

Model Lesson

Unit Name: Inequalities in Real Life		Unit Length: 1 day	
Overview: Set up, solve, graph, and interpret single variable inequalities			
DESIRED RESULTS			
TEKS and Student Expectations (See Appendix A for detailed description.)			
(A.3) Foundations for functions. (A)			
(A.7) Linear functions. (A), (B), (C)			
Enduring Understandings (Big Ideas)		Essential Questions	Critical Vocabulary
Real life situations are ruled by inequalities. There are many times in which there is not an exact value (inequality) that describes the solution to a real problem, but a range of values (inequality) that describe the solution. (i.e. a passing grade is greater than or equal to 70.)		Why is an inequality so important in the real world? When is it important to know the benefits of solving inequalities in order to be able to qualify for certain situation in your life? (i.e. acceptance into a certain class with a minimum grade or meet the criteria to be hired for a job.)	inequality solution of an inequality inequality symbols graphing inequalities more than less than greater than greater than or equal to less than or equal to
Learning Goals		Materials Needed	
The student will be able to: explain in his/her own words the meaning of an inequality; change a word problem or real life situation into an inequality using symbols; find and represent all possible solutions on a number line.		Overhead transparencies or Powerpoint slides Chart paper, markers Student math journals Spanish/English Math Dictionaries available (also other languages, if needed)	
ASSESSMENT PLAN			
Performance Tasks		Other Evidence	
Given a unit test and with use of a self-developed problem-solving rubric (See attachment for rubric		Student's grasp of real life situations will be evidence of student	

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<p>components), students will:</p> <ul style="list-style-type: none"> • demonstrate how to set up an inequality based on a word problem and look for the different solutions or values that problem can have. • demonstrate how to represent a real life situation with an inequality and look for the different possible values for an answer. 	<p>understanding of the concept of inequalities.</p> <p>Examples contributed by students to class discussions will demonstrate student understanding.</p>
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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 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

Engage (5 minutes) -- (MC-17)

The teacher should launch the lesson by asking the students how many of them have had a situation when they have to comply with a certain rule to be able to get something or qualify for something. (i.e. passing grade, drivers license, etc.). The teacher should lead a class discussion about several of these situations.

Explore/Explain (15 minutes) -- (MC-09, MC-10, MC-17)

In a class discussion the teacher should explain with input from the students, one common example of inequalities, a failing grade.

A failing grade is below 70 .

The teacher will ask: What does "below" mean in mathematics? The student is expected to say "lower than or less than", then the teacher will make the transition.

The teacher will then say, "we need a variable to represent a failing grade..." then the student is expected to say "g" or any other variable.

The transition will be "g has to be less than 70", then the inequality will look like $g < 70$.

The teacher should discuss the possible solutions then demonstrate how to graph all of the possible solutions on a number line.

In this section it is very important for the students to understand the use of variables and the vocabulary involved, such as:
greater than
less than

Specific MELL
Connections for This Lesson

(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-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.

(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-14) - Teachers should support ELLs who need extra time for dialogue by providing opportunities to work in groups. When possible, pair each ELL with another student who has some fluency in the ELL's dominant

minimum of
maximum
at least

Elaborate (20 minutes): -- (MC-13, MC-16)

The teacher will ask the students to write an inequality for the following real life situations and graph the solutions on a number line:

minimum age required to get a drivers license;

minimum age required to watch a PG 13 movie;

what is considered a freezing temperature;

the number of credits required to graduate;

the set of positive numbers; etc.

The idea is to approach one situation at a time. The teacher should walk around the classroom and monitor the progress of the students. Once they come up with an answer and share it with the rest of the class, they can continue with another situation.

Evaluate (10 minutes) (MC-03, MC-04, MC-17)

The teacher should then give students a handout to be completed with two real life situations created by the students themselves. They will then represent this situations with an inequality and a graph.

Extension Activity -- (MC-14, MC-15, MC-16., MC-17))

Have students (individually, in pairs, or as a small group) create a real life situation involving a compound inequality demonstrating a conjunction and/or a disjunction. i.e. the grades it takes to make the letter grade "B"

language and who can function as a "peer tutor."

(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.

(MC-10) - ELLs should be provided with or assisted in developing a learning aid that shows math vocabulary in both English and their native language and should be allowed to use this tool when working on assignments. Student-made glossaries, word walls, and compare and contrast charts may help ELLs learn mathematics vocabulary.

(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 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.

would be $79 < x < 90$.

(MC-15) In forming groups, the teacher should make sure that ELLs are assigned with their peer tutor, that ELLs are distributed among the groups, and that no group is predominantly comprised of ELLs.

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 the student's level of English language

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

<p>proficiency. The student is expected to:</p>	
<p>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) commensurate with the student's level of English language</p>	<p>[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;</p> <p>(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;</p> <p>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;</p> <p>X[(c)(3)(D) - speak using grade-level content area vocabulary in context to internalize new English words and build academic language proficiency;</p> <p>X[(c)(3)(E) - share information in cooperative learning interactions;</p> <p>[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;</p> <p>[X] (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;</p> <p>(c)(3)(H) - narrate, describe, and explain with increasing specificity and detail as more English is acquired;</p> <p>(c)(3)(I) - adapt spoken language appropriately for formal and informal purposes; and</p> <p>(c)(3)(J) - respond orally to information</p>

<p>proficiency. The student is expected to:</p>	<p>presented in a wide variety of print, electronic, audio, and visual media to build and reinforce concept and language attainment.</p>
<p><i>Cross-curricular second language acquisition/reading.</i> 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 proficiency. For Kindergarten and Grade 1, certain of these student expectations apply to text read aloud for students not</p>	<p>[X] (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; [X] (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; [X] (c)(4)(E) - read linguistically accommodated content area material with a decreasing need for linguistic accommodations as more English is learned; [X] (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 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</p>

<p>yet at the stage of decoding written text. The student is expected to:</p>	<p>distinguishing main ideas from details commensurate with content area needs; (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.</p>
<p><i>Cross-curricular second language acquisition/writing.</i> 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 grade-level learning expectations across foundation and enrichment curriculum, all instruction delivered in English must be linguistically accommodated</p>	<p>(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; (c)(5)(E) - employ increasingly complex grammatical structures in content area writing commensurate with grade-level expectations, such as: (i) using correct verbs, tenses, and pronouns/antecedents; (ii) using possessive case (apostrophes) 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</p>

(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:

(c)(5)(G) - narrate, describe, and explain with increasing specificity and detail to fulfill content area writing needs as more English is acquired.

Appendix 1
TEKS and Student Expectations

(A.3) **Foundations for functions.** The student understands how algebra can be used to express generalizations and recognizes and uses the power of symbols to represent situations.

The student is expected to:

(A) use symbols to represent unknowns and variables.

(A.7) **Linear functions.** The student formulates equations and inequalities based on linear functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation.

The student is expected to:

(A) analyze situations involving linear functions and formulate linear equations or inequalities to solve problems;

(B) investigate methods for solving linear equations and inequalities using concrete models, graphs, and the properties of equality, select a method, and solve the equations and inequalities; and

(C) interpret and determine the reasonableness of solutions to linear equations and inequalities.

Formative Assessment Rubric

Part a) Correct Solution: Yes No

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