Introduction
Title: Games, Measurement, and Statistics

Grade: Six

Target Group: Mainstream Class with Integrated ELL students

Source of Written Reading Materials:


Source of Lessons:


Goals:

I want my students to know how to measure in metric units using a meter stick or ruler.

I want my students to know what a mode, median, range and mean are, and how to find them.

I want my students to know how that there is a connection between mathematics and their everyday activities (particularly their games/leisure activities.)

I want my students to know how to read, record and interpret data in a chart.
<table>
<thead>
<tr>
<th>Language</th>
<th>Content</th>
<th>Learning Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge</strong></td>
<td>Students will know....</td>
<td></td>
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<tr>
<td></td>
<td>How to measure in metric units using a meter stick or ruler</td>
<td>Cooperative learning and &quot;teamwork&quot;</td>
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<tr>
<td></td>
<td>The meaning of mode, median, range, and mean and how to calculate them</td>
<td>Critical Thinking</td>
</tr>
<tr>
<td></td>
<td>How to discern the connection between math and their everyday activities (particularly their games/leisure activities)</td>
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<td></td>
<td>How to read, record and interpret data in a chart</td>
<td></td>
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<tr>
<td><strong>Skills</strong></td>
<td>Students will be able to...</td>
<td></td>
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<tr>
<td></td>
<td>Use a metric ruler to complete individual/group tasks and write or orally express measurements using appropriate vocabulary</td>
<td>Measure the distance along a curve using indirect measurement</td>
</tr>
<tr>
<td></td>
<td>Measure distances in metric units</td>
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<tr>
<td></td>
<td>Complete worksheets and charts using appropriate vocabulary and mathematical formulas</td>
<td>Identify/determine/compute mean, median, mode and range in a set of data</td>
</tr>
<tr>
<td></td>
<td>Complete a chart to organize information obtained from peers</td>
<td>Identify the inclusion of math in games and everyday activities</td>
</tr>
<tr>
<td>Activity</td>
<td>Description</td>
<td></td>
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<tr>
<td>Interview/pose questions and gather data from peers</td>
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<tr>
<td>Orally respond to questions posed in class</td>
<td>Participate in a variety of games that apply the use of newly learned mathematical knowledge</td>
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<tr>
<td>Listen and follow directions to successfully complete group activities</td>
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<tr>
<td>Orally engage in group activities to complete tasks using metric units</td>
<td>Analyze data</td>
<td></td>
</tr>
<tr>
<td>Design a visual chart form using appropriate data and vocabulary of measurement / statistics</td>
<td>Rank/order data</td>
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<tr>
<td></td>
<td>Record data in a chart format</td>
<td></td>
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</tbody>
</table>

**Attitudes/Awareness**

Students will be aware...

<table>
<thead>
<tr>
<th>Awareness</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Math is everywhere in the world and is useful in everyday activities</td>
<td></td>
</tr>
<tr>
<td>Working as a team/group can expedite reaching a goal or completing a task</td>
<td></td>
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<tr>
<td>There is another system of measurement that is used in countries outside of the United States</td>
<td></td>
</tr>
</tbody>
</table>
Lesson 1
Lesson 1

Please note: This first lesson is an example of how a sheltered instruction classroom would be taught. There is a strong focus on language rather than content. The modifications applied to this lesson give concrete examples of how to make "teacher talk" more comprehensible, how to make text more comprehensible, how to visually contextualize and how to provide methods of output for ELL students in greater depth. This lesson is offered as an opportunity for mainstream teachers to view a variety of detailed techniques that they may apply to Lessons 2, 3 and 4 as necessary.

While developing this lesson, there were a number of key concepts I kept in mind in an effort to contextualize and assist the ease of English Language Learners learning in the classroom:

1. I looked to frame main ideas. You will notice as you read, that I suggest writing questions, key words and phrases on the board as you progress through the lesson. This allows you to refer back to the word to remind the student of what they are learning and increases the efficacy of your questioning and response strategies. This technique also enables the student to build their vocabulary by making a connection between the oral and written form of the word.

2. I’ve created two listening guides for ELL students to read and review as the lesson is being taught. This allows the student to have a visual “guide” of the lesson. They may circle words as they hear them said or as a concept is reviewed.

3. In order to check for understanding, I’ve included techniques such as “thumbs up, thumbs down”, checking for facial expressions and looking at body language in addition to listening to the oral responses of students. Also, I’ve included the activity of completing “exit slips” at the close of the lesson. The “exit slips” allow you to review the students’ individual comprehension. The “exit slips” set up as a CLOZE activity, allow early and preproduction ELL students to participate in the activity, build vocabulary and offer concrete evidence of comprehension.

4. The use of “food” in place of numbers assists pre and early production ELL students who may not yet understand numbers to be able to better visually relate to the lesson. It is also a method of further developing vocabulary necessary in “real life” activities. This method is also useful in reinforcing the vocabulary of emerging and intermediate language learners.

5. There is an emphasis on the instructor’s, tone, pace and particular use of wording. The instructor’s use of their voice is critical in allowing ELL students the opportunity to understand and process new information. Speaking too quickly, quietly or monotone may disengage or confuse the student. Additionally use of repetition is important in assisting a student to "remember" new words and add them to their own personal “word bank.”

6. Finally, I suggest creating a multilingual word wall in an effort to allow the students to have consistent visual reminders of their new words and meanings as well as connect to their L1.
<table>
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<tr>
<th>Function</th>
<th>Situation</th>
<th>Formula Expression</th>
<th>Grammar</th>
<th>Vocabulary</th>
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<tbody>
<tr>
<td>Solve</td>
<td>for &quot;mode&quot; or &quot;mean&quot; from a list of data</td>
<td>&quot;The _____ is _____&quot;</td>
<td>noun</td>
<td>mode, mean, total, numbers 1-50</td>
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<td>Define</td>
<td>orally the meaning of mode or mean in a class discussion</td>
<td>&quot;_____ means&quot;</td>
<td>noun</td>
<td>most, average</td>
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<td>Explain (for)</td>
<td>written and oral questions regarding how to solve for &quot;mean&quot; in a list of data</td>
<td>&quot;To find the _____ you ________, then ________.&quot;</td>
<td>verb</td>
<td>add, divide, multiply,</td>
</tr>
<tr>
<td></td>
<td>written and oral questions regarding how to solve for &quot;mode&quot; in a list of data</td>
<td>&quot;To find the _____ you ________ the _____ that has the ________.&quot;</td>
<td>verb</td>
<td>count, look for, define, find, solve</td>
</tr>
<tr>
<td>to written and oral questions regarding which object/group/number has the greatest/least amount of occurrences in a set of data</td>
<td>noun</td>
<td>object, number</td>
<td></td>
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<td>---</td>
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<td></td>
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</tr>
<tr>
<td>&quot;The________has the ________.&quot;</td>
<td>adjective</td>
<td>least</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pl. nouns</td>
<td>hamburger(s), pretzel(s), milk, pizza, orange(s), banana(s), strawberry</td>
<td>noun</td>
<td>group (of)</td>
<td></td>
</tr>
</tbody>
</table>
Lesson 1 of 4
Mode and Median – Sheltered Instruction Technique

Teacher: Jennifer O'Brien
Grade Level: 6
Duration: 60 min.

Subject Area: Math: Comparing Averages
Number of Students: 22
Type: Sheltered instructional with Mixed Levels

Instructional Objectives
By the end of this lesson:

All students will know how to:
• Recognize the words mean and mode in written text.
• Solve for mean and mode from a list using only visual aids, objects or graphical representations of numbers.

Most students will know how to:
• Recognize the words mean and mode and be able to define them orally using a minimum of one word explanations.
• Solve for mean and mode using a combination of numerals, visual aids, objects or graphical representations of numbers.

Some students will know how to:
• Recognize the words mean and mode and be able to define them both orally and written.
• Solve for mean and mode using only numerals.

Instructional Materials
Index Cards (randomly numbered with the numbers 1-5)
Overhead projector or Board
Blank transparency sheets (if using overhead projector)
Pictures (see appendix 9-13) OR create similar graphics to use as visual aids
Listening guides on “mean” and “mode” (see appendix 7, 8)
Blank paper to be used as closing “exit slips” (see appendix 5, [ELL]6)

Important Notes to Consider
• In order for students to be successful in this lesson, they must already have prior knowledge of addition, subtraction, multiplication and division.
• This lesson is designed to create background knowledge for the unit. The lessons following will continue to build on this background knowledge and check for understanding using interactive games.
• It is critical that every instruction be followed. Missing an instruction may result in making the material more difficult for ELL students to learn.
• Make sure to emphasize and point to key words EVERY time you use them.
• Repetition is important!
• Language that the instructor may want to use is highlighted in boldface type.
• Type in parentheses indicates directions to help facilitate the lesson.
• The use of “(emphasis)” will indicate that the word following will need to be emphasized by speaking slower, clearer and with a different tone.
• Whenever possible, ask that the students repeat words with you, count out loud with you, etc.
• If not already created, consider creating a math “word wall” and include this lesson’s new terms “mode” and “mean” to it. Under each word give a simple definition. For example, under the word mode would be the word “most” and under the word “mean” would be “average.” Also, include a visual representation of how to solve for both. Use the graphics in this lesson to help you. It may also be helpful to learn the word for each term in the respective ELL student’s language and include it on the wall as well.

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Lesson 1 of 4
Mode and Median – Sheltered Instruction Technique

Procedure
Initiating Activities
Before class, write on the board: "Content Objective: Today will how to solve for mode and mean. Language Objective: Today we will work as a class to find our class mode.

Give each student one index card with a number (from 1-5) on it. (Depending on the proficiency of the ELL, tell the student the number they have, and show them by holding up the same number of fingers.) Tell the students to put their cards to the side of their desk for an activity they will be participating in later.

**Also hand out the listening guides on mode and mean to ELL students ahead of time (appendix 7,8.) Show the students that we you will first be discussing "mode."

1. Write the words "mode" and "mean" on the blank transparency or board.

2. Introduce the lesson by explaining to the students that they will be learning about "mode" (point to the word mode) and "mean" (point to the word mean) today.

3. Ask the students to repeat the words with you. Point to the word "mode" and repeat "mode." Point to the word "mean" and repeat "mean."

4. Point again to the word "mode" and tell the students that you will first begin by learning what "mode" means.

Development of Lesson
"Mode"
Part 1

1. Create a pattern on a transparency using objects. See example below. (The shapes/objects will at first be used in place of numbers in an effort to allow ELL students who do not recognize numbers to have a better opportunity to comprehend the lesson.)

![Objects](image)

2. Say, "Let's see what we have in our list."

3. Ask the students to say the word with you as you point to each object and state its name. (For the example above the instructor would point to the hamburger and the class would say "hamburger," move to the pretzel, point and say "pretzel," etc.)

4. Tell the students "To find the (emphasis) mode (point to the word "mode." you must first count how many (write "How many?" on the transparency) of each object you have in your list."

5. Then say "Let's first count our hamburgers."

6. Put a picture of a hamburger up on the overhead with a "=" sign next to it.

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7. As the instructor counts, they should point to the object and write a numeral over it. (Example: "We have one hamburger" (point to the hamburger and write the numeral "1" over it). "We have one pretzel" (point to pretzel one and write the numeral "1" over it), two pretzels, (point to pretzel two and write the numeral "2" over it), three pretzels" (point to pretzel three and write the numeral "3" over it), etc.

8. When finished counting all of the foods, reinforce what you just did by holding up one finger, pointing to the hamburger and saying "We have one hamburger."

9. Write the number "1" next to "hamburger=".

10. Move on to the pretzel, hold up three fingers and say "We have three pretzels."

11. Write the number "3" next to "pretzel="...etc.

12. Repeat steps 10 and 11 for each food. When complete, the overhead should look similar to the example below:

```
  1   2   3   1

 1 1 1

 1 1 1

 1 1 1

 1 1 1
```

13. While emphasizing the word "most" and gesturing something being "big" with your hands, ask the students "Which one do we have the most of?" Demonstrate the "thumbs up" gesture. Give me thumbs up when I point to it."

14. When the students have given a thumbs up for the pretzel, circle the pretzel=3 and say "Correct. We have the most pretzels. Because we have 3 pretzels (point to the corresponding pretzel=3), one hamburger (point to the corresponding hamburger=1) one slice of pizza (point to the corresponding
Lesson 1 of 4
Mode and Median - Sheltered Instruction Technique

pizza=1) and one milk” (point to the corresponding milk=1).

15. Point to the pretzel and say “In this list (point to the row of objects), the pretzel is our (emphasis) mode.”

16. Point to the word “mode” and say, “...because the mode is the number that occurs the most often.”

17. Next to the word “mode” write “= most.”

18. Again point to a pretzel and say “The pretzel (point to the word mode) is our mode because it occurs the most (point to the pretzel=3).

19. Repeat the steps above using shapes (See appendix for examples.)

Part 2
Before beginning Part 2, the instructor may want to remind the ELL student which number they have on their index card.

1. When complete with Part 1, write “1,2,3,4,5” on the overhead.

2. Next, write “1=, 2=, 3=, 4=, 5=” in a column below the list on the overhead (see above example in Part 1.)

3. Ask the students to look at their index cards.

4. Then hold up one finger and point to the number one from the list (1,2,3,4,5) on the overhead and ask, “Who has the number one? Please stand up.” (Assist the ELL student with their number if they do not understand when it is their turn to stand or assign a peer to assist them.)

5. Count out loud pointing to each student.

6. Write the total number of students on the overhead next to “1=”.

7. Ask the students with the number one to sit back down.

8. Repeat for each number.

9. Repeat steps 10-18 from Part 1 substituting the appropriate numbers in place of foods.

Part 3
Continue to follow the steps of Part 1 using different lists of numbers until comfortable that students understand the concept/meaning of “mode.” (Check students’ facial expressions, body language, oral responses to questions, etc.)
“Mean” (Possibly Day 2 if no time is left on Day 1)

Part 1

1. Point to the word “mean” on the overhead and say “We are now going to talk about how to find the (emphasize) mean of a list of numbers.”

2. Tell the students that the (emphasize) mean is the (emphasize) average number in a list of numbers.

3. Write “=average” next to the word mean.

4. Repeat, “The mean (point to mean) is the average (point to average) of a list of numbers.”

5. Put the following transparencies on the overhead (or draw something similar):

![Transparencies with fruit illustrations]

6. Hold up 5 fingers as you point to the list and explain that there are 5 groups of fruit in the list.

7. Count and circle deliberately with your finger or a marker each group of fruit.

8. Say, “How many oranges do we have in our first group?” (The students will probably respond “five.”)

9. Tell them there are five oranges and then count and point to each orange in the group.

10. Write the number “5” over the group of fruit as you repeat, “There are five oranges in group one” (circle the group with your finger or a marker.)

11. Repeat steps 8-10 with the other four groups of fruit.

12. Reiterate what you just did by pointing to group one and circling it with a marker or your finger stating “Group one has five oranges.”

13. Point to group two and circle with a marker or your finger. Say “Group two has four bananas.” (Repeat step for each group.)

14. Point to the word “mean” and say “To find the (emphasis) mean or (emphasis) average (point to the word average), you must first add all your numbers.”

15. Circle all of the groups of fruit with either your finger or a marker to represent “adding” of all of the fruit.

16. Draw in a “+” sign between each group of fruit. As you add each new “+” say aloud “We must add group one and group two and group three and....together.”
17. Next say, "We must add our five oranges (point to the five above group one and add a "+" sign next to it), our four bananas (point to the four above group one and add a "+" sign next to it), the next group of five oranges (point to the five above group one and add a "+" sign next to it)..." etc.

18. Begin to add by counting the first group of oranges aloud. "One, two, three, four, five (continue to the group of bananas), six, seven, eight, nine (continue to the next group of oranges), ten, eleven...twenty."

19. Say, "Our total is twenty." Write =20 next to the list of numbers.

20. Repeat "There are twenty fruit." Your transparency should look similar to the below example:

\[ 5 + 4 + 5 + 5 + 1 = 20 \]

21. As you point to each group, ask the students, "How many (emphasis) groups of fruit are there?" The students will respond "five." As you hold up 5 fingers and/or point to the number five, say "Good. There are five groups."

22. Next, say, "To find the mean (point to the word mean) we have to (emphasis) divide twenty (point to the word twenty) by five because there are one, two, three, four, five groups." Draw a line under all of the fruit to symbolize "divide" and write the number "five" under it.

23. Then, rewrite twenty divided by five(one or more ways - depending on what students are used to.) See below graphic:

\[ \frac{5 + 4 + 5 + 5 + 1}{5} = 20 \]

\[ \frac{20}{5} = \]
24. Point to your equation and repeat “Our mean will be twenty divided by five.”

25. Point to each number and ask what twenty divided by five equals. The students will respond “four.”

26. Write the number four and say “Our mean (point to the word mean) is four (point to the number four) because twenty (circle all of the fruit with your finger or a marker) divided by five (point to each group) equals four (point to the number four).

27. Repeat, “Our (emphasis and point) mean or average equals four” (point to the four).

28. Repeat the exercise using other visual aids (if necessary) and/or move on to using strictly numbers.

Closure
Give each student an “exit slip” (blank piece of paper.) Ask the students to write on the piece of paper the definition of mean and mode. Tell them they must also find the (emphasis) mean and (emphasis) mode for a list of numbers. Write a list of numbers on the board 1,2,3,3,7,8) (ELL learners, depending on their proficiency may solve for mean and mode and use a CLOZE activity (see appendix 6), write one word explanations and solve or write more detailed explanations and solve.) See functional/notional chart for formulas to give ELL students as assistance.

The next lesson will reinforce using mode and mean through a variety of activities.
Lesson 2
Lesson 2

While developing this lesson, there were a number of key concepts I kept in mind in an effort to contextualize and assist the ease of English Language Learners learning in the classroom:

1. I looked to use linguistic clues whenever possible by emphasizing key words to help students make connections to their prior knowledge.

2. The game I chose to use allows students to play a game, a “fun” and “safe” activity with other peers. This allows for greater social interaction and social language development.

3. The pitching cards are two-fold. They are a means of keeping track of which card belongs to which child, but they also offer ELL students to learn basic words like “grade,” “age,” “hobby.” The pitching cards work as a way of empowering students with vocabulary particular to their individuality. Also, displaying the cards creates a sense of community and allows students to learn more about one another.

4. As an optional technique, I suggest giving pre-production or emerging ELL students, who may come from countries that do not use the same numeric system, a number chart to assist them in ordering numbers. Additionally, I’ve added a graphic to represent “order” and “least to greatest.” This sort of presentation offers students an opportunity to make visual and linguistic connections between words and numbers or objects.

5. I suggest modeling how to use and read a metric ruler by incorporating realia and attaching a ruler to the board to give visual and oral reminders regarding metric units.

6. Finally, the worksheets for this lesson are modified by having the graphic representation of “order” incorporated, and new vocabulary or key words highlighted.
**Name:** Jennifer A. O'Brien  
**Unit:** Games, Measurement, and  
**Title:** Statistics  
**Lesson 1:** Teaching Mode and Mean  
**Grade:** 6  
**Target Group:** Mainstream Class with Integrated ELL Students

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<td>&quot;The_________has the ________.&quot;</td>
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<td></td>
<td></td>
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<tr>
<td>adjective</td>
<td>least</td>
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| pl. nouns | hamburger(s), pretzel(s), milk, pizza, orange(s), banana(s), strawberry |
| noun | group (of) |
| verb | define, find, solve |

| Confirm individual distance measurements to other peers |
|---|---|
| "My________was____and____" |
| past tense | distance, centimeter(s), millimeter(s), decimeter(s) |
| verb "to be", noun, pl. noun |
Create a "pitching card" using personal information

"My _____ is ______."

noun age, grade, hobby (and appropriate words for their individual hobby)

Discuss individual and group distance variations with other peers

"My _____ was ______ and the group _____ was ______. The difference is ______."

pl. nouns centimeter(s), millimeter(s), decimeter(s)

Question peers for their data

"What was your ______?"

interrogatives measurement
Lesson 2 of 4
"Pitching Cards"

Teacher: Jennifer O'Brien
Grade Level: 6
Duration: 45 min.

Subject Area: Math: Comparing Averages
Number of Students: 22
Type: Mainstream with ELL students

Instructional Objectives

In addition to the previous lesson objectives, by the end of this lesson:

All students will know how to:
• Order a list of less than 10 numbers from least to greatest using only visual aids, objects or graphical representations of numbers.
• Use a metric ruler to measure distances and explain observations using only visual aids, objects or graphical representations of numbers.
• Complete a chart of data using only visual aids, objects or graphical representations of numbers.

Most students will know how to:
• Order a list of less than 10 numbers from least to greatest and explain their deductions orally using a minimum of one word explanations.
• Use a metric ruler to measure distances and explain observations using a combination of numerals, visual aids, objects or graphical representations of numbers.
• Complete a chart of data using a combination of numerals, visual aids, objects or graphical representations of numbers.

Some students will know how to:
• Order a list of less than 10 numbers from least to greatest and be able to define their deductions both orally and written.
• Use a metric ruler to measure distances and explain their observations orally and numerically.
• Complete a chart of data using only numerals.

Instructional Materials
Pitching Cards activity sheet for each student (see appendix [ELL]15, 16)
Pitching Card example (see appendix 14)
Meter sticks
5 unlined index cards per student
Crayons
Masking Tape
Optional: Bucket or Box
Calculators

Important Notes to Consider
• In order for students to be successful, they must already have prior experience with metric measurements. This lesson serves as a method of review for both metric measurements and the use of mode and mean.
• Before class, mark areas in the room from which the students will "pitch" their cards with masking tape. Several meters from the marks, create a "well" in which they are to pitch their cards. (This may be a box created on the floor with masking tape or a large box, bucket, etc.)
• The brief activity of taping a meter stick to the board and explaining its measurements (see #2 under “Development of Lesson”) may be recreated on
poster size paper or moved to an area of the room on a wall to be used for later reference.

- When checking for comprehension, remember to consider students’ facial expressions, body language, oral responses to questions, etc. **For further detailed information on particular referencing gestures and speech considerations, refer to the sheltered instruction descriptions throughout Lesson 1.**

**Procedure**

**Initiating Activities**
Before class, write on the board: "Content Objective: Today will use the metric system and complete charts. Language Objective: Today we will work together in small groups to find our team mean and mode.

Reintroduce and review the meaning of mode and mean, referring to Lesson 1. Continue to build on lesson 1 until comfortable with student response and comprehension. Refer to "Important Notes to Consider."

**Development of Lesson**

1. (OL) Give each student a set of five unlined index cards and crayons. **Ask them to draw a picture of themselves on the front and to write information about themselves on the back, for instance, age, grade, and hobbies.** (To assist ELL comprehension, write “age, grade, etc.” on board. For early and pre-production ELL students, give them a finished copy of an index card to copy as an example or, based on level, write out the words for them on the index card. (see appendix 14.)

2. **Tell the students that they are going to play a game called "Pitching Cards."** Explain that the game will require them to use metric measurements and a meter stick. Show the class a meter stick. Tape it to the board. Draw brackets to show the size of a millimeter, centimeter, decimeter and full meter and write the word next to each(refer to below graphic).
3. Write the word "order" on the board. Draw a small "1" on the board and a large "10" on the board. Write the numbers 2-9 gradually going from smaller to bigger. Write "least" under 1 and "greatest" under 10. Gesture "small" to "big" with your hands. **Ask the students to order their distance data from least to greatest. (This is an important step in that it serves as a tool in developing Lesson 3 – Finding the median and range of a set of data.)** (see below graphic.)

```
1 2 3 4 5 6 7 8 9 10
least  greatest
```

*If there are ELL students in the class who do not yet understand the English numeric system, give them a ruler or number chart and mark least to greatest on it so that they have a visual representation to work from.*

4. (OL) Next, Demonstrate how to “pitch” the cards from the marks on the floor to their corresponding “well” as well as how to measure distances with a meter stick.

5. Divide the students into small groups or pairs and distribute a copy of the Activity Sheet to each student. *(See appendix [ELL]15, 16 for activity sheets.)*

6. (OL) Guide the students as they take five turns each, recording their pitching card’s distance from the “well.” Have the children fully complete their activity sheets.


**Closure**

Discuss the completed worksheets as a class. **Ask each student for their mean number and write it on the board, then order the numbers from least to greatest. (OL) Ask the students if there is a mode for the list of data. Using calculators, ask the students to find the mean of the data.** Compare individual scores to the group’s mode and mean, emphasizing the amount of variation.

*Add the words “order,” “least” and “greatest” to the multilingual word wall.*

*Optional: Display the pitching cards, the personal data, and the pitching data.*

*The next lesson will introduce median and range building on the knowledge the students’ have learned in this lesson.*
Lesson 3

While developing this lesson, there were a number of key concepts I kept in mind in an effort to contextualize and assist the ease of English Language Learners learning in the classroom:

1. This lesson includes listening guides as visual aides that students may refer to during the lesson as well as while they work on their worksheets.

2. Again, a game is included that allows students to equally participate in a classroom activity therefore promoting a safe and comfortable classroom environment.

3. On the modified worksheets, the only major modification I made is to have the ELL student focus solely on their individual results versus calculating for the group's results. Because the worksheet is an effort to check for understanding, my concern was that switching from individual to group data is a minor detail that would, however, completely alter a student's answer. I was afraid that switching back and forth from individual to group data might make the task a bit more confusing.

4. A second assessment option is the provided in the form of an exit slip. The exit slip offers a "word" bank below each blank. This form of assessment gives the student an opportunity to reflect on their listening guide and group activity and demonstrate a basic understanding of key words.

5. I tried to add visual cues and graphic representation suggestions whenever possible. For example, I suggest drawing a line down the middle of a circle, etc to represent the word "middle," writing numbers from small to large representing least to greatest, and after teaching new vocabulary, writing "range=greatest-least" on the board. These visual reminders, combined with oral cues are powerful gestures in assisting ELL students in the classroom.
**Name:** Jennifer A. O'Brien  
**Unit Title:** Games, Measurement, and Statistics  
**Lesson 1:** Teaching Mode and Mean  
  **Grade:** 6  
  **Target Group:** Mainstream Class with Integrated ELL Students

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Formula Expression</th>
<th>Grammar</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solve</td>
<td>for &quot;median&quot; or &quot;range&quot; from a list of data</td>
<td>&quot;The _____ is _____&quot;</td>
<td>present tense, nouns</td>
<td>median, range, numbers 1-50</td>
</tr>
<tr>
<td>Define</td>
<td>orally the meaning of median in class discussion</td>
<td>&quot;_____ means _____&quot;</td>
<td>present tense, nouns</td>
<td>median, middle</td>
</tr>
<tr>
<td>Explain (for)</td>
<td>written and oral questions regarding how to solve for &quot;range&quot; in a list of data</td>
<td>&quot;To find the _____ first you _____ your numbers. Then you _____ the _____ from the _____.&quot;</td>
<td>present tense/past tense -ed verbs</td>
<td>order(ed), subtract(ed), noun adjective</td>
</tr>
</tbody>
</table>
### Spinning Tops

Written and oral questions regarding how to solve for "median" in a list of data.

| "To find the ______ you ______ the ______ then ______ the ______. If the list has ______ numbers, you must ______." | Present tense/regular and irregular past tense and -ed verbs adjective noun find (found), calculate(ed), divide(ed) even, odd median, numbers |
|---|---|---|

<table>
<thead>
<tr>
<th>Write distances in metric units on a chart by following oral and written directions.</th>
<th>&quot;The ______ is ______ ______ long.&quot; noun distance, centimeters, millimeters, decimeters, numbers</th>
</tr>
</thead>
</table>

| "____ your ______ from ______ to ______." | Noun distance adverb order greatest |
|---|---|---|
Lesson 3
Lesson 3 of 4
"Spinning Tops"

Teacher: Jennifer O'Brien
Grade Level: 6
Duration: 45-60 min.

Subject Area: Math: Comparing Averages
Number of Students: 22
Type: Mainstream with ELL students

**Instructional Objectives**
In addition to the previous lesson objectives, by the end of this lesson:

All students will know how to:
- Measure the distance along a curve using indirect measurement in metric units.
- Recognize the words median and range in written text.
- Solve for median and range from a list of data using only visual aids, objects or graphical representations of numbers.

Most students will know how to:
- Recognize the words median and range and be able to define them orally using a minimum of one word explanations.
- Solve for median and range using a combination of numerals, visual aids, objects or graphical representations of numbers.

Some students will know how to:
- Recognize the words median and range and be able to define them both orally and written.
- Solve for median and range using only numerals.

**Instructional Materials**
Spinning Tops activity sheet for each student (see appendix [ELL]21, 22)
One small circular plastic top per student
Felt tip pens
One large sheet of white paper per group
One skein of yarn per group
One pair of scissors per group
Exit slip (see appendix 17, [ELL]18)
Median Listening Guide (see appendix 19)
Range Listening Guide (see appendix 20)

**Important Notes to Consider**
- In order for students to be successful, they must already have experience with metric measurements. This lesson serves as a method of review for both metric measurements and the use of mode and mean.
- When checking for comprehension, remember to consider students' facial expressions, body language, oral responses to questions, etc.
- For further detailed information on particular referencing gestures and speech considerations, refer to the sheltered instruction descriptions throughout Lesson 1.

**Procedure**
Initiating Activities
Before class, write on the board: "Content Objective: Today will learn to measure the distance along a curve. Language Objective: Today we will discuss the how to find range and median for a list of numbers." Reintroduce and review the meaning of mode and mean, referring to Lesson 1. Additionally, briefly review measuring with a metric ruler. Continue to build on lessons 1 and 2 until comfortable with student response and comprehension. Refer to "Important Notes to Consider."

24 Jennifer A. O'Brien, 2005, jennifer@jenniferobrien.com
Lesson 3 of 4
"Spinning Tops"

(OL) Guide the students as they decorate tops made by pushing a writing pen through a plastic cover, such as those from yogurt and margarine containers. Distribute a large sheet of white "contest paper" to each group or pair of students and demonstrate a spin on the top and how to "copy" the distance with yarn or string and then measure the string with a centimeter ruler. Guide the students as they record the data in their charts and compute their individual and then group means. They should not do Knowledge Check yet. See adapted worksheets for ELL students (appendix 21.)

Developing the lesson

1. Distribute listening guide (appendix) to those ELL students who may need it. Tell the students that they will now be calculating the range. Using the example below (from Lesson 2), circle the greatest and least number. Explain that the range is the smallest or least number subtracted from the greatest or biggest number in an ordered list of numbers.

2. Write "Range = Greatest – Least" on the board. Continue to give students a mix of numbers, order them and find the range as a class.

3. Next, write the word "median" on the board and tell the students that they are going to find the median of a set of numbers. Tell them that the "median" is the "middle" number. Write "median=middle" on the board. Depending on the level of your ELL students, you may want to draw a circle and put a line down the center or something similar.

4. Write five numbers (not in order) on the board. Ask the students to put them in order from least to greatest. Ask them which number is the middle number and how they know. Circle the number three. Write 3=middle, 3=median on the board. Continue this step with a few more odd numbered groups of numbers.

5. Write a group of six unordered numbers on the board. Have the students order them. Ask them what number is the median. Explain that in order to find the median in an even group of numbers, you must take the two middle numbers and divide them by two.

6. Continue with other even numbered groups of numbers.

Closure

Ask the students to use their spinning tops data to complete "Knowledge Check" on their worksheets. Then, distribute exit slips to check for knowledge at lesson end. (See appendix 17, [ELL]18.)

Optional: Add the words "range" and "median" to the multilingual word wall. Display the "spinning tops" worksheets. Allow students to walk around the room and review others' data.

The final lesson will reinforce the use of median, range, mean and mode.
Lesson 4

While developing this lesson, there were a number of key concepts I kept in mind in an effort to contextualize and assist the ease of English Language Learners learning in the classroom:

1. I chose this lesson because it related to literature - Mark Twain's "The Jumping Frog of Calaveras County." There are a number of excellent books and literature available that may be used in developing a connection between language arts and mathematics. In a classroom with ELL students, it is imperative to incorporate language whenever possible. I edited the "Jumping Frog of Calaveras County" to frame main ideas and simplify text for easier comprehension and readability. **Please note, editing should be done based on the individual ELL student's language proficiency.** I have incorporated some basic vocabulary for discussion purposes in the functional/notional chart of this lesson. However, as that the content of these lessons are not language based, but math-content based, I limited the amount of new formulas/vocabulary to be used from the story.

2. I note, as in all of the lessons, to write new vocabulary words on the board "data" and "official distance" vs. "total distance." While these words are also visually represented on worksheet, it is important to note that repetition is critical in developing vocabulary. The more the student hears the word, the more likely they are to retain it.

3. The selected game offers the students an opportunity to collaborate and work in small groups for a couple of reasons. For one, small groups offer a "safe" opportunity for ELL students to develop their "output" skills, or social speaking abilities. Second, the closure activity of calling on any one person per group is an effort to develop community and make sure that the other students include the ELL student and assist their understanding of the task.

4. Again, I have developed modified worksheets. On the ELL worksheet, the numbers 1, 2, 3, etc. are listed over the words "first, second, third, etc." in order for students to make a visual connection to what may be new vocabulary words. The exit slip offers ELL students an opportunity to solve for mean, median and range - words they should at this point recognize, but of the "official distance." This new variable is added to assess students new knowledge but the slip has been limited to only a few questions so as not to become overwhelming.

5. Finally, the closure activity of resurfacing the "pitching cards" and discussing hobbies, not only allows students to make a connection between mathematics and their everyday activities, but also offers an opportunity to create more vocabulary words that ELL students may need in non-academic activities. It also creates an opportunity for all students in the classroom to develop more of a community bond.
<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Formula Expression</th>
<th>Grammar</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read</td>
<td>a story in class</td>
<td>The author says Jim Smiley('s)_______</td>
<td>past tense verb/ preposition agreement</td>
<td>placed, bet (on), gambled (on),</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>noun/ pl. noun</td>
<td>taught, were, did, won, lost, died</td>
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<td>dog(s), horse(s), frog(s), bet(s),</td>
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<td>trick(s)</td>
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<td>his</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>fast, slow, sick</td>
</tr>
<tr>
<td>Advise / Instruct peers in group activity</td>
<td></td>
<td>&quot;______ turn.&quot;</td>
<td>pronouns</td>
<td>my, your, her</td>
</tr>
<tr>
<td>Question</td>
<td>peers in group activity</td>
<td>&quot;______ next.&quot;</td>
<td>contractions</td>
<td>I'm, you're, he's, she's</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&quot;Who's ________?&quot;</td>
<td>interrogatives</td>
<td>turn, next</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&quot;What was your ________?&quot;</td>
<td></td>
<td>distance, answer, measurement</td>
</tr>
</tbody>
</table>
Report: written and orally regarding team findings

"The __________ is __________." 

nouns: mean, median, range, mode, (numbers)

We _____ it by __________ and __________ the __________.

regular and irregular past tense and -ed verbs

To find the ______ you ______ the ______ then ______ the ______. If the list has ______ numbers, you must ______.

adjective: greatest, least, even, odd

Write: distances in metric units on a chart by following oral and written directions.

"The ______ is ______ _______ long.

noun: distance, centimeters, millimeters, decimeters, numbers

Brainstorm: ways in which games and everyday activities pertain to math.

"Math is part of ________ because you ________ and _________."

nouns: hobbies (will be provided by individual peers in class)
"My hobby is _______."

verbs

add, subtract, multiply, divide, calculate, find, (as well as other verbs which will be particular to each student's hobby.)
Instructional Objectives

In addition to the previous lesson objective, by the end of this lesson:

All students will know how to:
- Complete a chart using metric measurements.
- Identify math in their everyday games/activities.
- Recognize the words data, total distance and official distance in written text.
- Solve for mean, mode, range and median from a list using only visual aids, objects or graphical representations of numbers.

Most students will know how to:
- Recognize the words data, total distance and official distance and be able to define them orally using a minimum of one word explanations.
- Identify math in their everyday games/activities and discuss using simple phrases what games the
- Solve for mean, mode, range and median using a combination of numerals, visual aids, objects or graphical representations of numbers.

Some students will know how to:
- Recognize the words data, total distance and official distance and be able to define them both orally and written.
- Solve for mean, mode, range and median using only numerals.

Instructional Materials
The Celebrated Jumping Frog activity sheet for each student (see appendix [ELL]23, 24)
The Celebrated Jumping Frog of Calaveras County, by Mark Twain (see appendix [ELL] 27-33)
Exit Slips (see appendix 25, [ELL]26)
A centimeter ruler for each student
One cotton ball for each student
Large paper clips
Masking tape

Important Notes to Consider
- In order for students to be successful, they should have had experience with metric measurements. This lesson serves as a method of review for both metric measurements and the use of mode, mean, range and median.
- When checking for comprehension, remember to consider students’ facial expressions, body language, oral responses to questions, etc. For further detailed information on particular referencing gestures and speech considerations, refer to the sheltered instruction descriptions throughout Lesson 1.

Procedure
Initiating Activities
During a snack, break or the day before, read and distribute (OL) "The Celebrated Jumping Frog of Calaveras County" by Mark Twain to the students. (See appendix 27-33 for adapted text for ELL students.)
Lesson 4 of 4
“Jumping Frog Contest”

Before class, write on the board: “Content Objective: Today will learn the difference between total distance and official distance. Language Objective: Today we will discuss how math is an important part of the games we play.”

Developing the lesson

1. **Tell the students that today they will be having their own “frog jumping” contest.** They will be measuring the length their frogs jump in two different ways, the “official distance” and the “total distance.” **Explain:** The official distance is the distance the frog has jumped from the starting line to its final jump. The total distance is the distance the frog has jumped in total – by adding each leg of the jump. (See graphic below. Draw graphic on board as explaining.)

2. Explain that they will be tallying all of their “jumps” on a chart. They will then need to also find the mean, median, mode and range for their list of numbers.

3. Write the word “data” on the board. **Tell the students that there is another word for the “list of numbers” they have been using during their activities.** A list of numbers, their “findings” or information that has been gathered is also called “data."

4. (OL) Have each student create a “frog” from a cotton ball.

5. (OL) Demonstrate how to place the frog on a large paper clip that has been slightly spread apart and make it "jump." **Place the frog on the smaller end and pushing down on the elevated large end, the player can usually make the frog hop over her or his finger. Remind students to use centimeters to record their findings.**

6. (OL) Allow the students to practice jumping their frog.

7. (OL) Divide the students into small groups and show them how to set up a track with a starting line and a course for the official distance using masking tape.

8. (OL) Guide the students as they work in small groups to simulate the frog jump and record the data on their chart. Instruct the students to tally the median, mode, range and mean for their individual set of data for total distance and then work as a team to find their group median, mode, range and mean for their total distance. (see appendix [ELL]23, 24)

9. **Tell the students that one person will be selected from each group to explain how they found their answer.** Therefore, all students should have a solid understanding of the task. (It may be beneficial to offer some sort of “reward system” to enforce this activity among the teams.)

Closure

Select one student from each team to discuss the variations of the median, mode, range and mean of their collective data versus individual data and how they found their answers.

The students will then have to complete an “exit slip” solving for mode, median, range and mean using the data from their team’s official distance as well as for their own individual official distance data. (see appendix 25, [ELL]26.)

Jennifer A. O'Brien, 2005, jennifer@jenifermbrien.com
Unit Wrap Up

Tell students that they have now played three days of games using math. Develop a discussion about other games they may play and how they use math in those games. **Use the hobbies they listed on their pitching cards as a point of reference.** The discussion may expand into how they may use math every day in ways they had not before considered.

(For ELL students use the student's individual hobby as an example so that the student has a better understanding of what you are referring to, as that they may not be familiar with the other games/hobbies of the other students.)

Add the words "data," "total distance" and "official distance" to the multilingual word wall.
The Celebrated Jumping Frog of Calaveras County

By Mark Twain

In compliance with the request of a friend of mine, who wrote me from the East, I called on good-natured, garrulous old Simon Wheeler, and inquired after my friend's friend, Leonidas W. Smiley, as requested to do, and I hereunto append the result. I have a lurking suspicion that Leonidas W. Smiley is a myth; that my friend never knew such a personage; and that he only conjectured that if I asked old Wheeler about him, it would remind him of his infamous Jim Smiley, and he would go to work and bore me to death with some exasperating reminiscence of him as long and as tedious as it should be useless to me. If that was the design, it succeeded.

I found Simon Wheeler dozing comfortably by the barroom stove of the dilapidated tavern in the decayed mining camp of Angel's, and I noticed that he was fat and bald headed and had an expression of winning gentleness and simplicity upon his tranquil countenance. He roused up, and gave me good day. I told him that a friend of mine had commissioned me to make some inquiries about a cherished companion of his boyhood named Leonidas W. Smiley - Rev. Leonidas W. Smiley, a young minister of the Gospel, who he had heard was at one time a resident of Angel's Camp. I added that if Mr. Wheeler could tell me anything about this Rev. Leonidas W. Smiley, I would feel under many obligations to him.

Simon Wheeler backed me into a corner and blockaded me there with his chair, and then sat down and reeled off the monotonous narrative which follows this paragraph. He never smiled, he never frowned, he never changed his voice from the gentle-flowing key to which he tuned his initial sentence, he never betrayed the slightest suspicion of enthusiasm; but all through the interminable narrative there ran a vein of impressive earnestness and sincerity, which showed me plainly that, so far from his imagining that there was anything ridiculous or funny about his story, he regarded it as a really
important matter, and admired its two heroes as men of transcendent genius in finesse. I let him go on in his own way, and never interrupted him once.

'Rev. Leonidas W. H'm, Reverend Le-- well, there was a feller here once by the name of Jim Smiley, in the winter of '49 -- or maybe it was the spring of '50 -- I don't recollect exactly, somehow, though what makes me think it was one or the other is because I remember the big flume warn't finished when the first come to camp; but anyway, he was the curiosest man about always betting on anything that turned up you ever see, if he could get anybody to bet on the other side; and if he couldn't he'd change sides. Any way that suited the other man would suit him -- any way just so's he got a bet, he was satisfied. But still he was lucky, uncommon lucky; he most always come out winner. He was always ready and laying for a chance; there couldn't be no solit'ry thing mentioned but that feller'd offer to bet on it, and take any side you please, as I was just telling you. If there was a horse-race, you'd find him flush or you'd find him busted at the end of it; if there was a dog-fight, he'd bet on it; if there was a cat-fight, he'd bet on it; if there was a chicken-fight, he'd bet on it, why, if there was two birds setting on a fence, he would bet you which one would fly first; of if there was a camp-meeting, he would be there reg'lar to bet on Parson Walker, which he judged to be the best exhorted about here, and so he was too, and a good man. If he even see a straddle-bug start to go anywheres, he woul'd bet you how long it would take him to get to -- to wherever he was going to, and if you took him up, he would foller that straddle-bug to Mexico but what he would find out where he was bound for and how long he was on the road. Lots of the boys here has seen that Smiley, and can tell you about him. Why, it never made no difference to him -- he'd bet on any thing -- the dangdest feller. Parson Walker's wife laid very sick once, for a good while, and it seemed as if they weren't going to save her; but one morning he come in, and Smiley up and asked him how she was, and he said she was considerable better--thank the Lord for his inf'nite mercy--and coming on so smart that with the blessing of Prov'dence she'd get well yet; and Smiley, before he thought, Â says, 'Well, I'll resk two-and-a-half she don't anyway.'
"Thish-yer Smiley had a mare—the boys called the fifteen-minute nag, but that was only in fun, you know, because of course she was faster than that—and he used to win money on that horse, for all she was so slow and always had the asthma, or the distemper, or the consumption, or something of that kind. They used to give her two or three hundred yards’ start, and then pass her under way; but always at the fag end of the race she’d get excited and desperate like, and come cavorting and straddling up, and scattering legs around limber, sometimes in the air, and sometimes out to one side among the fences, and kicking up m-o-o-r-e dust and and raising m-o-o-r-e racket with her coughing and sneezing and blowing her nose—and always fetch up at the stand just about a neck ahead, as near as you could cipher it down.

"And he had a litt ile small bull-pup, that to look at him you’d think he warn’t worth a cent but to set around and look ornery and lay for a chance to steal something. But as soon as money was up on him he was a different dog; his under-jaw’d begin to stick out like the fo’castle of a steamboat, and his teeth would uncover and shine like the furnaces. And a dog might tackle him and bully-rag, and bite him, and throw him over his shoulder two or three times, and Andrew Jackson—which was the name of the pup—Andrew Jackson would never let on but he was satisfied, and hadn’t expected nothing else—and the bets being doubled and doubled on the other side all the time, till the money was all up; and then all the sudden he would grab that other dog jest by the j’int of his hind leg and freeze to it—not chaw, you understand, but only just grip and hang on till they threwed on the sponge, if it was a year. Smiley always come out winner on that pup, till he harnessed a dog once that didn’t have no hind legs, because they’d been sawed off in a circular saw, and when the thing had gone along far enough, and the money was all up, and he come to make a snatch for his pet holt, he see in a minute how he’d been imposed on, and how the other dog had him in the door, so to speak, and he ’ppeared surprised, and then he looked sorter discouraged-like, and didn’t try no more to win the fight, and so he got shucked out bad. He give Smiley a look, as much as to say his heart was broke, and it was his fault, for putting up a dog that hadn’t no hind legs for him to take holt of, which was his main dependence in a fight, and then he limped off a piece and laid down and died. It was a good pup, was that Andrew Jackson, and would have made a name for hisself if he’d lived,
for the stuff was in him and he had genius -- I know it, because he hadn't no opportunities to speak of, and it don't stand to reason that a dog could make such a fight as e could under them ci Ürumontances if he hadn't no talent. It always makes me fell sorry when I think of that last fight of his'n, and the way it turned out.

"Well, this-yer Smiley had rat-tarriers, and chicken cocks, and tomcats and all the kind of things, till you couldn't rest, and you couldn't fetch nothing for him to bet on but he'd match you. He ketch a frog one day, and took him home, and said he call'ated to educate him; and so he never done nothing for three months but set in his back yard and learn that frog to jump. And you bet you he did learn him, too. He'd give him a little punch behind, and the next minute you'd see that frog whirling in the air like a doughnut-see him turn one summerset, or maybe a couple, if he got a good start, and come down flat-footed and all right, like a cat. He got him up so in the matter of ketching flies, and kep' him in practice so constant, that he'd nail a fly every time as fur as he could see him, Smiley said all a frog wanted was education, and he could do 'most ever Üything--and I believe him. Why, I've seen him set Dan'l Webster down here on this floor--Dan'l Webster was the name of the frog--and sing out, 'Flies, Dan'l flies!' and quicker'n you could wink he'd spring straight up and snake a fly off'n the counter there, and flop down on the floor, and fall to scratching the side of his head with his hind foot as indifferent as if he hadn't no idea he'd been doin' any more'n any frog might do. You never see a frog so modest and straightfor'ard as he was, for all he was gifted. And when it come to fair and square jumping on a dead level, he could get over more ground at one straddle than any animal of his breed you ever see. Jumping on a dead level was his strong suit, you understand; and when it come to that, Smiley would ante up money on him as long as he had a red. Smiley was monstrous proud of his frog, and well he might be, for fellers that had traveled and been everywheres all said he laid over any frog that ever they see.

"Well, Smiley kep' the beast in a little lattice box, and he used to fetch him down-town sometimes and lay for a bet. One day a feller -- a stranger in camp, he was -- come acrost him with his box, and says:
"What's in the box?"

"What might it be that you've got in the box?"

"And Smiley says, sorter indifferent-like, 'It might be a parrot, or it might be a canary, maybe, but it ain't -- it's only just a frog.'"

"And Smiley says, easy and careless, 'he's good enough for one thing, I should judge -- he can outjump any frog in Calaveras County.'"

"The feller took the box again, and took another long, particular look, and give it back to Smiley, and says, very deliberate, "Well," he says, "I don't see no p'ints about that frog that's better'n any other frog."

"Maybe you don't," Smiley says. "Maybe you understand frogs and maybe you don't understand 'em; maybe you've had experience, and maybe you ain't only a amateur, as it were. Anyways, I've got my opinion, and I'll resk forty dollars that he can outjump any frog in Calaveras County."

"And the feller studied a minute, and then says, kinder sad-like, "Well, I'm only a stranger here, and I ain't got no frog; but if I had a frog, I'd bet you."

"And then Smiley says, "That's all right -- that's all right -- if you'll hold my box a minute, I'll go and get you a frog." And so the feller took the box, and put up his forty dollars along with Smiley's, and set down to wait."
"So he set there a good while thinking and thinking to himself, and then he got the frog out and prized his mouth open and took a teaspoon and filled him full of quail-shot -- filled him pretty near up to his chin -- and set him on the floor. Smiley he went to the swamp and slopped around in the mud for a long time, and finally he ketched a frog, and fetched him in, and give him to this feller, and says:

"Now, if you're ready, set him alongside of Dan'l, with his fore paws just even with Dan'l's, and I'll give the word." Then he says, "One -- two -- three -- git!" and him and the feller touched up the frogs from behind, and the new frog hopped off lively, but Dan'l give a heave, and hysted up his shoulders -- so -- like a Frenchman, but it warn't no use -- he couldn't budge; he was planted as solid as a church, and he couldn't no more stir than if he was anchored out. Smiley was a good deal surprised, and he was disgusted too, but he didn't have no idea what the matter was, of course.

"The feller took the money and started away; and when he was going out the door, he sorter jerked his thumb over his shoulder -- so -- at Dan'l, and says again, very deliberate, "Well," he says, "I don't see no plints about that frog that's any better'n any other frog."

"Smiley he stood scratching his head and looking down at Dan'l a long time, and at last he says, "I do wonder what in the nation that frog throw'd off for -- I wonder if there ain't something the matter with him -- he 'pears to look mighty baggy, somehow." And he ketched Dan'l by the nap of the neck, and hefted him, and says, "Why blame my cats if he don't weig 3' five pound!" and turned him upside down and he belched out a double handful of shot. And then he see how it was, and he was the maddest man -- he set the frog down and took out after the feller, but he never ketched him. And--"
[Here Simon Wheeler heard his name called from the front yard, and got up to see what was wanted.] And turning to me as he moved away, he said: "Just set where you are, stranger, and rest easy -- I ain't going to be gone a second."

But, by your leave, I did not think that a continuation of the history of the enterprising vagabond Jim Smiley would be likely to afford me much information concerning the Rev. Leonidas W. Smiley, and so I started away.

At the door I met the sociable Wheeler returning, and he buttonholed me and recommenced:

"Well, thish-yer Smiley had a yaller one-eyed cow that didn't have no tail, only just a short stump like a bannanner, and --"

However, lacking both time and inclination, I did not wait to hear about the afflicted cow, but took my leave.
Checklists
TAT Checklist of Sheltered Strategies

I. Contextualize Lesson
1. Visuals (Realia, Manipulatives, Gestures)
2. Model (Instructions, Processes)
3. Activate Background Knowledge
4. Opportunities to Negotiate Meaning and Check Understanding

II. Make Text Comprehensible
1. Graphic Organizers
2. Develop Vocabulary
3. Simplify Written Text

III. Make Talk Comprehensible
1. Graphic Organizers, Listening Guides
2. Frame Main Ideas
3. Pace Teacher’s Speech

IV. Engage: Opportunities for Output
1. Teacher Questioning and Response Strategies; Instructional Conversations
2. Small Group Work (including Information Gap Activities)
3. Meaningful, real-life activities: Students as Researchers
4. Provide Language Prompts for spoken and written output

V. Engage at Appropriate Language Proficiency Levels
1. Use questions appropriate for language levels in conversation, activities, and assessments

VI. Literacy/Academic Development
1. Allow us of L1 for planning and conceptualizing
2. Lots of real oral and written language
Write the page numbers and any other identifying features to identify those parts of your lessons that employ the following strategies.

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Original Lessons
Comparing Averages: Lesson 4 of 6

Overview: 1 2 3 4 5 6

Lesson Information
Length: 1 period(s)
Grades: 6

Data Analysis & Probability

Students create a box and whisker plot and compare the mean, median, and mode of a set of data. This lesson uses the Representation Process Standard.

Learning Objectives

Students will be able to:

- create a box and whiskers (or box) plot
- find and compare the measures of center for a set of data

Materials

- Crayons
- Paper
- Computer with Internet access
- File cards
- Yarn
- Calculators
- Class Notes

Instructional Plan

Students who can find the range and mode of a set of data have the abilities and skills necessary to be successful in this lesson.

To assess prior knowledge, provide a small data set and ask them to find these statistics. You may wish to use the number of vowels in their last names.

Give each student a file card. Ask them to write their first and last names on their cards and then record the number of letters in each name and the total letters. Tell them that they are going to make a human box plot, and that this special graph shows the range and median for a set of data.

Ask students to hold their file cards in front of them. Help students order themselves, starting with the student whose name has the fewest letters. Students who have the name length should stand side by side.

Give the student with the smallest number (say 9) a card on which you have written "Minimum." Give the student with the longest name (for example, 17) a card on which you have written "Maximum." Ask students to find the range of the data. To find the range, subtract the minimum from the maximum. Record the range on the board.

Tell students that they will next find measures of center for this set of data. The mode, which cannot be determined from a box plot, is the data point that occurs most often. The mean is the arithmetic average. The median is the halfway point or 50th percentile in the ordered data—one half the observations are above it and one half are below it. These three statistics are called measures of center or averages.

To find the mode, have students determine which value occurs more times than
all the others. Identify that value as the mode and record it on the board. Next, tell students that there are three measures of center—the mode, which they have just found, and the mean, and the median. Tell them that they will next find the median, or middle value, for this set of data.

To find the middle number, have students at each end of the line say "1" at the same time and sit on the floor. Ask students next to them to say "2." Have students count off in this fashion until only one or two students are standing.

If there are an odd number of students, there will be one student; if there is an even number, there will be two students. If there is one student, identify this number as the median. If there are two students, the arithmetic average of their numbers is the median.

Ask a student to write the median on the board under the mode and label both measures of center. Give student(s) who represent the median a card on which you have written "median" and invite them to stand again. Tell students that another name for median is "50th percentile."

Tell students that they will next find the median, or middle number, on each of the two sides. Have the student with the shortest name and the person in the median position count off as before. Ask the group on the other side of the median to find the middle point of the upper half of the set. Provide a card that says "75th percentile" to the center student on the upper end and a card that says "25th percentile" to the center student on the lower end.

As this terminology may be new to students, you may wish to explain that the 25th percentile is that point greater than 25 percent of the score. To use a money analogy, it is like a quarter. Similarly, the 75th percentile is the point greater than 75 percent of the scores. In the money analogy, it is like 75 cents.

You may wish to line the file cards up on the blackboard tray so the data is visible to all the students. If you have done so, you could indicate with sticky notes the low and high values, the median, the mean, and the mode with labeled file cards used in the human box and whiskers plot.

Tell students that they will become part of a graph called a box plot. Have students holding the 25th percentile and 75th percentile cards to stretch their arms out to make the ends of the box. Put one end of a long piece of yarn in the right hand of the student holding the 75th percentile card. Then, holding the yarn, walk back to the student who holds the 25th percentile card and place yarn in his or her right hand. As you pass in front of that student, ask the student to grab the yarn with the left hand, so that a line of yarn is stretched across the front of his or her body.

Complete the fourth side of the box by carrying the yarn back to the student holding the 75th percentile card. Ask the student to grab the yarn in his or her left hand. To make the "whiskers," stretch a piece of yarn between the student holding the "minimum" card and the student at the 25th percentile. This creates the lower "whisker." Similarly, stretch a piece of yarn between the student holding the "maximum" card and the student at the 75th percentile. This creates the upper "whisker."

Invite students, a few at a time, to step out of the line to see that a yarn "box" with "whiskers" is formed. Explain that they have made a human box and whiskers plot. The maximum and minimum points are the endpoints of the "whiskers" and the 25th and 75th percentile parts are called the lower and upper hinges, respectively, of the box. Copy the plot on the board, then collect the yarn and the cards and ask the students to take their seats.
Sample Ordered List of Full Names

<table>
<thead>
<tr>
<th>Name</th>
<th>Score</th>
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<tr>
<td>Diana Rigg</td>
<td>9</td>
</tr>
<tr>
<td>Paul Newman</td>
<td>10</td>
</tr>
<tr>
<td>Meryl Streep</td>
<td>11</td>
</tr>
<tr>
<td>Ben Kingsley</td>
<td>11</td>
</tr>
<tr>
<td>Susan Sarandon</td>
<td>12</td>
</tr>
<tr>
<td>Nicholas Cage</td>
<td>12</td>
</tr>
<tr>
<td>Michael Caine</td>
<td>12</td>
</tr>
<tr>
<td>Jack Nicholson</td>
<td>13</td>
</tr>
<tr>
<td>Anthony Hopkins</td>
<td>14</td>
</tr>
<tr>
<td>Katharine Hepburn</td>
<td>16</td>
</tr>
<tr>
<td>Christopher Reeve</td>
<td>16</td>
</tr>
<tr>
<td>Valerie Bertainelli</td>
<td>17</td>
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Maximum: 17  Range: 9  Mode: 12  Mean: 12.917

Call on a volunteer to label the 25th, 50th, and 75th points. Call on another volunteer to draw a line from the left-hand side of the box and label the end of the line with the lowest value in the data set.

Have another student draw a line from the right-hand side of the box and label the end of the line with the highest value in the data set. Ask students to copy the figure from the board, naming the highest and lowest values, and the 25th and 75th percentiles, and the mean.

---

9 11 12 15 17
---

Invite students to find the mean by computing with paper and pencil or using their calculators to add all the values and dividing by the number of students in the class. If any value occurs more than once, it should be entered into the sum as many times as it appears.

When they have found the mean, ask a volunteer to write it on the board under the median. Ask what they notice about the averages and which one best describes the "average" length of names in the class. The averages are probably not the same. The median is the best average in this case.

Tell students that they will next construct a box plot on the computer. Go to the Box Plot Simulation [link to http://cnx.rice.edu/content/m11192/latest/], hit "Clear All," and follow the directions for entering your own data and drawing the box plot. This site allows you to print out the box plot, so you may wish to complete several box plots while you are here.

To develop their understanding further, ask students how the box and whiskers plot would change if your name were included in the data set. Finally, ask students to copy and label the box plot, and record the measures of center and range. Add it to their portfolios.

Questions for Students

1. What graph did we make today? (box and whiskers plot, or box plot) What length was the most common name length in our class? What measure of central tendency is that? (mode)
2. What was the shortest name in the class? The longest? How did we show these values on the box plot?
3. What was the difference between these numbers? What do we call that difference? (range)
4. What were the mean and median of the data set? What does each term tell about the data? How did we find the mean? The median?
5. Suppose a new student came into the class. How would that change the plot we made? (Repeat with other names.)
6. Suppose (student name) moved away. How would that change the plot? (Repeat with other names.)
7. How many students in the class had names longer than the name at the 75th percentile? How many students had names shorter than the length of the name at the 25th percentile?
8. How can you locate the range on the box plot?
9. Challenge: Suppose the median is like a half dollar. What amount is the 25th percentile like? (25 cents; a quarter) What does 25th percentile mean? (25 percent of the class is accounted for when we get to this piece of data)

How about the 75th percentile? How were these points shown on the plot? (They form the ends of the box)

Using this analogy, how about the lower whisker? (0 %, 0 cents) The upper whisker? (100%, 100 cents or 1 dollar)

Assessment Options

At this stage of the unit, students should be able to do the following:

- Construct and read a box and whisker plot
- Identify the mean, median, mode, and range in a set of data

Students may raise other questions that will enrich the discussion. Follow their lead, which may result in increased understanding of the box plot and the statistics used to generate it.

After the lesson, you may wish to add more comments to the Class Notes Teacher Resource Sheet. When revisited later in the year, this information may suggest ways to apply this learning.

Teacher Reflection

1. Which students were able to understand the features of the human box and whiskers plot?
2. Which students easily found the range and mode? The median? The mean?
3. Which students could compare the measures of center with understanding?
4. Which students were not yet able to draw a box and whiskers plot? What did they have trouble with? What were they able to do without prompting?
5. What data would we collect to extend this instructional experience?
6. What will I do differently the next time I teach this lesson?

Standards and Expectations

Data Analysis & Probability 3-5

- represent data using tables and graphs such as line plots, bar graphs, and line graphs.
- compare different representations of the same data and evaluate how well each representation shows important aspects of the data.
- use measures of center, focusing on the median, and understand what each does and does not indicate about the data set.
- describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed.

Credit

This lesson was developed by Grace M. Burton.

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In the following lessons, students participate in activities in which they focus on the uses of numbers. The activities use the theme of games to develop concepts of measurement and statistics. Students are asked to measure distances using standard and nonstandard units and to record their measurement in various tables. Then they are asked to use descriptive statistics to report the results.

**Learning Objectives**

Students will be able to:
- measure distances in centimeters
- record data, in a chart format
- rank order data and determine median and range

**Materials**
- Pitching Cards activity sheet for each student
- Meter sticks
- 5 unlined index cards per student
- Crayons.

**Instructional Plan**

Preparing the Investigation

1. Reproduce a copy of the Pitching Cards activity sheet for each student.

Structuring the Investigation

1. Give each student a set of five unlined index cards and crayons. Ask them to draw a picture of themselves on the front and to write data about themselves on the back, for instance, age, grade, and hobbies.
2. Demonstrate how to pitch the cards from a set distance to the well, as well as how to measure distances with a meter stick.
3. Divide the students into small groups and distribute a copy of the Activity Sheet to each student.
4. Guide the students as they take five turns each, recording the distance from the wall of each card pitched.
5. Ask the students to order their distance data from least to greatest.
6. Demonstrate how to determine the median, or middle score, and the range.
7. Discuss the completed worksheets.

**Extensions**

1. Help the students to order the medians for the group and to
determine the median of the medians and the range for the
group. Compare individual scores to the group's median and
range, emphasizing the amount of variation.

2. Display the pitching cards, the personal data, and the pitching
data. Compare these data to the data on the traditional baseball
cards.

Standards and Expectations

Data Analysis & Probability 3-5

- collect data using observations, surveys, and experiments.
- design investigations to address a question and consider how
data-collection methods affect the nature of the data set.

References

- Helene Silverman. "IDEAS: Games, Measurement, and
- Hindman, Darwin A. Kick the Can and Over 800 Other Active
  Games and Sports for All Ages. Englewood Cliffs, N.J.: Prentice-
  Techniques for Examining Data Generated by Classroom
  Activities." Teaching Statistics and Probability. NCTM Yearbook
  Twain, Mark. "The Celebrated Jumping Frog of Calaveras
  County." The Celebrated Jumping Frog of Calaveras County and
PITCHING CARDS

<table>
<thead>
<tr>
<th>Turn</th>
<th>Distance from wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Order from least to greatest distance:

Median: __________

Range: __________
Spinning Tops: Lesson 4 of 5

Overview | 1 | 2 | 3 | 4 | 5

In the following grades 7-8 lesson, students participate in activities in which they focus on the uses of numbers. The activities use the theme of games to develop concepts of measurement and statistics. Students are asked to measure distances using standard and nonstandard units and to record their measurement in various tables. Then they are asked to use descriptive statistics to report the results.

Learning Objectives

Students will be able to:

- measure the distance along a curve using indirect measurement
- record data in chart form
- compute individual and group medians
- analyze data

Materials

- Spinning Tops activity sheet for each student
- One small circular plastic top per student
- Felt tip pens
- One large sheet of white paper per group
- One skein of yarn per group
- One pair of scissors per group

Instructional Plan

Background Information

During a top-spinning contest students measure the distance along a curve using indirect measurement. They record the data for their group in a chart and compute their individual median and the group median.

Preparing the Investigation

1. Reproduce a copy of the Spinning Tops activity sheet for each student.

Structuring the Investigation

1. Guide the students as they decorate tops made by pushing a writing pen through a plastic cover, such as those from yogurt and margarine containers.
2. Distribute a large sheet of white "contest paper" and demonstrate a spin on the top and how to "copy" the distance with yarn or string and then measure the string with a centimeter ruler.
3. Guide the students as they record the data in their charts and compute the medians.

Encourage discussion of the tables created.
4. Encourage discussion of the tables created.

**Extensions**

1. Demonstrate how to make a stem-and-leaf plot with the data from all the groups. Guide the students as they display and analyze their position within the table, as well as the general tendency of the group.

**Standards and Expectations**

*Data Analysis & Probability 6-8*

- select, create, and use appropriate graphical representations of data, including histograms, box plots, and scatterplots.
- find, use, and interpret measures of center and spread, including mean and interquartile range.

**References**

**Spinning Tops**

- Plastic cover
- Paper with track
- Narrow felt-tipped pen
- Ball of yarn or string

<table>
<thead>
<tr>
<th>Name</th>
<th>First turn</th>
<th>Second turn</th>
<th>Third turn</th>
<th>Median distance</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

**Median:** 

---
The Celebrated Jumping Frog: Lesson 3 of 5

In the following grades 5-6 lesson, students participate in activities in which they focus on the uses of numbers. The activities use the theme of games to develop concepts of measurement and statistics. Students are asked to measure distances using standard and nonstandard units and to record their measurement in various tables. Then they are asked to use descriptive statistics to report the results.

Using the story "The Celebrated Jumping Frog of Calaveras County" by Mark Twain, students simulate a jumping-frog contest and determine the distances "jumped." The students record the distance of individual jumps in centimeters and determine the total distance jumped (the sum of the three separate jumps) and the official distance (the straight-line distance from the starting line to the end of the frog's third jump). The students compare the range and median of the total distances with those of the official distances of the group. An online version of this story can be seen at http://www.visitcalaveras.org/htdocs/welcome/frogsstory.html

Learning Objectives

Students will be able to:

- measure distances jumped in a simulated jumping-frog contest
- record data
- determine median and range of the obtained data

Materials

- copies of Mark Twain's "The Celebrated Jumping Frog"
- The Celebrated Jumping Frog activity sheet for each student
- A centimeter ruler for each student
- One cotton ball for each student
- Large paper clips

Instructional Plan

Preparing the Investigation

1. Reproduce a copy of the The Celebrated Jumping Frog for each student.

Structuring the Investigation

1. Have each student create a frog from a cotton ball.
2. Demonstrate how to place the frog on a large paper clip that has been slightly spread apart and make it "jump." By placing the frog on the smaller end and pushing down on the elevated large end, the player can usually make the frog hop over her or his finger. Also demonstrate how to record the distances in centimeters on the Activity Sheet.
3. Allow the students to practice jumping their frog.
4. Divide the students into small groups and show them how to set
up a track with a starting line and a course for the official distance.
5. Guide the students as they work in small groups to simulate the frog jump and record the data on their chart.
6. Discuss the variations from the median of the group for each player and compare the medians and ranges for the total distance with those for the official distance.

Extensions

1. Collect the data for each group. Determine a class median and range for both the total distances and the official distances. Guide the students as they compare the data for their group with the data for the class.
2. Help the students to set up contests and simulations of their own.

Standards and Expectations

Data Analysis & Probability 3-5

- describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed.

References

The Celebrated Jumping Frog

Unit: centimeter

<table>
<thead>
<tr>
<th>Name</th>
<th>First jump</th>
<th>Second jump</th>
<th>Third jump</th>
<th>Total Distance (of three jumps)</th>
<th>Official (straight-line distance)</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

Total distance  
Official distance

<table>
<thead>
<tr>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total distances  
Official distances
Appendix
1. Define **mode**:

2. Define and explain how to find **mean**:
Exit Slip

1. Define **mode:**

   The ______________________ has the ______________________.
   (mode, mean)               (most, least)

2. Define **mean:**

   To find the ______________________ you ______________________ then
   (mode, mean)               (add, subtract)

   ______________________.
   (multiply, divide)
Mean

The **mean** is the **average** of a list of numbers.

**Example:**

**Directions:** Find the **mean**.

five (5)  four (4)  five (5)  five (5)  one (1)

1. **Add** all of the numbers:

```
five (5)  four (4)  five (5)  five (5)  one (1)
```

\[5 + 4 + 5 + 5 + 1 = 20\]

2. **Divide** by the number of numbers there are in the list:

```
1  2  3  4  5
```

\[\frac{20}{5} \text{ or } \frac{20}{5} = 4\]

The **mean** or **average** is 4.
Mode

The **mode** is the object (or number) that is used the **most** in a list.

**Example 1:**

**Directions:** Find the mode.

- hamburger
- pretzel
- milk
- pretzel
- pretzel
- pizza

**Answer:**
The pretzels are our **mode** because we have the **most** pretzels.

- hamburger
- pretzel
- milk
- pretzel
- pretzel
- pizza

**Example 2:**

**Directions:** Find the **mode**.

1 2 3 4 3 5 3

**Answer:**
Three is our **mode** because we have the **most** of number 3.

1 2 3 4 3 5 3
Example of a “Pitching Card”

Front

Miss O’Brien

Back

About Me

Age: 28

grade: 6

Hobby: Running
Pitching Cards

BENNY

About Me
Age 9
Grade 4
Hobby: Soccer

Carla

About Me
Age 9
Grade 4
Hobby: Tennis

Pitching Order

1 2 3 4 5

Distance from wall

Remember to use metric units (millimeter, centimeter, decimeter, meter)!

1 2 3 4 5 6 7 8 9 10

least greatest

1. Order your distances from least to greatest:

2. Find the mean:

3. Find the mode:

15 Jennifer A. O’Brien, 2005. jennifer@jenniferobrien.com
Pitching Cards

**Individual Distances**

1. Order your distances from **least to greatest**.

2. Find the **mean**.

3. Find the **mode**.

**Group Distances**

1. Order the group’s distances from **least to greatest**.

2. Find the **mean**.

3. Find the **mode**.
Exit Slip

1. Define **median:**

2. Define and explain how to find **range:**
Exit Slip

1. Define **median:**

   The ______________________ is the ______________________ number in a list.
   (median, mean)          (first, middle, last)

2. Define **range:**

   To find the ______________________ you must first ______________________ your
   (range, median)         (order, subtract)

   numbers. Then you _________________ the ______________________
   (add [+], subtract [-])         (biggest, least)

   number from the _________________.
   (greatest, smallest)
Median

The **median** is the **middle** number in a list.

**Example:**

**Directions:** Find the **median**.

5 2 3 1 4

1. **Order** all of the numbers from **least to greatest**:

   1 2 3 4 5 6 7 8 9 10
   
   least  greatest

   1 2 3 4 5

2. Find the **middle** number (halfway).

   1 2 3 4 5

   The **median** is 3

3. If there are an even number of numbers, pick the **middle two numbers**.

   1 2 3 4 5 6

   **Add** them and **divide** by 2.

   \[3 + 4 = 7, \quad \frac{7}{2} = 3.5\]

   The **median** is 3.5
Range

The **range** is the **difference** between the least and the greatest numbers.

**Example:**

Directions: Find the **range**.

\[
\begin{array}{c}
5 \\
2 \\
3 \\
1 \\
4 \\
\end{array}
\]

1. **Order** all of the numbers from least to greatest:

\[
\begin{array}{c}
1 \\
2 \\
3 \\
4 \\
5 \\
6 \\
7 \\
8 \\
9 \\
10 \\
\end{array}
\]

\[
\begin{array}{c}
\text{least} \\
\text{greatest} \\
\end{array}
\]

\begin{array}{c}
1 \\
2 \\
3 \\
4 \\
5 \\
\end{array}

2. **Subtract** the least (smallest) number from the greatest (biggest) number.

\[
\begin{array}{c}
5 \\
1 \\
\end{array}
\]

\[
\begin{array}{c}
greatest \\
\text{least} \\
\end{array}
\]

\[
5 - 1 = 4
\]

The **range** is 4.
Spinning Tops

Fill in the chart

<table>
<thead>
<tr>
<th>First Spin</th>
<th>Second Spin</th>
<th>Third Spin</th>
<th>Fourth Spin</th>
</tr>
</thead>
<tbody>
<tr>
<td>___ cm</td>
<td>___ cm</td>
<td>___ cm</td>
<td>___ cm</td>
</tr>
</tbody>
</table>

Remember to use centimeters! (cm)

1. Find the mean for your spins.

Knowledge Check

1. Find the median for your spins.

2. Find the range for your spins.

Jennifer A. O'Brien, 2005. jennifer@jenniferobrien.com
**Spinning Tops**

Fill in the chart:

<table>
<thead>
<tr>
<th>Name</th>
<th>First Spin</th>
<th>Second Spin</th>
<th>Third Spin</th>
<th>Fourth Spin</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

1. Find the **mean** for your spins.

2. Find the **mean** for your group's spins.

**Knowledge Check**

Now that we've discussed **median** and **range**, using the chart above, find the median and range for your data.
Frog Jumping Contest

Fill in the chart.

<table>
<thead>
<tr>
<th>Name</th>
<th>1 First Jump</th>
<th>2 Second Jump</th>
<th>3 Third Jump</th>
<th>Total Distance all jumps added</th>
<th>Official Distance straight line distance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Remember to use centimeters (cm)

2. Find the **mean** for your total distance.

3. Find the **median** for your total distance.

4. Find the **range** for your total distance.

5. Find the **mode** for your total distance.
Frog Jumping Contest

Fill in the chart:

<table>
<thead>
<tr>
<th>Name</th>
<th>First Jump</th>
<th>Second Jump</th>
<th>Third Jump</th>
<th>Total Distance</th>
<th>Official Distance</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

Remember to use centimeters (cm)

6. Find the mean, mode, range and mode for your total distance.

7. Find the mean, mode, range and mode for your total group distance.
Exit Slip

Knowledge Check

1. Find the mean of your frog’s *official* distance.

2. Find the median of your frog’s *official* distance.

3. Find the range of your frog’s *official* distance.

4. What is another name you would use to describe the information you might gather or are given to solve a problem?

5. What is the difference between official distance and the total distance?
Exit Slip

Knowledge Check

1. Find the **mean** of your frog’s **official** distance.

2. Find the **median** of your frog’s **official** distance.

Find the **range** of your frog’s **official** distance.