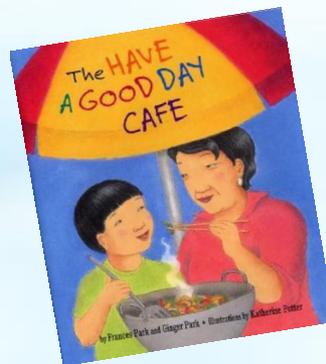
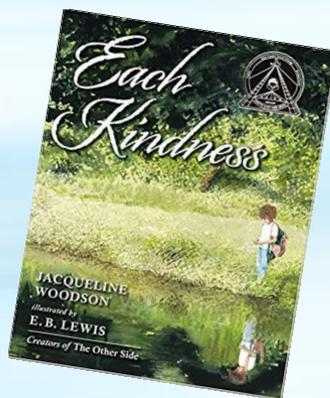
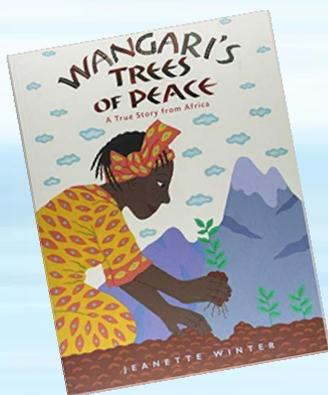




# Making the Most of Children's Literature: A Context to Explore Math and Understand the World



Sue O'Connell  
@SueOConnellMath



# Math in Context

**Math is all around us!**

- Is that apparent to your students?

**Numbers and equations mean something.**

- $3 \times 6$

**Math is about solving problems.**

- Math is about application and situations.

Exploring math in context matters.



# Why literature?

Students are engaged by it.

- Children love stories!

Students connect to it.

- See themselves and their experiences

Students are transported by it.

- Step out of their world into another world and different experiences

Students are challenged by it.

- Consider and reflect on new perspectives



# What books do we choose?

Lots of books are written to teach math concepts.

What if instead, we searched for situations in which math occurs?



# What books do we choose?

What math do we see in the book?

How can we explore math concepts through the characters or events in the book?

Integrating literature and mathematics gives students that all-important context!



But, could stories do more?

Could they expand students' thinking about the world in conjunction with the math?

Could they focus on social justice along with the math?

Could they support a sense of belonging along with the math?

With a careful selection of literature it can be more than just a math context.



# Selecting books

Think about the math:

What real situations do you think about?

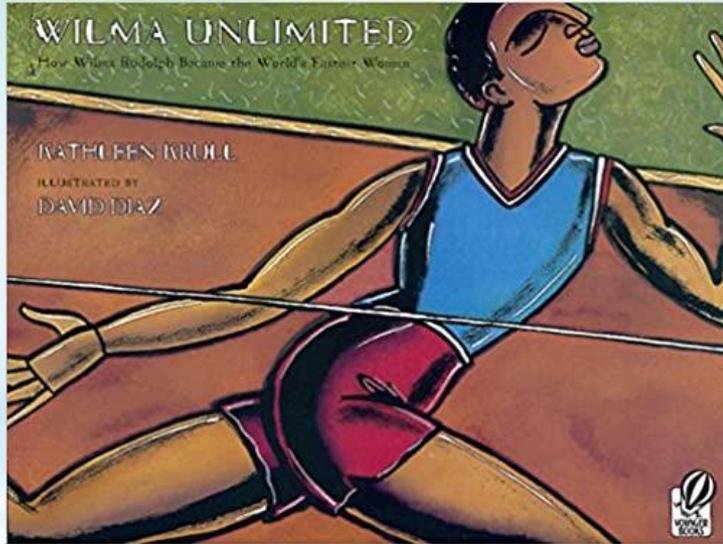
- Comparing decimals to hundredths?
- Multiplying multi-digit numbers?
- Finding perimeter?

Find stories to show those situations.

Can we find stories that are interesting and socially conscious that fit those situations?



# Comparing Decimals to Hundredths



When Wilma Rudolph was 4, she got scarlet fever and polio.

She worked hard to be able to walk again.

In 1960, she became the first American woman to win 3 gold medals at a single Olympics, and she did it running!

Where is the math?



# 1960 Olympic Race Times

Wilma's Times		
Race	Olympic Trials	Olympic Games (Gold)
100 meter	11.5 seconds	11.0 seconds
200 meter	23.9 seconds	24.0 seconds
4x100 relay	44.5 seconds	44.5 seconds



# Comparing Race Times

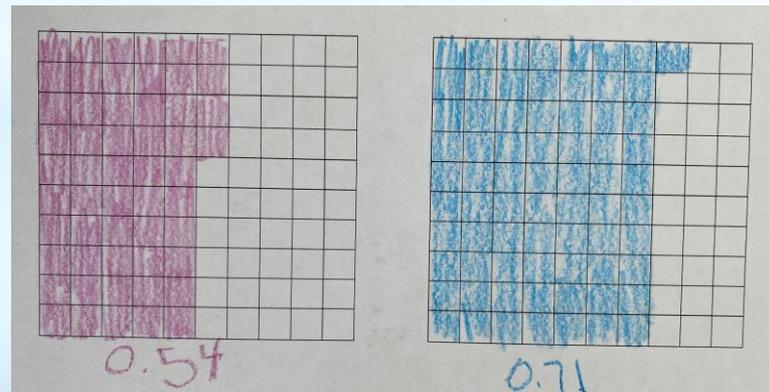
In 1988, Florence Griffith-Joyner won the Olympic gold medal in the 100m race with a time of 10.54 seconds.

In 2016, Elaine Thompson won the gold medal in a time of 10.71 seconds.

What do you notice?

Who ran the race in less time?

How do you know?



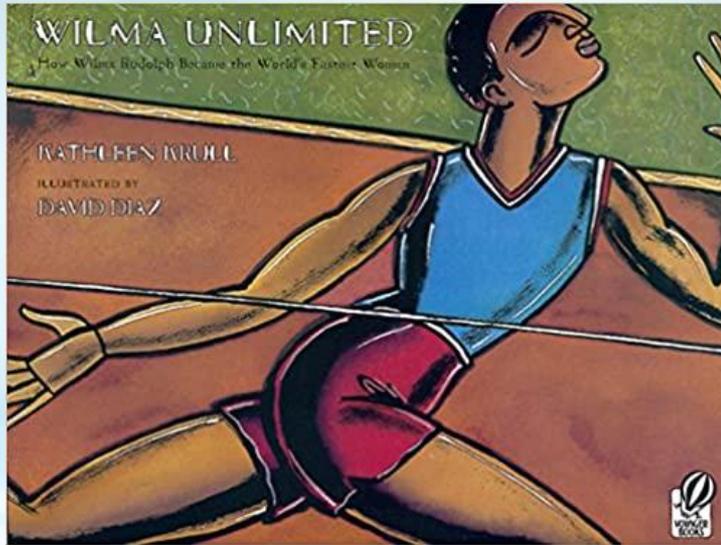


## Who was faster?

- Helen Stephens (1936) 11.5
- Renate Stecher (1972) 11.07

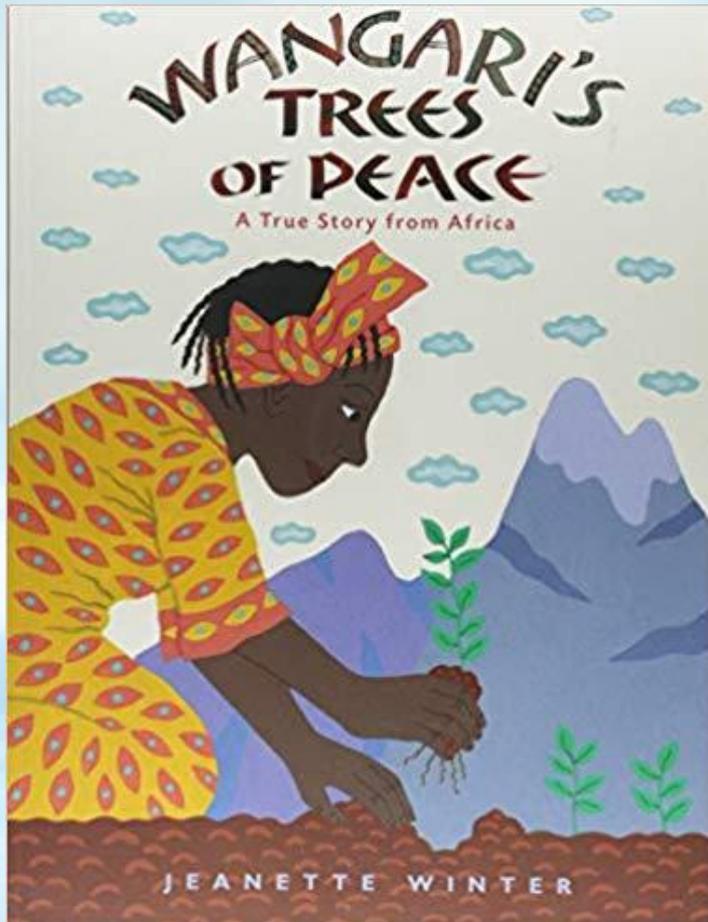
## Who was faster?

- Gail Devers (1992) 10.82
- Evelyn Ashford (1984) 10.97



## What else surfaces?

- Facing adversity – polio – couldn't attend school
- What it was like to be black in 1940's
- Determination and perseverance (from polio patient to Olympian)

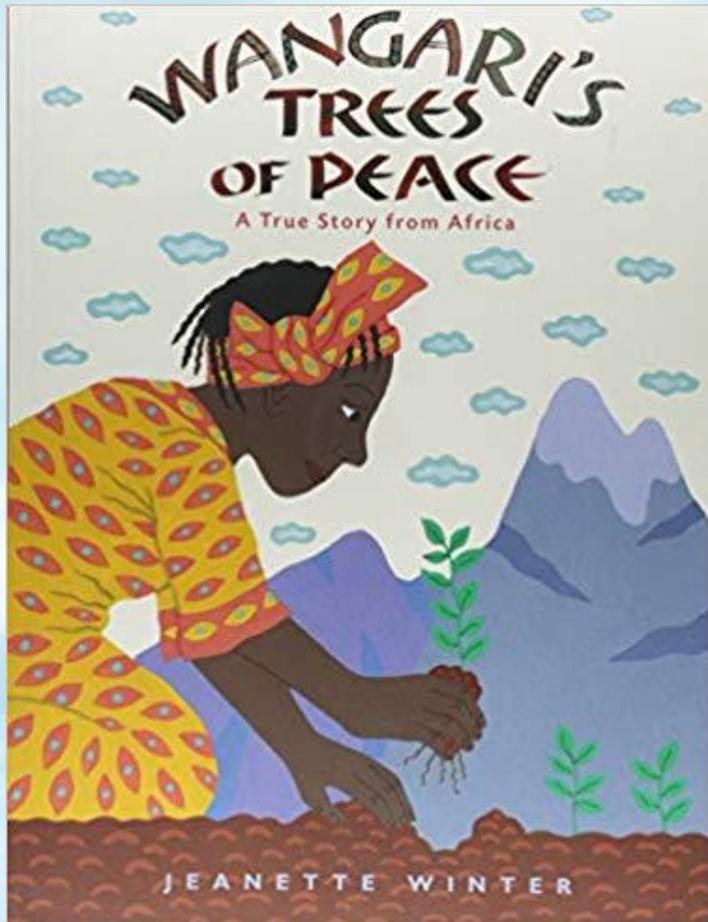


Wangari planted trees  
in her community in  
Kenya.

She asked other  
women to help.  
And more women  
helped.

Rows of trees  
appeared!

Where is the math?



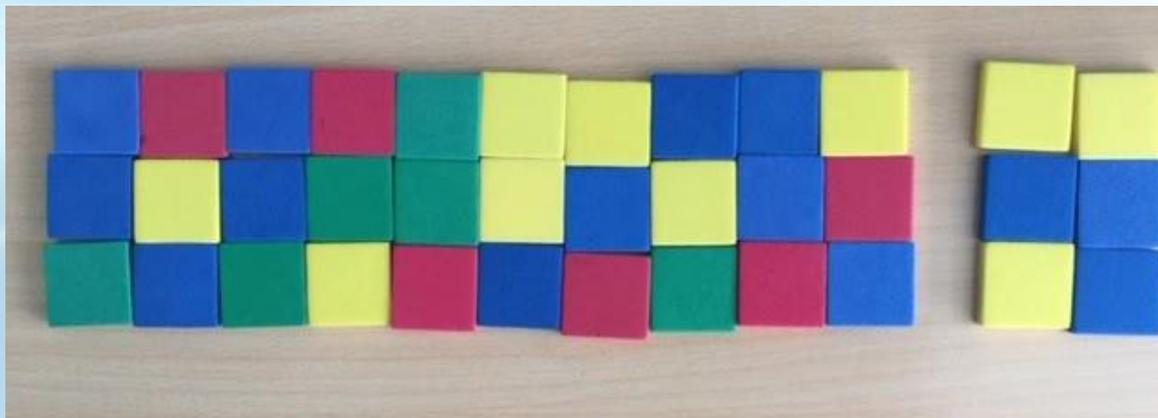
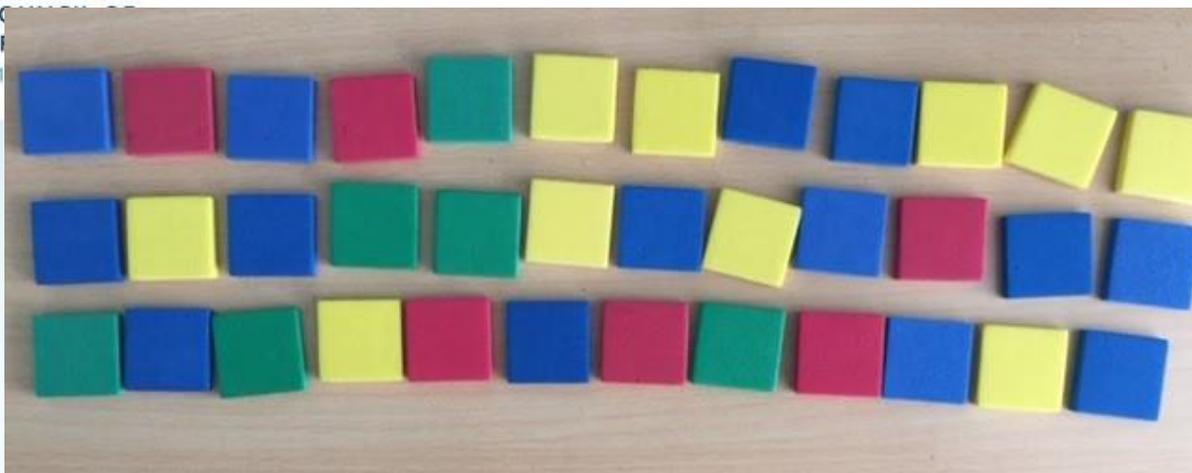
“The women spread out over the village, planting tiny trees in long rows...”

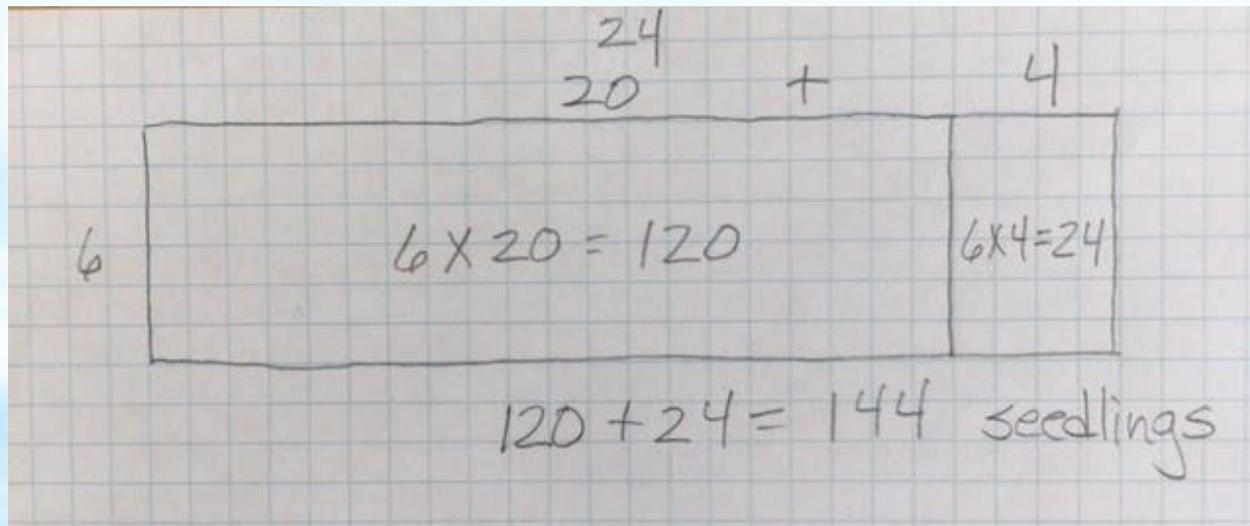
Multi-digit multiplication using the area model

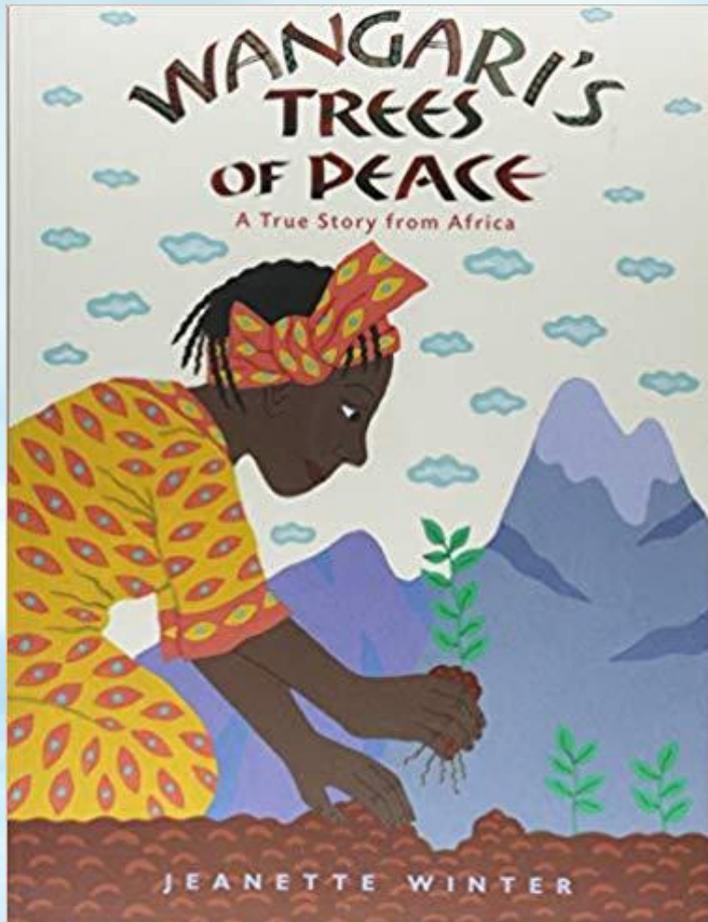
- rows of trees
- visualizing arrays and moving to rectangle models



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CELEBRATING 100 YEARS

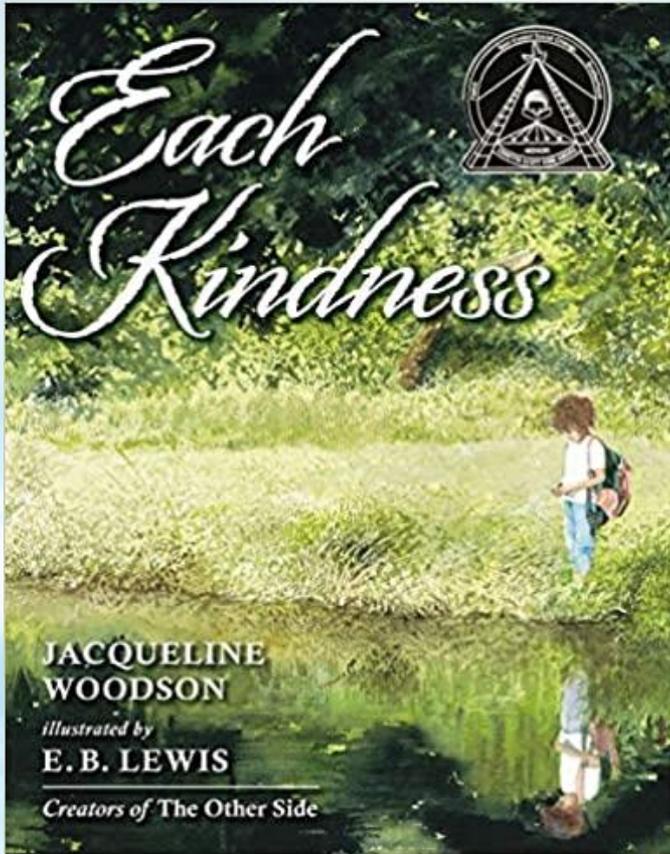






What else surfaces?

- Environmental issues (Green Belt Movement won her a Nobel Prize)
- Persecuted and jailed by the men who thought she was a troublemaker
- Inspiration – what one person can accomplish



A new girl arrives in school.

No one reaches out to her.

When she doesn't return to school, Chloe reflects on what she might have done.

Where is the math?



- Chloe's teacher gives a lesson about how even small acts of kindness can change the world.
- Explore acts of kindness



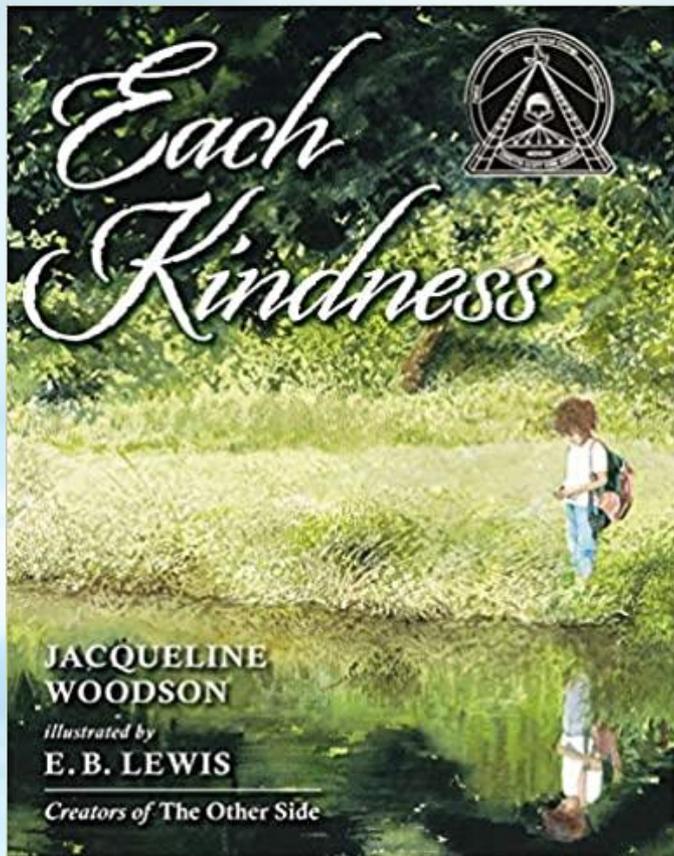
# Exploring Acts of Kindness

- Week 1 - 10 friends agreed on an act of kindness they would do that week
- Week 2 – they each found 9 others and made groups of ten and all did an act of kindness
- Week 3 - they each found 9 others and made groups of ten and all did an act of kindness
- How many acts of kindness would be done in week 5?



# Changing the World

Week	My thinking	People holding doors for others
1	10	10
2	$10 \times 10$	100
3	$100 \times 10$	1,000
4	$1,000 \times 10$	10,000
5	$10,000 \times 10$	100,000



What else surfaces?

- Accepting people despite differences
- The power of small acts of kindness



# First focus: the story

- Initial discussions focus on the story rather than the math
- Allows students time to get pulled into the context and reflect on the characters and events



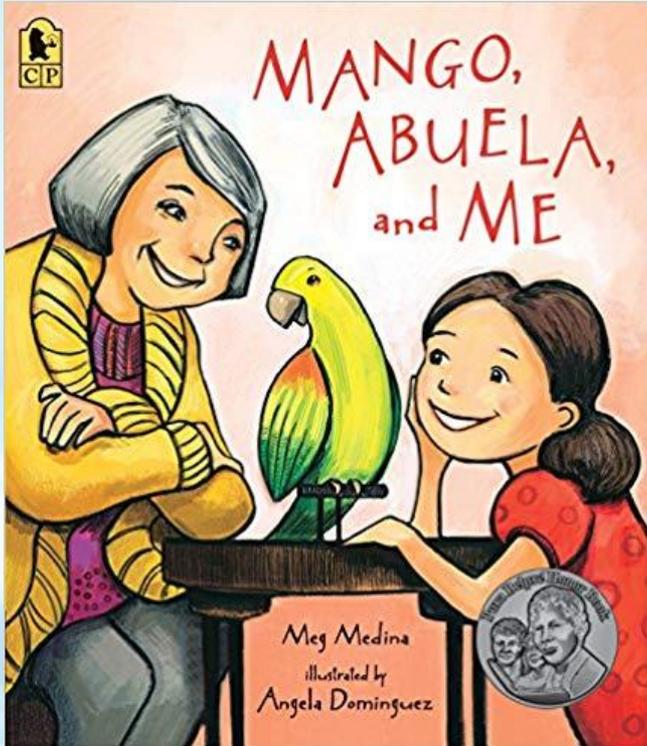
# Math Focus: driven by a character or event in the story

- May be several ways to connect to math
  1. Do lots of math tasks that have connections (graph, add, solve problems...)
  2. Focus on one strong math connection and use the context to explore and teach that math concept

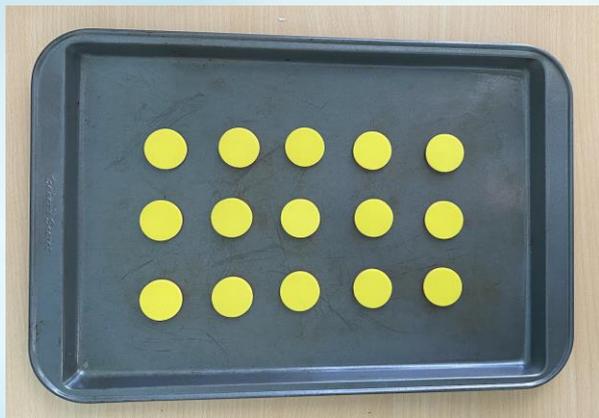


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CELEBRATING 100 YEARS

# More Possibilities to Explore



Mia's far-away grandmother comes to live with her family. Abuela cannot speak English and Mia only knows a little Spanish. They cook together and Mia helps her learn English with the help of a parrot named Mango. Where is the math?



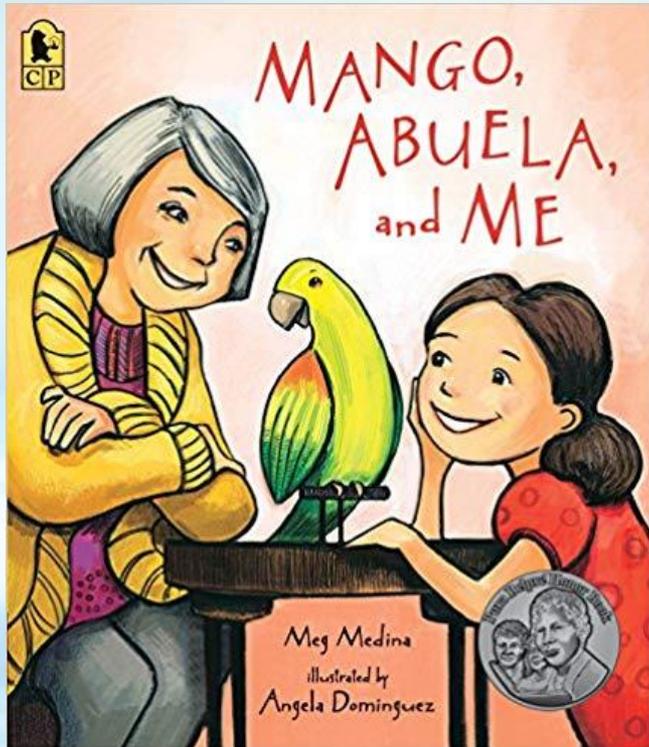
How many meat pies on the tray?

How do you know?

What equation shows it?

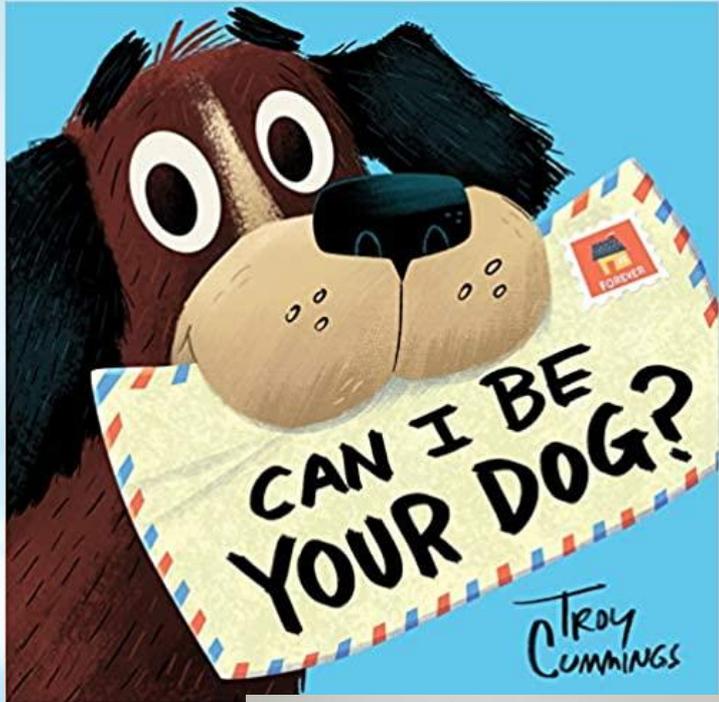
$$5 + 5 + 5 = 15$$

$$3 \times 5 = 15$$



## What else surfaces?

- Leaving homeland and the feelings associated with it
- Language barriers
- Love between generations



Arfy wants a home.  
Writes letters to everyone  
in the neighborhood to  
adopt him.  
He gets lots of rejections.

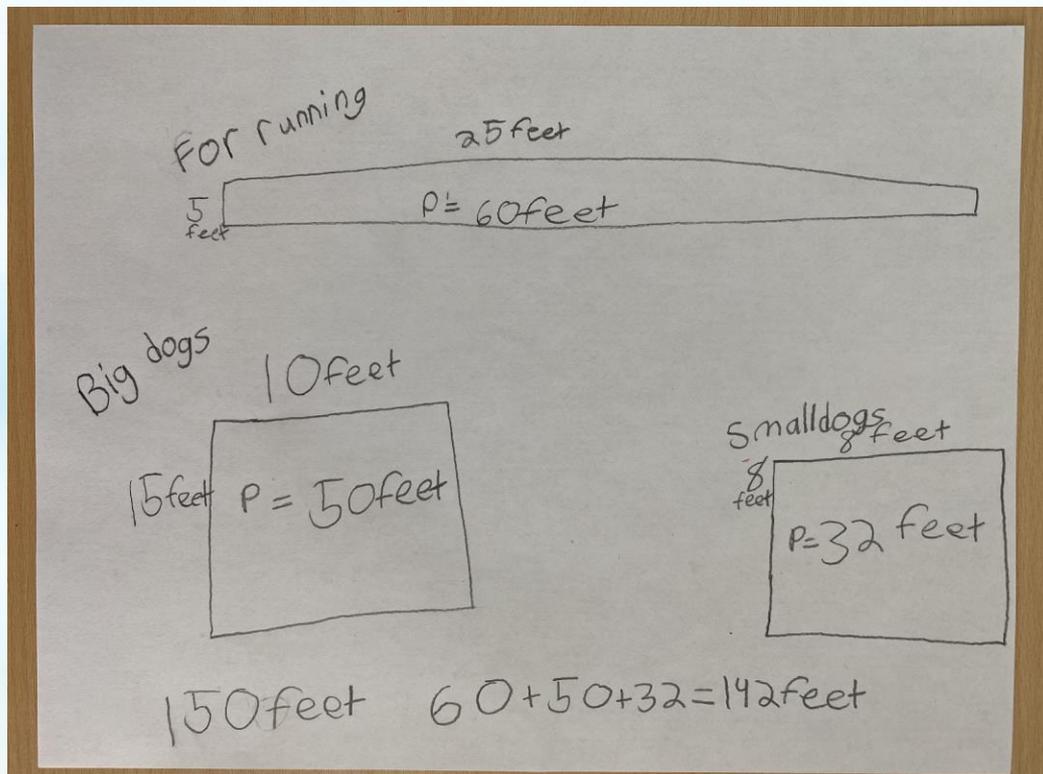
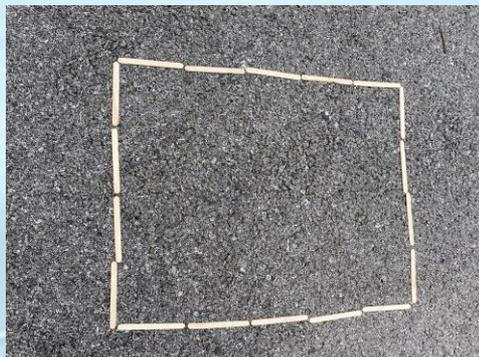


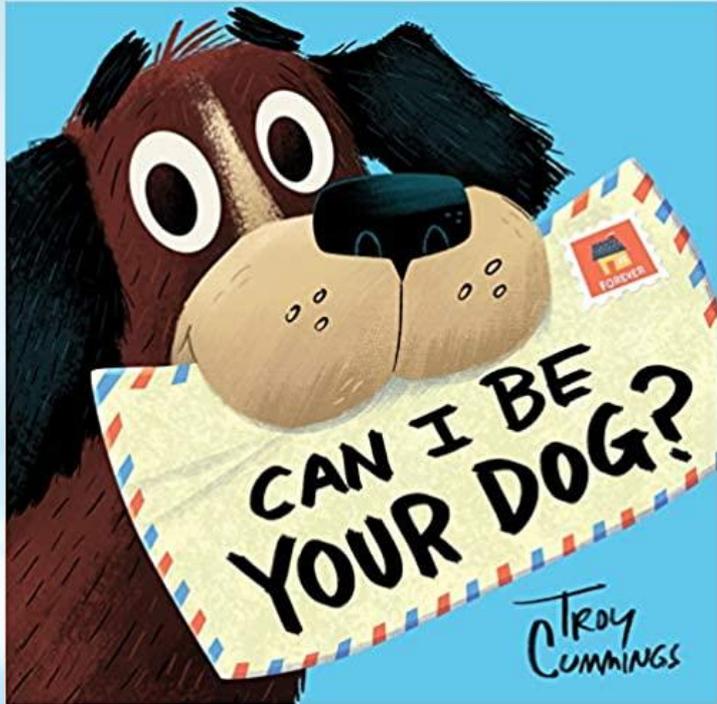
Where is the math?



# How to Care for a Pet

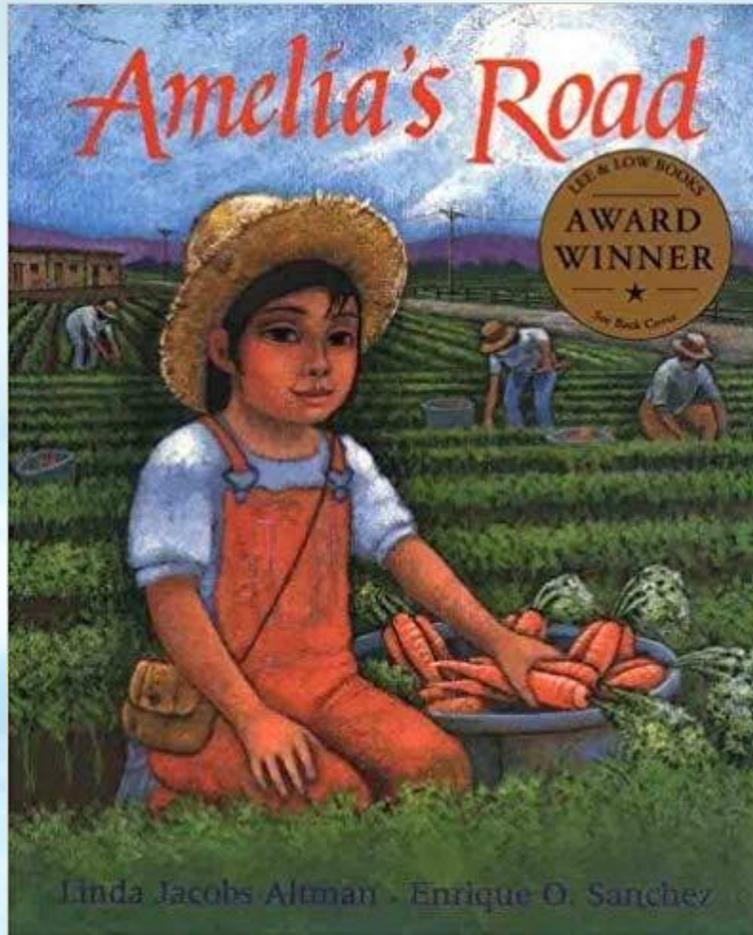
## Designing Play Yards for Alfie





## What else surfaces?

- Taking care of pets - responsibility
- Pet adoption
- Empathy



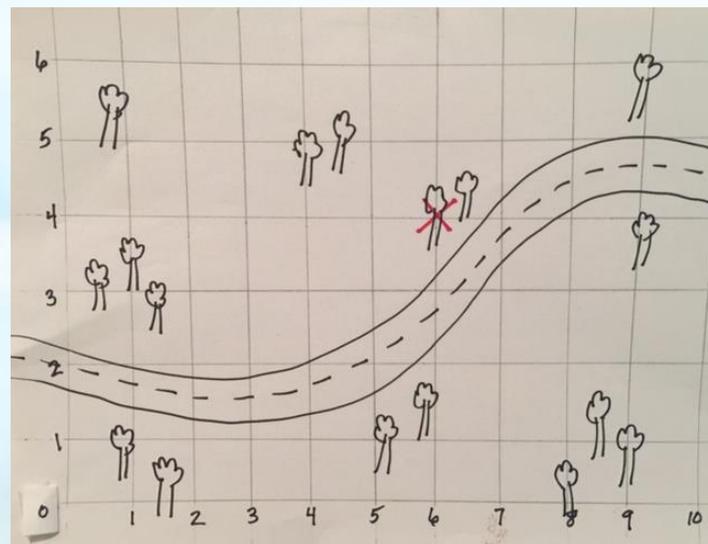
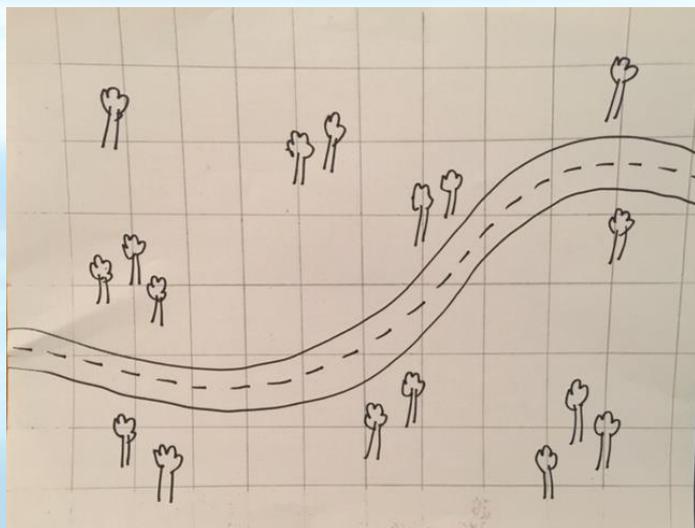
Amelia and her family are migrant workers.

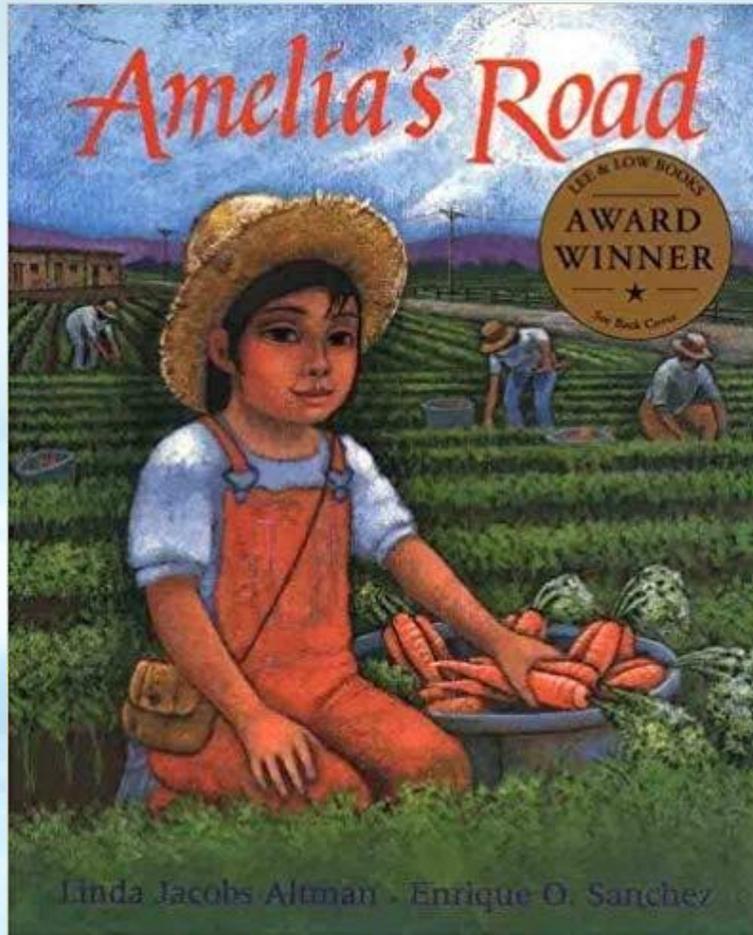
She longs for a home of her own.

Amelia buries a treasure box on the farm, so she has somewhere that she can call home.

Where is the math?

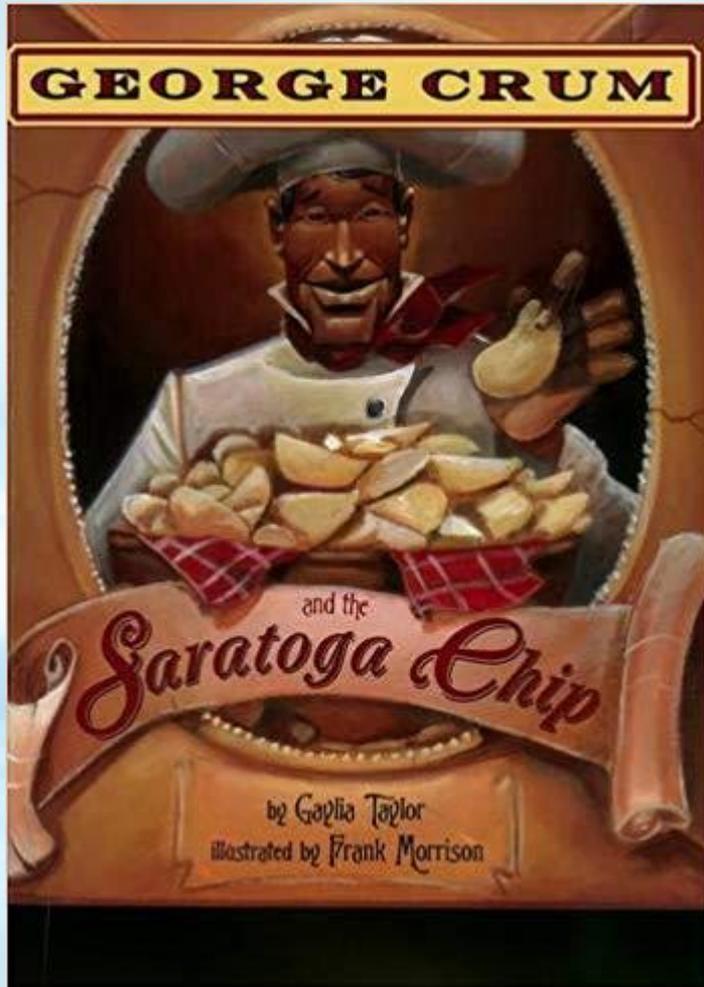
- Where did Amelia bury her treasure box?
- How is she going to be able to find it when she returns?





What else surfaces?

- Life of a migrant worker
- Need to belong
- Meaning of home



George Crum  
accidentally invented  
the potato chip!  
His reaction to a  
complaining customer  
led him to slice potatoes  
very thin and fry them  
longer than normal.  
Where is the math?

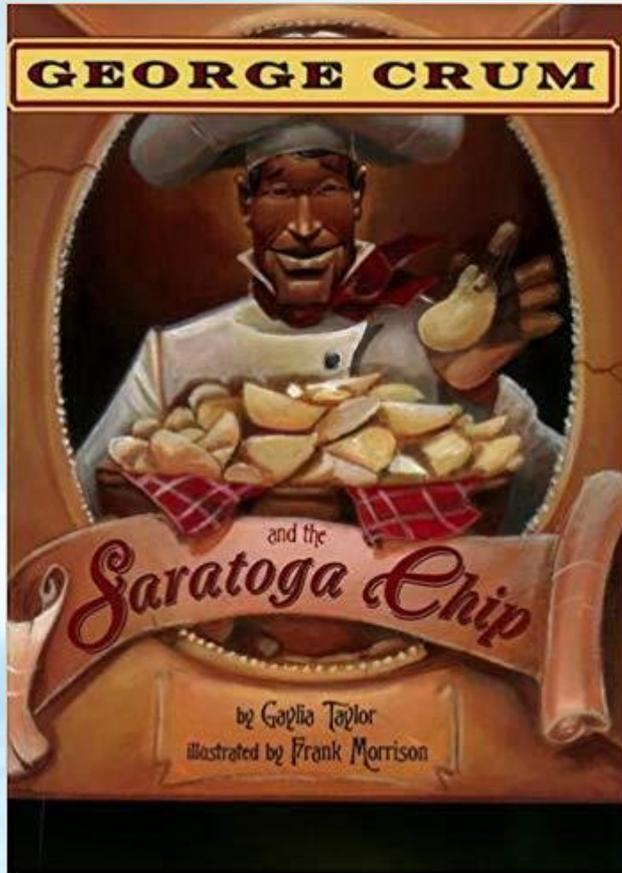


# Exploring Snacks

<b>Snack</b>	<b>Calories in a Small Bag</b>
Pretzels	109
Potato chips	274
Corn chips	160
Tortilla chips	295
Popcorn	116

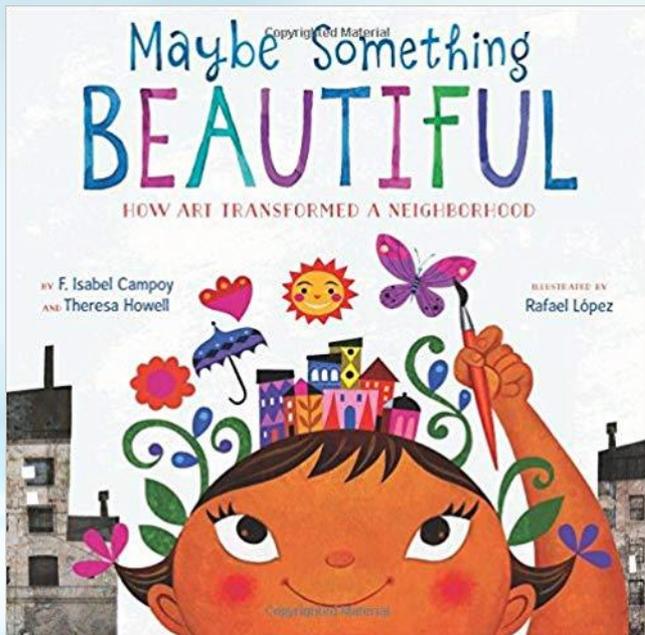
What do you notice?

Which has the fewest calories or the most?



## What else surfaces?

- George is part Native American and part African-American and was often treated unkindly
- Persevered to get a job as a restaurant chef
- Was a success and opened his own restaurant
- Ways to deal with people who are not kind



Mira's neighborhood was gray and depressing.

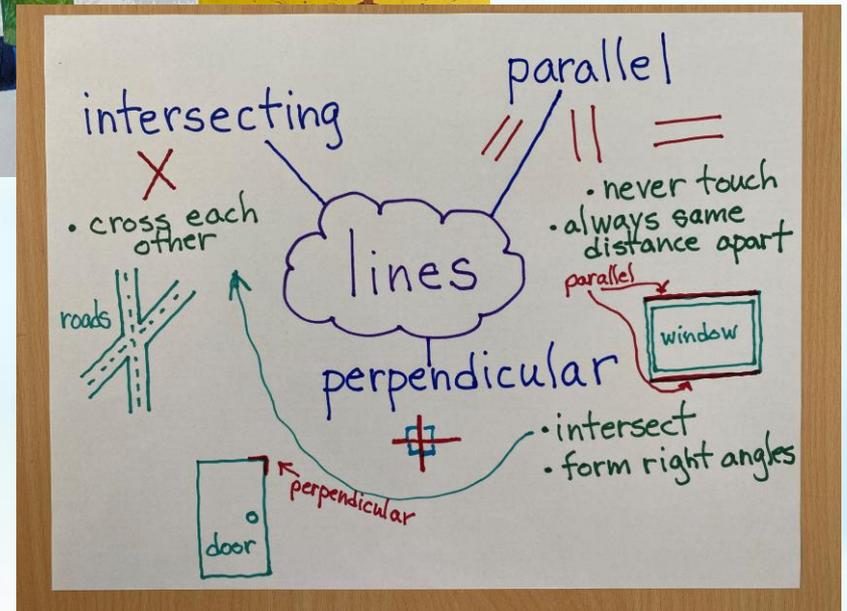
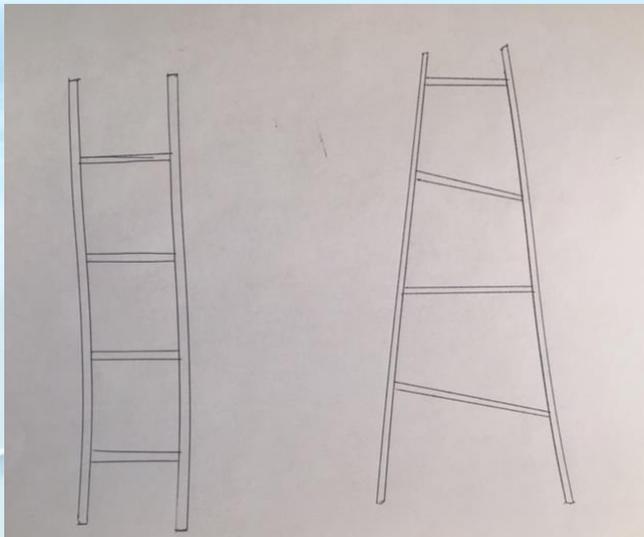
She loved to draw colorful pictures to cheer up her neighbors.

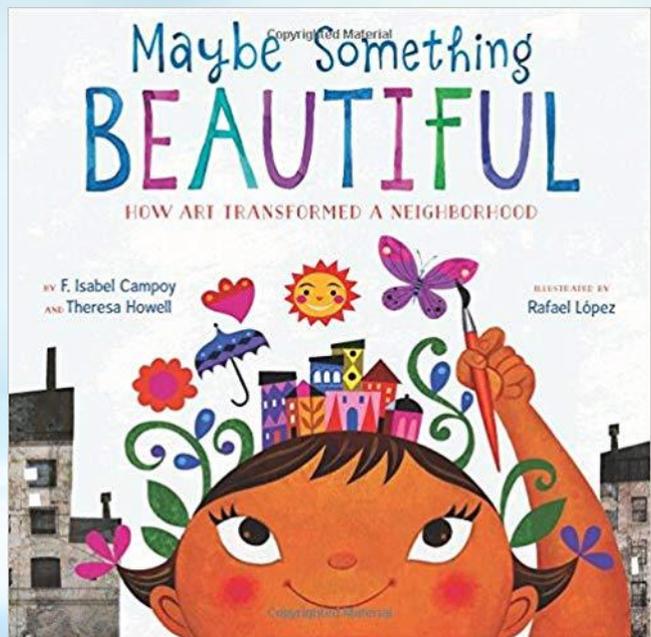
She met an artist and joined him to paint murals on city walls and neighbors joined them, bringing color to the gray city.

Where is the math?



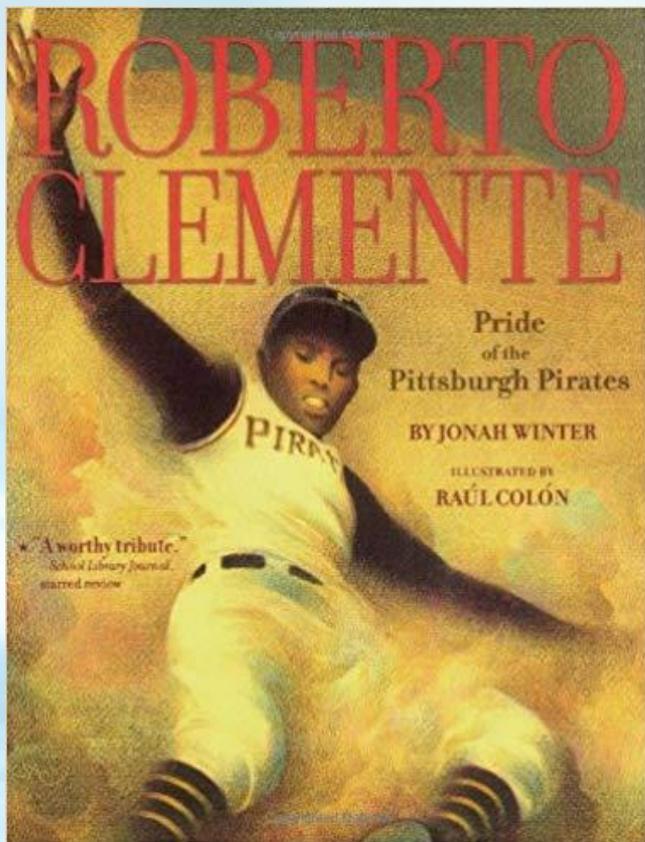
# Lines and angles in the art





## What else surfaces?

- What can be accomplished when working together
- Spreading joy through art
- Taking ownership of their community



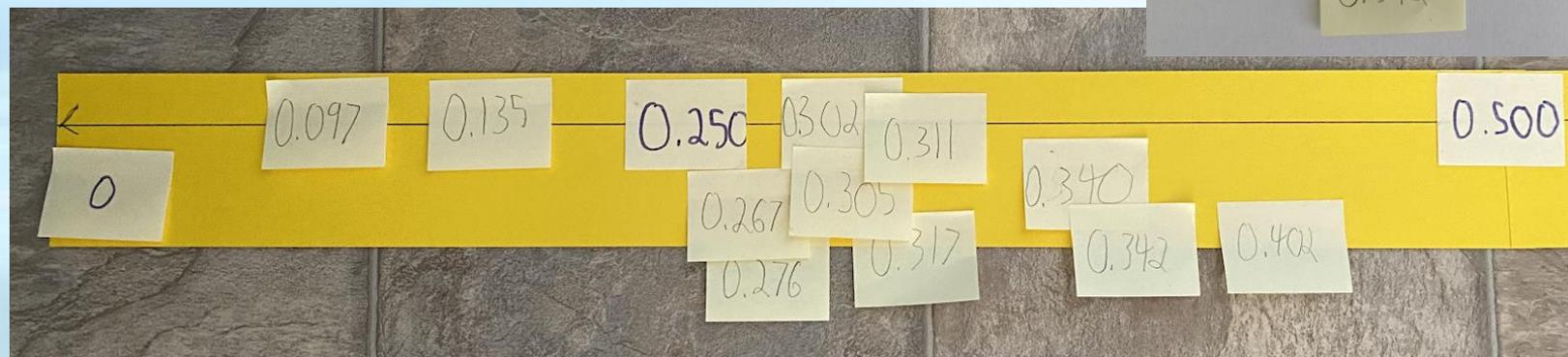
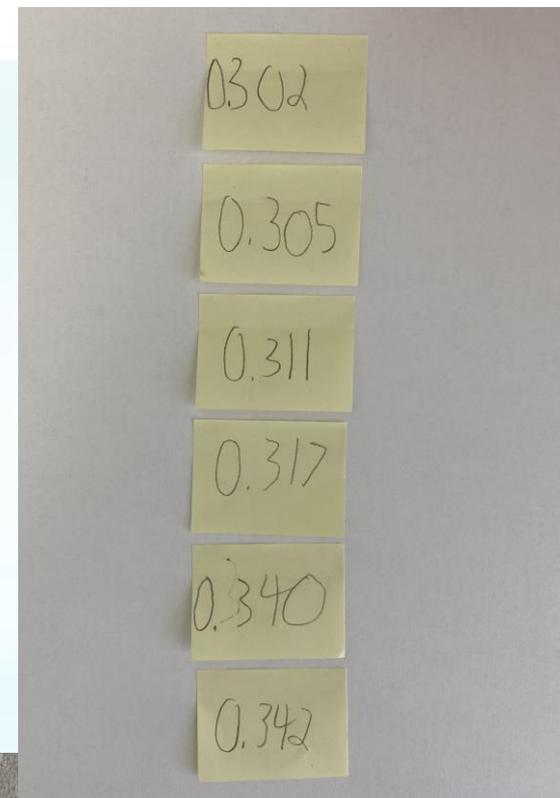
As a child in Puerto Rico, Robert Clemente didn't have money for a real baseball. He worked hard and made it to the major leagues. Faced criticism and prejudice from the press. He died in a plane crash carrying food and supplies to earthquake victims. Where is the math?

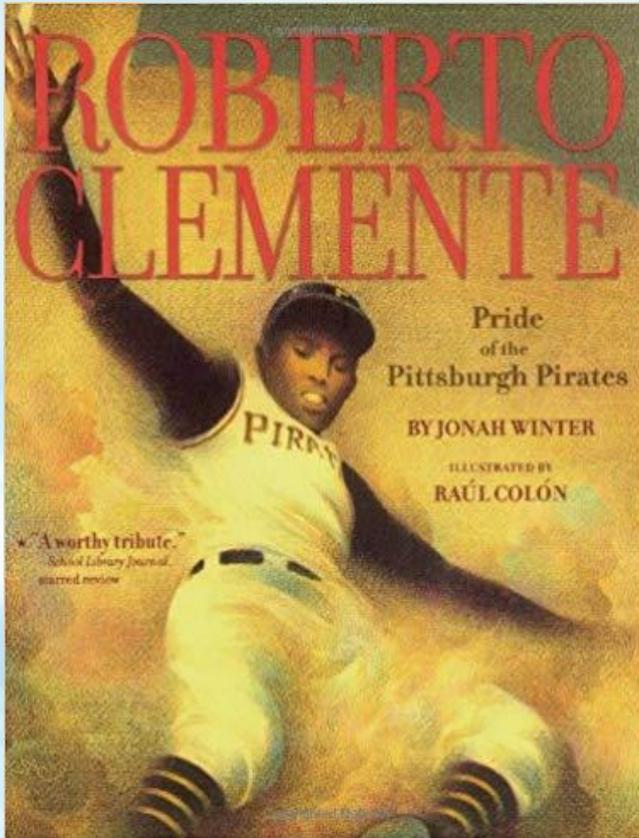


# Batting Averages

Roberto Clemente 0.317

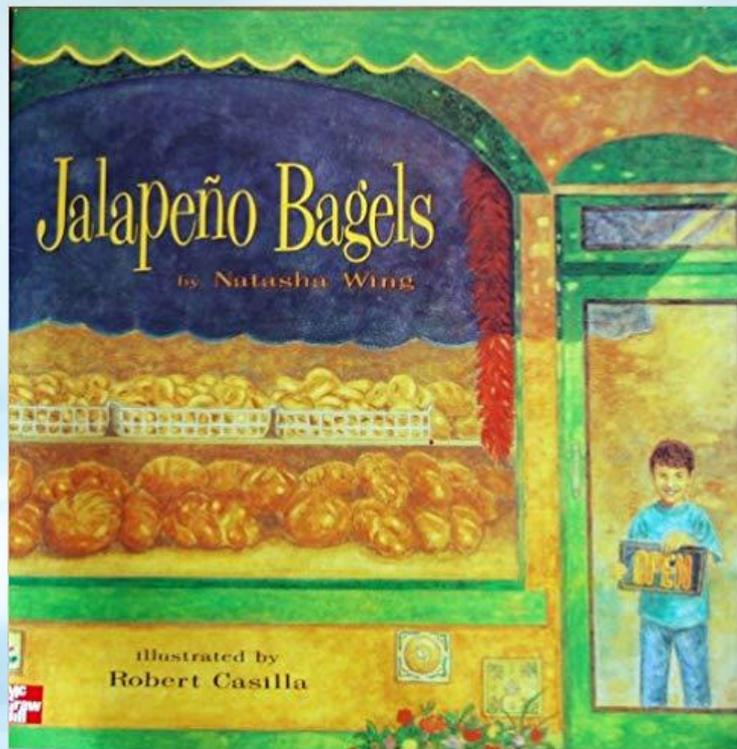
Looked at batting averages of  
some Hall of Famers





What else surfaces?

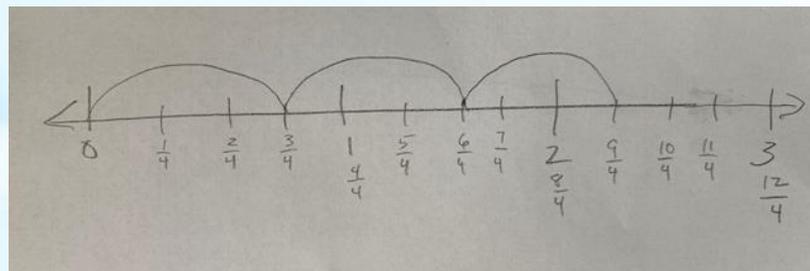
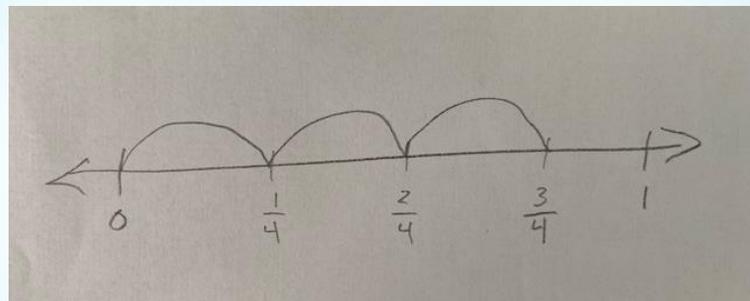
- Racial prejudice
- Determination and hard work lead to success
- Giving back to his community

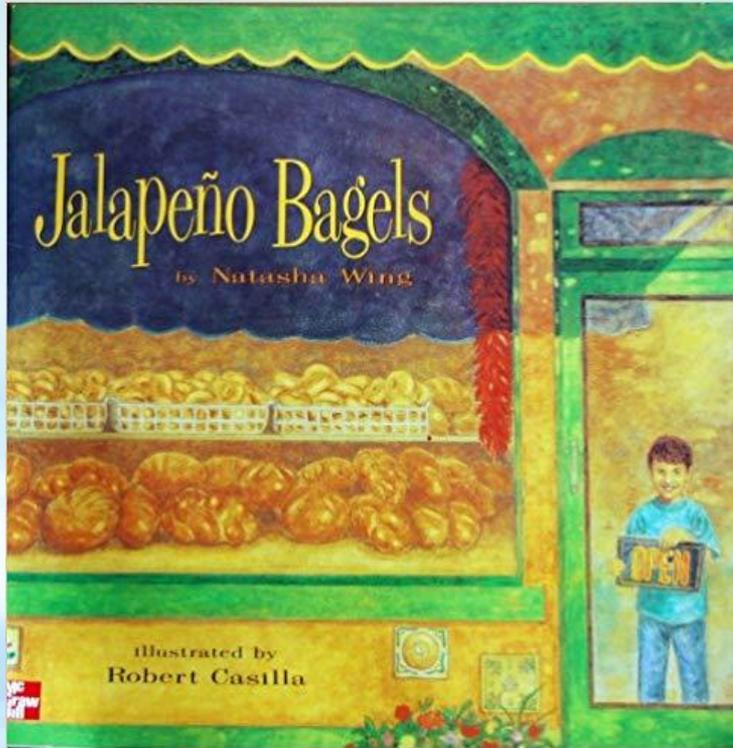


Pablo needs to decide on something to bring to school for International Day. His Mexican mother and Jewish father own a bakery. He struggles with what reflects his heritage and finds a way to merge both cultures. Where is the math?

# Bring a Recipe to School

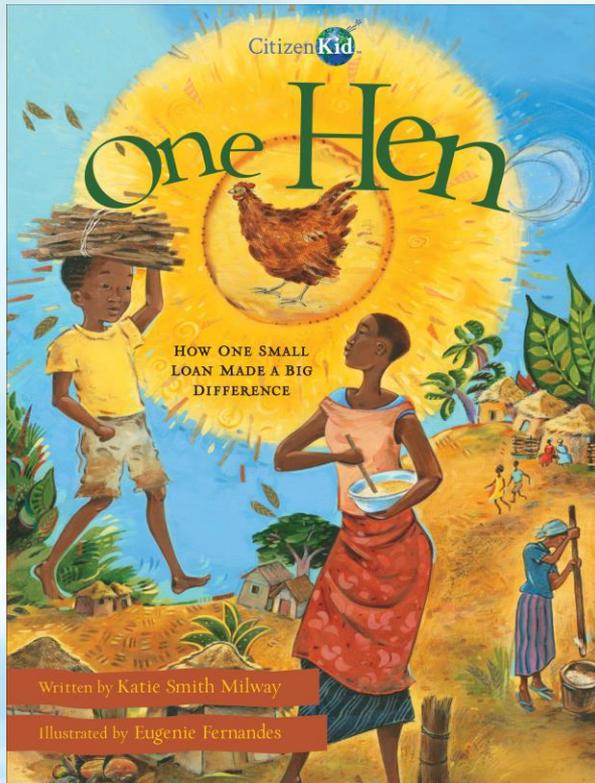
- Need more
- How will you make 3 times as much?
- Multiplying a fraction by a whole number





## What else surfaces?

- Blending of cultures and traditions
- Pride in your heritage



Kojo and his family live in a tiny village in Ghana.

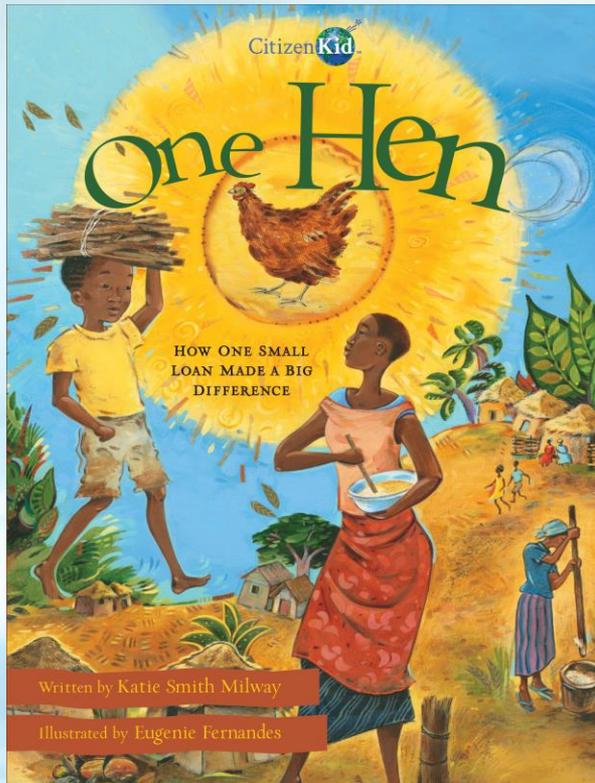
The families all put a little money aside and one at a time families can borrow money.

After his mother's turn there are a few coins left and he buys a hen and eventually owns the largest poultry farm in West Africa. Where is the math?



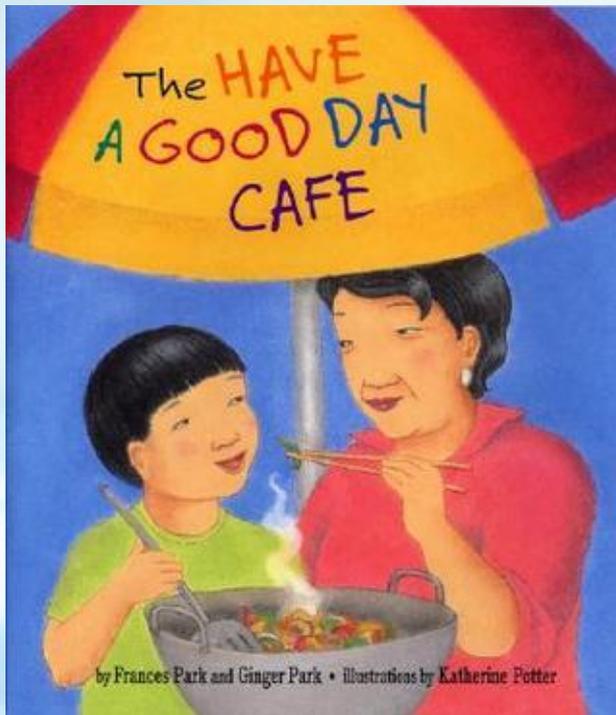
# Where is the math?

- The people of Ghana use money called cedis. One cedi is worth about 20 cents.
- How much does it cost for various quantities of items?
- What business might you like to try? How much money would you need as a loan? How would you spend it?



## What else surfaces?

- A glimpse into life in a small village
- Perseverance and hard work
- Working as a community
- Giving back – once successful, he set up a system to give loans to families



Grandma came from Korea to live in America. She misses her homeland.

The family in America has a food cart selling pizza and hot dogs.

Grandma and grandson work together to help the business by featuring Korean food.

Where is the math?

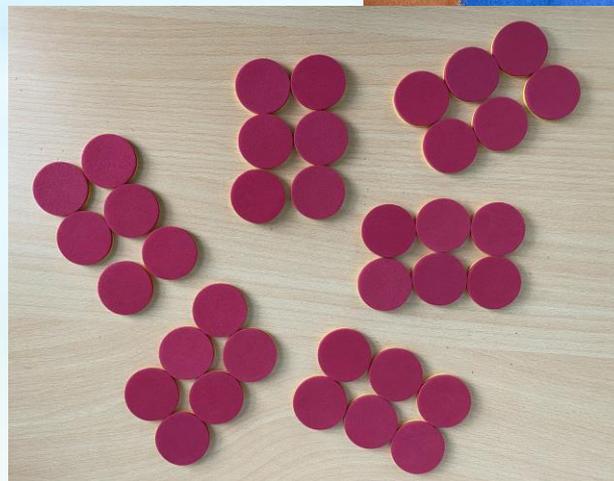
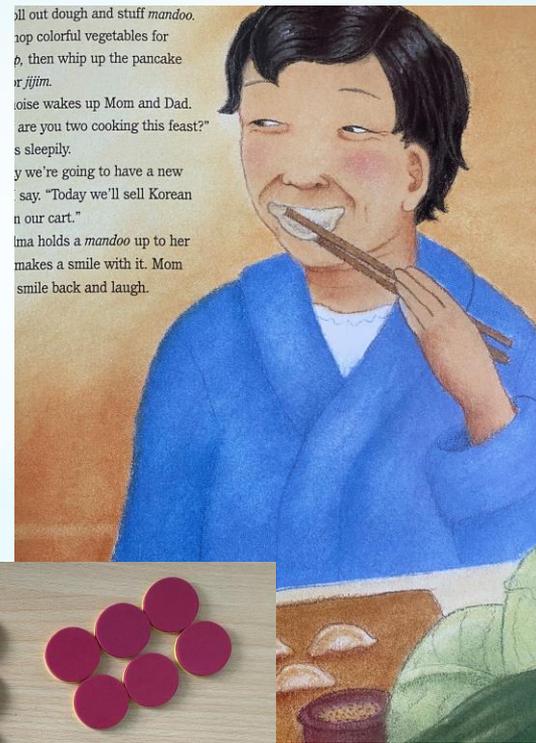
# Bowls of Mandoo

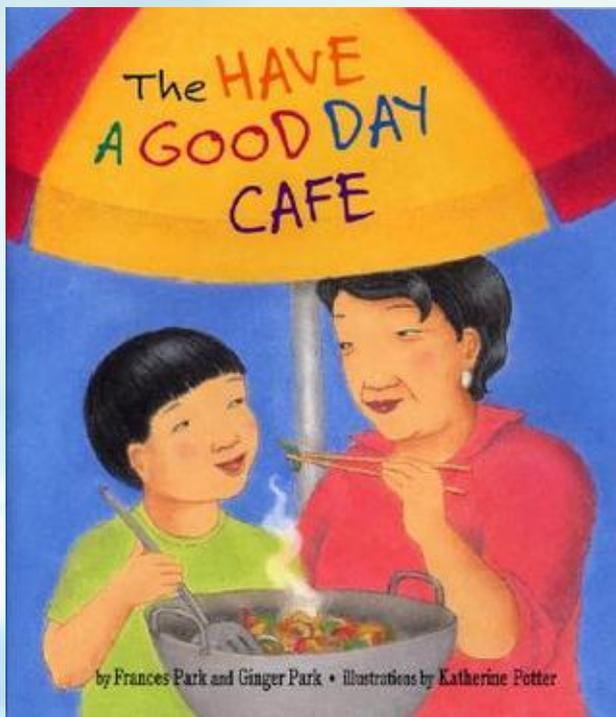
Grandmother prepared bowls of mandoo to sell at the food cart.

She put 6 mandoo in each bowl.

How many mandoo did she have to prepare?

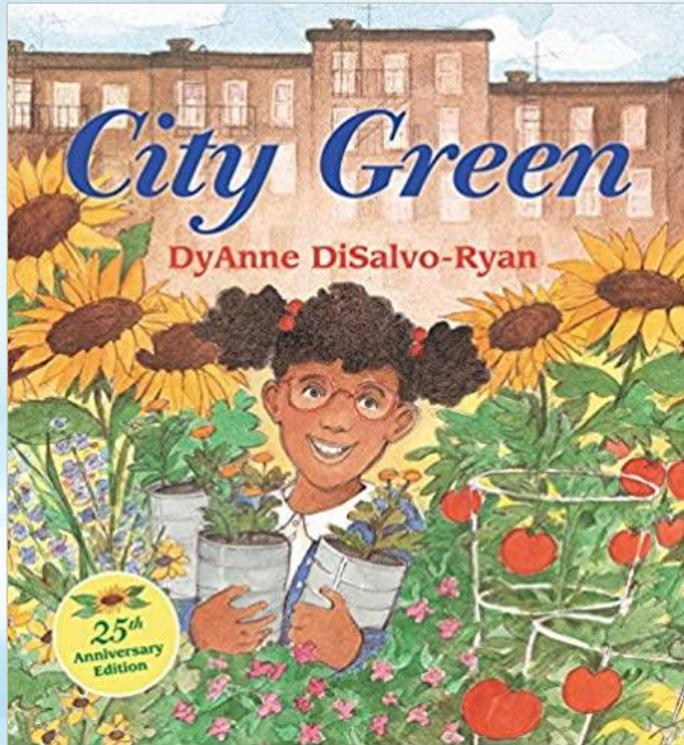
Roll out dough and stuff mandoo.  
Add colorful vegetables for  
filling, then whip up the pancake  
wrapper.  
Grandmother wakes up Mom and Dad.  
"Are you two cooking this feast?"  
They sleepily.  
"Why we're going to have a new  
stand. Today we'll sell Korean  
mandoo in our cart."  
Grandmother holds a mandoo up to her  
mouth and makes a smile with it. Mom  
smile back and laugh.





## What else surfaces?

- The loneliness of leaving your country behind
- Pride in your heritage
- The importance of traditions
- The blending of cultures

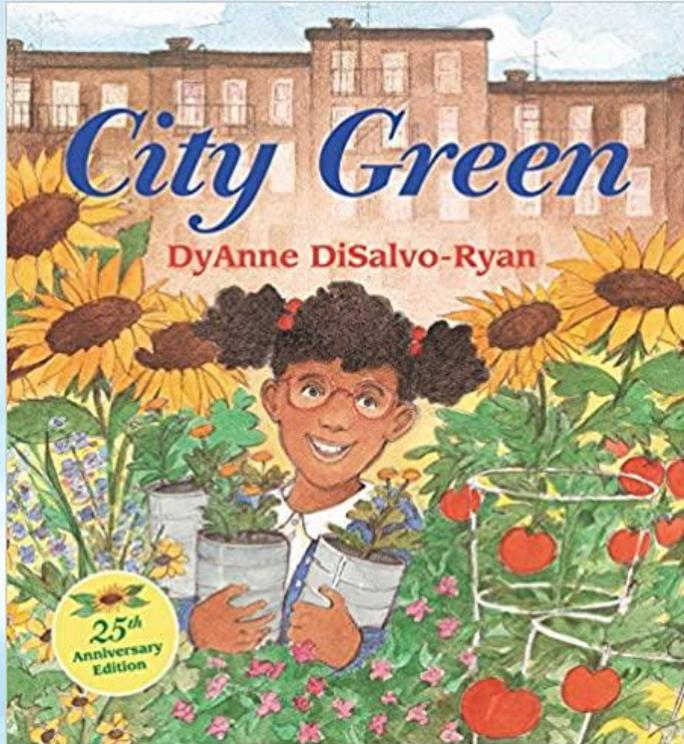


There is a littered, vacant lot in the middle of Marcy's city block. Marcy and her neighbors go to City Hall and get a permit to rent the lot.

They clear it and plant a community garden. Where is the math?

# Area and perimeter





## What else surfaces?

- Working together as a community
- Beautifying their environment
- Growing their own vegetables
- Showing kindness to an elderly neighbor



The books we choose can...

...connect our students to real math.

...reflect our students' lives and experiences.

...transport them to different worlds.

...challenge them to consider new perspectives.

...inspire them to make change.

...be a springboard to discussions about social justice.



# Why settle for less?



## For More Ideas



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For handouts:

[www.qualityteacherdevelopment.com](http://www.qualityteacherdevelopment.com)



Join the *Math in Practice* Facebook group!