

Mathematics Governor's Institute 2003 Problem-in-a-bag Template

Title of Project: Bow-Wow Meow

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Grade Level and/or Course: Grade 5

Concept(s) used: Predictions, whole numbers (addition, division), median, average, analyzing data, compare/contrast, graphing, greater than, less than, computation, graphing, categorize

PA Standard(s) Addressed:

2.2.5I	Select a method of computation.
2.4.5B	Use models, number facts, properties and relationships to check and verify predictions and explain reasoning.
2.5.5A	Develop a plan to analyze a problem, identify the information needed to solve the problem, carry out the plan, check whether an answer makes sense and explain how the problem was solved.
2.5.5B	Use appropriate mathematical terms, vocabulary, language symbols and graphs to explain clearly and logically solutions to problems.
2.5.5C	Show ideas in a variety of ways including words, numbers, charts, graphs and tables.
2.5.5D	Connect, extend and generalize problem solutions to other concepts, problems and circumstances in mathematics.
2.5.5F	Use appropriate problem-solving strategies
2.6.5A	Organize and display data using pictures, tallies, tables, charts, bar graphs and circle graphs.
2.6.5B	Describe data sets using mean, median, mode and range.
2.6.5E	Construct and defend simple conclusions based on data.
2.11.5A	Make comparisons of numbers (e.g., more, less, same, least, most, greater than, less than).
2.11.5B	Identify least and greatest values represented in bar and circle graphs.

NCTM Standard(s) Addressed:

Data Analysis and Probability: Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

Representation: Select and use appropriate statistical methods to analyze data.

Create and use representations to organize, record, and communicate mathematical ideas.

Connections: Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.

Recognize and apply mathematics in contexts outside of

Objectives/Applications:

1. The student will predict which pet (dog or cat) is more expensive to own.
2. The student will categorize pet expenses according to cost of pet, medical fees, food and pet supplies.
3. The student will compute the yearly cost of owning a dog or cat by computing medians for given price ranges of various pet necessities.
4. The student will compare the cost of owning a dog to the cost of owning a cat.
5. The student will create a double bar graph to reflect a comparison of costs of owning a dog or cat.
6. The student will write a paragraph expressing their conclusion on which pet is more expensive to own.

Question:

Is it more expensive to own a dog or a cat?

Resources and Materials:

See attached list of books
Graph paper, ruler, markers, and calculator

Procedure

1. Students will predict whether a dog or a cat would be more expensive to own for a year.
2. Students will be given a chart, Yearly Costs for Raising Cats and Dogs (See attachments for chart), to complete the following activities:
 - a. Classify items into given categories.
 - b. Calculate the median cost for each item.
 - c. Calculate the sum of each category using the median costs.
 - d. Calculate the total cost for each pet.
3. Students will create a double bar graph comparing the cost of owning a dog to owning a cat.
4. Develop a paragraph expressing your conclusion on which pet is more expensive to own. Students should include information from the double bar graph in their paragraph.

Teacher Notes:

1. There are a variety of ways to begin the lesson. Teacher could read a book. The reference section has a suggested book list. The teacher could lead a discussion on the students' pets and create a graph using the students' data.
2. Here is a list of prerequisites for this lesson. Students should have experience with double bar graphs, finding median using a high and low range, and practice reading and interpreting charts.

Accommodations/Adaptations:

ESL: Use different colored highlighters to indicate pet items to be categorized.
Provide pictures to illustrate definitions of terms such as leash, etc.
Student resource books are available in several languages from Amazon.

Special Ed: Large space charts (see attachments)
Color code dog/cat items.
Use calculators as necessary.
Round numbers to tens and hundreds places.
Use large print books and provide colored overlays.
Reduce assignment to one animal.
Provide a scribe to assist in writing a paragraph or provide key
Questions to verify the student's understanding of the project.

Enrichment: Students will use actual prices of items instead of provided ranges
Using a specific breed of dog or cat.
Compute the high and low end of the ranges as compared with
median values.

SCORING RUBRIC:



ADVANCED (5 points)

All procedures and calculations are correct.

- Categorize items
- Calculate median cost
- Calculate the sum of each category and the total cost
- Create double bar graph



PROFICIENT (4 points)

Correct procedures and calculations for:

- Median cost of each pet
- Double bar graph

Correct procedures for **one** of the following:

- Categorize items
- Calculate the sum of each category and the total cost



BASIC (3 points)

Correct procedures and calculations for:

- Median cost of each pet

Correct procedures for **one** of the following:

- Categorize items
- Calculate the sum of each category and the total cost
- Double bar graph



BASIC (2 points)

Correct procedures and calculations for:

- Median cost of each pet



BELOW BASIC (1 point)

Correct calculations for **any** of the procedures.

YEARLY COSTS FOR RAISING CATS AND DOGS

Items	Dogs	Cats
Initial Price of Animal	\$50 - 750	\$30 - 100
Collar	\$6 - 20	\$5 - 15
Medications	\$40 - 100	\$60 - 80
Food	\$225 - 450	\$180 - 360
Spay/Neuter	\$81 - 101	\$46 - 71
Leash	\$5 - 20	
Shots	\$77 - 140	\$128 - 188
Toys	\$8 - 17	\$10 - 15
Cat Litter		\$80 - 100

Name _____

1. Classify each item according to the following categories: medical fees, food, and pet supplies.

Cost of Dog	Median Cost	Medical Fees	Median Cost	Food	Median Cost	Pet Supplies	Median Cost

Cost of Cat	Median Cost	Medical Fees	Median Cost	Food	Median Cost	Pet Supplies	Median Cost

2. Calculate the median cost for each item.
3. Calculate the sum of each category using the median costs.
4. Calculate the total cost for each pet.

Cost of Cat	Median Cost	Medical Fees	Median Cost	Food	Median Cost	Pet Supplies	Median Cost

Cost of Dog	Median Cost	Medical Fees	Median Cost	Food	Median Cost	Pet Supplies	Median Cost

SCORING RUBRIC:



ADVANCED (5 points)

All procedures and calculations are correct.

- Categorize items
- Calculate median cost
- Calculate the sum of each category and the total cost
- Create double bar graph



PROFICIENT (4 points)

Correct procedures and calculations for:

- Median cost of each pet
- Double bar graph

Correct procedures for **one** of the following:

- Categorize items
- Calculate the sum of each category and the total cost



BASIC (3 points)

Correct procedures and calculations for:

- Median cost of each pet

Correct procedures for **one** of the following:

- Categorize items
- Calculate the sum of each category and the total cost
- Double bar graph



BASIC (2 points)

Correct procedures and calculations for:

- Median cost of each pet



BELOW BASIC (1 point)

Correct calculations for **any** of the procedures.

RESOURCE LIST FOR DOGS

Basset Hounds

by Cari Meister

Bow Wow: A Day in the Life of Dogs

by Judy Reinen

Caring for Your Dog (Caring for Your Pet)

by Jill Foran

Cocker Spaniel (Popular Dog Library)

by Michael Teasley

Dear Mrs. Larue: Letters from Obedience School

by Mark Teague

Dog Heaven

by Cynthia Rylant

The Field of the Dogs

by Katherine Paterson

German Shepherds

by Lynn M. Stone

Golden Retrievers

by Lynn M. Stone

Labrador Retrievers

by Lynn M. Stone

101 Facts About Puppies

by Julia Barnes

Puppies, Dogs, and Blue Northerners: Reflections on Being Raised by a Pack of Sled Dogs

by Gary Paulsen

Saving Shiloh

by Phyllis Reynolds Naylor

Shiloh

by Phyllis Reynolds Naylor

The Summer of Riley

by Eve Bunting

Where the Red Fern Grows: The Story of Two Dogs and a Boy

by Wilson Rawls

RESOURCE LIST FOR CATS

Cows, Cats, and Kids: A Veterinarian's Family at Work

by Jean L. S. Patrick, Alvis Upitis (Photographer)

Cat Heaven

by Cynthia Rylant

Cat (Eyewitness Books)

by Juliet Clutton-Brock, Dave King (Photographer)

Totally Fun Things to Do with Your Cat

by Maxine Rock (Author), Rand McNally Inc.

Kittens

by Carey Scott, Dorling Kindersley Publishing, Kindersley

Why Do Cats Do That?

by Nancy White, Gioia Fiammenghi (Illustrator)

Siamese Cats (Cats Set I)

by Stuart A. Kallen

Choosing the Perfect Cat: A Complete and Up-To-Date Guide (Basic Domestic Pet Library)

by Dennis Kelsey-Wood, Eve Kelsey-Wood, American Society for the Prevention of Cruelty to Animals

Feline Behavior (Basic Training, Caring & Understanding Library)

by Sandra L. Toney, Herbert Axelrod

The Kids' Cat Book

by The Editors of Owl Magazine, Owl Magazine (Editor)

My Pet Cats (All About Pets)

by Leeanne Engfer, Andy King (Photographer)

Healthy Skin and Coat: Cats (Cats and Dogs a Basic Training, Caring, and Understanding Library)

by Dunbar Gram

The Incredible Journey

Sheila Burnford

Carl Burger

Every Living Thing

Cynthia Rylant

S.D. Schindler

Catwings

Ursula Le Guin

Socks

Beverly Cleary

Alan Tiegreen