



**Doggy  
Dilemma  
Open Ended  
Problem**

# Introduction to Open Ended Problems

## Why work on open ended problems?

If you've been paying attention to the assessments that are following the Common Core State Standards, then you know that we need to raise rigor in our classrooms when it comes to problem solving. These problems will help prepare students for performance task assessments.

## What is an open ended problem?

An open ended problem (sometimes called a performance task) is a full page (or more) of reading to help students practice reading for understanding in math problems. The problems are open ended, meaning that students can come to more than one answer. The problems are deep, multi-step and require perseverance. You will notice that the Standards for Mathematical Practice are embedded within the problem. Some of my problems also include writing, like this one.

## What age group is this most appropriate for?

This challenge is appropriate for end of the year 3rd grade (or gifted 3rd graders anytime), 4th grade and possibly for struggling 5th graders.

## How and when do you use this problem type in class?

They could be used as an assessment, a partner activity, for small group work, as work for students who have finished assignments early or for gifted and talented small groups. Each problem most likely will take more than one class period to complete. When I did this problem it took me 30 minutes and I should admit that I was rushing!

The first time I did an open ended problem with my third graders, we did it together as a whole group. We went through it and talked about the complexity, did a close reading of it and then attempted another one on our own after that. You know your class best!

# Doggy Dilemma - The Problem

Your parents are finally letting you get a dog after YEARS of begging. However they need you to do something first (nothing comes without a little work). In your neighborhood there is a requirement that dogs must be kept in an enclosed fence (dog pen) in the backyard when they are outside.

## Your parents need you to:

1. Choose a dog that is appropriate for your family.
2. Map out the fenced area (dog pen) in the backyard on the graph paper attached.
3. Choose a type of fencing from the table.
4. Calculate the cost of the fencing for your dog pen by finding the perimeter.
5. Calculate the area of the fenced dog pen.
6. Write a letter explaining all of your choices: the dog you chose and why, the square footage of your dog pen, the reason you made your dog pen the size that it is, and the type of fencing you chose. Don't forget to include the final cost of the fencing in your letter.

## Details you should think about:

- Your backyard is 30' x 35'.
- Your little sister wants space to set up her pool in the summer. She needs about 50 square feet for that. She doesn't really want it to be inside the fenced area because she is afraid the dog will go to the bathroom in her pool. Please include that space in your backyard plan and label it POOL.
- When you decide the size of your dog pen, consider the activity level and size of the dog you are choosing.
- When you choose the fence type, you may want to consider how tall your dog is, and how high a dog can jump.
- For dogs that like to dig, you'll need to put chicken wire or large stones around the base of the fence to keep them from escaping.
- Do you need four sides of fencing, or can one side be the back of the house (which has a back door)? If you are using the house as one side of your fence, draw the house in your diagram.
- Label the dimensions of your diagram in feet. When you calculate the total perimeter, include that number inside your dog pen. Include the total area inside your dog pen as well.

# Doggy Dilemma - Information

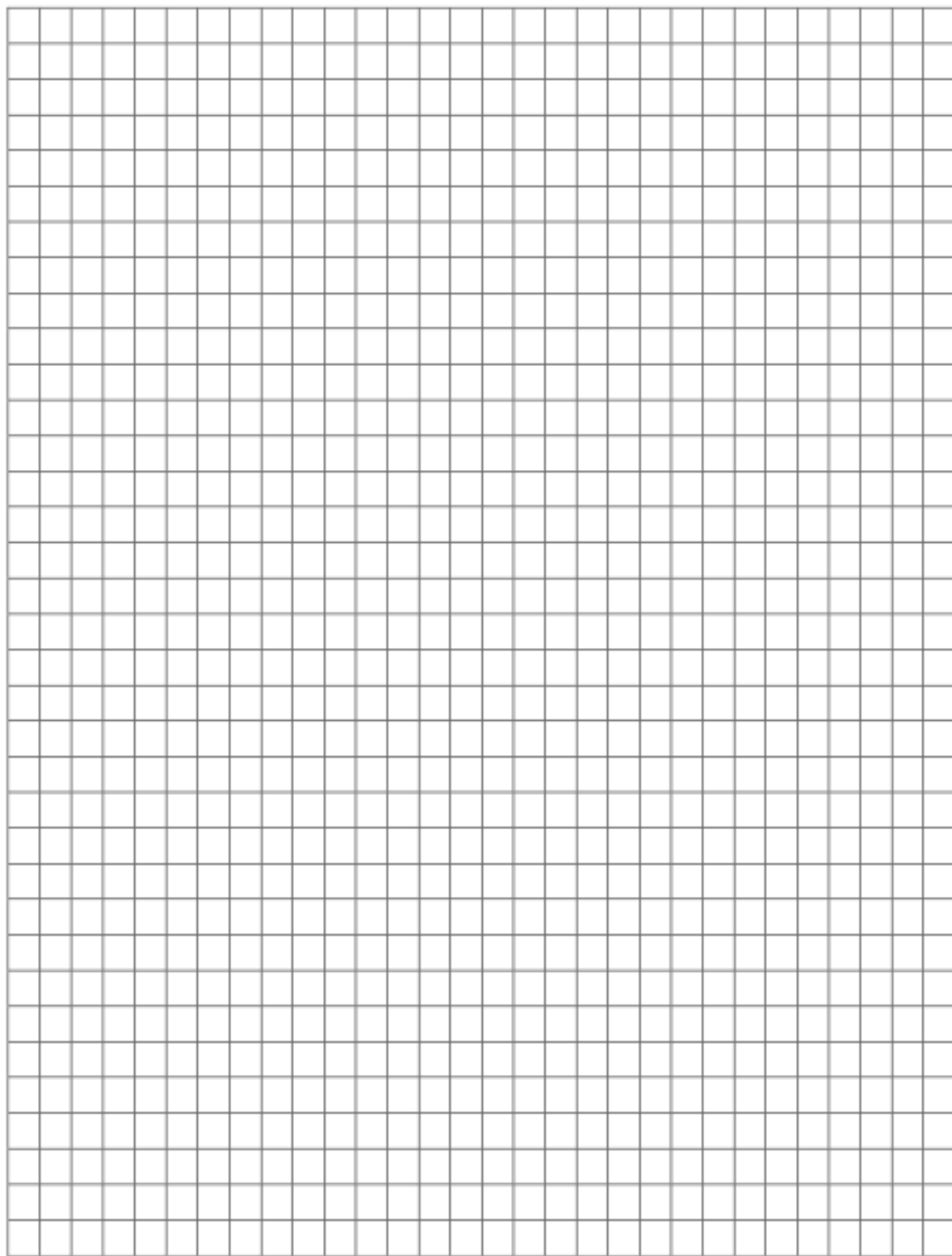
Dogs available for adoption:

Dog Breed	Dog Details
Siberian Husky	Siberian Huskies are 35-60lbs as a full grown dog. They live between 12-14 years. They are bred to haul things for hundreds of miles. The ancestor of the Siberian Husky is the wolf. The average height of a Siberian Husky is 21-24 inches. Some Siberian Huskies have been known to jump up to 5 feet from a sitting position. They also love to dig.
Golden Retriever	Golden Retrievers weigh 60-75lbs as a full grown dog. Their life span is 10-12 years. Golden Retrievers are known for being kind, friendly, loyal, and calm. Golden Retrievers are often used as guide dogs. The average height is between 23-24 inches tall. Golden Retrievers require 2 or more hours of exercise daily.
Beagle	Beagles weigh 20-25lbs as a full grown dog. They have a great sense of smell and tracking instinct. The Beagle will typically live 12-15 years. Beagles have been bred for hunting rabbits. Beagles are excellent diggers. They grow to a height of 13-16 inches high. Some Beagles have been known to jump as high as four feet.

Types of fencing available for purchase:

Fencing information	Fencing Cost
Chain Link – 6 feet tall, 50 foot roll	\$256.00 per roll
Vinyl Panels – 6 feet tall, 6 foot sections	\$151.00 per section
Wood Picket – 3 feet tall, 8 foot sections	\$73.00 per section
Chicken Wire – 1 foot tall, 25 foot roll	\$7.00 per roll
Large Stones – 1 foot brick	\$1.00 per brick

# Doggy Dilemma - The Diagram



# Doggy Dilemma - Writing the Letter

Take some time to organize your thoughts.

Write a letter to your parents explaining all of your choices:

- the dog you chose and why
- the square footage of your dog pen
- the reason you made your dog pen the size that it is
- the type of fencing you chose.
- the final cost of the fencing

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# Rubric for Scoring the Problems

Student name: \_\_\_\_\_

Circle one descriptor under each of the three columns.

	<b>Understanding</b>	<b>Strategy</b>	<b>Communication</b>
<b>1</b> Makes an effort, but has no understanding at all.	I don't understand the problem.	I'm not sure what steps to take.	I'm not sure, and I can't explain it.
<b>2</b> Understands some of the problem, but still makes an error.	I think I understand, but I'm still a little unsure.	I got started, but I'm still thinking.	I can explain some of what I did.
<b>3</b> A clear understanding and can show it.	I got it.	I have a plan, but I'm not sure of the steps.	I can tell you and show you, I can explain what I did.
<b>4</b> Excellent understanding and can show that understanding in many ways.	I got it, I can prove it and I can do other problems like this.	I can show more than one plan to check my work.	I clearly showed my thinking and explained the problem with details.

## Feedback:

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**Updated: Metric Pages Attached**



# Doggy Dilemma - The Problem

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## Your parents need you to:

1. Choose a dog that is appropriate for your family.
2. Map out the fenced area (dog pen) in the backyard on the graph paper attached.
3. Choose a type of fencing from the table.
4. Calculate the cost of the fencing for your dog pen by finding the perimeter.
5. Calculate the area of the fenced dog pen.
6. Write a letter explaining all of your choices: the dog you chose and why, the area of your dog pen, the reason you made your dog pen the size that it is, and the type of fencing you chose. Don't forget to include the final cost of the fencing in your letter.

## Details you should think about:

- Your backyard is 9 m x 11 m.
- Your little sister wants space to set up her pool in the summer. She needs about 4 square metres for that. She doesn't really want it to be inside the fenced area because she is afraid the dog will go to the bathroom in her pool. Please include that space in your backyard plan and label it POOL.
- When you decide the size of your dog pen, consider the activity level and size of the dog you are choosing.
- When you choose the fence type, you may want to consider how tall your dog is, and how high a dog can jump.
- For dogs that like to dig, you'll need to put chicken wire or large stones around the base of the fence to keep them from escaping.
- Do you need four sides of fencing, or can one side be the back of the house (which has a back door)? If you are using the house as one side of your fence, draw the house in your diagram.
- Label the dimensions of your diagram in metres. When you calculate the total perimeter, include that number inside your dog pen. Include the total area inside your dog pen as well.

# Doggy Dilemma - Information

Dogs available for adoption:

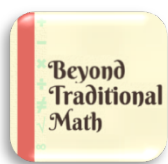
Dog Breed	Dog Details
Siberian Husky	Siberian Huskies are 15-30 kgs as a full grown dog. They live between 12-14 years. They are bred to haul things for hundreds of kilometres. The ancestor of the Siberian Husky is the wolf. The average height of a Siberian Husky is 53-60 centimetres. Some Siberian Huskies have been known to jump up to 2 metres from a sitting position. They also love to dig.
Golden Retriever	Golden Retrievers weigh 30-33 kgs as a full grown dog. Their life span is 10-12 years. Golden Retrievers are known for being kind, friendly, loyal, and calm. Golden Retrievers are often used as guide dogs. The average height is between 60-61 centimetres tall. Golden Retrievers require 2 or more hours of exercise daily.
Beagle	Beagles weigh 10-12 kgs as a full grown dog. They have a great sense of smell and tracking instinct. The Beagle will typically live 12-15 years. Beagles have been bred for hunting rabbits. Beagles are excellent diggers. They grow to a height of 33-40 centimetres high. Some Beagles have been known to jump as high as 1.2 metres.

Types of fencing available for purchase:

Fencing information	Fencing Cost
Chain Link – 2 metres tall, 15 metre rolls	\$256.00 per roll
Vinyl Panels – 2 metres tall, 2 metre sections	\$151.00 per section
Wood Picket – 1 metres tall, 2.5 metre sections	\$73.00 per section
Chicken Wire – 0.5 metre tall, 7.5 metre rolls	\$7.00 per roll
Large Stones – 0.5 metre brick	\$1.00 per brick

# Thank You!

If you like this open ended problem, there are more to check out in my store. (The first set is actually my bestseller!) I have taught 3<sup>rd</sup> and 4<sup>th</sup> grade in the past eight years and pride myself on creating projects and problem solving opportunities that students can connect to the real world.



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