Unit Name: Measures of Central Tendency	Unit Length: 1 Week
Overview: Lesson 2 of 2 on Mean, Median, Mode, and Range	

DESIRED RESULTS

TEKS and Student Expectations (See Appendix A for detailed description.)
(6.10) **Probability and statistics.** (B)

Enduring Understandings (Big Ideas)	Essential Questions	Critical Vocabulary
There are special numerical measures that describe the center and spread of numerical data sets. It is frequently helpful to be able to succinctly describe sets of numbers using mean, median, mode and range instead of having to list each number in a set of numbers.	How are means, medians, modes and ranges used in real life situations? When is it advantageous to know the mean of a set of numbers rather than simply having the entire list of numbers in a data set? What are the steps involved in calculating the mean, median, mode and range of a set of numbers?	Average Mean Median Mode Range

Learning Goals	Materials Needed
The student will be able to: Explain in his/her own words the meaning of mean, median, mode and range. Give at least three examples of how the concepts of mean, median, mode and range can be applied to real-world situations.	Overhead transparencies or PowerPoint slides Number cubes Chart paper, markers, masking tape Math problem worksheet Student math journals Spanish/English Math dictionaries available (also other languages, if needed)

ASSESSMENT PLAN

Performance Tasks	Other Evidence
The teacher will use a scoring	Students' grasp of how means are

rubric (See Attachment) to individually assess students' ability to: • demonstrate how to calculate the mean of a data set using addition and division. • demonstrate how to calculate the mean of a data set using number cubes. • write in their own words how to calculate a mean in their math journals. • generate and display examples of how means are used in real-world situations. • exhibit appropriate group work habits when engaging in group tasks.	used in calculating grades will be evidence of student understanding of the concept of mean. Examples contributed by students to class discussions will demonstrate student understanding. As news events occur that integrate measures of central tendency, teacher can pose questions to students and assess their grasp of concepts based upon their answers and discussions.

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-03) Teacher should start with a brief review about what the class learned yesterday about means and how to calculate them, and go over the problems from the end-of-class worksheet and let students check their answers. The teacher should then ask one student to be the "scribe" and should have students report back on their conversations with their parents about how means are used in everyday situations. The scribe should record the answers on chart paper along with the student's name and the chart can be posted with those constructed yesterday (and later used to figure bonus points for the next test). Explore/Explain/Elaborate (30 minutes) (MC-12), (MC-13), (MC-16) Teacher should transition to the concept of median, by showing the following example: Elena wanted to look at her friend's weeks in a different way, so she rank ordered them from the most hours worked, down to the least hours worked. She wanted to see which weeks were in her friend's "top half", which were in the "bottom half" and which week was "right in the middle." Teacher can then introduce "median' as the middle number. Teacher could then use the earlier two practice problems to let students determine the median. Because the first practice problem had an even number of numbers in the data set, it is necessary to average the two middle numbers to find the median. After working with the concept, teacher should ask students to write "in their own words" in their math journals the concept of median. Teacher can then ask students to share and discuss their entry with their learning partner, and if time permits, the teacher can ask for volunteers to share their entries with the class.	**MELL Connections** (MC -12) - ELLs should be given numerous opportunities to write about the mathematics concepts they are learning. Journal entries, for example, provide opportunities for the students to crystallize their thinking about concepts and for the teacher to check for understanding. Students who have limited English language skills should be allowed to write in their first language initially and should not be penalized for spelling or grammar errors.

Finally, the teacher can introduce the concepts of mode and range using the following example:

Elena's brother asked Elena to guess how many hours she would work her first week on the job. When she explained that there was no way to know for sure, his reply was "Just guess. I will give you $5 if you correctly guess the number of hours you are allowed to work the first week." Knowing what she knows from her friend's experience, what number should Elena guess and why?"

Teacher could ask students for their guesses and then could pose the question, "Would 8 be a good guess? Would 25 be a good guess?" Teacher could then introduce the concept of range and how to calculate it. In this example, the number of hours ranged from 10 to 20 hours, but the actual range is determined by subtracting the lowest number from the highest number (20-10 = 10; range = 10).

After students have had some discussion, teacher should introduce "mode" as the most frequently re-occurring number in a data set.   Again the teacher should use the practice problems to let the students practice finding the range and the mode. As before, the teacher should ask the students to write down "in their own words" their understanding of "range" and "mode" in their math journals. Students should be instructed to leave their math journals open to the correct page on their desk for later checking by the teacher.

Evaluate (15 minutes) (MC-06)

Teacher should then give students a handout with ten data sets that instructs them to calculate the mean, median, mode and range of each set of numbers. Students can work with a partner on the assignment until the end of the period and partners should divide the unfinished problems and finish them for homework.   While students work, the teacher will walk around and check math journal entries

(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.

(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.

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 proficiency. The student is expected to:	[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)(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; [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.
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 proficiency. The student is expected to:	[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 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.
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 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:	(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 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 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:	[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) - pell 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) - mploy 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 (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.

Appendix A
TEKS and Student Expectations

(6.10) **Probability and statistics.** The student uses statistical representations to analyze data.

The student is expected to:
(B) identify mean (using concrete objects and pictorial models), median, mode, and range of a set of data;

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 wny. **Terminology** Uses limited or inappropriate terminology or notation.