SITES-M Mathematics Challenge

Field Trip to the Zoo

Level: Grade Four

Standard: Data, Probability and Statistics

Learning Target: Focus on Data Representations

Checks for Understanding

0406.5.4 Develop and use stem-and-leaf plots.

State Performance Indicators

SPI 0406.5.1 Depict data using various representations (e.g., tables and bar graphs).

SPI 0406.5.3 Given a set of data or a graph, describe the distribution of the data using the median, range, or mode;

SITES-M Mathematics Challenge Packet

Focus on Data Representations Grade 4

Field Trip to the Zoo Data Representations

The purpose of the Mathematics Challenges is to provide opportunities for students to develop and demonstrate understanding of important mathematical concepts and standards. Each Challenge includes a set of tasks that require higher-order thinking skills. Because these types of tasks may be new for students and they will have varying levels of understanding, the student responses will vary. The Challenges and guiding questions were designed to help teachers plan their implementation and elicit, analyze, and act on evidence of student understanding.

You will be able to choose which Mathematics Challenge Packet to implement each month, according to the learning needs of your students and your teaching context. Each packet contains all the materials necessary to implement the Mathematics Challenge including a grade-appropriate Challenge, the Mathematics Challenge Meeting Protocol, and the Guiding Questions for Analyzing Student Responses to Mathematics Challenges.

For each Challenge, you will complete a six step process of planning, implementation, and analysis and reflection.

The Mathematics Challenge Process

Stage	Step	Task
Planning	Step 1.	Review the Mathematics Challenge Meeting Protocol
	Step 2.	Review and solve the Mathematics Challenge prior to your Professional Learning Community (PLC) meeting. Think about your responses to the guiding questions on the Meeting Protocol
	Step 3.	Hold your PLC meeting and discuss your responses to the Guiding Questions on the Meeting Protocol
Implementation	Step 4.	Implement the Mathematics Challenge with your class
Analysis and Reflection	Step 5.	For your own planning and documentation, respond to the Guiding Questions on the Analyzing Student Responses Protocol
	Step 6.	To help us improve the Challenges and to provide recommendations for teachers implementing them in future years, complete the Mathematics Challenge Feedback Log and provide copies of all student work to the Assessment Coordinator

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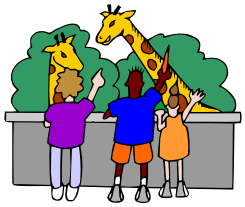
Mathematics Challenge Meeting Protocol

Each month, your Professional Learning Community will meet to discuss the implementation of one Mathematics Challenge. In preparation for your monthly meeting, please print and review this month's Mathematics Challenge, solve all tasks within the Challenge, and think about the guiding questions below. These questions will be used to facilitate a group discussion regarding the implementation of the upcoming Mathematics Challenge.

Guiding Questions for Implementing the Mathematics Challenges

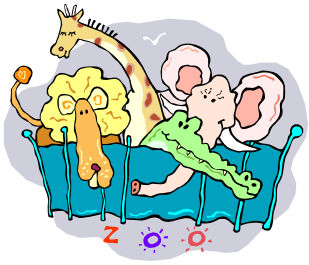
1. What is the title of the Challenge that you will use this month?
2. What skills or standards is this Challenge measuring?
3. Where does this Challenge fit within your curriculum? Within which unit?
4. At what point during the unit will you administer this Challenge (e.g., At the beginning of a unit to determine what students do or do not know, at the end of a unit to assess what students have or have not learned, in the middle of a unit to determine where to go next instructionally)?
5. How will your students complete this Challenge (e.g., individually, one-on-one, in small groups, as a class)? Why?
6. Are there any prerequisite skills, common misunderstandings, or vocabulary needs that you will have to address? What are they?
7. What difficulties do you anticipate your students will have with the Challenge? How will you address them?
8. Are these skills and difficulties different for special needs students, ELL students, etc.? How? Will you do anything different for these students? What?
9. How will you evaluate student responses (e.g., grade responses with the provided rubric, scan responses to identify common mistakes/misconceptions, have students evaluate one another's responses, have students evaluate their own response)?
10. What will student responses to this Challenge tell you about student understanding?
11. How might you use this evidence of student understanding to adapt your teaching and learning?
12. What other materials, resources, or support might you need? Where can you get them?
13. How can your colleagues assist you in the analysis of student understanding?
14. What other questions or concerns do you have about this Mathematics Challenge?

After you have implemented the challenge with your class, be sure to respond to the Guiding Questions on the Analyzing Student Responses Protocol.



SITES-M Mathematics Challenge
Focus on Data Representations Grade 4

Field Trip to the Zoo Data Representations



Standard: Data, Probability, and Statistics

Learning Target: Focus on data analysis

Claims:
Students should understand and be able to explain or demonstrate how to:
- ✓ Depict data using various representations (e.g., tables and bar graphs);
- ✓ Given a set of data or a graph, describe the distribution of the data using the median, range, or mode;
- ✓ Develop and use stem-and-leaf plots.

Task Preparation:
Each student will need a copy of the student response sheet and the data sheet, a pencil, and crayons (optional).

Stimulus Cards (Drawing or Word Description):
Each student needs a copy of the data sheet.

Manipulatives/Supplies:
Copies of the student response sheet and data sheet for each student
Pencils
Crayons (optional)

SITES-M Mathematics Challenge
Focus on Data Representations Grade 4

Cues/Directions:
Distribute student response sheets and data sheets. Students should be directed to look at each figure carefully. Allow students time to answer.

Instruct students to follow along as you read aloud and say: **Ms. Perkins' class went to the zoo. After the trip, the students voted for the animal they liked best.** Have students look at their data sheets.

1. Say: **Complete the table below of the number of votes each animal got from both boys and girls. (TEACHER NOTE:** Students should write the number to record the votes for each animal in the table.**)**

2. **How many votes are there in all? Show how you get your answer. (TEACHER NOTE:** Students should show their work or explain their answers in the box.**) There are _____ votes in all. (TEACHER NOTE:** Students should fill in the blank with the correct number of votes.**)**

3. **Complete the double bar graph below of the boys' and girls' votes for the animal they liked best. (TEACHER NOTE:** Students who would like to use crayons to make their bar graphs may do so. As students work, monitor what they are doing, and ask if they are forgetting something if they are not graphing both bars and/or including the labels.**)**

4. **Now look at your graph. The greatest difference between boys' votes and girls' votes is for which animal? _____ (TEACHER NOTE:** Students should fill in the blank with the correct animal.**) What is the difference? _____ (TEACHER NOTE:** Students should fill in the blank with the correct number.**) How do you know? (TEACHER NOTE:** Students should write their answers in the box.**)**

Direct students' attention to the set of data which will be used in question 5.

5. **What is the mean of the data shown above? (TEACHER NOTE:** Students should fill in the blank with the correct number.**) Show how you get your answer. (TEACHER NOTE:** Students should show their work in the box.**) What is the median of the data shown above? (TEACHER NOTE:** Students should fill in the blank with the correct number.**) Show how you get your answer. (TEACHER NOTE:** Students should show their work or explain their answers in the box.**)**

Direct students' attention to the set of data which will be used in question 6.

6. **Make a stem-and-leaf plot of the data shown above. The plot has been started for you. (TEACHER NOTE:** Students should complete the stem-and-leaf plot using the data at the top of the page. Be sure they realize that the entry for 12 has already been done.**)**

7. **Use the following ordered stem-and-leaf plot to find the range, mode, and median of the data in the plot. (TEACHER NOTE:** Discuss the stem-and-leaf plot with students to help clear up any misunderstandings.**) What is the range? (TEACHER NOTE:** Students should fill in the blank with the correct number.**) How do you know? (TEACHER NOTE:** Students should show their work or explain their answers in the box.**) What is the mode? (TEACHER NOTE:** Students should fill in the blank with the correct number.**) How do you know? (TEACHER NOTE:** Students should write their answers in the box.**) What is the median? (TEACHER NOTE:** Students should fill in the blank with the correct number.**) How do you know? (TEACHER NOTE:** Students should show their work or explain their answers in the box.**)**

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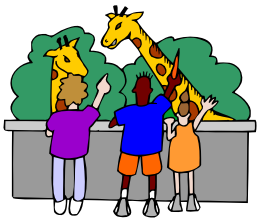

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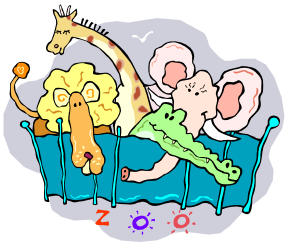
Focus on Data Representations Grade 4



Student Response Sheet

Field Trip to the Zoo Data Representations

Name: _____ **Date:** _____

Ms. Perkin's class went to the zoo. After the trip, the students voted for the animal they liked best.

1. **Complete the table below of the number of votes each animal got from boys and girls.**

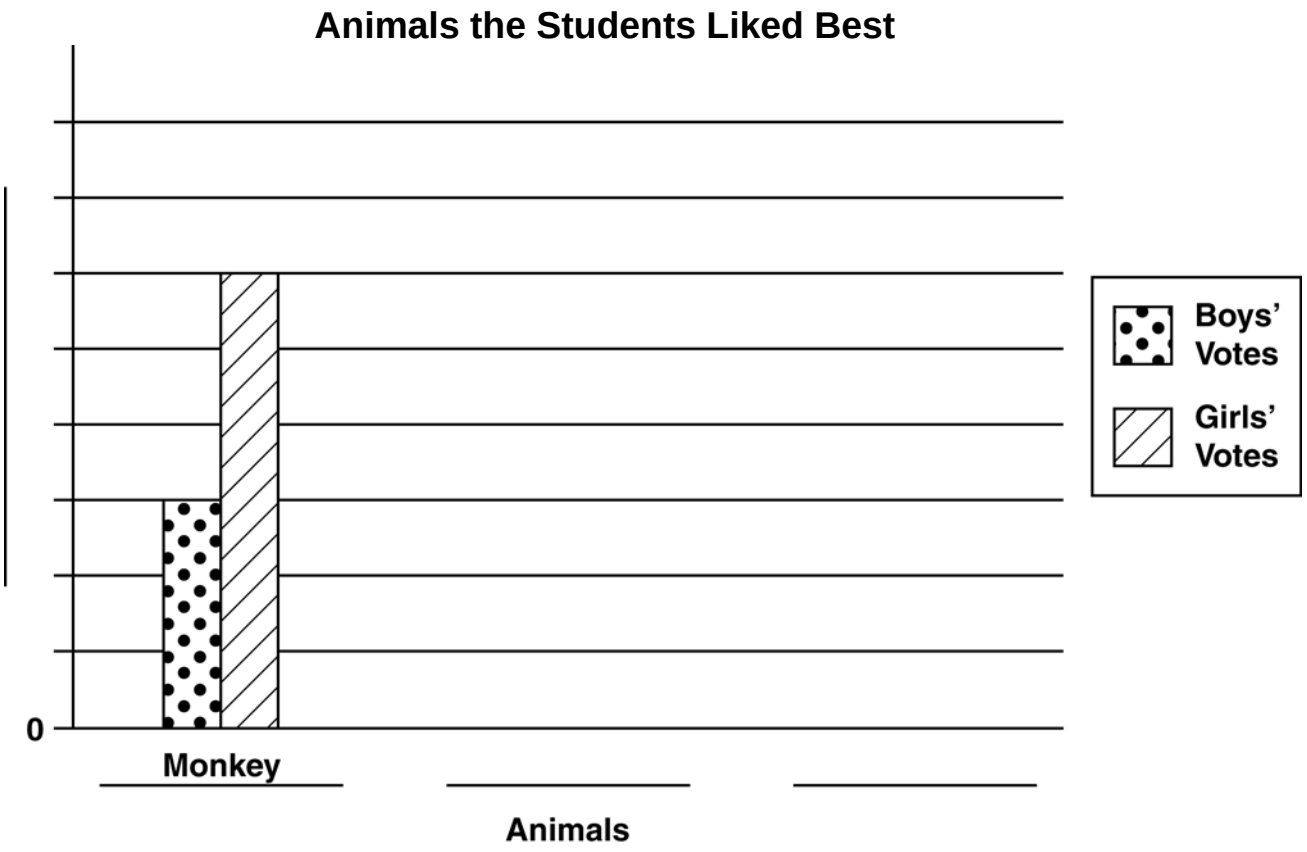
Animal	Number of Votes	
	Boys	Girls
Elephant		
Monkey		
Zebra		

2. **How many votes are there in all?**

Show how you get your answer.

There are _____ votes in all.

3. Complete the <u>double bar graph</u> below of the boys' and girls' votes for the animal they liked best.



4. Now look at your graph. The greatest difference between boys' votes and girls' votes is for which animal? _____

What is the difference? _____

How do you know?

Data: 10 15 0 13 12

5. What is the <u>mean</u> of the data shown above? _____

Show how you get your answer.

What is the <u>median</u> of the data shown above? _____

Show how you get your answer.

Data:

12	**33**	**50**	**37**
13	**50**	**35**	**37**
34	**21**	**51**	**12**

6. Make a stem-and-leaf plot of the data shown above. The plot has been started for you.

Stem	Leaf
1	2
2	
3	
4	
5	

Key
1 | 2 represents 12

7. Use the following ordered stem-and-leaf plot to find the range, mode, and median of the data in the plot.

Stem	Leaf
6	1 3
7	7 8 9
8	3 5
9	0 0
10	4
11	
12	1

Key
6 | 1 represents 61

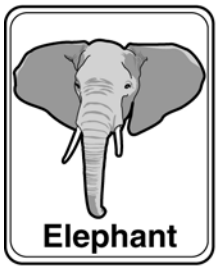
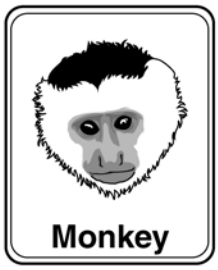
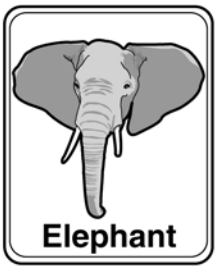
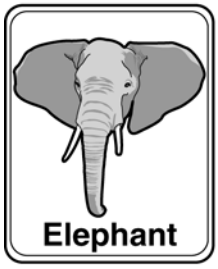
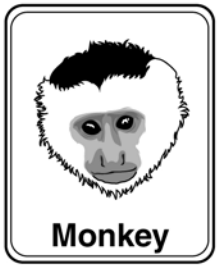
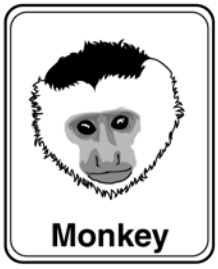
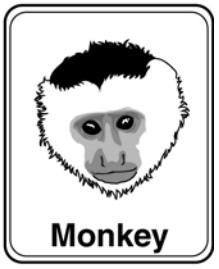
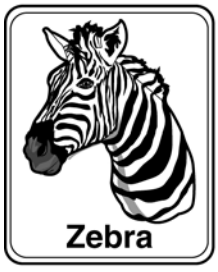
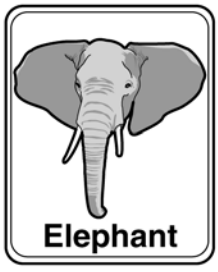
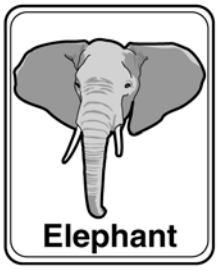
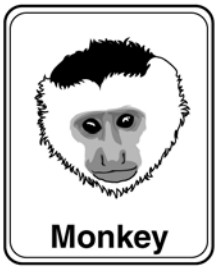
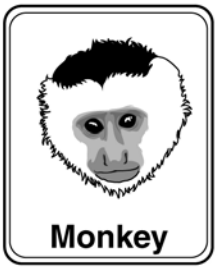
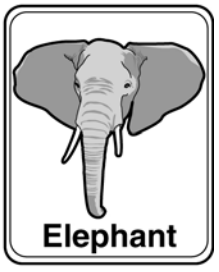
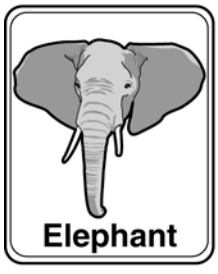
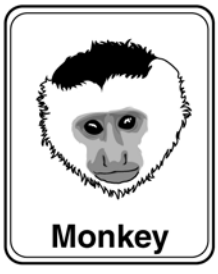
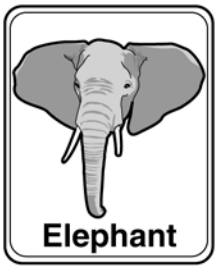
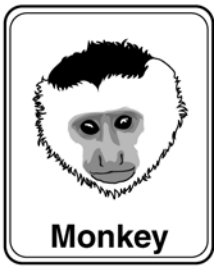
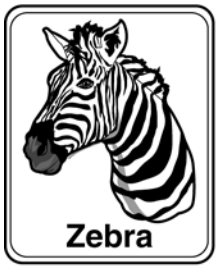
What is the range? _____ How do you know?

What is the mode? _____ How do you know?

What is the median? _____ How do you know?

SITES-M Mathematics Challenge
Focus on Data Representations Grade 4

Data Sheet
Animals the Students Liked Best

Boys	Girls
 Elephant	 Monkey
 Zebra	Monkey
 Elephant	 Zebra
 Elephant	 Monkey
 Monkey	 Zebra
 Zebra	 Monkey
 Zebra	 Elephant
 Elephant	 Monkey
 Monkey	 Elephant
 Elephant	 Zebra
 Monkey	 Elephant
 Zebra	 Monkey
 Zebra	 Zebra
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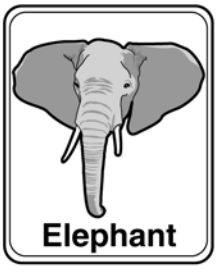
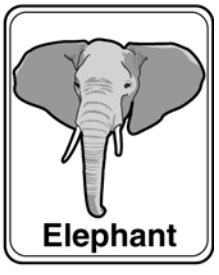
 Elephant	 Elephant

Learning and Teaching Considerations

Task 1:

A) Be sure that students understand that the words, "number of votes," specifically mean a digit or digits (0 - 9) that represent how many votes each animal got from the boys and the girls. Some students may answer in words, symbols, pictures, tally marks, etc.

B) Be sure that students understand that the number of any object is represented by a digit or a string of digits. The location of the digit tells whether it is in the unit's place, ten's place, hundred's place, etc. (how many one's, ten's, hundred's, etc. there are or which power of 10 it multiplies). In this task, each digit is in the one's place, denoting how many one's there are, e.g., 6 elephants (1 + 1 + 1 + 1 + 1 + 1), 3 monkeys (1 + 1 + 1), and 6 zebras (1 + 1 + 1 + 1 + 1 + 1). Working with base-ten blocks may help.

C) Be sure that students make the connection between orally counting up or physically adding up the animal pictures on the data sheet with putting the correct numbers in the table that represent the vote totals.

Task 2:

A) Be sure that students understand that the words "in all" generally signify the addition operation. For this task, they have to total the votes across all three groups of animals by adding.

B) Students may answer in words, symbols (digits, dots, dashes, base-10 block representations, M's, E's, Z's, etc.), pictures (Elephants, Monkeys, Zebras), or by using manipulatives (blocks, cubes). They may also count on their fingers, use number lines, or recall addition facts. Be sure they understand that they can get the correct answer using any of these strategies, though some are more efficient.

C) Some students may add the boy's votes first and then the girls' votes or vice versa, before adding the subtotals. Others may first add both the boy's and girls' votes for elephants, followed by monkeys and zebras, before adding the subtotals. Still others may add all the individual cells. Be sure they understand that they can get the correct answer using any of these strategies.

D) Be sure that students understand that as you move right (→) on a number line, the numbers increase in value. As you move left (←), the numbers decrease in value.

E) If a student says or writes, "I just know," prompt him or her by saying something like "I'm glad you know, but it's important in math to be able to explain your answers so other people can understand what you're thinking." (This applies to the other tasks, as well.)

F) If a student says or writes, "I don't know," say something positive like "Let's start with what you do know about this problem." Students often know more than they think or say, and getting them to vocalize or write about that knowledge is all they need. (This applies to the other tasks, as well.)

Task 3:

A) Be sure that students understand the basic parts of a double bar graph: 1) a descriptive title, 2) the axes and their labels (the "grouped data axis" that displays the type of data being graphed and is always at the base of the bars; and the "frequency data axis" that has a scale and measures the frequency, number, or count of the data groups), and 3) the double bars that are rectangular blocks and can be either horizontal or vertical. Each bar represents a subset of the data for only one data group and begins at the appropriate axis.

B) Be sure that students understand that each double bar on this type of graph represents data from two different groups, e.g., boy and girls. Each double bar on the graph always represents the two different groups in the same order, for consistency. In this case it is boys/girls, but it could be the other way around.

C) Be sure that students understand that all the basic parts of a bar graph must be accurately labeled and completed. For this task, the title is already labeled, the horizontal axis should be labeled with the three animal groups ("monkey" is already labeled), the bar heights should match the vote count for the corresponding animal groups, and the vertical axis should have an appropriate scale and be labeled as a count or number of votes.

D) Be sure that students understand that the animal groups and their associated data bars do not have to be ordered like the table (elephant, monkey, zebra). Any order is fine as long as the animal groups match the appropriate data bar height. (For this graph, the monkey data bars have been placed first.)

E) Some students may have the misconception that the labels on the grouped data axis (animal groups) do not need to match the data bars for those groups, e.g., the data bar for monkeys = 6 and 4 or 6 and 5.

F) Some students may have the misconception that the intervals on the frequency scale do not have to be numerically equivalent, e.g., 1, 2, 3, 4, 5, 10, 15, 20, 25, 30, 40, 50. For this graph, an appropriate scale to match the data would range from 0-8, counting by intervals of one.

Task 4:

A) Be sure that students understand that the word "difference" generally signifies using the subtraction operation when comparing numbers or amounts, and that the word "greatest" signifies "more or larger than all the others." So for this task, it is necessary to compare the difference in boys' and girls' votes for all three animals. To do this, students may count on their fingers, use number lines, or recall number sense and subtraction facts.

B) Some students may have the misconception that the word "greater" signifies the same meaning as "greatest" and so will write the elephant, because a difference of two votes is greater than a difference of one. Working with manipulatives of different numbers and amounts may help.

C) Be sure that students understand how to obtain the number of votes from boys and girls for each animal group by matching the top of the appropriate bar with the correct value on the scale of the frequency axis.

Task 5:

A) Be sure that students understand that the "mean" of a set of data is the sum of all the items divided by the number of items in the set. It is also called the "average."

B) Some students may have the misconception that adding a zero to a data set does not impact the mean, e.g., 10, 15, 0, 13, 12 has the same mean (12.5) as 10, 15, 13, 12.

C) Be sure that students understand that the "median" of a set of data is the middle value of an odd-numbered, ranked set and the average of the two middle values of an even-numbered, ranked set.

D) Some students may have the misconception that it is not necessary to rank a set of data before determining the median value, e.g., 10, 15, 0, 13, 12 has a median of 0.

Task 6:

A) Be sure that students understand the basic parts of a stem and leaf plot: Data is arranged by place value. The digits in the largest places are referred to as the stem and the digits in the smallest place are referred to as the leaf (leaves). Typically, the leaf contains the last digit of the number and the stem contains all of the other digits. The plot is drawn with two columns separated by a vertical line. The stems are listed to the left of the vertical line and the leaves are displayed to the right. It is important that each stem is listed only once and that no numbers are skipped, even if it means that some stems have no leaves. The leaves are listed in increasing order in a row to the right of each stem.

Task 7:

A) Be sure that students understand that the "range" of a set of data is difference between the greatest and the least value. The least value is subtracted from the greatest, e.g., 121 – 61 = 60.

B) Be sure that students understand that the "mode" of a set of data is the value that occurs the most. In this case, the value 90 occurs twice and the other values occur only once.

C) Be sure that students understand that the "median" of a set of data is the middle value of an odd-numbered, ranked set and the average of the two middle values of an even-numbered, ranked set, e.g., the data set 61, 63, 77, 78, 79, 83, 85, 90, 90, 104, 122 has a median value of 83.

Name: ANSWER KEY Date: _____

Ms. Perkin's class went to the zoo. After the trip, the students voted for the animal they liked best.

1. Complete the table below of the number of votes each animal got from boys and girls.

Animal	Number of Votes	
	Boys	Girls
Elephant	6	4
Monkey	3	6
Zebra	6	5

2. How many votes are there in all?

Show how you get your answer.

6+3+6=15
4+6+5=15
15+15=30

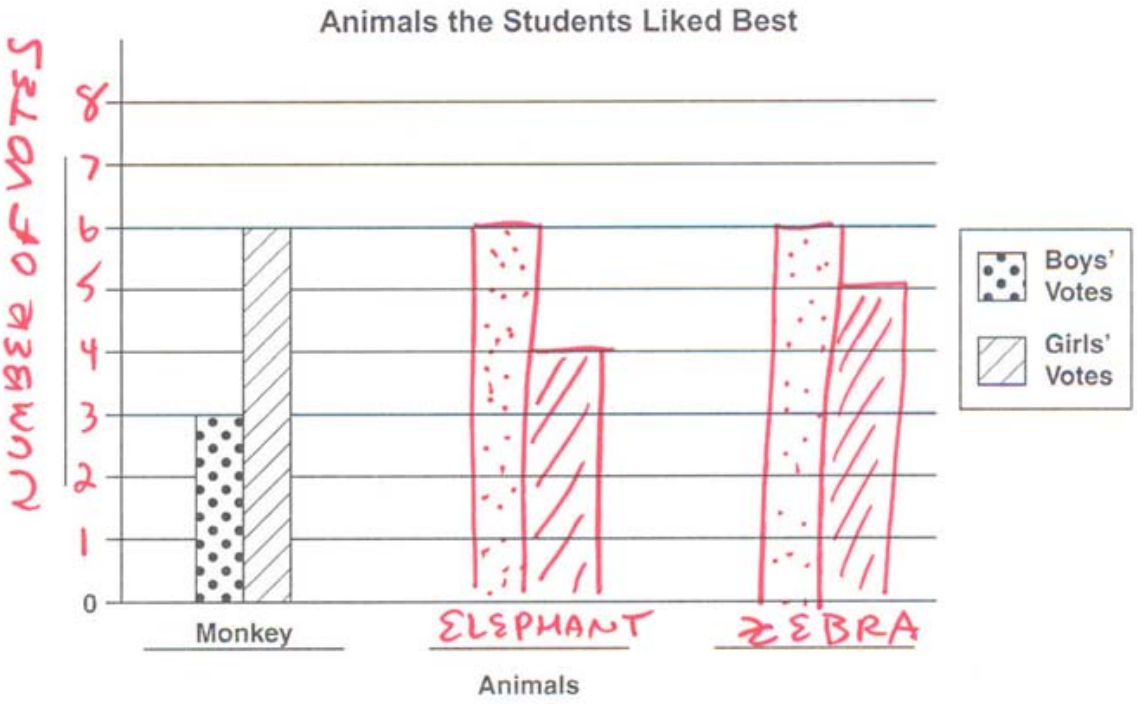
OR

6+4=10
3+6=9
6+5=11
10+9+11=30

(METHODS MAY VARY)

There are 30 votes in all.

3. Complete a <u>double bar graph</u> below of the boys' and girls' votes for the animal they liked best.



4. Now look at your graph. The greatest difference between boys' votes and girls' votes is for which animal? MONKEY

What is the difference? 3

How do you know?

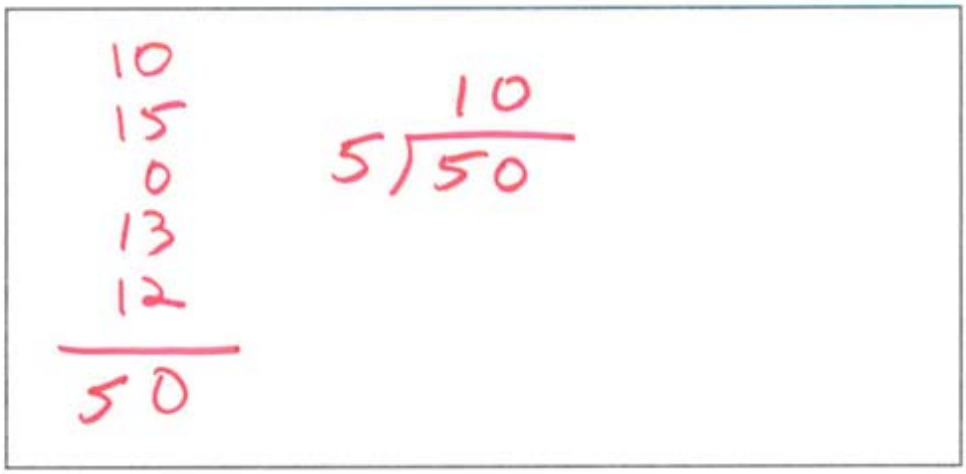
THE BAR FOR GIRLS IS 3 HIGHER THAN THE BAR FOR BOYS. IT IS LESS FOR THE BARS OF THE OTHER ANIMALS.

(ANSWERS CAN VARY.)

Data: 10 15 0 13 12

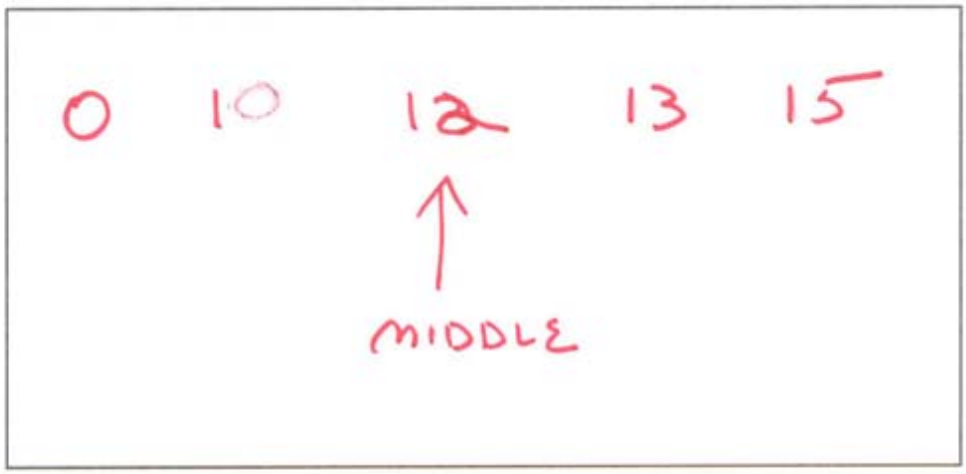
5. What is the mean of the data shown above? 10

Show how you get your answer.



What is the median of the data shown above? 12

Show how you get your answer.



Data:

12	33	50	37
13	50	35	37
34	21	51	12

6. Make a stem-and-leaf plot of the data shown above. The plot has been started for you.

Key
1 | 2 represents 12

Stem	Leaf
1	2 3 2
2	1
3	3 7 5 7 4
4	
5	0 0 1

NOTE: ORDER OF LEAF NUMBERS IS NOT IMPORTANT

7. Use the following ordered stem-and-leaf plot to find the range, mode, and median of the data in the plot.

Stem	Leaf
6	1 3
7	7 8 9
8	3 5
9	0 0
10	4
11	
12	1

Key
6 | 1 represents 61

What is the range? 60 How do you know?

121 − 61 = 60

What is the mode? 90 How do you know?

90 IS THE MOST

What is the median? 83 How do you know?

THERE ARE 11 NUMBERS. THE 6TH NUMBER IN ORDER IS 83. OR THERE ARE 5 NUMBERS LESS THAN 83 & 5 NUMBERS MORE THAN 83.

SITES-M Mathematics Challenge Rubric
Focus on Data Representations Grade 4

CATEGORY	4	3	2	1
Mathematical Concepts	**Response shows complete understanding of the mathematical concepts used to solve the problem(s).**	**Response shows substantial understanding of the mathematical concepts used to solve the problem(s).**	**Response shows some understanding of the mathematical concepts needed to solve the problem(s).**	**Response shows very limited understanding of the underlying concepts needed to solve the problem(s), OR the response is not written.**
	Response shows evidence in at least 8 of the following parts of tasks. **Task 2**. Student provides evidence that all numbers in the table must be added. **Task 3**. Stduent provides evidence of correctly splitting the bars by animal and by boy/girl. **Task 3**. Student labels numbers correctly on the vertical axis (1, 2, 3, etc.). **Task 4**. Student identifies monkey as having the greatest difference (3). **Task 5**. Student provides evidence of finding an average (sum and divide). **Task 5**. Student provides evidence of ranking the data. **Task 6**. Student provides evidence of correct placement of digits in stem row (no need to put in order). **Task 7**. Range: Student provides evidence of finding the greatest and least number from the stem-and-leaf. **Task 7**. Mode: Student provides evidence of finding the mode in the stem-and-leaf. **Task 7**. Median: Student provides evidence of counting the numbers in the stem-and-leaf.	Response shows evidence in only 6 or 7 of the task descriptions in category 4.	Response shows evidence in only 4 or 5 of the task descriptions in category 4.	Response shows evidence in only 3 or fewer of the task descriptions in category 4.

SITES-M Mathematics Challenge Rubric
Focus on Data Representations Grade 4

CATEGORY	4	3	2	1
Strategy/ Procedures	**Student typically uses an efficient and effective strategy to solve the problem(s).**	**Student typically uses an effective strategy to solve the problem(s).**	**Student sometimes uses an effective strategy to solve problem(s), but not consistently.**	**Student rarely uses an effective strategy to solve problem(s).**
	Response shows evidence in ALL of the following parts of tasks. **Task 2**. Student provides evidence of an addition process. **Task 5**. Student provides evidence of calculation of average. **Task 5**. Student provides evidence of ranking when finding the median. **Task 7**. Student provides evidence of subtraction when finding the range. **Task 7**. Student provides evidence of ranking when finding median.	Response shows evidence in only 4 of the tasks described in category 4.	Response shows evidence in only 3 of the tasks described in category 4.	Response shows evidence in only 2 or fewer of the tasks described in category 4.

SITES-M Mathematics Challenge Rubric
Focus on Data Representations Grade 4

CATEGORY	4	3	2	1
Explanation/ Communication	**Explanation is detailed and clear; uses appropriate terminology and/or notation.**	**Explanation is clear; uses some appropriate terminology and/or notation.**	**Explanation is a little difficult to understand, but includes critical components; little use of appropriate terminology and/or notation.**	**Explanation is difficult to understand, is missing several components, does not use or include appropriate terminology and/or notation.**
	Response shows evidence in at least 4 of the following parts of tasks. **Task 3**. Student provides a label on the vertical axis that includes the word "number" or "frequency" or "count" (or synonym for count). A label of "Votes" is not enough. **Task 4**. Student refers to the graph in the explanation (such as, says that the bar for girls is 3 higher than the bar for boys) AND compares the difference as being greater than that of the other animals. **Task 7**. Student refers to the least and the greatest number in the stem and leaf in range box. **Task 7**. Student refers to the number that occurs the most, or more than the others, in the mode box. **Task 7**. Student referes to the order of the data (or that the leaves are in order) and says that the 6th number is the median in the median box	Response shows evidence in only 3 of the explanations described in category 4.	Response shows evidence in only 2 of the explanations described in category 4.	Response shows evidence in 1 explanation from category 4, or response gives no explanations.

SITES-M Mathematics Challenge Rubric
Focus on Data Representations Grade 4

CATEGORY	4	3	2	1
Mathematical Accuracy	**Response shows all or almost all of the steps and solutions have no mathematical errors.**	**Response shows most of the steps and solutions have no mathematical errors.**	**Response shows some of the steps and solutions have no mathematical errors.**	**Response shows few of the steps and solutions have no mathematical errors.**
	Student provides correct answers for at least 6 of the following parts of tasks. **Task 1**. Student fills in 6, 3, 6 for boys and 4, 6, 5 for girls, as shown on answer sheet. **Task 2**. Student answers 30. **Task 4**. Student answers 3. **Task 5**. Student answers 10 for the mean. **Task 5**. Student answers 12 for the median. **Task 7**. Student answers 60 for the range. **Task 7**. Student answers 90 for the mode. **Task 7**. Student answers 83 for the median.	Student provides correct answers for only 5 of the tasks described in category 4.	Student provides correct answers for only 4 of the tasks described in category 4.	Student provides correct answers for only 3 or fewer of the tasks described in category 4.

SITES-M Mathematics Challenge
Focus on Data Representations Grade 4

Scoring Notes Checklist

Task	Check Yes	Category
Task 1		
Fills in table correctly.		Accuracy
Task 2		
Provides evidence that numbers in table must be added.		Concept
Provides evidence that numbers in table are being added.		Strategy
Answers 30.		Accuracy
Task 3		
Provides evidence of splitting bars by animal and boy/girl.		Concept
Places correct numbers on vertical axis (1, 2, 3, etc.).		Concept
Provides descriptive label of vertical axis that refers to a number or count.		Explanation
Task 4		
Identifies monkey with greatest difference.		Concept
Refers to the graph (such as, the bar for girls is 3 higher than the bar for boys) AND compares to other animals.		Explanation
Answers 3.		Accuracy
Task 5		
Provides evidence of finding an average, even if answer is not correct.		Concept
Provides evidence of ranking to find median, even if answer is not correct.		Concept
Provides evidence of adding and dividing to find an average.		Strategy
Provides evidence of ranking to find the median.		Strategy
Answers mean is 10.		Accuracy
Answers median is 12.		Accuracy
Task 6		
Provides evidence of correct placement of units digits in stem rows (order not important).		Concept

Task	Check Yes	Category
Task 7		
Provides evidence of finding greatest and least in the plot.		Concept
Provides evidence of finding mode in the plot.		Concept
Provides evidence of finding number of numbers in the plot.		Concept
Provides evidence of subtraction in the range box.		Strategy
Provides evidence of ranking in the median box.		Strategy
Refers to the greatest and the least number in the stem-and-leaf.		Explanation
Refers to the number that occurs the most.		Explanation
Describes the ordering of the numbers in each leaf.		Explanation
Answers range is 60.		Accuracy
Answers mode is 90.		Accuracy
Answers median is 83.		Accuracy

SITES-M Mathematics Challenge
Focus on Data Representations Grade 4

The purpose of the Mathematics Challenges is to provide opportunities for students to develop and demonstrate understanding of important mathematical concepts and standards. They include extended responses, open-ended tasks, and tasks that require higher-order thinking skills. Because these types of tasks may be novel for students and they will have varying levels of understanding, the student responses will vary.

The guiding questions below were designed to assist you in analyzing your class' response to the Challenge and determining appropriate next steps for your teaching and learning. Responses to these questions are for your reflection and documentation and will not be collected.

Guiding Questions for Analyzing Student Responses to the Mathematics Challenges

1. When completing the Challenge, what did your students do well? How do you know?

2. When completing the Challenge, what did your students struggle with? How do you know?

3. When your students completed the Challenge, did they implement multiple correct solutions strategies? What insightful approaches to problem solving did you observe?

4. What, if any, patterns (e.g., common errors/misconceptions) did you observe across your student responses?

5. What questions or concerns did your students have when working through this Challenge or a particular task? Are these things you should address for the class as a whole?

6. What, if any, feedback did you provide to your class? How did you provide it?

7. What did you learn about your students' mathematical understanding based on their responses to this Challenge?

Reminders:

1) After you have completed the Challenge with your class and responded to these Guiding Questions for Analyzing Student Responses, please complete the Challenge Feedback Log. A link to this Log is e-mailed to you each month. Responses will be used to improve the Challenges and to provide recommendations for teachers implementing the Challenges in future years.

2) Please provide copies of all student work to the Assessment Coordinator.