

Session 3

**Strike
Zone**

Growing Mathletes

Strike Zone

Description: 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.4** Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch to the nearest quarter-inch.

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.

Science Standards: Scale, Proportion, and Quantity: Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.

Growth Mindset Connection: The value of mistakes in supporting learning.

Objectives (verb in bold)

Level
Level
Level

1

Youth will **define** strike zone
Youth will **identify** the shape of a strike zone

2

Youth will **measure** the length and width of a strike zone

3

Youth will **calculate** the area of their own strike zone by counting the number of unit squares that fill the area, or by using the formula for area of a rectangle.

Materials

Tape measure (10 ft.) or Yard Stick (one per youth pair)
Butcher Paper
Chart paper with square grid
Scissors
Markers
Masking Tape
Screen/computer/projector to share video clip with youth
Foam balls (for indoor pitching) or baseballs (for outdoor pitching)
Worksheet 4.1 (one copy per youth)
Projector

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 chart paper with square grids.

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

(30 minutes)

Partners, Whole Group Discussion (**Grades 6-8 ONLY**)

STEM

Connection:

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. $Area = length \times width$.

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, and 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 arm pits.

Source: http://mlb.mlb.com/mlb/official_info/umpires/strike_zone.jsp

Instructions for how to measure your strike zone: <https://youtu.be/OXm7vmXxj6k>

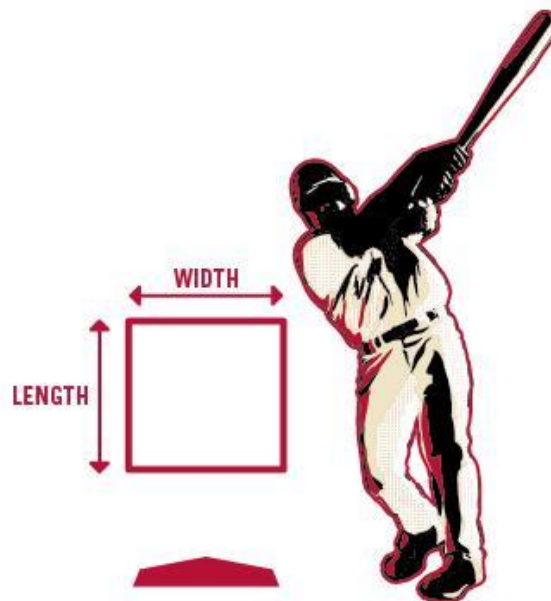
Activity:

In this activity, youth will work in pairs to measure the length and width of their strike zones, to record the dimensions on Worksheet 4.1, 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.

- 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**.

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

- Drawing the Strike Zone: Ask youth to draw their own strike zone, using the measurements, on a sheet of butcher paper or chart paper (or by taping smaller pieces of paper together). Hint: if you use sheets of $8\frac{1}{2}$ " x 11" paper, taping two of them together side by side will result in 17" ($8\frac{1}{2}$ " plus $8\frac{1}{2}$ " equals 17").
- Calculating the Area of the Strike Zone: Ask youth to calculate the area of their strike zone. They can use the dimensions of their strike zone, and the area formula to calculate the area ($Area = length \times width$). If youth drew their strike zone on chart paper with a square grid, they can also count the unit squares to find the area.



Supporting STEM Concepts:

Depending on youth's 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 youth are struggling to calculate the area of their strike zone using the area formula, encourage them to use a square grid and to count the number of squares needed to cover the grid.

Activity (Whole Group Discussion) (Grades 6-8 ONLY):

Create a group dot plot to display the area of each student's strike zone. Consider including data from facilitator strike zone (or strike zones of older players) to add additional variability in the data. The horizontal axis should be labelled in equal increments to capture the range in the data. (See **Worksheet 2**)



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

- Ask students: What is the lowest value we need to represent in the dot plot? (the smallest strike zone area). What is the largest value we need to represent in the dot plot? (the largest strike zone area).
- Ask students to each record the area of their strike zone with an “x” on the dot plot. (Students place a “x” above the value on the horizontal axis that represents the area of their strike zone). Remind students that their “x” markings should all be the same size, and that one “x” should be placed above another, to form columns.
- Once all data is represented on the dot plot, as students:
 - What do you notice about the distribution of the data?
 - What is the range?
 - Where is the center of the data distribution?
 - How is the data clustered, or spread?

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? What are different strategies you and your partner tried?

Activity 2 - Throwing a Ball in the Strike Zone

(30 minutes) - Outside
Groups of 4

Activity:

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 on a wall or a fence. 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.

Reflection Questions:

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

- What was challenging at first, but you got through it? What was something you worked really hard on? Were you able to help someone with something they found challenging?
- Why is it important to understand your strike zone? How might knowing about your strike zone help you to get better at baseball?

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

(20 minutes)

Whole Group Discussion

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:

For pitchers, it is challenging to always throw a pitch into the strike zone. 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.

Show youth a video that reflects the power of persistence and learning from mistakes. Here are several video options:

- Alex Breggman talks about mistakes and slumps (0:00-3:29): [Overcoming SLUMPS & FAILURE | Alex Bregman](#)
- Cal Ripkin [Cal Ripken Jr.: 'Baseball Is A Game Of Frustration & Failure' | How I Made It | CNBC Make It.](#)
Fernando Tatis Jr (Padres) (00:40 - 02:45): [Padres' Fernando Tatis Jr. MIC'D UP during game vs. Athletics!](#). Asked what he can do to improve his game. Fernando says that you must improve every single day in every single area. One day you can be the best player and another day you can be the worst and to stay humble and be yourself. Walks the interviewers through how he adjusts his game during playing time (importance of positioning). Tatis mentions adjusting his game as he is playing. Do you apply this strategy to school or social activities in your life?
- Dave Belisle Speech (start at 0:40 - 05:00): [Coach Dave Belisle Full Postgame Speech \(BEST QUALITY\)](#). His little league team lost the 2014 Little League World Series but the coach puts a positive spin on their efforts and teamwork to achieve what they did. You can still make an effort and not win. That's ok and leads to pride and bigger and better things. Lets team know they had massive support all along the way.

Connection to Prior Experiences:

Ask youth to think about instances in their own lives (in sports, in school, or in everyday life) where they have made multiple mistakes and learned from those mistakes. Invite youth to share examples with a partner, and then with a whole group. Emphasize how youth learned from mistakes, persisted, and adjusted to improve their performance over time.

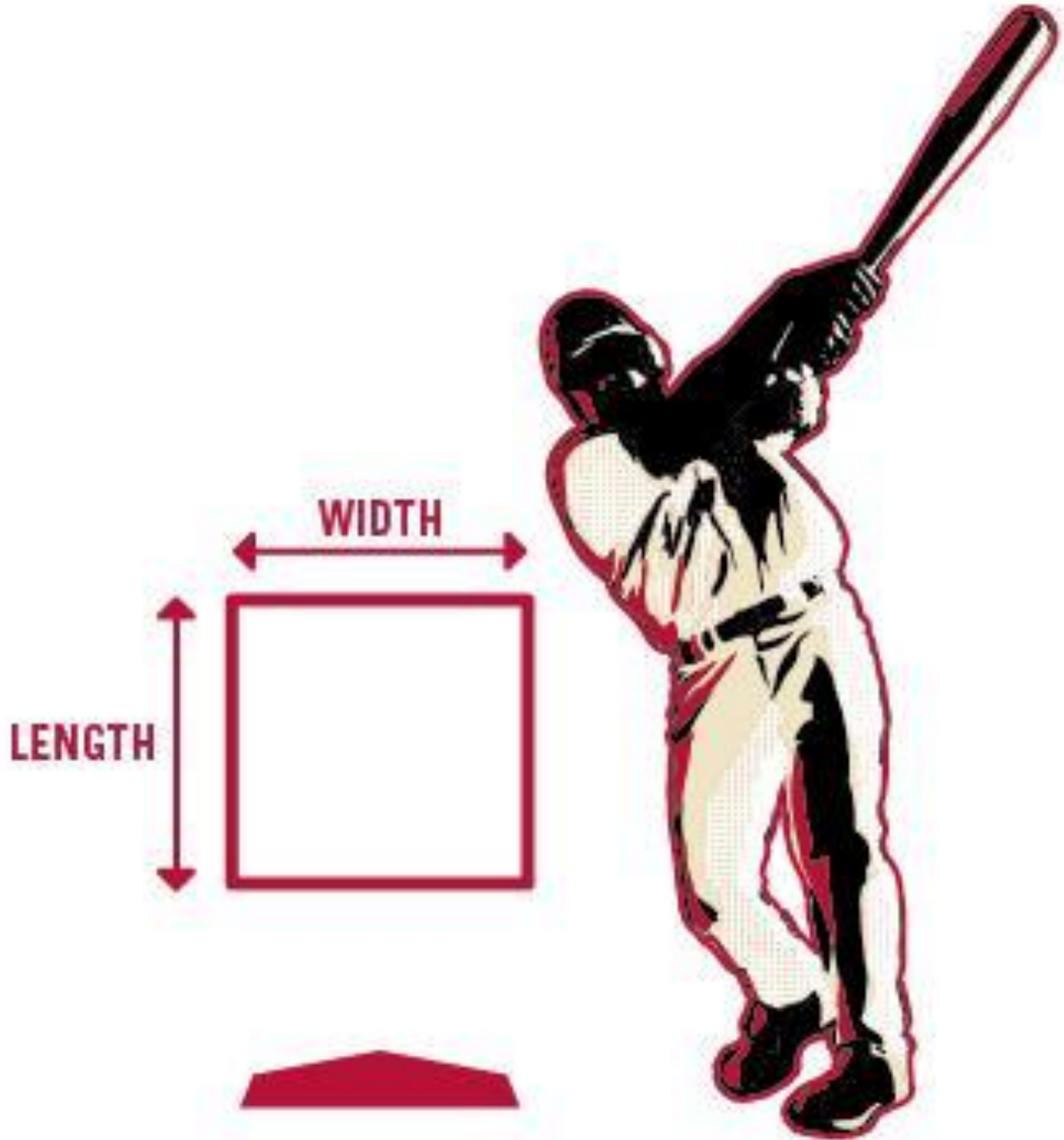


Activity 3 - The Strike Zone and Mistakes (Growth Mindset)

Reflection Questions:

- Wrap up the activity with a reflective discussion about the concepts in the activity and the driving questions for the lesson.
- o Discuss video clip with youth. Ask youth to share what “life lessons” stood out to them in the video. Emphasize the value of mistakes as learning opportunities.

Worksheet 1 - Strike Zone



Worksheet 2- Dot Plot of Strike Zone Area

Grades 6-8 ONLY

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

