or not!).

In this stage teacher will ask the students to listen to him. He will praise his students for what they have done. The teacher will tell his students about the real-life application of the concept they have just learnt. For instance he can mention the preparation of large paint cans. Where from a big piece of sheet metal a number of cylinders are produced.

Then the teacher will assign and describe the homework problem, described in the Homework section below, to the students.

How to monitor / assess :

Assessment/Evaluation: Describe how you will determine the extent to which students have attained the instructional objective. Be sure this part is directly connected to the behavior called for in the instructional objective.

Assessment/ evaluation strategies are given below

- When walking around and observing the students, I will be able to make sure each student is actively participating in the group discussion.
- formative evaluation (checking students understanding during the lesson)
- Whether or not the students were able to accurately progress through the assignment will allow me to assess if the students learned the material taught to them today.
- Finally I will ask different questions, summary of the activity and how they are going to use their knowledge, which they acquire from this lesson in the real world.

Homework :

Goal : to help assess the level of understanding that

Follow-up Activities: Indicate how other activities/materials will be used to reinforce and extend this lesson. Include homework, assignments, and projects.

Students are asked to complete the following task at home. They will submit their homework at the next lesson for assessment and feedback.

each student has achieved in this topic.	**Q.** Suppose you work for a company that makes water tanks. A customer wants three tanks that measures • 15 m, • 10 m, • and 5 m in height and • 3 m, • 2 m, • and 1 m in diameter respectively. How much metal should you order to make these tanks, NOT including the flat tops and bases of the tanks ?
Evaluation / Reflection :	*Self-Assessment (to be completed after the lesson is presented): Address the major components of the lesson plan, focusing on both the strengths, and areas of needed improvement. Determine here how you plan to collect information that will be useful for planning future lessons. A good idea is to analyze the difference between what you wanted (the objective) and what was attained (the results of the assessment).* ---
References :	EDUC 6645 Tutorial Notes Week 3 QCAR Essential Learnings by end of Year 9 Knowledge and Understanding document Years 3 to 9 Ways of Working document Years 3 to 9 Learning and Assessment Focus document Years 3 to 9
Comment :	**Make sure every student has a worksheet. Scissors, ruler and calculators are required but may be shared between students - if necessary.**
Other :	

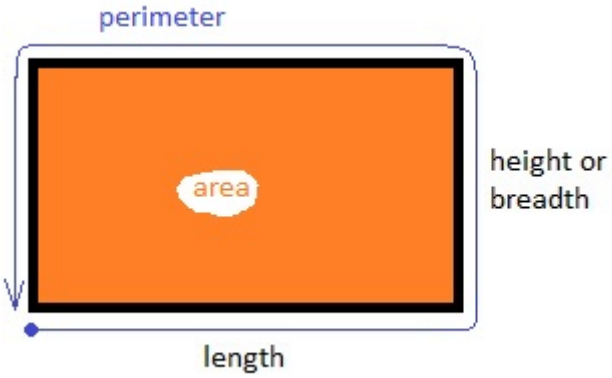
Student Worksheet : Unit – Measurement
Topic – Surface area of a cylinder

Date : Student Name :

Note : This worksheet is to be completed by <u>one</u> student, signed and handed in for assessment at the end of the lesson.

Parts of a rectangle :-

- length
- height or breadth
- perimeter
- area



Cy-lindri-cal Can	Esti-mated area in cm^2	length in cm	breadth/height in cm	calcu-lated area in cm^2

Table 1

Hypothesis : (To be completed after Step 1 - the estimation step)

After estimating the area of the curved surface of the cylinder, which characteristic height or diameter has a greater effect on surface area, and why ?

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Step 1

Select 3 cans from the box of cans. List the cans in column 1 of table 1 and estimate the surface area of the curved cylindrical surface in column 2

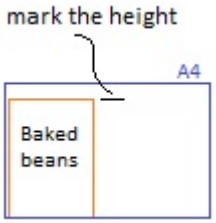
After estimating the areas, make an record your hypothesis about the height or diameter of a cylinder having more effect on the surface area, and why you think this is so.

Step 2

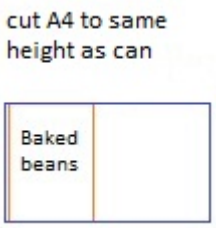
In order to measure the surface area, we need to simplify the task by converting the curved 3D cylindrical surface into a flat 2D rectangle.

For each can in turn, do the following ...

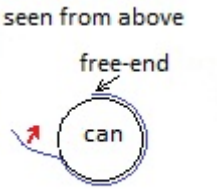
- stand an A4 sheet next to the can and mark the height of the cylinder on the A4 sheet



- cut the sheet along the marked line, so that it is the same height as the can



- wrap the paper around the can, and mark where the paper meets the free end



- cut the paper off at this mark
- enter the length and height of the rectangle of paper into table 1

Step 3 Using a calculator, calculate the area of the rectangle, and enter this value into column 5 of table 1	Step 4 Compare the calculated area to that of your estimates for the three cans. What can you say about the accuracy of your estimated values ? Ans:
Problem: You are given a big rectangular piece of paper of 60 cm x 40 cm. Using the whole paper make three cylinders of height 30cm, 20cm and 10cm each. Now a) Using the concept you have learnt find out the surface areas of 3 different cylinders. b) If you would make a large cylinder with the 60cm x 40cm, would the surface area of the bigger cylinder smaller, bigger or equal than the area of 3 smaller cylinders combined. Explain your answer.	

This is all my own work ... signed

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