

Diagnostic Assessment #2 for Statistical Sleuths



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Assessment Instructions
Diagnostic Assessment #2 - Constructed Response
Collecting Clues and Analyzing Answers

Duration: 40 - 50 minutes

Standard(s) Assessed:

MA.E.1.3.1.8.2, MA.E.1.3.2.8.1, MA.E.1.3.2.8.3

Description of Assessment Activity:

Given sets of collected data, students organize information in tables, and construct bar and circle graphs and box-and-whisker graphs to analyze the data. Students are asked to explain why data is often organized in different ways (bar, circle, and line graphs), and when the range, average, median, and mode can be used to interpret collected data. After organizing, displaying, and analyzing data, students draw conclusions that can be supported by the data in order to solve a problem.

Teacher Directions:

Prepare separate copies of Collecting Clues and Analyzing Answers, which determine students' comprehension of the process of data collection and analysis. Reassure the students that their diagnostic assessments will provide information for you about needed instruction and will not be scored for a grade.

Return Diagnostic Assessment #2 to students once the answers are assessed.

Student Directions:

Mike, one of the data detectives in our unit, has been investigating the homework habits of his classmates in order to answer the following question: How can I make a good grade on my homework? The results of his investigation are presented on the following pages. Read each section carefully and follow the directions given. Help Mike analyze the clues he has collected so he can find an answer to his perplexing problem!

Scoring Method & Criteria:

See the Scoring Criteria for Diagnostic Assessment #2, Short-Answer Question Rubric and Total Points Awarded for Diagnostic Assessment #2 to determine students' prior knowledge.

Diagnostic assessments are designed to be challenging assessments to gauge what your students know or do not know about the topic. Make sure students understand this. Do not worry if students do not know the answers. If they know all the answers, then there is no reason to teach this unit. Do not allow your students to spend too much time agonizing over the answers if they do not know them.

Scoring Criteria for Diagnostic Assessment #2

These point values are available to help the teacher gauge student performance based on a scale from 0-100. (A sample score sheet has been attached. Remember this assignment is a diagnostic assessment of each student's prior knowledge and should **not** be counted for a grade.)

Table 1

- (No points): Students correctly organize the results of the survey and display the data in a frequency table. This section should not be formally scored because creating a table is not taught or assessed in this unit. However, this table does allow a student to organize his/her thoughts and should be used as a tool.

Part A

- (4 points): Students chose a reasonable title. (Ex: Homework Hints and Helps)
- (4 points): Students chose an appropriate scale.
- (4 points): Students labeled each of the four bars of the graph.
- (4 points): Students accurately graphed the four bars of data.

Part B

- (8 points): Four points per correct, comparative statement. For example, students may have noted that most of the students advised Mike to check his work or ask for help. Also, very few students advised Mike to copy someone else's work. (Statements may vary but should be supported by the data presented.)

Table 2

- (8 points): Two points for each correct completion of the Number of Students for the type of Advice Given. (9-12-3-6)
- (8 points): One point for each correct Fraction of the Class ($\frac{9}{30}$, $\frac{12}{30}$, $\frac{3}{30}$, and $\frac{6}{30}$) and its simplified version ($\frac{3}{10}$, $\frac{4}{10}$, $\frac{1}{10}$, and $\frac{2}{10}$). (For the diagnostic assessment, students will probably not reduce the fractions, but on the post-test this should be done in order to make the graphing easier by using a common fraction, such as tenths.)

Part C

- (4 points): Students chose a reasonable title.
- (4 points): Students labeled the four parts of the circle graph.
- (10 points): Students accurately graphed the data on the circle graph. (Different colors or designs may be used to distinguish each part of the circle graph, if desired.)

Part D

- (8 points): Four points per correct, comparative statement. For example, students may have noted that 9/10 of the class gave Mike good advice on how to improve his homework grade. Also, 1/2 of the class advised Mike to either check his work or follow directions in order to improve his grade. (Statements may vary but should be supported by the data presented.)

Analyzing Answers (#1-4)

(14 points): Use the highlighted area of the Short-Answer Question Rubric(SAQR) titled **Explaining and Interpreting Your Answer** to assess whether the explanation is **correct and complete**. Weigh each point value from Explaining and Interpreting Your Answer X 2. (for example, did students explain their answer so correctly and completely that someone else can follow their reasoning? If so, they would score 2 points on the SAQR which would then be multiplied by 2 for a final score of 4 points). Possible correct and complete answers for the following items: (1 and 2) The bar graph helps to show comparison, while the circle graph does a better job of showing percentages and relationships of the part to the whole, (3) The line graph was not appropriate because it is used to display data that changes over time, and (4) A box-and-whisker graph shows the median, quartiles, and range of the data set. By looking at the spread of the data, a box-and-whisker graph helps summarize large amounts of data into an easily read diagram.

Analyzing Answers (#5) - Part B

- (12 points): One point for each correct value given. See table below for correct answers:

Measures of Central Tendency Type of student response	Mean	Median	Mode
Check your work	10.2	10	12
Ask for help	13	13	12 and 14
Copy someone else	2.6	3	3
Follow directions	5	5	4 and 6

Analyzing Answers (#5) - Part C

- (8 points): Use the Long-Answer Question Rubric to assess students' responses to the prompt: Based on the measures of central tendency identified above, decide which method a student should use to make good grades on their homework. (See the Unit Plan associated file.) Explain if it was the mean, median, or mode that led you to your decision. (A possible answer: - By **Asking for Help** a student could make good grades on homework. The highest number of responses for this type of Homework Hints and Helps was 14, which was also the **mode** for that category.

Total Points Awarded on Diagnostic Assessment #2

Collecting Clues and Analyzing Answers		
Student:		
Table 1	___ no points available	Comments:
Part A	___ out of 16 points	Comments:
Part B	___ out of 8 points	Comments:
Table 2	___ out of 8 points ___ out of 8 points	Comments:
Part C	___ out of 18 points	Comments:
Part D	___ out of 8 points	Comments:
AA: #1-4	AA#1 ___ out of 3 points AA#2 ___ out of 3 points AA#3 ___ out of 3 points AA#4 ___ out of 5 points	Comments:
AA:# 5	___ out of 20 points	Comments:
TOTAL POINTS:	___ out of 100 points	Comments:

These point values are available to help the teacher gauge student performance based on a scale from 0-100. (Remember this assignment is a diagnostic assessment of each student's prior knowledge and should **not** be counted for a grade.)

Use the information acquired through these diagnostic assessments to determine what students need for further instruction. Diagnosing students' needs should drive all instruction.

Short-Answer Question Rubric

	2 points	1 point	0 points
Answering the Problem	You arrive at a correct answer.	You arrive at a partially correct answer.	Your answer was incorrect or not given at all.
Showing Your Work	You follow the given directions in order to show how you solved the problem. All of the steps show correct math procedures.	You follow the given directions in an attempt to show how the problem was solved. Some of the steps show correct math procedures.	You make no attempt to show how you solved the problem, or all of the steps shown are incorrect.
Explaining and Interpreting Your Answer	You explain how you solved the problem so <u>correctly</u> and completely that someone else can find the answer. When asked, you make true statements about the given answer.	You explain how you solved the problem, but leave out steps that are needed to guide the reader to the correct answer. When asked, you attempt to make true statements about the given answer.	Your explanations and interpretations are not correct, understood, or given.
Remember:	<i>A score of two means your work shows a complete understanding of the math concepts and procedures used in the problem.</i>	<i>A score of one means your work shows a partial understanding of the math concepts and procedures used in the task.</i>	<i>A score of zero means your work was completely incorrect, not understood, or that you gave no response at all.</i>

Diagnostic Assessment #2

Collecting Clues and Analyzing Answers

COLLECTING CLUES

Mike surveyed the homework habits of his classmates. He wants to answer the following question: How can I make a good grade on my homework? The results of his investigation are shown below.

Homework Hints and Helps

Student	Advice
Fred	Check your work
Sally	Ask for help
John	Copy someone else
Susan	Ask for help
Mark	Check your work
Elizabeth	Follow directions
Spencer	Follow directions
Julie	Check your work
Cynthia	Ask for help
Jean	Ask for help
Peggy	Ask for help
Jack	Follow directions
Mackenzie	Ask for help
Carol	Check your work
Michelle	Copy someone else

Student	Advice
Ben	Ask for help
Tom	Copy someone else
Paul	Ask for help
George	Check your work
Kathy	Ask for help
Pat	Check your work
Zane	Follow directions
Mary	Check your work
Tim	Ask for help
Sam	Follow directions
Marie	Follow directions
Eddie	Ask for help
Ethan	Ask for help
Ken	Check your work
Dan	Check your work

Table 1

Organize the results of the survey in a table.

Mike then graphed the survey results of his thirty classmates another way.

Table 2

Use the data from Table 1 to complete Table 2.

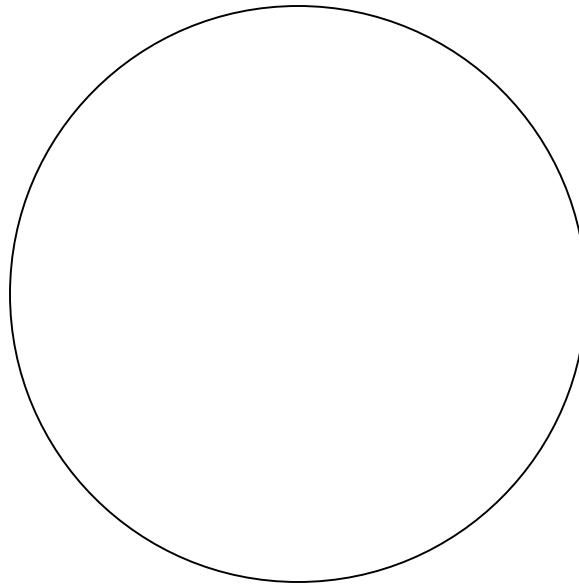
Homework Hints and Helps

Advice Given	Number of Students	Fraction of the Class
Check your work		
Ask for help		
Copy someone else		
Follow directions		

Part C: Represent the data on a circle graph.

Be sure to

- Write a title for your graph _____
- Label all the parts



Part D: On the lines below, write two statements that summarize the students' advice provided in the Table **Homework Hints and Helps** and displayed in the graph above.

1) _____

2) _____

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ANALYZING ANSWERS

1. Why did Mike organize the survey results in a **bar graph**?

2. Why did he choose to organize them again in a **circle graph**?

3. Why **didn't** Mike make a **line graph** of the survey results?

4. Explain how different displays of data can lead to different interpretations.
(Examples of data displays include circle, line, bar, and box-and-whisker graphs.)

THINK
SOLVE
EXPLAIN

5. In order to avoid a biased sample, Mike decided to gather data from four other classrooms from other areas of the United States as well. He planned to use the measures of central tendency (**mean, median, and mode**) to help him interpret the survey results. See the results of his findings on the *next* page.

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5. Part A:

Review the combined survey results from class A, B, C, D, and E (shown below).

Homework Hints and Helps (Survey #2)

	Class A (Survey #1)	Class B	Class C	Class D	Class E
Check Your Work	9	8	12	12	10
Ask for Help	12	14	12	13	14
Copy Someone Else	3	3	2	1	4
Follow Directions	6	4	5	4	6

Part B:

Determine the **mean**, **median**, and **mode** for each type of advice. Finally, write these measures in the tables provided below.

Check Your Work

Copy Someone Else

Mean=	Mean=
Median=	Median=
Mode=	Mode=

Ask for Help

Follow Directions

Mean=	Mean=
Median=	Median=
Mode=	Mode=

Part C:

Based on the measures of central tendency identified above, decide which method a student should use to make good grades on their homework. Explain if it was the mean, median, or mode that led you to your decision.

<u>THINK</u>
<u>SOLVE</u>
<u>EXPLAIN</u>

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