NCSC Math Activities with Scripted Systematic Instruction (MASSI): Middle School Data Analysis Progress Monitoring and Skills Test

The National Center and State Collaborative (NCSC) is applying the lessons learned from the past decade of research on alternate assessments based on alternate achievement standards (AA-AAS) to develop a multi-state comprehensive assessment system for students with significant cognitive disabilities. The project draws on a strong research base to develop an AA-AAS that is built from the ground up on powerful validity arguments linked to clear learning outcomes and defensible assessment results, to complement the work of the Race to the Top Common State Assessment Program (RTTA) consortia.

Our long-term goal is to ensure that students with significant cognitive disabilities achieve increasingly higher academic outcomes and leave high school ready for post-secondary options. A well-designed summative assessment alone is insufficient to achieve that goal. Thus, NCSC is developing a full system intended to support educators, which includes formative assessment tools and strategies, professional development on appropriate interim uses of data for progress monitoring, and management systems to ease the burdens of administration and documentation. All partners share a commitment to the research-to-practice focus of the project and the development of a comprehensive model of curriculum, instruction, assessment, and supportive professional development. These supports will improve the alignment of the entire system and strengthen the validity of inferences of the system of assessments.

These materials and documents were developed under the National Center and State Collaborative (NCSC) General Supervision Enhancement Grant and are consistent with its goals and foundations. Any changes to these materials are to be consistent with their intended purpose and use as defined by NCSC.

This document is available in alternative formats upon request.

NCSC is a collaborative of 15 states and five organizations.

The states include (shown in blue on map): Arizona, Connecticut, District of Columbia, Florida, Georgia, Indiana, Louisiana, Nevada, Pacific Assessment Consortium (PAC-6)[1], Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, and Wyoming.

Tier II states are partners in curriculum, instruction, and professional development implementation but are not part of the assessment development work. They are (shown in orange on map): Arkansas, California, Delaware, Idaho, Maine, Maryland, Montana, New Mexico, New York, Oregon, and U.S. Virgin Islands.

- District of Columbia
- Pacific Assessment Consortium (PAC-6)
- U.S. Virgin Islands
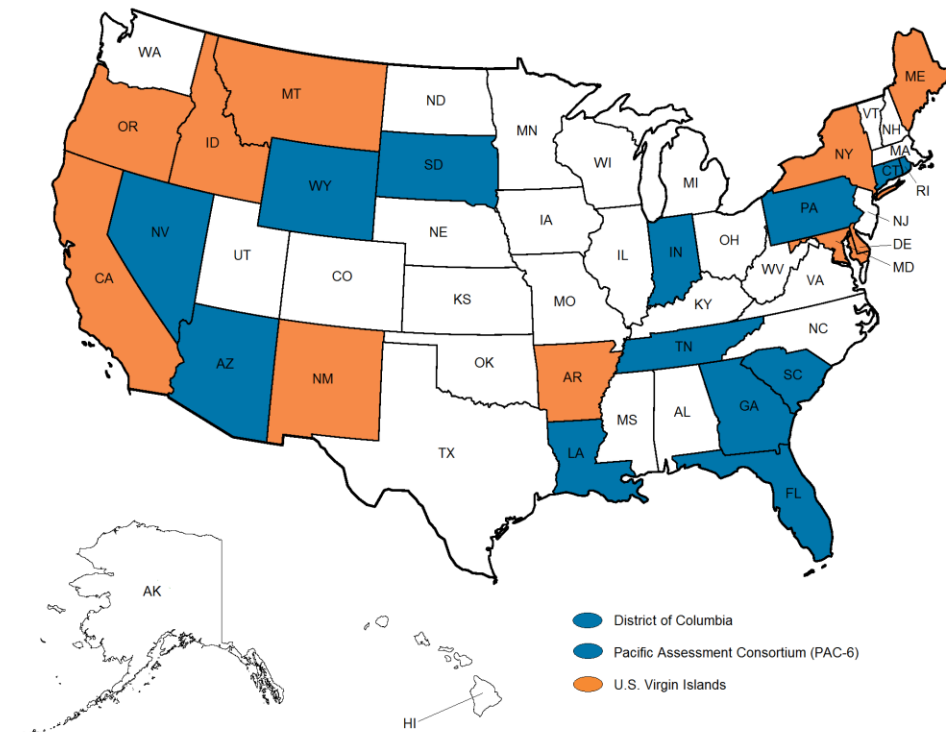
*Core partner states are blue in color and Tier II states are orange in color.

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[1] The Pacific Assessment Consortium (including the entities of American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Guam, Republic of Palau, and Republic of the Marshall Islands) partner with NCSC as one state, led by the University of Guam Center for Excellence in Developmental Disabilities Education, Research, and Service (CEDDERS).

National Center and State Collaborative

The five partner organizations include: The National Center on Educational Outcomes (NCEO) at the University of Minnesota, The National Center for the Improvement of Educational Assessment (Center for Assessment), The University of North Carolina at Charlotte, The University of Kentucky, and edCount, LLC.

National Center and State Collaborative

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July 2013

MASSI: Middle School Data Analysis

Options for Progress Monitoring/ Formative Assessment

1. Middle School Data Analysis Progress Monitoring (pg. 6-11): record student responses made during instruction on data sheet provided; teacher records each step correct during the lesson.

2. Middle School Data Analysis Skills Test (pg. 12-24): a brief, on demand performance assessment; could be given weekly to see if student has mastered this lesson; also helps student practice responding in a test format.

    a. NOTE: The Skill Test can be used as a baseline assessment to check for any skills the student may already have prior to beginning the MASSI.

    b. NOTE: The Skill Test can also be readministered to check for maintenance throughout the year.

Student Name: _____

Middle School Data Analysis Progress Monitoring

Directions: Score each step during instruction or as soon as the lesson is complete. Score the step as unprompted correct with a "+." Use a system to code level of prompting required for incorrect responses (e.g., V = verbal prompt, G = gesture, P = physical). Graph the number of unprompted correct responses to monitor progress.

BUILDING ESSENTIAL UNDERSTANDING: CONCEPT AND SYMBOLS: Identifying Highest and Lowest Value in a Data Set, Matching Source of Values on x axis with the Category of Related Data on the Table, Analyzing a Bar Graph for Greater/Less/Equal

Materials and Directions for Teacher	*Instructional Cue*	*Student Expected Response* Date:						
1. Give student the bar graph for 7th grade class president election results.	**"Show me who has the highest value; who got the most votes?"**	Student identifies Karim (e.g., by stating his name or pointing to his data).						
2. Give student the table for 7th grade class president election results.	**"Show me who has the highest value; who got the most votes?"**	Student identifies Karim (e.g., by stating his name or pointing to his data).						
3. Give student the bar graph for 7th grade class president election results.	**"Show me who has the lowest value; who got the least votes?"**	Student identifies Maya (e.g., by stating her name or pointing to her data).						
4. Give student the table for 7th grade class president election results.	**"Show me who has the lowest value; who got the least votes?"**	Student identifies Maya (e.g., by stating her name or pointing to her data).						
5. Give student the bar graph for 6th grade class president election results.	**"Show me who has the highest value; who got the most votes?"**	Student identifies Ruby (e.g., by stating her name or pointing to her data).						
6. Give student the table for 6th grade class president election results.	**"Show me who has the highest value; who got the most votes?"**	Student identifies Ruby (e.g., by stating her name or pointing to her data).						
7. Give student the bar graph for 6th grade class president election results.	**"Show me who has the lowest value; who got the least votes?"**	Student identifies Clara (e.g., by stating her name or pointing to her data).						
8. Give student the table for 6th grade class president election results.	**"Show me who has the lowest value; who got the least votes?"**	Student identifies Clara (e.g., by stating her name or pointing to her data).						
9. Teacher points to Amy on the 7th grade results table.	**"How many votes did Amy get?"**	Student states, points to, or otherwise indicates 23.						
10. Teacher points to Amy on the 7th grade results bar graph.	**"Now find Amy on the bar graph."**	Student points to Amy on the bar graph.						

11. Teacher points to Ben on the 7th grade results table.	"How many votes did Ben get?"	Student states, points to, or otherwise indicates 29.						
12. Teacher points to Ben on the 7th grade results bar graph.	"Now find Ben on the bar graph."	Student points to Ben on the bar graph.						
13. Teacher points to Karim on the 7th grade results table.	"How many votes did Karim get?"	Student states, points to, or otherwise indicates 35.						
14. Teacher points to Karim on the 7th grade results bar graph.	"Now find Karim on the bar graph."	Student points to Karim on the bar graph.						
15. Teacher points to Esperanza on the 7th grade results table.	"How many votes did Esperanza get?"	Student states, points to, or otherwise indicates 29.						
16. Teacher points to Esperanza on the 7th grade results bar graph.	"Now find Esperanza on the bar graph."	Student points to Esperanza on the bar graph.						
17. Teacher points to Maya on the 7th grade results table.	"How many votes did Maya get?"	Student states, points to, or otherwise indicates 19.						
18. Teacher points to Maya on the 7th grade results bar graph.	"Now find Maya on the bar graph."	Student points to Maya on the bar graph.						
19. Now remove the 7th grade materials and present the 6th grade results table and bar graph. Teacher points to Maya on the table.	"Now let's work on the 6th graders' election results How many votes did Anya get?"	Student states, points to, or otherwise indicates 25.						
20. Teacher points to Anya on the 6th grade results bar graph.	"Now find Anya on the bar graph."	Student points to Anya on the bar graph.						
21. Teacher points to Ali on the 6th grade results table.	"How many votes did Ali get?"	Student states, points to, or otherwise indicates 27.						
22. Teacher points to Ali on the 6th grade results bar graph.	"Now find Ali on the bar graph."	Student points to Ali on the bar graph.						
23. Teacher points to Clara on the 6th grade results table.	"How many votes did Clara get?"	Student states, points to, or otherwise indicates 21.						
24. Teacher points to Clara on the 6th grade results bar graph.	"Now find Clara on the bar graph."	Student points to Clara on the bar graph.						
25. Teacher points to Liam on the 6th grade results table.	"How many votes did Liam get?"	Student states, points to, or otherwise indicates 25.						
26. Teacher points to Liam on the 6th grade results bar graph.	"Now find Liam on the bar graph."	Student points to Liam on the bar graph.						
27. Teacher points to Ruby on the 6th grade results table.	"How many votes did Ruby get?"	Student states, points to, or otherwise indicates 32.						
28. Teacher points to Ruby on the 6th grade results bar graph.	"Now find Ruby on the bar graph."	Student points to Ruby on the bar graph.						

29. Student has 7th grade bar graph.	**"Whose data is greater than Esperanza?"**	Student states, points to, or otherwise identifies Karim.					
30. Student has 7th grade bar graph.	**"Find one student whose data is less than Ben's."**	Student states, points to, or otherwise identifies Amy or Maya.					
31. Student has 7th grade bar graph.	**"Whose data is equal to Esperanza?"**	Student states, points to, or otherwise identifies Ben.					
32. Student has 6th grade bar graph.	**"Now let's look at the 6th graders. Whose data are less than Liam's?"**	Student states, points to, or otherwise identifies Clara.					
33. Student has 6th grade bar graph.	**"Whose data is greater than Ali's?"**	Student states, points to, or otherwise identifies Ruby.					
34. Student has 6th grade bar graph.	**"Whose data is equal to Liam?"**	Student states, points to, or otherwise identifies Anya.					
		NUMBER CORRECT:					

6th BUILD A GRADE ALIGNED COMPONENT: Given a Data Set, Matching Statements for Range, Average (Mean), and Finding Mode and Median (7th & 8th SYMBOL USE)

35. Give each student the 7th grade election results table and a blank range equation.	**"Find the range for the 7th grade set of data."**	Student writes, stamps, or otherwise identifies the highest value (35) in the corresponding place in the equation.					
36. See above.	Wait for students to independently initiate this step or say **"What's next?"**	Student writes, stamps, or otherwise identifies the lowest value (19) in the corresponding place in the equation.					
37. See above.	Wait for students to independently initiate this step or say **"Now solve for the range."**	Student subtracts 35-19 to get the correct answer (16) and writes it in the equation.					
38. Give each student the 6th grade election results table and a blank range equation.	**"Good work finding the range for 7th grade, now find the range for the 6th grade set of data."**	Student writes, stamps, or otherwise identifies the highest value (32) in the corresponding place in the equation.					
39. See above.	Wait for students to independently initiate this step or say **"What's next?"**	Student writes, stamps, or otherwise identifies the lowest value (21) in the corresponding place in the equation.					
40. See above.	Wait for students to independently initiate this step or say **"Now solve for the range."**	Student subtracts 35-19 to get the correct answer (11) and writes it in the equation.					
41. Give each student the 7th grade election results table, a blank average equation, and a calculator.	**"Find the average/mean for the 7th grade set of data. First you need to find the sum of the values."**	Student adds the values using the calculator to find the sum (135) and writes, stamps, etc. in the corresponding place in the equation.					

42. See above.	**"Now you need to count how many values there were in the data set. That means how many students were in the election."**	Student counts five values and writes, stamps, etc. the number of values (5) in the corresponding place in the equation.						
43. See above.	**"Ok, now use your calculator to solve for the average or mean."**	Student enters 135 into the calculator, presses divide, enters 5, and presses equals to get the average (27) and writes, stamps, etc. the average (27) in the corresponding place in the equation.						
44. Give each student the 6th grade election results table, a blank average equation, and a calculator.	**"Now find the average/mean for the 6th grade set of data. First you need to find the sum of the values."**	Student adds the values using the calculator to find the sum (130) and writes, stamps, etc. in the corresponding place in the equation.						
45. See above.	**"Now you need to count how many values there were in the data set. That means how many students were in the election."**	Student counts five values and writes, stamps, etc. the number of values (5) in the corresponding place in the equation.						
46. See above.	**"Ok, now use your calculator to solve for the average or mean."**	Student enters 130 into the calculator, presses divide, enters 5, and presses equals to get the average (26) and writes, stamps, etc. the average (26) in the corresponding place in the equation.						
47. Give each student the 7th grade election results table.	**"Find the mode of this data."**	Student vocally states or points to the mode (29).						
48. Give each student the 6th grade election results table.	**"Find the mode of this data."**	Student vocally states or points to the mode (25).						
49. Give each student the 7th grade election results table.	**"Find the median of this data."**	Student puts the numbers in order (either by writing them or using Velcro numbers or number stamps, etc.).						
50. See above.	Wait for the student to initiate this step or say **"Keep going."**	Student identifies the middle number (29).						
51. Give each student the 6th grade election results table	**"Find the median of this data."**	Student puts the numbers in order (either by writing them or using Velcro numbers or number stamps, etc.).						
52. See above.	Wait for the student to initiate this step or say **"Keep going."**	Student identifies the middle number (25).						
		NUMBER CORRECT:						

7th BUILD A GRADE ALIGNED COMPONENT: Analyzing a Bar Graph to Make Comparative Inferences
8th SYMBOL USE: Analyzing a Bar Graph to Make Comparative Inferences

53. Give each student the bar graph for 7th grade showing the votes divided by class.	**"Did more of Mrs. Boswell's students or Ms. Thompson's students vote for Amy?"**	Student says, points to, or otherwise identifies Ms. Thompson's students.					
54. See above.	**"Did more of Mrs. Boswell's students or Ms. Thompson's students vote for Ben?"**	Student says, points to, or otherwise identifies Mrs. Boswell's students.					
55. See above.	**"Did more of Mrs. Boswell's students or Ms. Thompson's students vote for Karim?"**	Student says, points to, or otherwise identifies Ms. Thompson's students.					
56. See above.	**"Did more of Mrs. Boswell's students or Ms. Thompson's students vote for Esparanza?"**	Student says, points to, or otherwise identifies Ms. Thompson's students.					
57. See above.	**"Did more of Mrs. Boswell's students or Ms. Thompson's students vote for Maya?"**	Student says, points to, or otherwise identifies Ms. Thompson's students.					
58. See above.	**"Did more of Mrs. Boswell's students or Ms. Thompson's students vote in all?"**	Student says, points to, or otherwise identifies Ms. Thompson's students.					
59. Give each student the bar graph for 6th grade showing the votes divided by class	**"Now let's look at the 6th grade results. The blue bars represent Mr. Green's students' votes and the red bars represent Ms. Joy's students' votes. Did more of Mr. Green's students or Ms. Joy's students vote for Anya?"**	Student says, points to, or otherwise identifies Ms. Joy's students.					
60. See above.	**"Listen to this next question carefully. Did fewer of Mr. Green's students or Ms. Joy's students vote for Ali?"**	Student says, points to, or otherwise identifies Mr. Green's students.					
61. See above.	**"Did fewer of Mr. Green's students or Ms. Joy's students vote for Clara?"**	Student says, points to, or otherwise identifies Mr. Green's students.					
62. See above.	**"Did more of Mr. Green's students or Ms. Joy's students vote for Liam?"**	Student says, points to, or otherwise identifies Ms. Joy's students.					
63. See above.	**"Did more of Mr. Green's students or Ms. Joy's students vote for Ruby?"**	Student says, points to, or otherwise identifies Ms. Joy's students.					

| 64. See above. | **"Did more of Mr. Green's students or Ms. Joy's students vote in all?"** | Student says, points to, or otherwise identifies Ms. Joy's students. | | | | | |
| | | NUMBER CORRECT: | | | | | |

8th BUILD A GRADE ALIGNED COMPONENT: Analyzing a Table with Bivariate Data to Select an Appropriate Claim about the Data

65. Student has the 7th grade results table showing number of hours campaigning and votes received. Can give response options if needed.	**"Is there a relationship between the number of hours spent campaigning and the number of votes each candidate received?"**	Student states that there is no relationship between the number of hours spent campaigning and the greater number of votes received.					
66. Student has the 6th grade results table showing number of hours campaigning and votes received. Can give response options if needed.	**"Let's look at the 6th grade data. Is there a relationship between the number of hours spent campaigning and the number of votes each candidate received?"**	Student states that the greater number of hours spent campaigning results in greater number of votes received.					
		NUMBER CORRECT:					

DATA ANALYSIS SKILL TEST 1: CONCEPT AND SYMBOLS

Note to teachers: It may be helpful to use a cover sheet of paper. Pull the cover sheet down far enough to show the model and read the text. Then, pull the sheet of paper down to show the problem and read the directions. Record "+" for an independent correct response or "-" for incorrect response beside number in blank.

____ **MODEL: Look at this bar graph. The highest value in the data set is dogs. That means that most students have dogs as pets.**
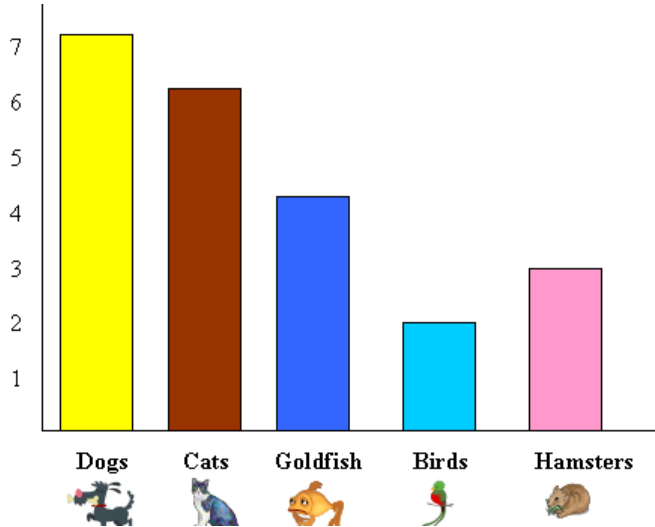
STUDENT PROBLEM: Circle (or otherwise mark) the highest value in this data set. What animal do most of these students have?
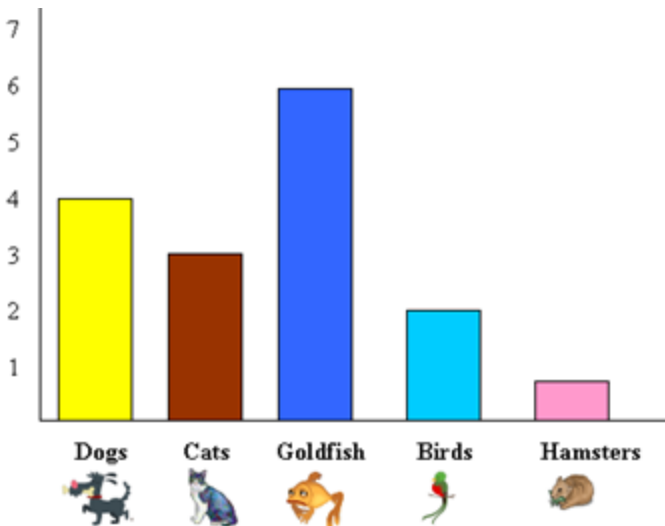
___ MODEL: Look at this bar graph. The lowest value in the data set is birds. That means that the least amount of students has birds as pets.
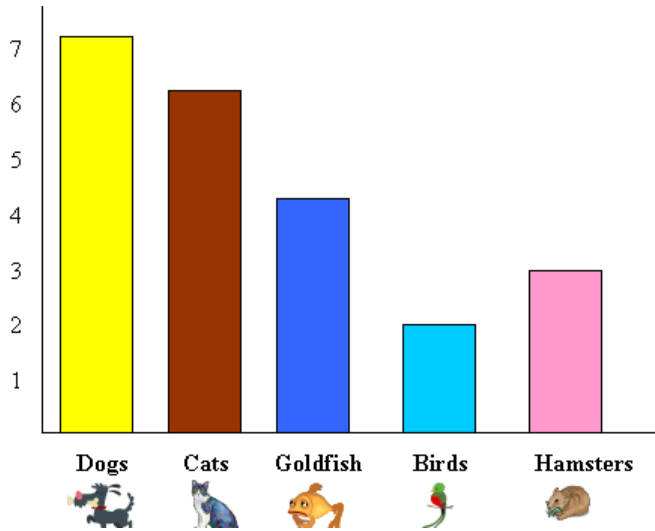
STUDENT PROBLEM: Circle (or otherwise mark) the lowest value in this data set. What animal do the least number of these students have?
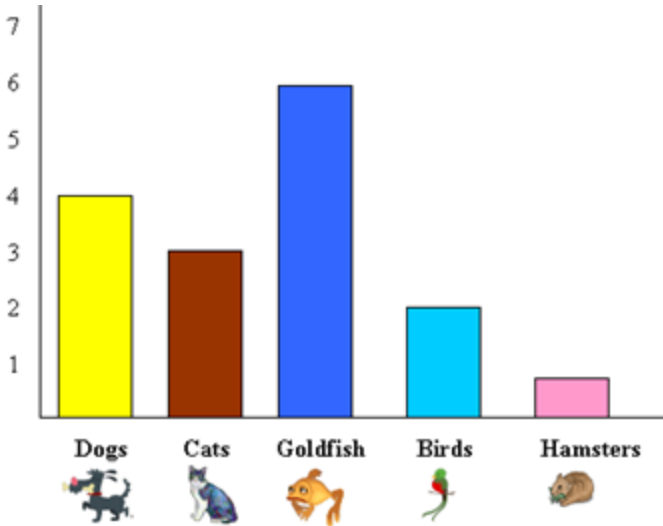
___ **MODEL: Look at this table. The highest value in the data set is 4 snowy days. That means that they had the most snowy days.**

Weather	Number of Days
☀ Sunny	1
🌧 Rainy	2
🌨 Snowy	4

STUDENT PROBLEM: Circle (or otherwise mark) the highest value in this data set. What type of weather did they have the most days of?

Weather	Number of Days
☀ Sunny	7
🌧 Rainy	3
🌨 Snowy	2

___ **MODEL: Look at this table. The lowest value in the data set is 1 sunny days. That means that they had the least amount of sunny days.**

Weather	Number of Days
Sunny	1
Rainy	2
Snowy	4

STUDENT PROBLEM: Circle (or otherwise mark) the lowest value in this data set. What type of weather did they have the fewest days of?

Weather	Number of Days
Sunny	7
Rainy	3
Snowy	2

___ **MODEL: Look at this table and bar graph. I have circled the number of people who have dogs on the table. Watch me circle the same data on the bar graph.**
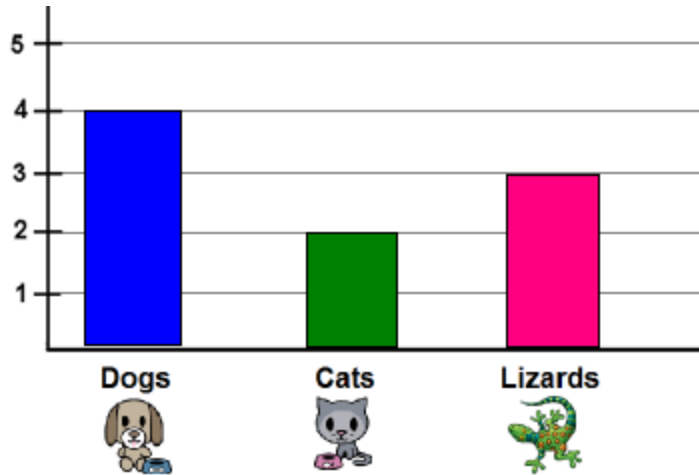
STUDENT PROBLEM: In this table the number of people who have lizards is circled on the table. Circle (or otherwise mark) the same data on the bar graph.
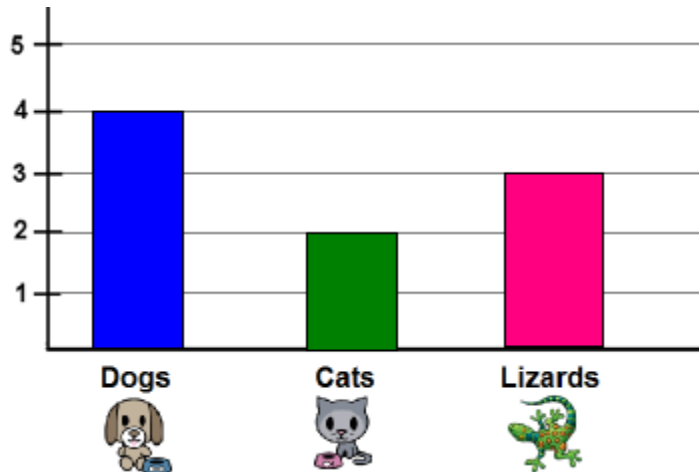
___ MODEL: Look at this bar graph. Watch me circle the data showing which type of weather they had the most days of?
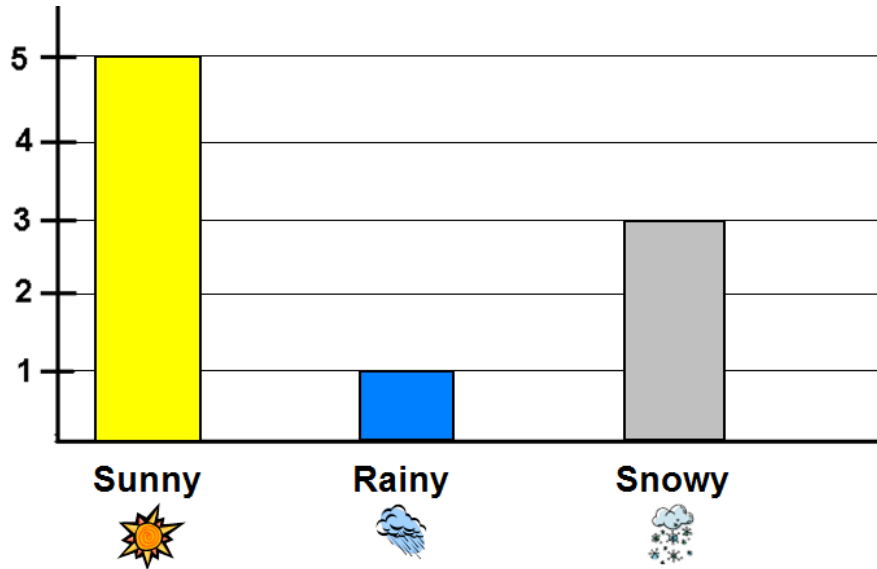
STUDENT PROBLEM: Circle (or otherwise mark) which type of weather did they have the most of?
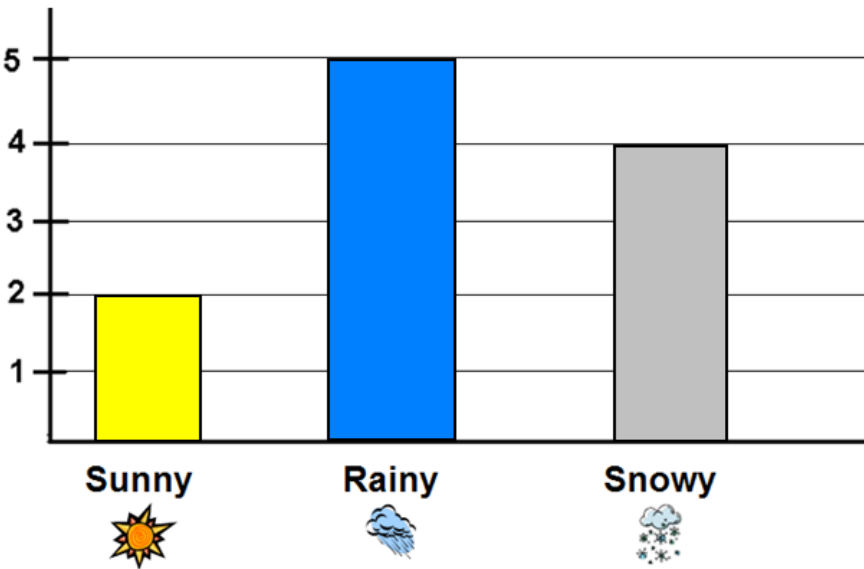
___ MODEL: Look at this bar graph. Watch me circle the data showing which type of weather they had the least days of?
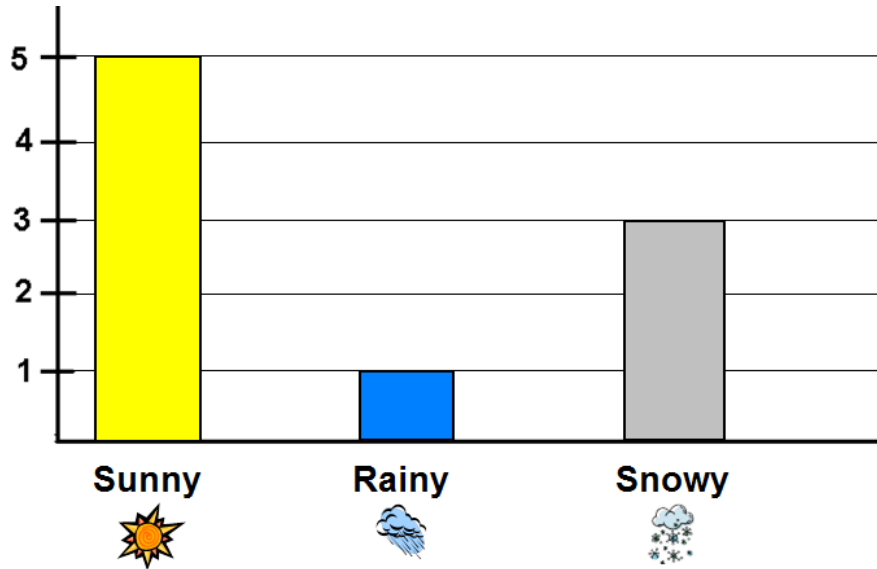
STUDENT PROBLEM: Circle (or otherwise mark) which type of weather did they have the least of?
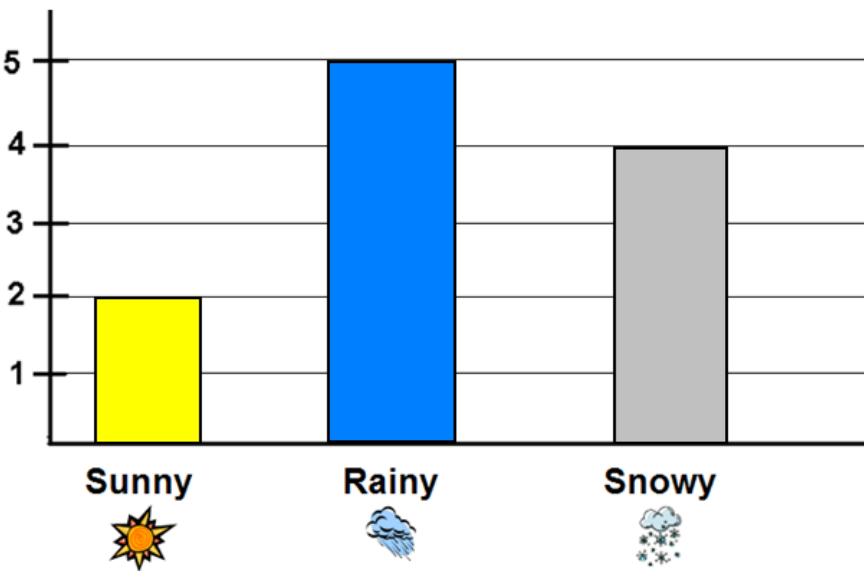
DATA ANALYSIS SKILLS TEST 2: Given a Data Set, Matching Statements for Range, Average (Mean), and Finding Mode and Median

__ **Find the range of this data set.**

Day of the week	Number of lunches served in cafeteria
MONDAY Monday	46
TUESDAY Tuesday	62
WEDNESDAY Wednesday	43
THURSDAY Thursday	31
FRIDAY Friday	43

_____ - _____ = _____
highest value   lowest value   range

__ Find the mean/average of this data set.

Day of the week	Number of lunches served in cafeteria
MONDAY Monday	46
TUESDAY Tuesday	62
WEDNESDAY Wednesday	43
THURSDAY Thursday	31
FRIDAY Friday	43

List values and add here:

+

_____ / _____ = _____
   sum   number of values   average

__ **Find the mode of this data set.**

Day of the week	Number of lunches served in cafeteria
MONDAY Monday	46
TUESDAY Tuesday	62
WEDNESDAY Wednesday	43
THURSDAY Thursday	31
FRIDAY Friday	43

__ **Find the median of this data set.**

Day of the week	Number of lunches served in cafeteria
MONDAY Monday	46
TUESDAY Tuesday	62
WEDNESDAY Wednesday	43
THURSDAY Thursday	31
FRIDAY Friday	43

DATA ANALYSIS SKILL TEST 3: Analyzing a Bar Graph to Make Comparative Inferences

Use the bar graph to answer the following questions. Circle your answers.
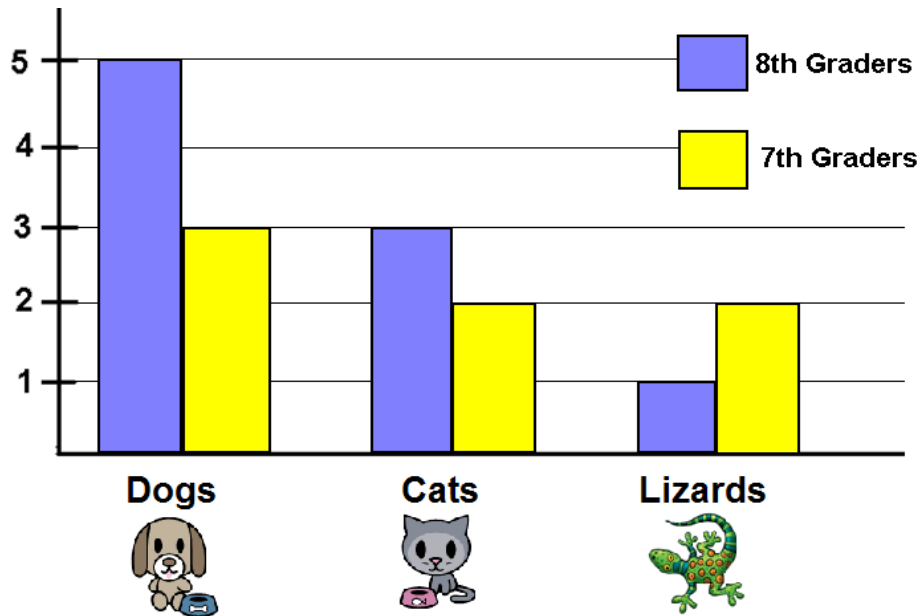
____ Did more 8th graders or 7th graders vote for dogs?

      8th graders   7th graders

____ Did fewer 8th graders or 7th graders vote for cats?

      8th graders   7th graders

____ Did more 8th graders or 7th graders vote for lizards?

      8th graders   7th graders

____ Did more 8th graders or 7th graders vote in all?

      8th graders   7th graders

DATA ANALYSIS SKILL TEST 4: Analyzing a Table with Bivariate Data to Select an Appropriate Claim about the Data

Analyze the bivariate data below. Is there a relationship between the number of hours studied and the grades students got on their biology exam?

Student	Hours Studied	A+ Grade on Biology Exam
Joe	1	80
Betsy	1	85
Andrew	2	88
Julia	3	93
Tom	4	97
Jenny	5	100

The more hours spent studying resulted in a higher grade.	The more hours spend studying resulted in a lower grade.	There is no relationship between the hours spent studying and the grades received.

Analyze the bivariate data below. Is there a relationship between the number of hours a sub shop is open and the number of subs they sold?

Day of the week	Hours Open	Subs Sold
SUNDAY Sunday	4	45
MONDAY Monday	4	50
TUESDAY Tuesday	6	30
WEDNESDAY Wednesday	8	35
THURSDAY Thursday	8	60
FRIDAY Friday	10	45
SATURDAY Saturday	12	35

The more hours open resulted in a more subs sold.	The more hours open resulted in a fewer subs sold.	There is no relationship between the hours open and the subs sold.