

Title: Doggie DayCare

Brief Overview:

In this unit the students will demonstrate a fundamental knowledge of graphing, analyzing classroom data and using that knowledge to solve problems. After several data collecting activities, the students will be asked to use what they have graphed to design a Doggie DayCare that will meet the needs of the most popular pet, the dog. The student will then write a friendly letter to the President encouraging him to build a Doggie DayCare for his two dogs.

NCTM 2000 Principles for School Mathematics:

- **Equity:** *Excellence in mathematics education requires equity - high expectations and strong support for all students.*
- **Curriculum:** *A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.*
- **Teaching:** *Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*
- **Learning:** *Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.*
- **Assessment:** *Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.*
- **Technology:** *Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.*

Links to NCTM 2000 Standards:

- **Content Standards**

- **Algebra**

- *Understand patterns, relations, and functions; and represent and analyze patterns and functions, us words, tables, and graphs.*
 - *Use mathematical models to represent and understand quantitative relationships; and model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions.*

- **Data Analysis and Probability**

- *Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them; collect data using observations, surveys, and experiments; represent data using tables and graphs such as line plots, bar graphs, and line graphs; and recognize the differences in representing categorical and numerical data.*

- *Select and use appropriate statistical methods to analyze data; 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; use measures of center, focusing on the median, and understand what each does and does not indicate about the data set; and compare different representations of the same data and evaluate how well each representation shows important aspects of the data.*
- *Develop and evaluate inferences and predictions that are based on data; and propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions.*

- **Process Standards**

- **Problem Solving**

- *Instructional programs from prekindergarten through grade 12 should enable all students to build new mathematical knowledge through problem solving; and apply and adapt a variety of appropriate strategies to solve problems.*

- **Reasoning and Proof**

- *Instructional programs from prekindergarten through grade 12 should enable all students to recognize reasoning and proof as fundamental aspects of mathematics; and select and use various types of reasoning and methods of proof.*

- **Communication**

- *Instructional programs from prekindergarten through grade 12 should enable all students to organize and consolidate their mathematical thinking through communication; communicate their mathematical thinking coherently and clearly to peers, teachers, and others; and use the language of mathematics to express mathematical ideas precisely.*

- **Connections**

- *Instructional programs from prekindergarten through grade 12 should enable all students to understand how mathematical ideas interconnect and build on one another to produce a coherent whole; and recognize and apply mathematics in contexts outside of mathematics.*

- **Representation**

- *Instructional programs from prekindergarten through grade 12 should enable all students to create and use representations to organize, record, and communicate mathematical ideas; select, apply, and translate among mathematical representations to solve problems; and use representations to model and interpret physical, social, and mathematical phenomena.*

Grade/Level:

Grades 2-3

Duration/Length:

Three days for 45 - 60 minutes per day.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Constructing a bar graph with all elements present
- Using a rubric to evaluate writing
- Tallying data
- Understanding area and perimeter

Student Outcomes:

Students will:

- correctly construct a bar graph, pictograph, pie chart and line plot with all elements present.
- collect data from various sources
- synthesize information from various resources
- translate tally counts into graphic form
- make predictions and draw conclusions from available information
- interpret and describe information (oral and written) from a graph or table.
- demonstrate an understanding of least and greatest to determine the range of a set of data
- present results in written, oral, and visual forms.

Materials/Resources/Printed Materials:

- Copy of Student Resource Sheets for each student.
- Teacher Resource Sheets
- Shape book patterns (horse, dog, cat, fish & bird)
- Large Graph paper/chart for teacher use or make a transparency from Teacher Resource.
- Templates for pie chart, bar graph, pictograph, and line plot.
- Pencils & crayons for each student.
- Blank writing paper for each shape book for each student.
- Survey template for each group of students.
- Graph paper for each student.
- Chart paper

Development/Procedures:

DAY 1:

Motivation: The teacher should create a pictograph template and display it in the classroom before the students arrive. Have a marker on each student's desk. The teacher should also have a transparency of Teacher Resource #1 (*with ONLY the question visible*). The teacher should then direct the students to look at the names of the different pets in each column of the pictograph template. Introduce the lesson by asking the following question: What pet do you think is the most popular in the U.S.? Have the students come up and place a tally mark in the category that they feel is the most popular pet. Tell the students that today we are going to get some information from our class and other classes. When we gather information about a topic, it is called data collection. We are collecting data in order to find out information about a particular topic. Today's topic is Favorite Pets.

Discuss the reasons why students feel a particular pet is more popular or not as popular as another. Come to a classroom consensus as to the most popular pet in our classroom. Ask the students if they feel that the data that was collected was indicative of everyone at our school or just students in our class.

Discuss that everyone has different views. Ask them if they feel that other classrooms will or will not come to the same conclusions. Tell them that their assignment is to go to an assigned classroom to collect this data. Discuss with the students that the question is “What animal do they think is the most popular pet in the U.S.?” The question is not, “What is your favorite pet?” Please make sure that you make this very clear before sending the students to classrooms.

Form cooperative groups of 4 students to visit five classrooms. These classrooms can be different grade levels or the same grade level. Using Student Resource #1 send these students on their way. Make sure that you obtain permission from other teachers and administration before this activity.

When students return, demonstrate how to take their data and make a pictograph using Student Resource #2 and teachers are to place a transparency on the overhead projector to model the display of the data collected. When the pictograph is complete, discuss the results of the survey for the most popular pet.

After this, you will share with your students the information that you have concerning the four most popular pets using statistics that you have on the Teacher Resource #1 by uncovering the bottom portion. By having the fish on the original pictograph and survey, you can open a discussion on why a fish is not a popular pet.

If you are running out of time, you could stop here and continue with the activity the next day. This should not impact your unit or overall time frame.

Next you will introduce them to Presidential Pets using Student Resource #3 (The teacher should place a copy of this on the overhead.) Discuss the information contained in the table. As a class make a tally table of the number and type of pets the presidents had. The students then take the data from the class tally table to make a pictograph of the Presidential Pets on graph paper. You can use silhouettes of the presidents or small stickers depending on grid size and time constraints to make your pictograph. Use the information from their pictographs to tie the lesson back into favorite pets by asking what was the favorite Presidential Pet. Have some discussion (as time allows) about why they think these were the favorite pets. Relate why we chose the dog over the other pets even if the data collected showed another animal.

Follow Up: Give each student a copy of Student Resource #4. The students are to construct a bar graph including all elements, using their pictograph of Presidential Pets. This is to be used as a homework assignment. This will assess how well the students can transfer data from one type graph to another type of graph.

Conclusion of Day 1: Have each student choose the picture of their favorite pet (Student Resources #5-9 were pulled from abcteach.com). To make a shape book, the students are to choose one picture. They are to staple 3-5 sheets of notebook paper underneath the picture. You should staple the papers together inside the shapes so that when you cut out the shape, the pages are together. The students will then cut out the shape with all papers stapled to them. Then ask them to use mathematical terms to explain what they have learned about data collection today.

DAY 2:

Motivation: Choose a book from Teacher Resource #2 to get your students focused on today’s lesson. You will be focusing on the needs of the most popular pet, dogs. Brainstorm a list of things that a dog needs in order to be well taken care of. The students should come up with the following six needs: food, sleep, shelter, bathroom, activity, and companionship.

Students should use Student Resource #10 to rate the six needs, one being not as important and six being the most important. They will take this information and make a line plot for each need. Students will discuss the mode and median for each need and list the needs by ranking them from the highest to the lowest number.

Taking the information from the line plot they will generate a pie chart (Student Resource #11) to show the ratio of needs for a dog. The students are to look at the pie chart and compare it to a clock. What is half? What is one fourth? etc. This activity is to be completed with the whole group with teacher instruction. This is the opportunity to bring in fractional parts. This part of the activity should be kept to halves, thirds, fourths and possibly sixths.

Conclusion: Discussion will be held about the importance of a dog's needs and satisfying those needs daily. The teacher will indicate that tomorrow the students will be designing a special Doggie DayCare. This park will be specifically for dogs so they should be thinking about what they want to put in their Doggie DayCare.

The students will take their shape books and make a list of ideas for their Doggie DayCare.

Performance Assessment:

DAY 3:

The students will be given a large sheet of white paper. They will be instructed to use the graphs that have been discussed in class this week concerning a dog's needs in order to plan a Doggie DayCare that will meet all of the needs of a dog. Use Teacher Resource #3 to set the stage. The students will need to make sure they have adequate room for all needs. Students will use Student Resource #12 as an instruction sheet for their Doggie DayCare.

When the students have completed their design, they are to write in their shape book. They will explain to the teacher the importance of gathering the data and justify their Doggie DayCare designs.

When their designs are finished, the students will write a letter to the President persuading him to build a Doggie DayCare for his dogs. The students will use Student Resource #13 for their friendly letter. Teacher Resource #4 will have the Presidential Letter rubric for the writing piece. Make sure that you show them Teacher Resource #4 so the students will know your expectations.

Extension/Follow Up:

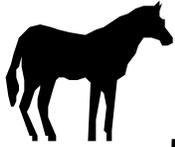
- You could draw the students' attention to the fact that previous presidents had more horses and farm like animals. You could use this as a springboard for a Science and/or Social Studies exploration as to the reasons behind it.
- You could have the students research to find out why some presidents had unusual pets such as alligators and silkworms.
- If you chose to use only one grade level for your survey, you might consider checking other grade levels to see if the results are different depending on age. There could be a relationship of popular pet with age of the student.
- You could contact another school in your school system and have them do the same activity with classes in their school. Then the two classes could compare results. You could even do this with another school in another state via e-mail. Also, you can compare results from a rural setting with a city setting.
- You could compare rural settings versus urban settings to discover if there is a difference in popularity of certain types of pets.

- You could introduce the needs of living creatures by constructing a Venn diagram to compare the needs of people to the needs of pets.

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Today's Questions:



What is the most popular pet for families to have in the United States?



Answers:

Dogs: 31.2 Million

Cats: 27.0 Million

Birds: 4.6 Million

Horses: 1.5 Million

Name _____ Date _____

Favorite Animal Survey

Directions: Use this survey to ask other classes the question, "What do you think is the most popular pet in the U.S.?" Make tally marks to record your results.

Pets	Tally
Dog	
Cat	
Fish	
Horse	
Bird	

What class did you survey? _____

What animal had the most votes? _____

What animal had the least votes? _____

Return to class and use your results to make a graph.

Pictograph



Cat Fish Dog Horse Bird

KEY:  = _____ students



White House Pets



Presidents	Animals
George Washington	bird, horse, and dogs
John Adams	horses
Thomas Jefferson	bird and bears
James Madison	bird and sheep
James Monroe	dog
John Quincy Adams	alligator and worms
Andrew Jackson	horses and bird
Martin Van Buren	tigers
William Henry Harrison	goat and a cow
John Tyler	dog and horse
James Knox Polk	horse
Zachary Taylor	horse
Millard Fillmore	dog, bird, and elephant
Franklin Pierce	no pets
James Buchanan	dog, bird, and elephant
Abraham Lincoln	bird, goat, horse, cat, dog, pig, and rabbit
Andrew Johnson	mice
Ulysses S. Grant	dogs, birds, horses, and pigs

White House Pets Continued

Presidents	Animals
Rutherford B. Hayes	cat, dogs, cows, horses, and goats
James Garfield	horse, dog, and fish
Chester Alan Arthur	no pets
Grover Cleveland	dog and birds
Benjamin Harrison	dogs, cat, and opossum
William McKinley	bird and cats
Theodore Roosevelt	dogs, cats, and a horse
William Taft	cow
Woodrow Wilson	sheep, chickens, and cats
Warren Harding	dogs and birds
Calvin Coolidge	dogs, birds, raccoon, cats, donkey, bear, antelope, hippo, and lions
Herbert Hoover	dogs and a opossum
Franklin D. Roosevelt	dogs
Harry S. Truman	dogs
Dwight D. Eisenhower	dog
John F. Kennedy	birds, horses, rabbit
Lyndon Johnson	dogs, birds, and hamster
Richard Nixon	dogs and fish
Gerald Ford	dog and cat
Jimmy Carter	dog and cat
Ronald Reagan	dogs
George Bush	dogs
Bill Clinton	dog and cat
George W. Bush	dogs and cat

Name _____ Date _____

Analyze This

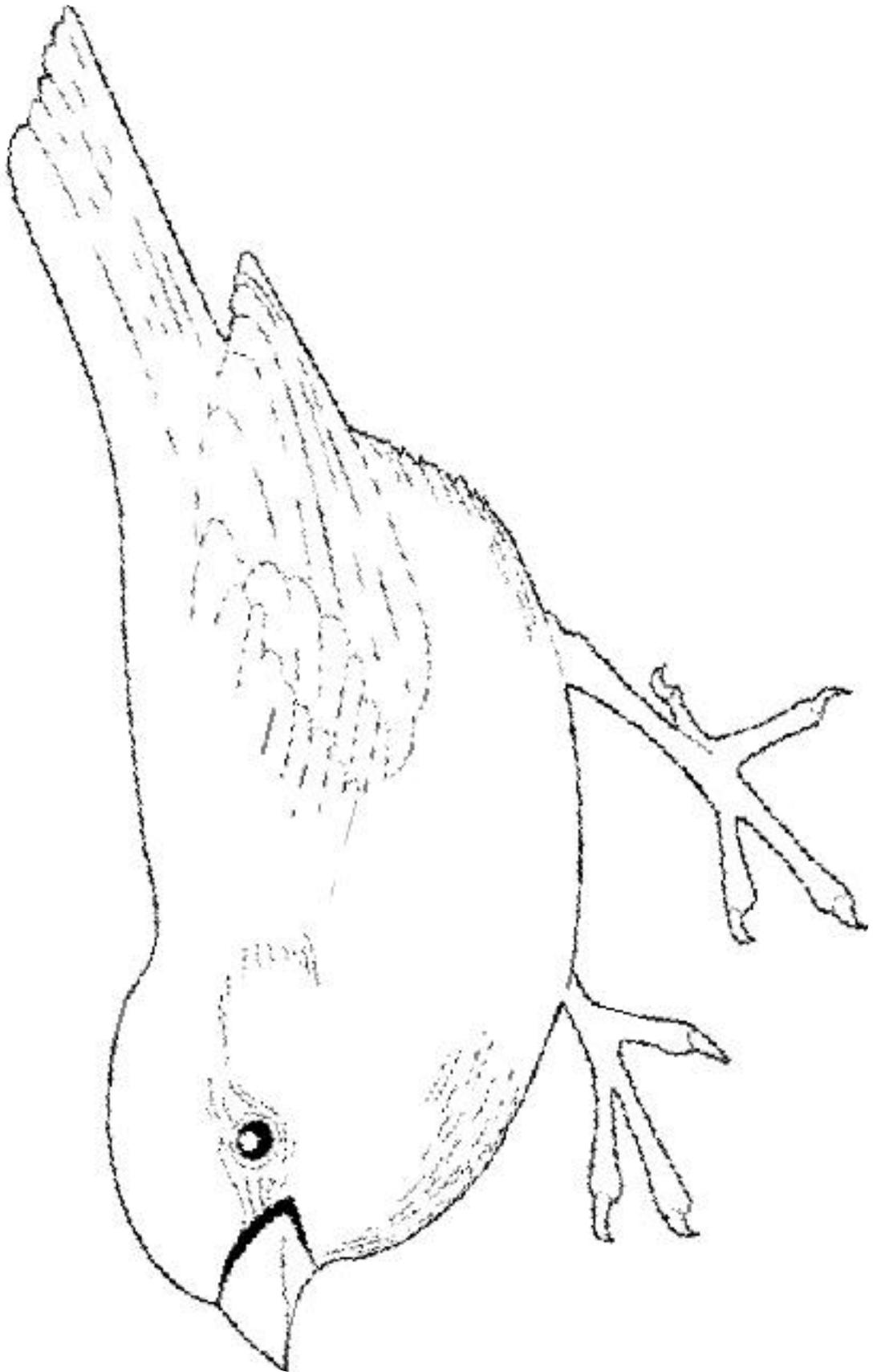
Directions: Take the data from your pictograph about the White House Pets and make a bar graph that shows the same information just in a different way. Be sure to include all of the elements of a graph. Turn in both graphs to your teacher.

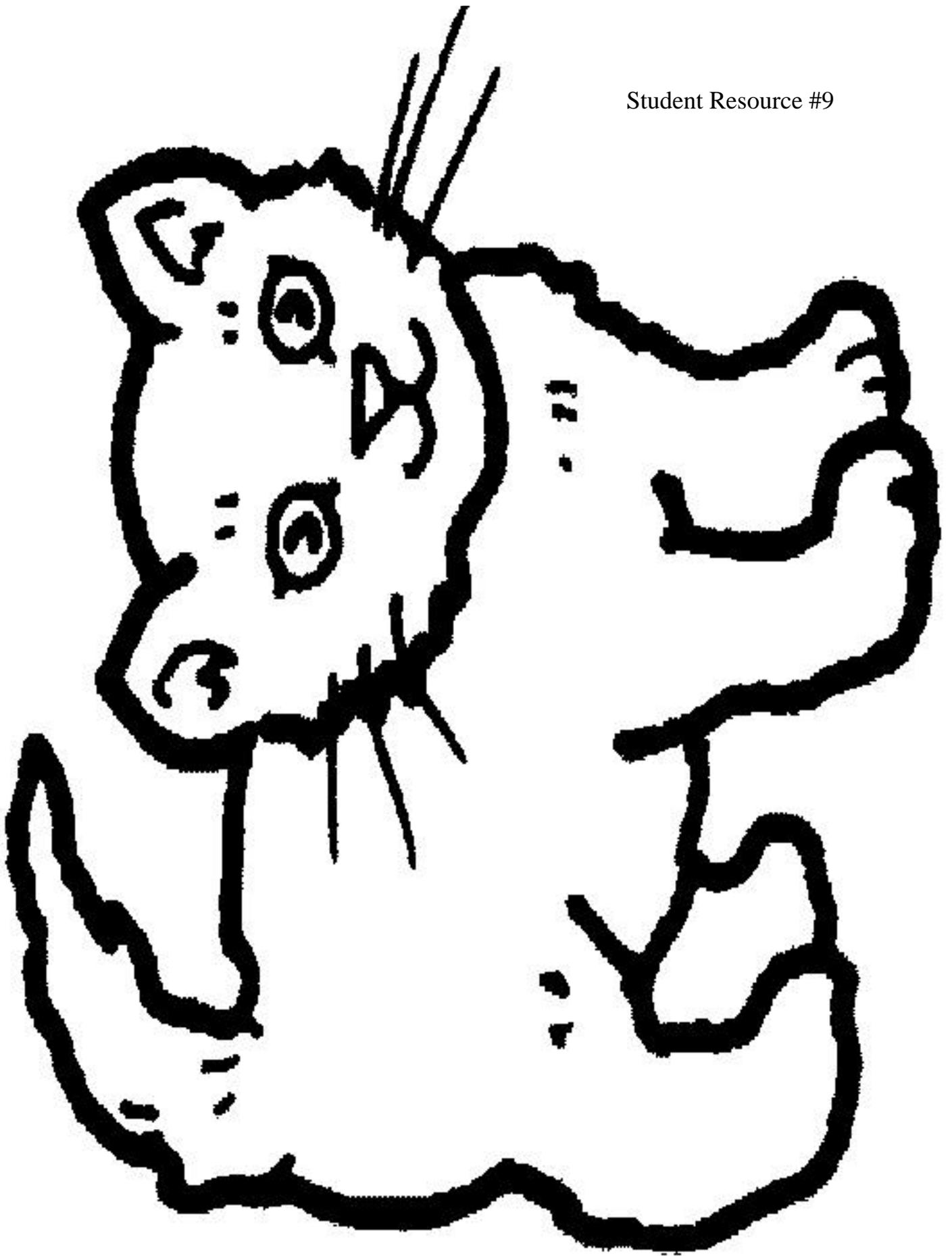
A large empty rectangular box for drawing a bar graph. To the left of the box is a vertical line, and below the box is a horizontal line, suggesting a coordinate system for the graph.













Book List



Chewy Louie by: Howie Schneider

Harry the Dirty Dog by: Gene Zion

Dog Breath by: Dav Pilkey

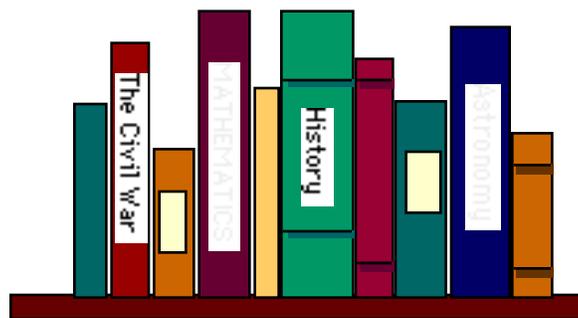
How to Talk to Your Dog by: Jean Craighead George

Dog Heaven by: Cynthia Rylant

The Night I Followed the Dog by: Nina Laden

Very Kind Rich Lady and Her One Hundred Dogs
by: Chinlun Lee

The Complete Dog Book for Kids by: American Kennel Club Staff



A Dog's Needs



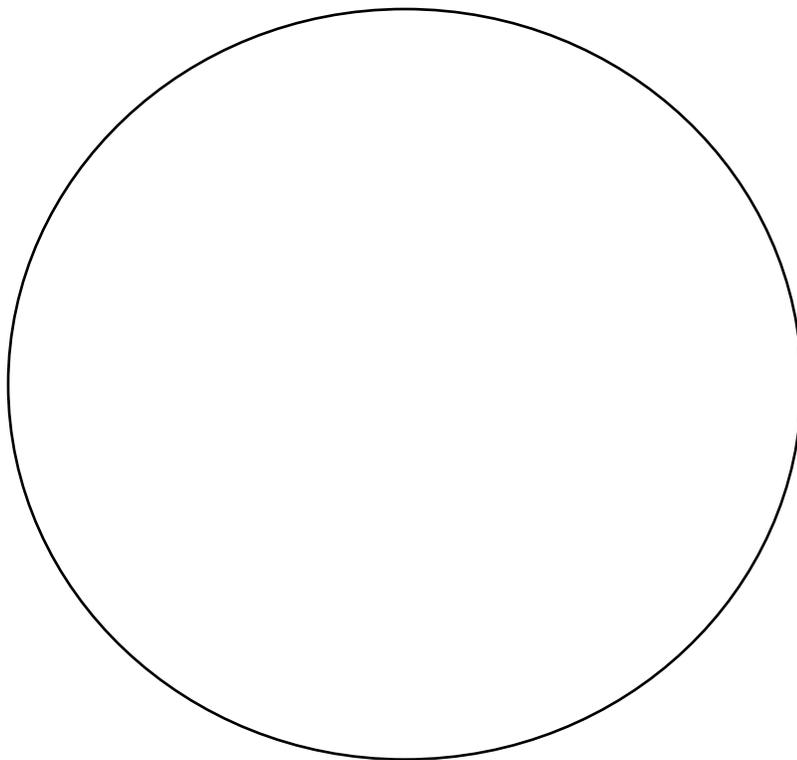
Directions: All animals have needs. Rate the following needs for a dog with number 1 being the least one needed and number 6 being the one that they need the most.

Needs	Rank
Sleep	
Food	
Shelter	
Bathroom	
Activity	
Companionship	

Easy as Pie

Name: _____ Date: _____

Directions: Use the information from the Line Plots and make a Pie Chart showing the importance of each need.



Key

red=sleep	green=bathroom	black=shelter
blue=food	purple=activity	orange=companionship

Vignette

HAVE YOU EVER THOUGHT ABOUT WHAT A PET DOES WHEN NO ONE IS HOME? WHAT DO THEY DO ALL DAY? HOW ABOUT THE PETS AT THE WHITE HOUSE? WHAT DO THEY DO ALL DAY? WHO PLAYS WITH THEM? YOUR FIRST GOAL WAS TO COLLECT AND PRESENT DATA THAT SHOWS THE MOST POPULAR PET AND RANK THE FOLLOWING NEEDS FROM MOST IMPORTANT TO LEAST IMPORTANT: FOOD, COMPANIONSHIP, SHELTER, SLEEP, ACTIVITY, AND BATHROOM. THE NEXT GOAL IS TO DESIGN A DOGGIE DAYCARE THAT MEETS THESE NEEDS. FOR EXAMPLE, MOST DOGS NEED A LARGE AREA FOR ACTIVITY BUT A SMALLER AREA FOR SLEEPING AND EATING. DON'T FORGET TO NAME YOUR DAYCARE.

YOU WILL EXPLAIN TO YOUR TEACHER HOW YOU USED YOUR DATA TO COMPLETE THIS PROJECT.

USING A FRIENDLY LETTER FORMAT, WRITE TO PRESIDENT BUSH AND TELL HIM WHY HE SHOULD BUILD A DOGGIE DAYCARE FOR HIS DOGS.

Dog Plan Sheet

Name: _____ Date: _____

Directions: Use the information on this sheet to help you plan your Doggie DayCare.



YOU WILL BE GRADED ON THE FOLLOWING ELEMENTS:

_____ INCLUDED NAME OF DAYCARE

_____ USED THE DATA THAT WE COLLECTED OVER THE LAST FEW DAYS

_____ USED PRIOR KNOWLEDGE OF MATH CONCEPTS

_____ COMPLETED PREVIOUS GRAPHING ACTIVITIES

_____ INCLUDED WRITTEN EVIDENCE OF THE CORRELATION BETWEEN THE DATA AND THE DESIGN

_____ DEMONSTRATED QUALITY OF WORK-NEATNESS, READABILITY, AND CREATIVITY

_____ INCLUDED LETTER TO THE PRESIDENT-CUPS(CAPITALS, WORD USAGE, PUNCTUATION, AND SPELLING) AND FATP (FORM, AUDIENCE, TOPIC, AND PURPOSE)

PRESIDENTIAL LETTER RUBRIC

-USES CORRECT FRIENDLY LETTER FORMAT

-USES CORRECT AUDIENCE

-USES MATH VOCABULARY

-EXPLAINS HOW THEIR DATA PROVES THAT
THE PRESIDENT SHOULD HAVE THE DOGGIE
DAYCARE

-USES A TOPIC SENTENCE

-USES CORRECT CAPITALIZATION

-USES CORRECT WORD USAGE AND SPELLING

-USES CORRECT PUNCTUATION