

Counting on Katherine: Let's Have a Ball!

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| Author | Carolina Keough |
| Grade Level | 5 |
| Duration | 1-3 class periods |

National Standards

GEOGRAPHY

Element 4: Human Systems

- 2. Places have physical and human characteristics.
- 6. How culture and experience influence people's perceptions of places and regions.

AZ Standards

ELA

Reading

Key Ideas and Details

- 5.RI.3. Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text, based on specific information in the text.

Integration of Knowledge and Ideas

- 5.RI.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

Writing

Production and Distribution of Writing

- 5.W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

MATHEMATICS

Geometry

- 5.G.A. Graph points on the coordinate plane to solve mathematical problems as well as problems in realworld context
- 5.G.A.2 Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

SCIENCE

- 5.P3U3.5 Apply scientific ideas to define problems and design solutions pertaining to force and motion.

Arizona Social Science Standards

GEOGRAPHY

Examining human population and movement helps individuals understand past, present, and future conditions on Earth's surface.

- 5.G3.1 Use key historical events with geographic tools to analyze the causes and effects of environmental and technological events on human settlements and migration.

SIOP Elements

Preparation

- Adapting content
- Linking to background
- Linking to past learning
- Strategies used

Scaffolding

- Modeling
- Guided practice
- Independent practice
- Comprehensible input

Grouping Option

- Whole class
- Small groups
- Partners
- Independent

Counting on Katherine: Let's Have a Ball

| Integrating Processes | Application | Assessment |
|---|---|--|
| Reading Writing Speaking Listening | Hands on Meaningful Linked to objectives Promotes engagement | Individual Group Written Oral |

Arizona English Language Proficiency Standards

Stage III

Basic

Reading

Standard 4: The student will analyze text for expression, enjoyment, and response to other related content areas. The student will demonstrate knowledge of reading comprehension by:

B-4: asking who, what, where, when, why, which and how questions about text, with instructional support

B-7: identifying the main idea and two-to-three details from text.

B-14: identifying characters and their traits within a fictional text.

Writing

Standard 1: The student will express his or her thinking and ideas in a variety of writing genres.

B-3: taking notes using a teacher selected and student created graphic organizer or cloze notes with instructional support (e.g., teacher modeling, visuals, word banks, etc.).

B-5: writing a summary statement containing only relevant key ideas summarizing a variety of familiar text with instructional support.

Overview

"When will I ever use math in real life?" This lesson will show students how a little girl grew up to use math to save NASA astronauts and how they can use math, along with the power of observation to make math come alive!

Purpose

In this lesson students will learn the basics of a parabola. Students will also learn how collaboration can solve problems and how one person can make a difference in the lives of others by using principles found in everyday math and science.

Key Vocabulary

arc: a smooth curving line

calculate: to use mathematics to solve problems

computer: name for a person that did mathematics for NASA a long time ago

launch: to send a rocket into air or space

mathematician: a person who is trained in the study of numbers and calculations

parabola: a type of curve, such as the path of something that is tossed up in the air and comes down in a different place

segregated: to keep people physically apart from each other based on race

variable: able to be changed or adapted

yearn: to really want something

Math Idioms:

- count on me
- counting on
- back to square one
- on cloud nine

Materials

- Copy of *Counting On Katherine* by Helaine Becker
- Sentence starters for students
- Vocabulary cards.
- Variety of balls
- Clipboards
- Graph paper
- Slo-Mo video on phone (optional)
- Idiom Detective worksheets
- KWLE Chart

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- My Predictions worksheet
- Sentence Stems
- Out of This World Vocabulary! worksheet
- Vocabulary Test
- Somebody Wanted But So Then worksheet
- Vocabulary Cards
- Counting on Katherine Assessment

Objectives

The student will be able to:

1. Define parabola and its the basic shape.
2. Define and use common math idioms.
3. Explain how one person makes a difference.
4. Explain what a geographer does.

Procedures

SESSION ONE

Engage:

1. Ask students to share what they already know about space travel, NASA, and any names of people they may know involved in space travel. (**Preparation: Linking to Background**)

Explore:

1. Write what they say on a KWLE class chart (Know, Wonder, Learned, Evidence)
2. Read the book *Counting on Katherine* to the students. (**Integrating Process: Listening**)
3. Break students into groups of three. Distribute a set of sentence starters to each group. (Select a student to cut each one or precut them for students.)
4. Demonstrate how to use the sentence frames by modeling an example. "I was surprised that Katherine skipped grades in school."
(**Scaffolding: Modeling**) Have students take turns using the sentence starters, round robin style, as they share what they learned from the book. (**Integrating Process: Speaking**)
5. Distribute the Somebody Wanted But So Then to students and have them complete the form on Katherine Johnson. Then have students write a summary of the text so that it includes details from the top part of the worksheet.
6. When most students are done, go back to the KWLE and add information they learned.

SESSION TWO

Explain:

1. Distribute pretest for vocabulary to students and have them identify their level of familiarity with the words. (**Preparation: Linking to past learning**)
2. Model for students Total Physical Response motion for each word. (arc- swing an arc with your arm; calculate- tap finger on palm of hand to mimic using a calculator; computer- point to self as a person that can do math; launch- make hand into a rocket shape and shoot up in the air; mathematician- use pointer finger to point to your brain; parabola- swing arm in an arcing motion several times; segregated- place palms together and then move hands apart; variable- move hands in a weighing motion (like scales); yearned- move hands to heart and look longingly into space. (**Scaffolding: Comprehensible Input, Application: Promotes engagement**)
3. Discuss and define the idioms with students. Have students fill out the Idiom Detective worksheets by drawing what it sounds like and what it actually means. (**Scaffolding: Comprehensible Input, Application: Hands on**)

SESSION THREE

Elaborate:

1. Return to the page in the book where Katherine was experimenting with the ball. Discuss what Katherine was doing.
2. Distribute My Prediction worksheets to each group. Have the students predict the shape the ball will make when they throw it in the air. (Remind students about the vocabulary words **parabola** and **arc**.)
3. Discuss other **variables** that they could take into account. (How high they throw the ball, how fast they throw it, how slow, etc.)
4. Encourage students to make a prediction of the shape the arc will take when they throw the ball using one of the variables on the paper before they throw the ball. Then instruct students to draw the shape that was made below their prediction. Have students draw and label their prediction.
5. Take students outdoors and the teacher will model throwing the ball. Students will draw the shape that the ball made in the air. Direct students to meet with their group and decide on variables and predict the shape each arc will take. Have them stand away from the other groups. Students need enough room so that they don't hit another group.
6. Allow students time to conduct their experiments. (Optional: Use the slow-mo mode on a phone and video the experiments.)

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**(Scaffolding: Independent Practice;
Application: Hands On)**

7. Return to the classroom. Group the students to review the data and their findings.
8. Debrief by asking the following questions: What variables did you change? What was the result? Did the shape change? What caused the change, if there was one? What are other variables that could be changed. **(Integrating Process: Speaking)**

Evaluate:

1. Have students complete the Vocabulary Test and the Counting on Katherine Assessment. **(Assessment: Written, Individual)**

Assessment

ELA

The Idiom Detective Worksheet can be graded for accuracy and completeness. Mastery will be considered 80% or higher.

The Sentence Stems can be graded for completeness. Mastery will be considered 100%.

The Vocabulary Test can be graded for Organization and Ideas and Content on the 6 Traits Writing Rubric. Mastery will be considered 4 or higher.

The Somebody Wanted But So Then worksheet can be graded for an accurate summary using the details given. Mastery will be considered 80% or higher.

Mathematics

The My Predictions Worksheet can be graded for accuracy and completeness. Mastery will be considered 80% or higher.

ELA and Social Studies

The Counting on Katherine Assessment can be graded with the 6 Traits Writing Rubric for complete sentences and for ideas and content. Mastery will be considered 4 or higher on the rubric.

Extensions

Study more women of NASA. Use NASA's Modern Figures site.

<https://www.nasa.gov/modernfigures>

Have students create Trading cards for Modern Figures

<http://www.readwritethink.org/parent-afterschool-resources/games-tools/trading-card-creator-a-30181.html>

Add a map showing the journey Katherine's family had to take to find her a black high school she had to attend. Discuss the push/pull factors.

Add complex word families for some vocabulary words: segregate, segregated, segregating, desegregate, segregation, etc.

Sources

Becker, Helaine. Counting On Katherine. New York: Holt Publishing, 2018.