

Unit Name: Nets and Surface Areas		Unit Length: 2 days	
Overview: Using nets and rulers to find surface area			
DESIRED RESULTS			
TEKS and SEs			
(G.6) Dimensionality and the geometry of location. (B)			
(G.8) Congruence and the geometry of size. (D)			
(G.9) Congruence and the geometry of size. (D)			
(G.8) Congruence and the geometry of size. (A), (B), (C)			
Enduring Understandings (Big Ideas)		Essential Questions	
Surface area can be determined in multiple ways. Formulas sometimes make the work simpler, but complicated formulas are not always necessary. Using a ruler to find area is a necessary life skill.		<ul style="list-style-type: none"> Why is it important to know more than one way to find area and surface area? Why is it important to be able to use a ruler? What is the difference in total surface area and lateral surface area and where might that difference be helpful in our project? Why does one object have a greater surface area, even though it appears to be smaller? How do nets aide in the visualization of working with polyhedra? 	
		Critical Vocabulary	
		Lateral faces Lateral edges Right prism Lateral area Regular Pyramid Slant height Total surface area	
Learning Goals		Materials Needed	

Submitted by:	Robin Graves	Date:	1-15-08
Edited by:	Larry White and Beth Grounds	Date:	1-29-08
Edited by:	Pat Curtin & John Beck, MELL Staff	Date:	March, 2008

Model Lesson

<p>Multiple ways to find surface area > using formulas > adding areas of each face together; Use rulers to measure needed lengths; Use calculators; Use appropriate vocabulary</p>	<p>Rulers Nets for prisms and pyramids on colored paper Scissors Tape, glue Calculators</p>
---	---

ASSESSMENT PLAN

<p><u>Performance Tasks</u> A rubric will be used to check the required items from the students: Nets assembled Area of each face Total surface area of each polyhedron</p>	<p><u>Other Evidence</u> Check student's understanding of using a ruler to measure in centimeters. Check student's understanding of formula chart usage.</p>
--	---

GENERAL MELL CONNECTIONS THAT APPLY TO ALL LESSONS

(MC-01) - To assist the ELLs, the teacher should avoid speaking too rapidly and when possible use basic words rather than unfamiliar ones to introduce new concepts.

(MC-02) - Teachers should foster trusting relationships with ELLs through informal conversations and presentation of a culturally rich classroom.

(MC-03) - ELLs may need extra opportunities to demonstrate mastery. Grading policies should be flexible enough to provide multiple learning opportunities without severe grade penalties.

(MC-04) - ELLs may work at a slower pace than other students because of limited English language skills and should be provided with shortened assignments, or when appropriate, extra time to work on assignments.

(MC-05) - ELLs should be scheduled in a math class that has

Submitted by:	Robin Graves	Date:	1-15-08
Edited by:	Larry White and Beth Grounds	Date:	1-29-08
Edited by:	Pat Curtin & John Beck, MELL Staff	Date:	March, 2008

Model Lesson

students who have some proficiency in both languages. Teachers may need to work with counselors and others to ensure that this happens.

(MC-06) - Teachers should offer tutoring as frequently as possible and encourage ELLs to come in for extra assistance. If possible, the teacher should arrange for an aide or parent volunteer who speaks the language of the ELL to help with translation during the tutoring period on a regular schedule (for example, on Tuesdays and Thursdays, after school).

LEARNING PLAN

Day 1

- Demonstrate and discuss examples of polyhedrons seen in the student's everyday life. (ME-17, ME-09)
- Discuss how to find area of two dimensional figures such as square, rectangle, and triangle. (ME-01, ME-09)
- Discuss the difference between total surface area and lateral surface area in prisms. (ME-01, ME-09)
- Review where to find these formulas and surface area formulas on the TAKS formula chart.
(ME-01, ME-09)
- Nets will be available for students in a variety of colors. (ME-08)
- Students should select one of each type of net.
(ME-08)
- Students will work with a partner to cut out and assemble their nets so that each student has two prisms and two pyramids.
(ME-08, ME-13, ME-08)
- Once nets are assembled, students should find the area of each face on their prisms and pyramids by using rulers to measure the sides and using the formulas for area. The students will also be asked to find the total surface area of each net using the appropriate formula.

MELL Essentials

(MC-17) - Examples that are relevant to the lives of ELLs are helpful in motivating students and in promoting their engagement with the content.

(MC-09) - To assist the ELLs, the teacher should model the expected task and use visual representations to reinforce concepts and/or steps in the problem-solving process. Critical concepts should be clearly emphasized and repeated.

(MC-13) - Before asking ELLs to speak on a mathematics topic or problem in class, give the student time to practice what they will say with a peer

Submitted by:	Robin Graves	Date:	1-15-08
Edited by:	Larry White and Beth Grounds	Date:	1-29-08
Edited by:	Pat Curtin & John Beck, MELL Staff	Date:	March, 2008

Model Lesson

<p>(ME-09, ME-13, ME-08)</p> <ul style="list-style-type: none"> • Students should verify their findings with their partners and check with partners if they have questions before consulting the teacher. (ME-13) <p>Extension Activity</p> <ul style="list-style-type: none"> • Students will design a three dimensional object with their prisms and pyramids. They will be allowed to use as many nets as they wish to make their object (airplane, flag, etc.). (ME-09, ME-08, ME-16, ME-04) • Students may start assembling nets after they have decided on their object. (ME-02, ME-14, ME-04) <p>Day 2 --- Extension Activity (cont.)</p> <ul style="list-style-type: none"> • Students continue to assemble their nets. (ME-02, ME-16, ME-04) • After nets are assembled, students will create their objects. (ME-02, ME-16, ME-04) • Students will be asked to find the combined total surface areas of their object. Answers for combined surface areas should be written on the outside of their objects. (ME-02, ME-16, ME-04) • When all objects are assembled and all combined surface areas have been found, students will discuss the varying combined surface areas (Ex., Why does one have a greater combined surface area, even though it appears to be smaller?). (ME-01, ME-16) • Students will give feed back on each other's objects in the form of post-it notes • reviews. (ME-16) 	<p>tutor or partner. Without this technique, ELLs may tend to just say "I don't know" when asked a question to avoid possible embarrassment over language deficiencies.</p> <p>•</p> <p>(MC-08) - Hands-on activities involving math manipulatives are typically helpful to ELLs because the lesson involves multiple learning modalities and does not require the student to rely solely upon his/her ability to understand verbal instruction.</p> <p>(MC-16) - When monitoring ELLs during instruction, the teacher should make a special effort to to assist, re-explain and demonstrate again, if necessary. Encouragement and reinforcement should be used frequently.</p>
--	--

Submitted by:	Robin Graves	Date:	1-15-08
Edited by:	Larry White and Beth Grounds	Date:	1-29-08
Edited by:	Pat Curtin & John Beck, MELL Staff	Date:	March, 2008

English Language Proficiency Standards Quick Reference. (Chapter 74. Curriculum Requirements Subchapter A. Required Curriculum, §74.4. English Language Proficiency Standards). *The standards checked here are merely examples for the teacher's consideration for inclusion in this lesson.*

Cross-curricular second language acquisition/ listening. The ELL listens to a variety of speakers including teachers, peers, and electronic media to gain an increasing level of comprehension of newly acquired language in all content areas. ELLs may be at the beginning, intermediate, advanced, or advanced high stage of English language acquisition in listening. In order for the ELL to meet grade-level learning expectations across the foundation and enrichment curriculum, all instruction delivered in English must be linguistically accommodated (communicated, sequenced, and scaffolded) commensurate with

[X] (c)(2)(A) - distinguish sounds and intonation patterns of English with increasing ease;

[X] (c)(2)(B) - recognize elements of the English sound system in newly acquired vocabulary such as long and short vowels, silent letters, and consonant clusters;

[X] (c)(2)(C) - learn new language structures, expressions, and basic and academic vocabulary heard during classroom instruction and interactions;

[X] (c)(2)(D) - monitor understanding of spoken language during classroom instruction and interactions and seek clarification as needed;

[X] (c)(2)(E) - use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborated spoken language;

(c)(2)(F) - listen to and derive meaning from a variety of media such as audio tape, video, DVD, and CD ROM to build and reinforce concept and language attainment;

[X] (c)(2)(G) - understand the general meaning, main points, and important details of spoken language ranging from situations in which topics, language, and contexts are familiar to unfamiliar;

(c)(2)(H) - understand implicit ideas and information in increasingly complex spoken language commensurate with grade-level learning expectations; and

[X] (c)(2)(I) - demonstrate listening comprehension of increasingly complex spoken English by following directions, retelling or summarizing spoken messages, responding to questions and requests, collaborating with peers, and taking notes commensurate with content and grade-level needs.

Submitted by:	Robin Graves	Date:	1-15-08
Edited by:	Larry White and Beth Grounds	Date:	1-29-08
Edited by:	Pat Curtin & John Beck, MELL Staff	Date:	March, 2008

Model Lesson

the student's level of English language proficiency. The student is expected to:

Cross-curricular second language acquisition/speaking. The ELL speaks in a variety of modes for a variety of purposes with an awareness of different language registers (formal/informal) using vocabulary with increasing fluency and accuracy in language arts and all content areas. ELLs may be at the beginning, intermediate, advanced, or advanced high stage of English language acquisition in speaking. In order for the ELL to meet grade-level learning expectations across the foundation and enrichment curriculum, all instruction delivered in English must be linguistically accommodated (communicated, sequenced, and scaffolded)

- [X] (c)(3)(A) - practice producing sounds of newly acquired vocabulary such as long and short vowels, silent letters, and consonant clusters to pronounce English words in a manner that is increasingly comprehensible;
- (c)(3)(B) - expand and internalize initial English vocabulary by learning and using high-frequency English words necessary for identifying and describing people, places, and objects, by retelling simple stories and basic information represented or supported by pictures, and by learning and using routine language needed for classroom communication;
- [X] (c)(3)(C) - speak using a variety of grammatical structures, sentence lengths, sentence types, and connecting words with increasing accuracy and ease as more English is acquired;
- [X] (c)(3)(D) - speak using grade-level content area vocabulary in context to internalize new English words and build academic language proficiency;
- [X] (c)(3)(E) - share information in cooperative learning interactions;
- [X] (c)(3)(F) - ask and give information ranging from using a very limited bank of high-frequency, high-need, concrete vocabulary, including key words and expressions needed for basic communication in academic and social contexts, to using abstract and content-based vocabulary during extended speaking assignments;
- (c)(3)(G) - express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics;
- (c)(3)(H) - narrate, describe, and explain with increasing specificity and detail as

Submitted by:	Robin Graves	Date:	1-15-08
Edited by:	Larry White and Beth Grounds	Date:	1-29-08
Edited by:	Pat Curtin & John Beck, MELL Staff	Date:	March, 2008

Model Lesson

commensurate with the student's level of English language proficiency. The student is expected to:

Cross-curricular second language acquisition/reading

. The ELL reads a variety of texts for a variety of purposes with an increasing level of comprehension in all content areas. ELLs may be at the beginning, intermediate, advanced, or advanced high stage of English language acquisition in reading. In order for the ELL to meet grade-level learning expectations across the foundation and enrichment curriculum, all instruction delivered in English must be linguistically accommodated (communicated, sequenced, and scaffolded) commensurate with the student's level of English language

- more English is acquired;
- (c)(3)(I) - adapt spoken language appropriately for formal and informal purposes; and
- (c)(3)(J) - respond orally to information presented in a wide variety of print, electronic, audio, and visual media to build and reinforce concept and language attainment.
- (c)(4)(A) - learn relationships between sounds and letters of the English language and decode (sound out) words using a combination of skills such as recognizing sound-letter relationships and identifying cognates, affixes, roots, and base words;
- (c)(4)(B) - recognize directionality of English reading such as left to right and top to bottom;
- [X] (c)(4)(C) - develop basic sight vocabulary, derive meaning of environmental print, and comprehend English vocabulary and language structures used routinely in written classroom materials;
- (c)(4)(D) - use prereading supports such as graphic organizers, illustrations, and pretaught topic-related vocabulary and other prereading activities to enhance comprehension of written text;
- (c)(4)(E) - read linguistically accommodated content area material with a decreasing need for linguistic accommodations as more English is learned;
- (c)(4)(F) - use visual and contextual support and support from peers and teachers to read grade-appropriate content area text, enhance and confirm understanding, and develop vocabulary, grasp of language structures, and background knowledge needed to comprehend increasingly challenging language;
- (c)(4)(G) - demonstrate comprehension of increasingly complex English by participating in shared reading, retelling or summarizing material, responding to questions, and taking notes commensurate

Submitted by:	Robin Graves	Date:	1-15-08
Edited by:	Larry White and Beth Grounds	Date:	1-29-08
Edited by:	Pat Curtin & John Beck, MELL Staff	Date:	March, 2008

Model Lesson

proficiency. For Kindergarten and Grade 1, certain of these student expectations apply to text read aloud for students not yet at the stage of decoding written text. The student is expected to:

with content area and grade level needs;
 (c)(4)(H) - read silently with increasing ease and comprehension for longer periods;
 (c)(4)(I) - demonstrate English comprehension and expand reading skills by employing basic reading skills such as demonstrating understanding of supporting ideas and details in text and graphic sources, summarizing text, and distinguishing main ideas from details commensurate with content area needs;

[X] (c)(4)(J) - demonstrate English comprehension and expand reading skills by employing inferential skills such as predicting, making connections between ideas, drawing inferences and conclusions from text and graphic sources, and finding supporting text evidence commensurate with content area needs; and

(c)(4)(K) - demonstrate English comprehension and expand reading skills by employing analytical skills such as evaluating written information and performing critical analyses commensurate with content area and grade-level needs.

Cross-curricular second language acquisition/writing

. The ELL writes in a variety of forms with increasing accuracy to effectively address a specific purpose and audience in all content areas. ELLs may be at the beginning, intermediate, advanced, or advanced high stage of English language acquisition in writing. In order for the ELL to meet

[X] (c)(5)(A) - learn relationships between sounds and letters of the English language to represent sounds when writing in English;
 (c)(5)(B) - write using newly acquired basic vocabulary and content-based grade-level vocabulary;

(c)(5)(C) - spell familiar English words with increasing accuracy, and employ English spelling patterns and rules with increasing accuracy as more English is acquired;
 (c)(5)(D) - edit writing for standard grammar and usage, including subject-verb agreement, pronoun agreement, and appropriate verb tenses commensurate with grade-level expectations as more English is acquired;

e(c)(5)(E) - employ increasingly complex grammatical structures in content area writing commensurate with grade-level expectations, such as:

Submitted by:	Robin Graves	Date:	1-15-08
Edited by:	Larry White and Beth Grounds	Date:	1-29-08
Edited by:	Pat Curtin & John Beck, MELL Staff	Date:	March, 2008

Model Lesson

<p>grade-level learning expectations across foundation and enrichment curriculum, all instruction delivered in English must be linguistically accommodated (communicated, sequenced, and scaffolded) commensurate with the student's level of English language proficiency. For Kindergarten and Grade 1, certain of these student expectations do not apply until the student has reached the stage of generating original written text using a standard writing system. The student is expected to:</p>	<p>(i) using correct verbs, tenses, and pronouns/antecedents; (ii) using possessive case (apostrophe s) correctly; and (iii) using negatives and contractions correctly; (c)(5)(F) - write using a variety of grade-appropriate sentence lengths, patterns, and connecting words to combine phrases, clauses, and sentences in increasingly accurate ways as more English is acquired; and (c)(5)(G) - narrate, describe, and explain with increasing specificity and detail to fulfill content area writing needs as more English is acquired.</p>
---	---

Submitted by:	Robin Graves	Date:	1-15-08
Edited by:	Larry White and Beth Grounds	Date:	1-29-08
Edited by:	Pat Curtin & John Beck, MELL Staff	Date:	March, 2008

Model Lesson

Appendix 1

TEKS and Student Expectations

(G.6) Dimensionality and the geometry of location.

The student analyzes the relationship between three-dimensional geometric figures and related two-dimensional representations and uses these representations to solve problems.

The student is expected to:

(B) use nets to represent and construct three-dimensional geometric figures;

(G.8) Congruence and the geometry of size.

The student uses tools to determine measurements of geometric figures and extends measurement concepts to find perimeter, area, and volume in problem situations.

The student is expected to:

(D) find surface areas and volumes of prisms, pyramids, spheres, cones, cylinders, and composites of these figures in problem situations.

(G.9) Congruence and the geometry of size.

The student analyzes properties and describes relationships in geometric figures.

The student is expected to:

(D) analyze the characteristics of polyhedra and other three-dimensional figures and their component parts based on explorations and concrete models.

(G.8) Congruence and the geometry of size.

The student uses tools to determine measurements of geometric figures and extends measurement concepts to find perimeter, area, and volume in problem situations.

The student is expected to:

(A) find areas of regular polygons, circles, and composite figures;

(B) find areas of sectors and arc lengths of circles using proportional reasoning;

(C) derive, extend, and use the Pythagorean Theorem;

Submitted by:	Robin Graves	Date:	1-15-08
Edited by:	Larry White and Beth Grounds	Date:	1-29-08
Edited by:	Pat Curtin & John Beck, MELL Staff	Date:	March, 2008

----- Mathematics for English Language Learners (MELL) ----- p. 11
Model Lesson
Formative Assessment Rubric

Part a) **Correct Solution: Yes No**

Criteria	4	3	2	1
Part b) Conceptual Knowledge	Attribute(s) of concept(s) Correctly identifies attributes of the problem, which leads to correct inferences Inferences Combines the critical attributes of the problem in order to describe correctly the mathematical relationship(s) inherent in the problem	Attribute(s) of concept(s) Correctly identifies attributes of the problem, which leads to correct inferences. Inferences Combines the critical attributes of the problem in order to describe correctly the mathematical relationship(s) inherent in the problem	Attribute(s) of concept(s) Identifies some of the attributes of the problem, which leads to partially correct inferences Inferences Combines the identified attributes of the problem which leads to a partial identification of the mathematical relationship(s) inherent in the problem	Attribute(s) of concept(s) Lacks identification of any of the critical attributes of the problem. Inferences Combines few of the attributes of the problem which leads to an incomplete identification of the mathematical relationship(s) inherent in the problem
Part c) Procedural Knowledge	Appropriate strategy Selects and implements an appropriate strategy. Representational form Uses appropriate representation to connect the procedure to the concept of the problem. Algorithmic competency Correctly implements procedure to arrive at a correct solution.	Appropriate strategy Selects and implements an appropriate strategy. Representational form Uses appropriate representation to connect the procedure to the concept of the problem. Algorithmic competency Implements selected procedure but arrives at an incorrect solution.	Appropriate strategy Selects and implements an appropriate strategy. Representational form Uses inconsistent or insufficient representation for the selected solution strategy. Algorithmic competency Implements selected procedure but arrives at an incorrect or correct solution. (See Part a above)	Appropriate strategy Selects and implements an inappropriate strategy. Representational form Uses incorrect representations. Algorithmic competency Makes significant errors.
Part d) Communication	Justification Fully answers the question of "why" for the strategy selection, explains procedure, and/or evaluates reasonableness of solution. Terminology Uses appropriate terminology and notation.	Justification Fully answers the question of "why" for the strategy selection, explains procedure, and/or evaluates reasonableness of solution. Terminology Uses some appropriate terminology or notation.	Justification Incompletely answers the question of "why" for the strategy selection; explains procedure; and/or evaluates reasonableness of solution. Terminology Uses some appropriate terminology or notation.	Justification Provides very little or no explanation of what was done and why. Terminology Uses limited or inappropriate terminology or notation.