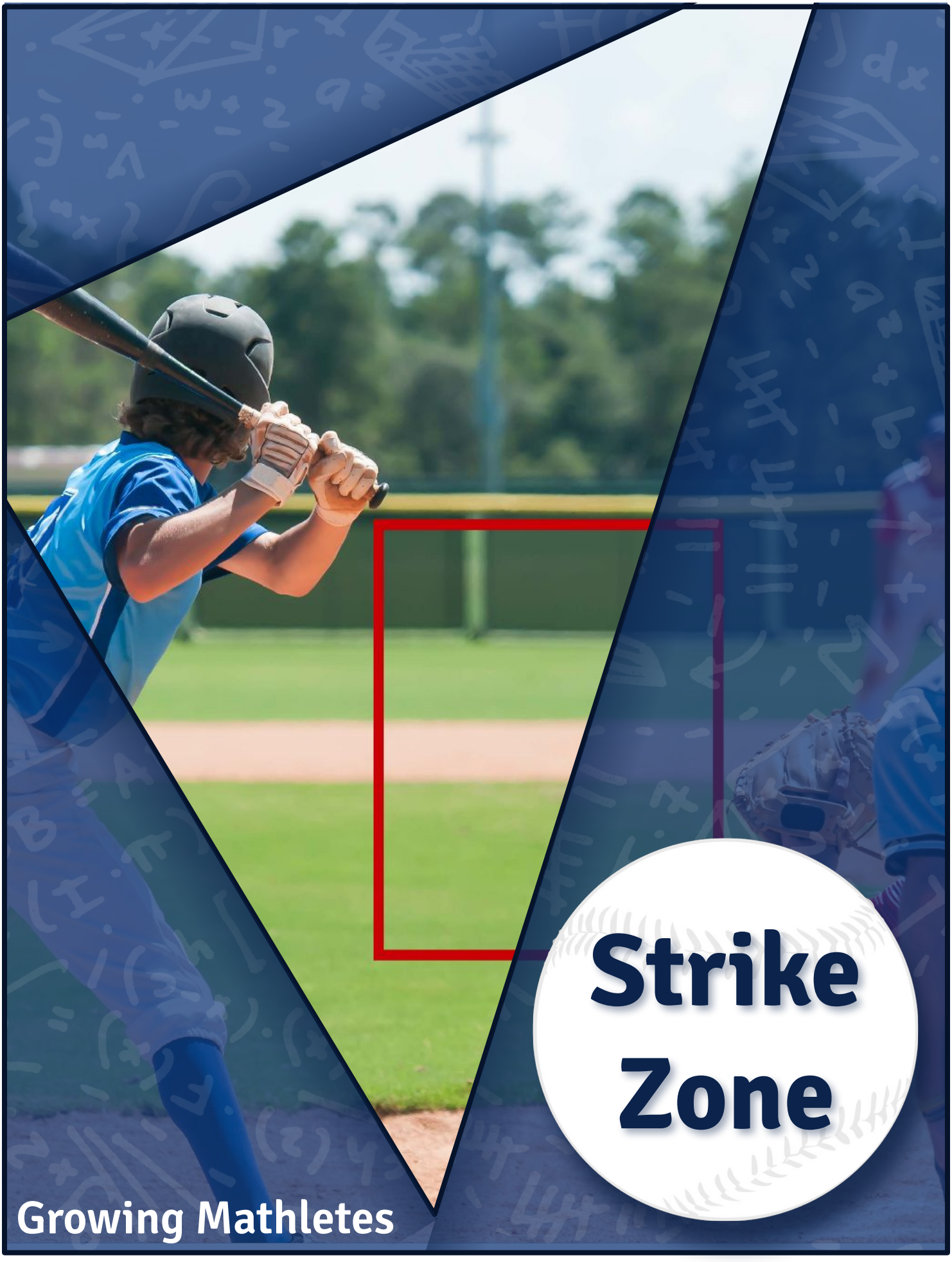

Strike Zone
Growing Mathletes

Strike Zone Overview

Key Ideas in this Session:

Youth learn how to measure their strike zone and discuss instances where professional baseball players and the youth themselves have made mistakes and learned from those mistakes.

Driving Questions:

1. How can we describe and measure a strike zone?
2. How do pitchers learn from mistakes to increase their success in throwing strikes?

Math Standards:

3.MD.7b Relate area to the operations of multiplication and addition. b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.

4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

6.SP.2 Understand that a set of data collected to answer a statistical question has a distribution that can be described by its center, spread, and overall shape.

6.SP.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

6.SP.4 Display numerical data in plots on a number line including dot plots, histograms and box plots.

Activity	Time	Description
Activity 1	30 minutes	**You will learn how to measure your strike zone and calculate the area. Extension: Youth plot the area of their strike zones on a group histogram.**
Activity 2	30 minutes	**You will practice throwing at your strike zone and calculate the number of balls and strikes thrown. You will learn how mistakes provide valuable learning opportunities.**

Materials

- Pencils, Markers
- Scissors (to cut out strike zone)
- Masking Tape or other strong tape
- Rubber balls or tennis balls (for indoor pitching) or baseballs (for outdoor pitching)
- Tape measure (10 ft.) or Yard Stick (one per youth pair)
- Gridded Chart paper (1 sheet per youth)
- Worksheet 1 (one copy per youth)

Set-Up

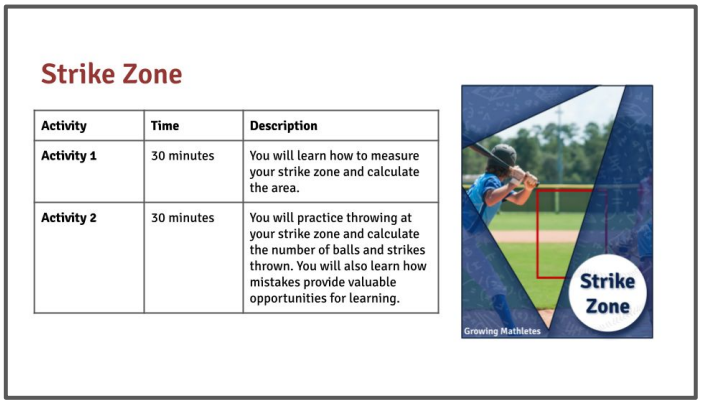
Prepare copies of Worksheets for each youth. Prepare the following materials for each pair of youth: a tape measure, markers, scissors, and butcher paper and/or gridded chart paper.

Growth Mindset Connection

The value of mistakes in supporting learning because they provide opportunities for growth to overcome frustration.

Strike Zone Introduction

Start the session by providing youth with an overview of the key activities.

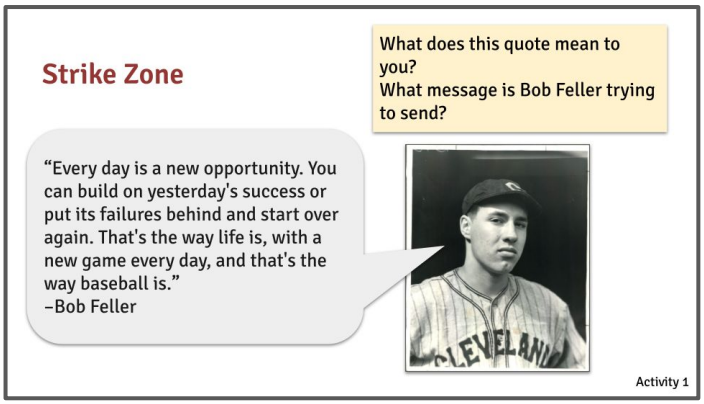


Strike Zone Youth Slides, Slide 1

Next, share and discuss this quote.

"Every day is a new opportunity. You can build on yesterday's success or put its failures behind and start over again. That's the way life is, with a new game every day, and that's the way baseball is."

– Bob Feller



Strike Zone Youth Slides, Slide 2

Activity 1 - Measuring, Drawing, and Calculating the Area of our Personal Strike Zones (1 of 3)

Description: Youth work in pairs to measure the length and width of their strike zones, to record the dimensions on Worksheet 1, and to represent their strike zone on a sheet of butcher paper or chart paper. When the youth are finished, have them write their name in the middle of their strike zone.

Math Ideas: Area Rectangular figures have a length and a width. Opposite sides of a rectangle are congruent (they are the same length). We can use measurement tools, such as tape measures and rulers, to measure each dimension. The area of rectangular figures can be calculated by multiplying the length times the width. *Area = length x width.*

LAUNCH: Connection to Prior Knowledge

Ask youth to share what they already know about Strike Zones.

- What is a strike zone? Why are strike zones important in baseball?
- Does every player have the same size strike zone?
- How is a strike zone measured?

Background Information:

The strike zone is an invisible rectangle of unique area for each player based on their height and batting stance.

The strike zone is the area above the hitter's knees, below the mid-point between the hitter's waist and shoulders, over the plate.

Note: the strike zone in professional baseball is slightly different than in little league. In professional baseball the top of the strike zone is marked by the batter's chest while in little league it is marked by the armpits.

Strike Zone Youth Slides, Slide 3

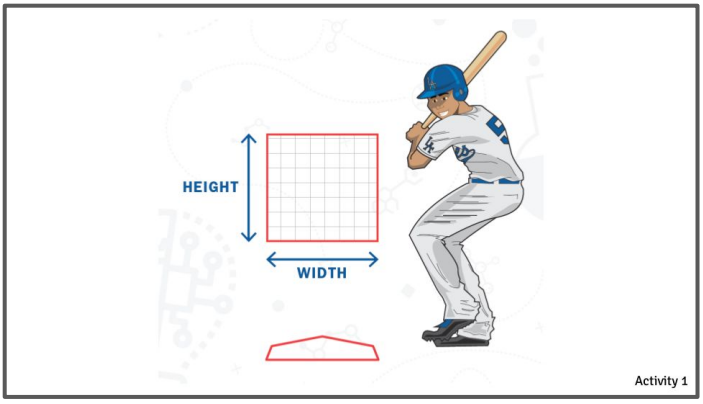
Link to video: Instructions for how to measure your strike zone: https://youtu.be/OXm7vmXxj6k
Note: link is also on youth slide 3

Activity 1 - Measuring, Drawing, and Calculating the Area of our Personal Strike Zones (2 of 3)

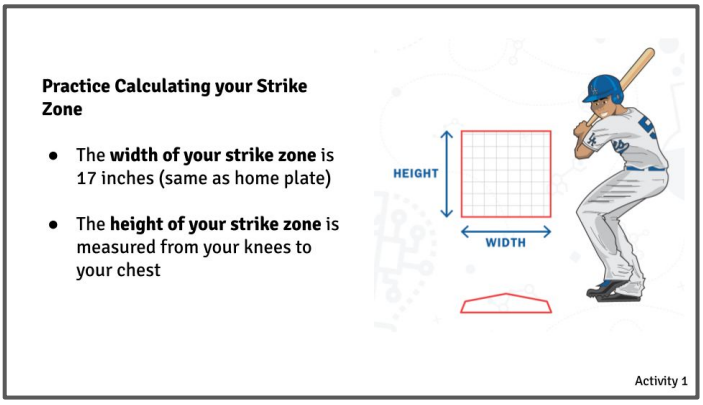
Partner Activity: Measuring Strike Zones

Measuring the Strike Zone:
Ask youth to work with a partner to measure **the length of their strike zone** –which is the distance between the batter's knees and their chest (specifically the midpoint between their shoulders and waist). Model how partner A can hold one end of the tape measure at partner B's knees, while partner B extends the tape measure to their chest and reads the measurement. Next, partners work together to measure the **width of the strike zone** – which is determined by the width of home plate (17 inches).

Ask youth to record the dimensions of their strike zone on **Worksheet 1** (pictured in slide 4).



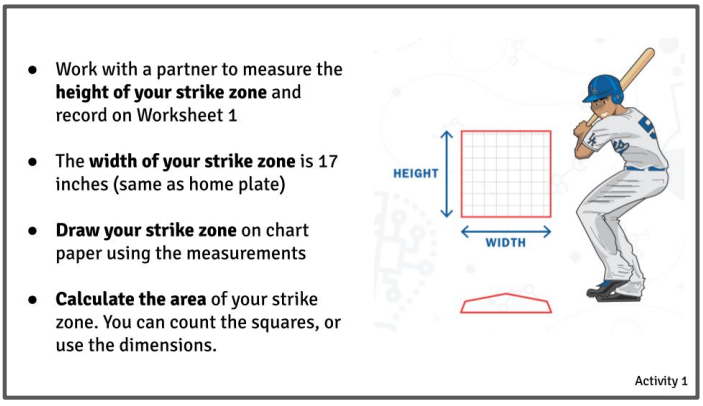
Strike Zone Youth Slides, Slide 4



Strike Zone Youth Slides, Slide 5

Drawing the Strike Zone:
Youth draw their own strike zone, using the measurements, on a sheet of gridded chart paper.

Calculating the Area of the Strike Zone: Youth calculate the area of their strike zone by using the dimensions of their strike zone and the area formula (*Area = height (or length) x width).* If youth drew their strike zone on chart paper with a square grid, they can also count the unit squares to find the area.



Strike Zone Youth Slides, Slide 6

Activity 1 - Measuring, Drawing, and Calculating the Area of our Personal Strike Zones (3 of 3)

Supporting STEM Concepts:

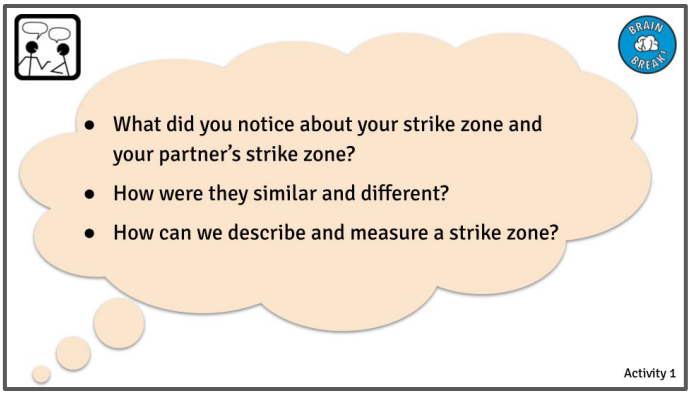
Depending on youths' prior experience with linear measurement, they can measure the dimensions of their strike zone to the nearest whole inch, the nearest half inch, or the nearest quarter inch. Support youth in using measurement tools accurately, and in checking measurements to improve precision.

If working with 6-8 graders, continue to the extension on pg 7. If not, close the activity with the reflection questions (below & on Youth Slide 7)

Reflection Questions:

Wrap up the activity with a reflective discussion about the concepts in the activity and the driving questions for the lesson.

- What did you notice about your strike zone and your partner's strike zone?
- How were they similar and different?
- How can we describe and measure a strike zone?



Strike Zone Youth Slides, Slide 7

Activity 1 - Plotting the Area of our Personal Strike Zones (Grades 6-8 Extension)

Description: Youth plot the area of their strike zones on a group histogram, and discuss the distribution of the data.

Math Ideas: Histograms A **histogram** is a graphical display where the data is grouped into intervals (such as 151-200 square inches, 201-250 square inches, etc.) and shows the frequency (the number of data values) for each interval as the height of a bar. Histograms are similar to line plots in that they show the shape and distribution of a data set. However, unlike a line plot, which shows frequencies of individual data values, histograms show frequencies of intervals of values. To identify a measure of center, such as a mean, we use individual data values from the data set.

Whole Group Discussion: Create a Group Histogram

Project an image of the blank histogram on **Worksheet 2** onto a white board or a wall covered with chart paper. Tell youth they will use this histogram to display the area of each youth's strike zone. The horizontal axis of the histogram is labelled in equal increments of 50 to capture the range in the data. The vertical axis of the histogram is labelled in increments of 1 to represent the frequency of intervals of values.

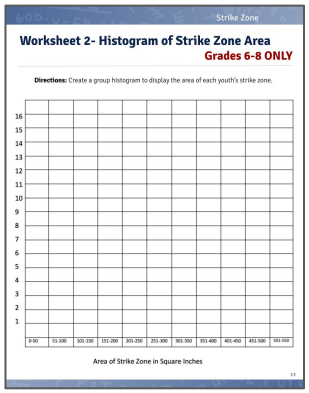
Alternatively, ask all youth to record their strike zone areas on a chart or white board (large enough for everyone to see the values) and then youth can work with a partner or in small groups to make their own histograms - plotting the data from all youth on the histogram on **Worksheet 2**.

NOTE: Consider including data from facilitators (or strike zones of older players) to add additional variability in the data.

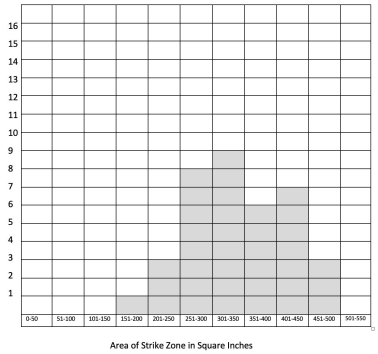
Ask youth to find the interval on the horizontal axis of the histogram that represents the area of their strike zone.

Next, ask each youth to shade in one rectangle in the column for the interval that shows the area of their strike zone, starting at the bottom of the column.

To the right is a sample histogram that shows a group of youths' strike zone areas.



Youth Worksheet 2



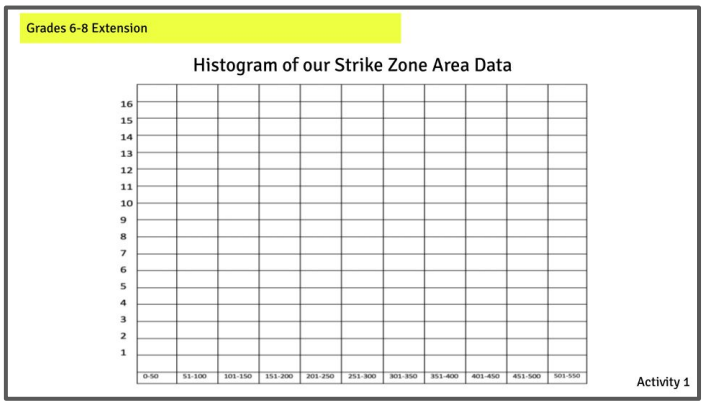
Sample Completed Histogram

Activity 1 - Plotting the Area of our Personal Strike Zones (Grades 6-8 Extension)

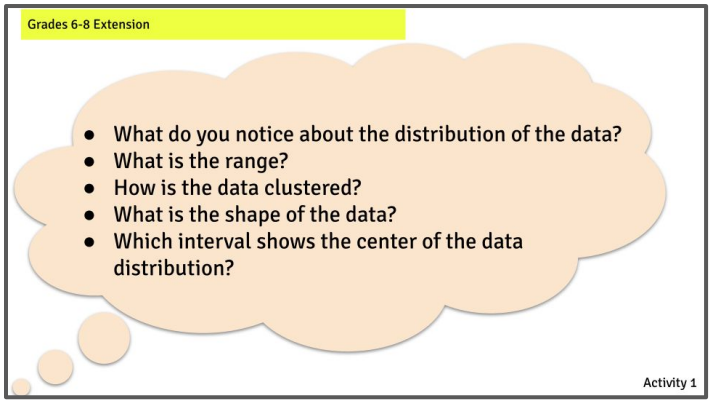
Whole Group Discussion:

Once all data is represented on the histogram, discuss these questions:

- What do you notice about the **distribution** of the data?
- What is the **range**?
- How is the data **clustered**?
- What is the **shape** of the data?
- Which interval shows the **center** of the data distribution?



Strike Zone Youth Slides, Slide 8

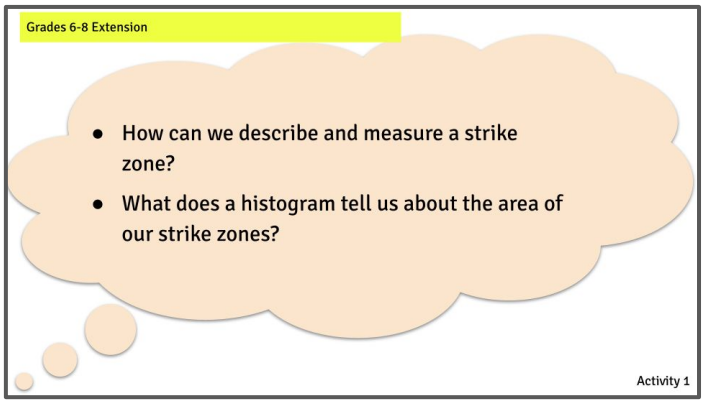


Strike Zone Youth Slides, Slide 9

Reflection Questions:

Wrap up the activity with a reflective discussion about the concepts in the activity and the driving questions for the lesson.

- How can we describe and measure a strike zone?
- What does a histogram tell us about the area of our strike zones?



Strike Zone Youth Slides, Slide 10

Activity 2 - The Strike Zone and Mistakes (Growth Mindset Connection) (1 of 3)

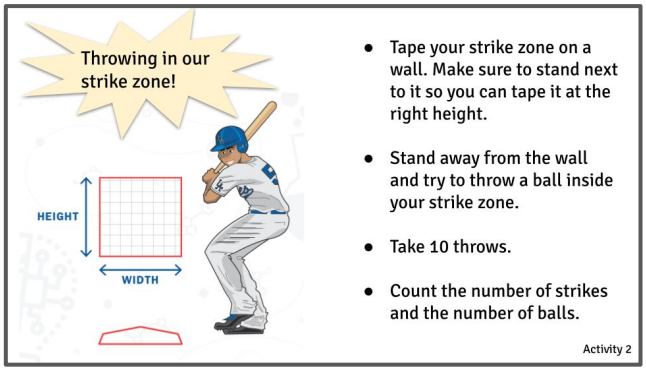
Description: **In this activity, youth will work groups of four and practice throwing at their strike zone, which will be taped to a wall or fence. They will then calculate the number of balls and strikes thrown. Youth will also watch a video to learn how mistakes provide valuable learning opportunities to improve their skills on and off the field.**

Activity: Throwing a Ball in our Strike Zone

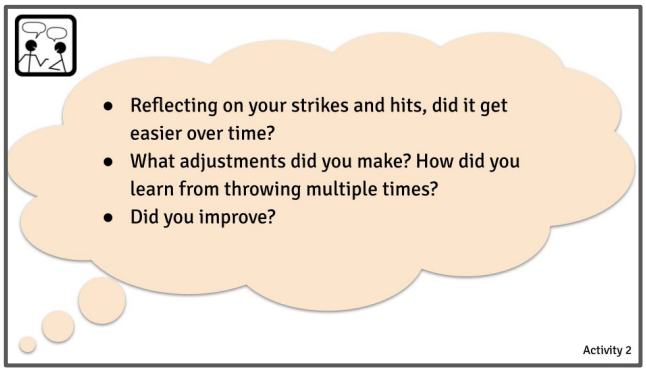
In this activity, youth work in groups of 4 to practice pitching a ball to their strike zone.

- Provide each small group with a space on a wall or fence and ask them to tape their butcher paper/chart paper strike zone. Encourage youth to stand next to the fence/wall when they are taping their strike zone, so that they can position it correctly. The bottom of the strike zone should be at the same level as the youth's knees. The top of the strike zone should be at the same level as the youth's chest.
- Ask youth to measure a distance from the wall from which they are comfortable throwing to their strike zone. Note: the MLB distance from pitcher's mound to home plate is 60 feet, 6 inches. The Little League distance from the pitcher's mound to home plate is 46 feet. Encourage youth to begin with a shorter distance like 20 feet.

- Review 'balls' and 'strikes' with youth in relation to where the ball lands in the strike zone. Ex: ball can graze the edge of the strike zone box and it still counts as a strike. Youth then take turns to each make 10 throws. While one group member throws a ball, other group members can observe whether or not the ball is thrown inside or outside the strike zone. Count the number of strikes (inside the strike zone) and the number of balls (outside the strike zone) out of the 10 throws. There is no worksheet for this activity, just ask youth to keep track.
- Have youth reflect on how many strikes they had and any adjustments they made as they threw to make it easier or get more strikes. Ask them what they learned by throwing and adjusting.



Strike Zone Youth Slides, Slide 11



Strike Zone Youth Slides, Slide 12

Activity 2 - The Strike Zone and Mistakes (Growth Mindset Connection) (2 of 3)

Growth Mindset Connection:

Mistakes provide valuable opportunities for learning. When we make mistakes, in school, in sports, and in other areas of life, we can reflect on the mistake and learn from the experiences. Reflecting on mistakes can help us to adjust and improve our performance in the future.

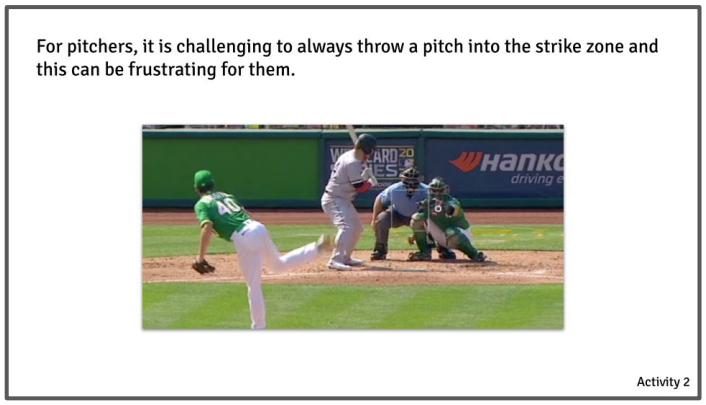
Activity: Video and Discussion

For pitchers, it is challenging to always throw a pitch into the strike zone and they can feel frustrated at times. Since each batter has a unique strike zone, pitchers have to make continual adjustments to their pitch. When a pitcher adjusts each pitch to match the strike zone of a new batter, this is a success! In other cases, pitchers do not want to throw a ball into the strike zone, because they want to throw a "ball." So when a pitcher hits their target it is a success, and when a pitcher misses their target it is a mistake (an opportunity for learning).

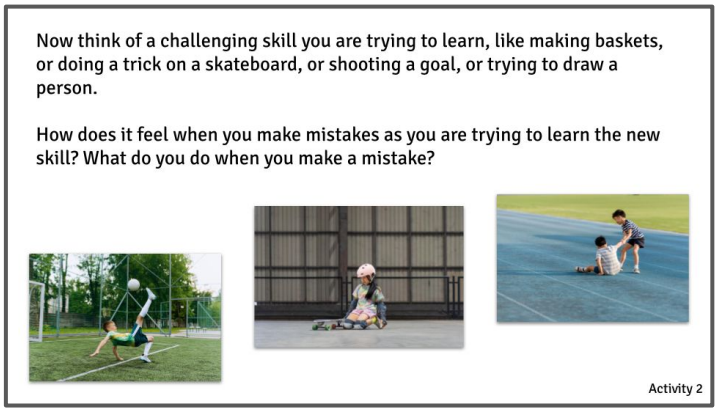
Show youth a video that reflects the power of persistence and learning from mistakes.

Video Link: Cal Ripkin Cal Ripken Jr.: 'Baseball Is A Game Of Frustration & Failure' | How I Made It | CNBC Make It.

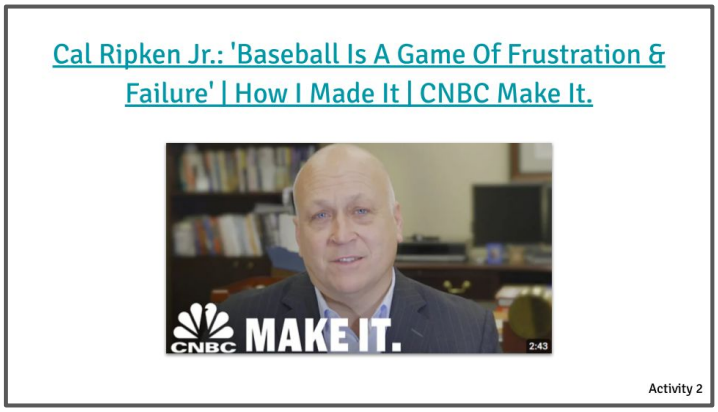
Note: video is also linked on Youth Slide 13.



Strike Zone Youth Slides, Slide 13



Strike Zone Youth Slides, Slide 14



Strike Zone Youth Slides, Slide 15

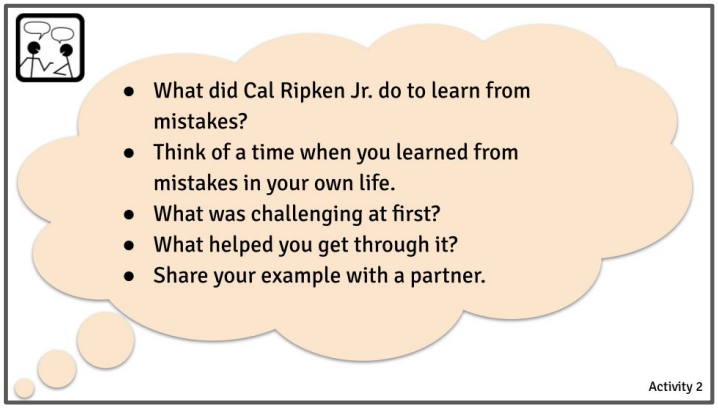
Activity 2 - The Strike Zone and Mistakes (Growth Mindset Connection) (3 of 3)

Closure Reflection Questions:

Wrap up the activity with a reflective discussion about the concepts in the activity and the driving questions for the lesson.

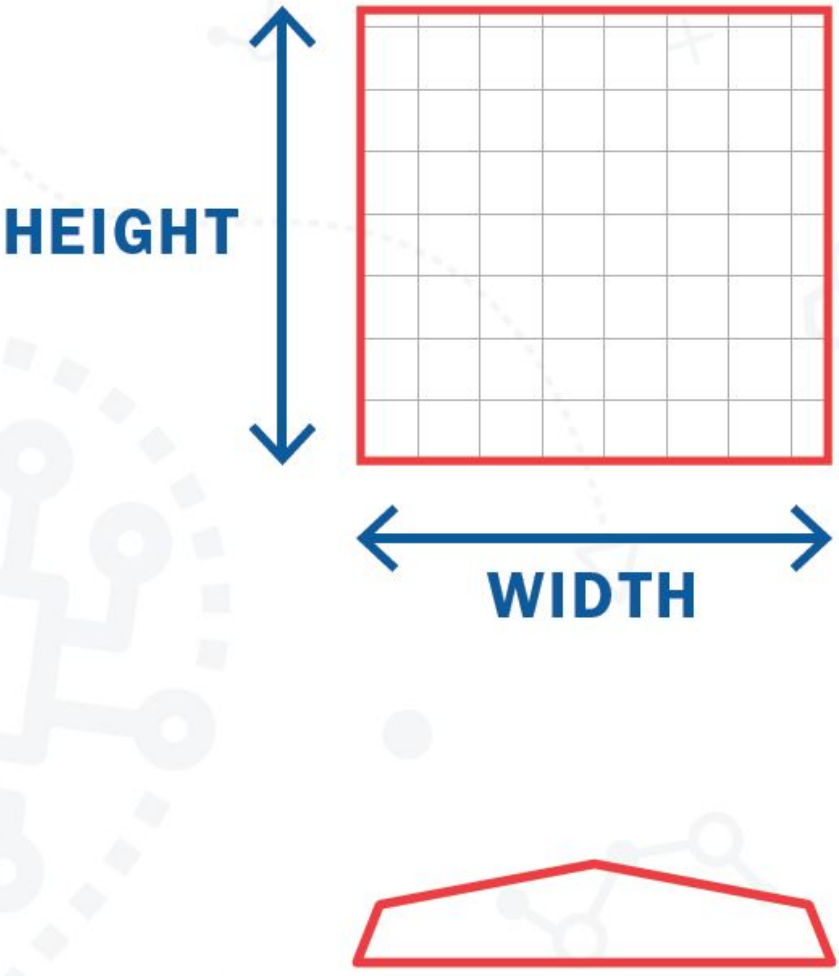
- Think of a time when you learned from mistakes in your own life (in sports, in school, or in everyday life) .
- What was challenging at first, but you got through it?
- Share your example with a partner.

Wrap it up: If there's time, you can have a few students share out, then close the activity by emphasizing how we can all learn from mistakes, persist, and adjust to improve our performance over time. If you can, add a personal story to inspire them.



Strike Zone Youth Slides, Slide 16

Worksheet 1 - Strike Zone



Worksheet 2- Histogram of Strike Zone Area

Grades 6-8 ONLY

Directions: Create a group histogram to display the area of each youth's strike zone.