Lesson Share Document – Morgan County Schools RE-3

Grade level(s): 4th		Big mathematical idea(s) addressed by this lesson: Measures of central tendency	Time Needed: 2 days
Objective(s):	What will the students be able to do as a result of this lesson/activity?	After the completion of the lesson, students will be able to *find the mean, median, mode, and range from a list of data. *compare data sets using measures of central tendency.	
	What mathematical practice does this lesson/activity provide?		
Materials needed: Marker boards, data cards, bike race worksheet, calculators, Enrichment worksheet 14.3 and 10.5			
Description of lesson / activity: Please include with the description teacher/student actions, questions asked by teacher, etc.	Lesson set-up: What has to happen before the lesson/activity?	Review mean, median and mode with the students.	
	During the lesson/activity.	Students use the data cards and use mean, median and mode to decide which section goes with their data set. The next day students analyze bike race data to figure out who won the race.	
	Conclusion: What makes an effective wrap-up for this lesson/activity?	Students sharing work and teacher led discussion at the end. Specific questions to ask are in the lesson plans.	
Measure of success: How is a teacher able to tell if this lesson was a success and that the objective was met? There is formative assessments written in the plans. Teachers monitor the class marking students as proficient or improving. Also, students write to compare mean, median and mode.			
Any other helpful tips for successful execution? Read the lesson plan.			

The Happyvale Elementary School 6th Grade Bike Race

Class A

	Time (min)
Student 1	44
Student 2	57
Student 3	41
Student 4	39
Student 5	63
Student 6	54
Student 7	56
Student 8	56
Student 9	57
Student 10	62
Student 11	54
Student 12	64

Class B

	Time (min)
Student 1	37
Student 2	56
Student 3	56
Student 4	52
Student 5	70
Student 6	64

Class C

	Time (min)
Student 1	67
Student 2	50
Student 3	50
Student 4	47
Student 5	52
Student 6	45
Student 7	45
Student 8	96
Student 9	86
Student 10	53
Student 11	120
Student 12	47
Student 13	41
Student 14	40
Student 15	56

Name_____Rm_____

Mean	9	Data set:_____
Median	10	Work:
Mode	no mode	
Range	14	

Mean	7	Data set:_____
Median	5	Work:
Mode	1	
Range	19	

Mean	4	Data set:_____
Median	5	Work:
Mode	0	
Range	8	

Mean	9	Data set:_____
Median	9	Work:
Mode	8	
Range	3	

LESSON PLANS

Grade: 4
Math Topic: Mean, Median, Mode, Range

Lesson Objectives: After the completion of the lesson, students will be able to
*find the mean, median, mode, and range from a list of data.
*compare data sets using measures of central tendency.

Colorado Model Content Standards:
Mathematics Standard 3: Students use data collection and analysis, statistics, and probability in problem-solving situations and communicate the reasoning used in solving these problems.
Benchmarks K-4 3.1: Construct, read, and interpret displays of data including tables, charts, pictographs, and bar graphs.
Benchmarks K-4 3.2: Interpret data using the concepts of largest, smallest, most often, and middle.

NCTM Standards:
Data Analysis and Probability: Select and use appropriate statistical methods to analyze data.
Grades 3-5 Expectations: Use measures of center, focusing on the median, and understand what each does and does not indicate about the data set.

District Goals:
Teach the book. Mean, median, mode, and range are in the fourth grade book, so I need to teach mean, median, mode, and range to my fourth graders.

Materials:
*marker boards/markers
*data set cards

A: 2, 5, 10, 12, 16	(Mean 9 Median 10 Mode no mode Range 14)
B: 1,1,5,8,20	(Mean 7 Median 5 Mode 1 Range 19)
C: 0,0,5,7,8	(Mean 4 Median 5 Mode 0 Range 8)
D: 8,8,8,9,9,10,11	(Mean 9 Median 9 Mode 8 Range 3)
E: 3,4,4,4,6,6,8,9,9,9,15	(Mean 7 Median 6 Mode 4,9 Range 12)
F: 7,15,17	(Mean 13 Median 15 Mode no mode Range 10)
G: 1,1,2,3,6,6,7,7,7,10	(Mean 5 Median 6 Mode 7 Range 9)
H: 1,3,3,5,6,18	(Mean 6 Median 4 Mode 3 Range 17)

*copy of Happyvale Bike Race results, one per student
*calculator, two per group
*worksheet copies of Enrichment 14.3 and 10.5 modified so that the two sides of the comparison do not have the same number of data points in the list

Prior Knowledge:
*Students are introduced to median, mode, and range in third grade.
*Students will have completed a sharing activity that gets at the concept of mean although that term may not have been used yet.
*Students will be familiar with a basic calculator.

Day 1

BEFORE

5 minutes
Review from yesterday with a problem on the board: Fernando has 5 pencils, Jennifer has 7 pencils, and Chris and Nathan each have 2 pencils. They want to share their pencils equally. How many pencils should each student have after they share?
Groups can discuss, draw, and write answers on marker boards. Share as a class.

DURING

30 minutes
Remind students that last year, they learned about median, mode, and range. Give groups a minute to discuss what they remember about those ideas. Make sure each group knows those terms have to do with lists of numbers, but don't explain terms yet.
Explain to students that they will get a data card set and a paper with the median, mode, and range listed for an unknown group of numbers. Each section will also have a number listed for the mean. Groups need to figure out which section goes with their data set and how each number was found. They can use calculators, but need to keep a record of their thinking. When they have one card set done, they will bring it to me to switch for another to see if the ideas they had seem to keep working or if they need to be refined. Groups will share as necessary to keep things moving for all.

15 minutes
Allow groups to share ideas on the board and show how one set of data fits their ideas. Allow other groups to comment.

AFTER

10 minutes
Have students do mathematical writing to explain "How are median and mean alike? How are they different? Why do some data sets have no mode? What information does the range give you?"
Collect those papers to read before tomorrow's lesson.

Adjustments:

*Arrange groups to accommodate students likely to need extra help.
*For groups with a good grasp of concepts, allow them to continue to match the card sets to the sections of the paper.
*For groups that are struggling, point to the section that matches their card set and ask them to figure out why it's a match.
*Most groups will get through about 4 data sets, but 8 sets will be available, 2 sets with an even number of data points for those groups that need more of a challenge (median).

Formative Assessment:
As students work on data sets, monitor with class list in hand. Mark each student as improving, proficient, or advanced. Provide additional support for those still at the improving level. This takes place DURING lesson.
Read students' writing and divide into piles for improving, proficient, or advanced. Compare to list made during class. Plan heterogeneous groupings for tomorrow's lesson. Make a note of students who need extra help. This takes place AFTER the lesson.

Day 2

BEFORE

10 minutes
Review meanings discovered the day before for median, mode, range, and mean. Add words to math vocabulary notebooks.

DURING

30 minutes
Explain that students have a friend who participated in a bike race with part of his/her class. They will now analyze the results to see which class won, and if the friend's class came in first. Each student gets a Bike Race results sheet, marked with the class their friend is in. These are distributed so that different students within one group are routing for different classes, so that each group looks at more than one option. They will be trying to figure out what the terms mean in this application. Calculators can be used, but thinking needs to be recorded. Students will need to be prepared to defend their thinking about which class should be labeled the winner.
As groups will finish at different times, have math book series worksheet Enrichment 14.3 ready to hand out to groups to work on as they finish.

15 minutes
Allow students to take turns declaring the winner and explaining why this is so. During the discussion, bring out mean and median. Discuss in depth what each says about the data. Also discuss what range and mode meant in this situation and whether or not they were useful in determining the winner. Look for discussion of first across line, last across line, how many students showed up to participate for each class, etc. Questions can be posed about a Class D that had one student show up. How does that affect the “winner” at various times for that student? What if just 2 students show up for Class D?

AFTER

5 minutes
Explain homework, modified worksheet Enrichment 10.5, comparing means of sets of data. Calculators are allowed, as long as they record results as they work. The Enrichment 14.3 that they started on the back is good for bonus if they wish to complete it.

Adjustments:

*Allow students who tend to struggle to speak first when declaring the winner so that they get a chance before all their ideas have been taken.
*Monitor struggling students during group work to make sure they are getting the content and are able to explain their point of view.
*Enrichment 14.3 provides a challenge for those ready for it.

Summative Assessment:
Check student worksheets. These topics will be carried into the next lessons, analyzing data on line plots and stem-and-leaf plots, so it will be important for students to have a basic understanding before trying to apply the ideas to various graphs.
This takes place AFTER the lesson.

Comments:
While for the most part I tried to keep the data sets to numbers using basic facts, the bicycle problems are much bigger. Students will be able to use long division or calculators to work with the data, making the concepts more accessible to all instead of just those good at long division. Students will be able to find answers for these topics, but we will also move into the idea of why you would want to find some of these answers.

References:

*Data set card activity from *Implementing Standards-Based Mathematics Instruction: A Casebook for Professional Development* by Stein, Smith, Henningsen, Silver.

*Happyvale Bike Race from MFT 517 by C. Dollard.

*Worksheets with Houghton Mifflin Math series.

Mean	7	Data set:_____
Median	6	Work:
Mode	4, 9	
Range	12	

Mean	13	Data set:_____
Median	15	Work:
Mode	no mode	
Range	10	

Mean	5	Data set:_____
Median	6	Work:
Mode	7	
Range	9	

Mean	6	Data set:_____
Median	4	Work:
Mode	3	
Range	17	