

# **Broad Jump**

**Growing Mathletes**

# Broad Jump Lesson Overview

**Key Ideas in This Session:** Youth use a measuring tape to measure the distance of their broad jump. Youth record the measurements on a histogram and discuss patterns and relationships. Connections to improving through practice are used to inspire youth and support growth mindset.

**Driving Questions:**

1. What can you do to jump as far as possible?
2. How can practice improve your jumping distance?

**Math Standards:**

**4.MD.A.1** Know relative sizes of measurement units within one system including km, m and cm. Within one system of measurement, express measurements in a larger unit with a smaller unit.

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

**6.SP.B2** Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

Activity	Time	Description
<b>Activity 1</b>	40 minutes	Youth are introduced to the concept of broad jump through a video. Youth measure their jumping distance in centimeters and try different techniques to improve their broad jump distance. Youth plot the measurements on a group histogram and discuss patterns and relationships.
<b>Activity 2</b>	20 minutes	Youth learn about Hall of Fame baseball player Jackie Robinson who won the NCAA Championship in Long Jump. Youth reflect on the effort and persistence shown by Jackie Robinson and how they might relate to this story.

## Materials

- 3-meter measuring tapes (8-12)
- Masking tape
- Markers or colored pencils
- **Worksheet 1** (one per group)
- **Worksheet 2** (one per group, printed on 11x17 inch sheet)

## Set-Up

**For Activity 1**, set up several measuring stations on the floor (1 per small group). See the diagrams on the next page for set-up details.

### Growth Mindset Connections

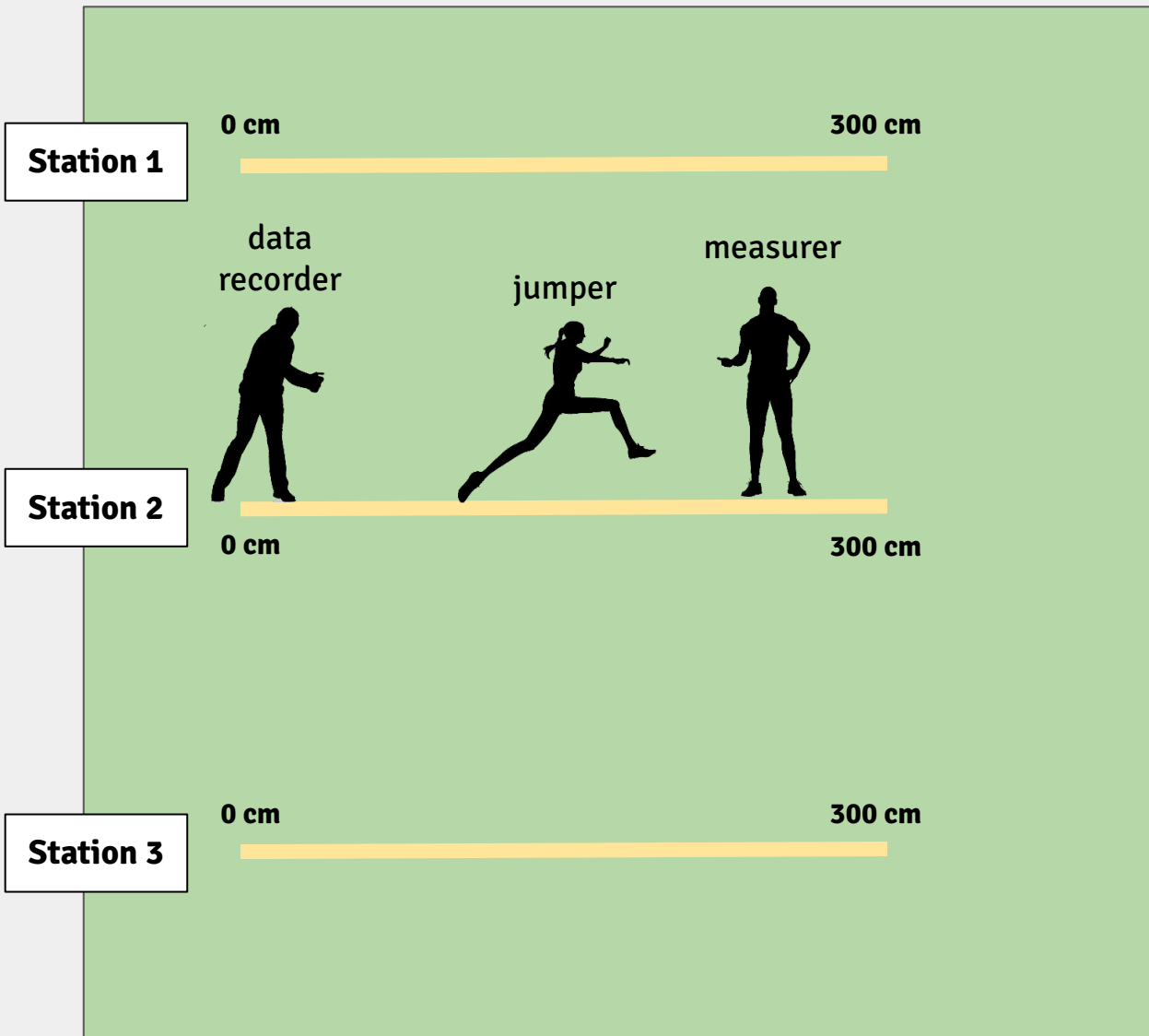
Effort and Persistence.

Practice leads to improvement.

# Broad Jump Set Up: Measuring Stations

## Broad Jump Measuring Stations

Set up several “measuring stations” in different locations around the room so that each small group of youth has a space to measure their broad jump. Tape measures should be taped to the floor to secure them in place. Place one stretched out measuring tape at each station on the floor in open space (for safety).



Youth will work in groups of two or three, including a jumper, a measurer, and a data recorder. If working in pairs, the measurer can also record data.


Most youth will jump 150-200 cm. **Make sure the floor surface is safe and not slippery** or hard since youth will be jumping and landing on their feet; carpet or turf works well, when available.

# Broad Jump Introduction

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

**Broad Jump**

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Broad Jump Slides, Slide 1

Next, share and discuss this quote.

**“Success is not an accident, success is a choice.”**  
- Steph Curry

**Broad Jump**

Success is not an accident, success is a choice.  
- Steph Curry



What does this quote mean to you?  
What message is Steph Curry trying to send?

Activity 1

Broad Jump Youth Slides, Slide 2



# Activity 1 - Broad Jump Measurement and Histogram (1 of 6)

## Description:

Youth are introduced to the concept of broad jump through a video. Youth measure the distance of their broad jump in centimeters and plot their measurements on a histogram. Youth also work on their broad jump technique by implementing specific improvements and practice.

## Math Ideas: Measuring in Metric Units

Youth measure their broad jump distance using metric units (**centimeters**). A key idea in this activity is to transfer the measurements of broad jump distances onto a histogram.

## Math Ideas: Histograms

In this activity, youth create a histogram. A **histogram** is a graphical display where data is grouped into intervals (such as 121-140 cm, 161-180 cm, etc.). A histogram shows the frequency (the number of data values) of each interval as the height of a bar. In this activity, the x-axis of the histogram is labelled in 20 cm increments.

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. We cannot read individual data values from a histogram.

## LAUNCH: Connecting to Prior Knowledge

**Ask youth to share** what they know about the concept of broad jump:

- How far do you think you can jump?
- How can broad jump distance be measured?
- How can broad jump be helpful in sports?
- What is the difference between broad jump and vertical (height) jump?

## Demonstrate Broad Jump With Video:

**Show the video to demonstrate** the broad jump technique & how to measure jump distance.

### VIDEO: Science of Baseball Broad Jump

<https://youtu.be/z5DsAB3GDbM>  
(2:07)

**Ask youth to define “broad jump”** in their own words.

## Activity 1: Broad Jump Measurement and Histogram

- How far do you think you can jump?
- How can broad jump distance be measured?
- How can broad jump be helpful in sports?
- What is the difference between broad jump and vertical (height) jump?



Activity 1

### Broad Jump Youth Slides, Slide 3

VIDEO: [Science of Baseball Broad Jump](#)



How do you define “broad jump” in your own words?

Activity 1

### Broad Jump Youth Slides, Slide 4

# Activity 1 - Broad Jump Measurement and Histogram (2 of 6)

## Demonstrate How to Measure Broad Jump

Tell youth that they will work in **small groups** to measure their broad jump distance, in centimeters. Remind youth to make sure the area is clear and safe for them to jump before jumping.

Ask youth to measure the distance of their broad jumps following the steps below:

1. Toes should be at mark 0 cm of the tape measure.
2. Jump forward and land on both feet without falling.
3. Measure the distance of the jump at back of the heel.



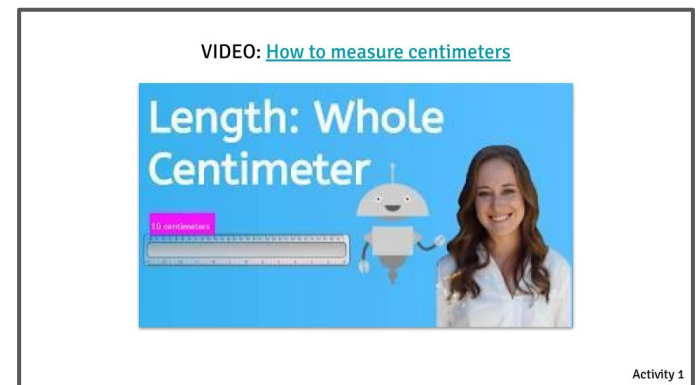
Broad Jump Youth Slides, Slide 5

## Demonstrate Measuring in Centimeters

To support youth understanding of different metric measurement units consider sharing the following video.

**VIDEO: Measuring with centimeters [3:57]**

<https://youtu.be/h3poZ1xGBq0>

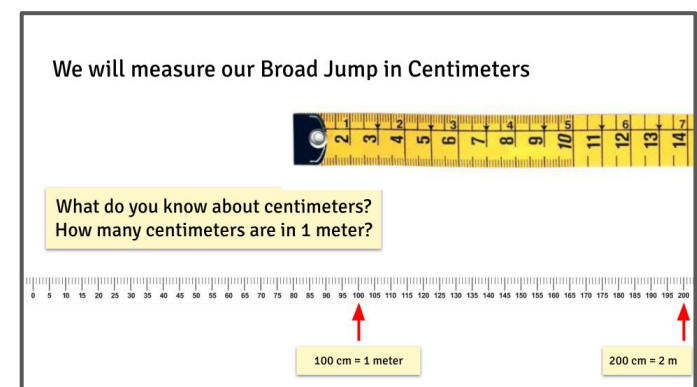


Broad Jump Youth Slides, Slide 6

Explain that youth will record their broad jump measurements using **centimeters**. For example, if a jump measures **1 meter and 52 centimeters**, they can record this length as:

- **152 centimeters** (because 1 meter is 100 centimeters, and 100 cm + 52 cm is 152 cm)

**Demonstrate how to use the measuring tapes accurately.**



Broad Jump Youth Slides, Slide 7

Specifically, call youth's attention to the **centimeter** markings. Ask youth to use the measuring tape to confirm the number of centimeters in one meter (1 meter = 100 centimeters). **Ask: How many centimeters are in 1 meter?**

Many measuring tapes have longer tick marks that are evenly spaced between each centimeter mark to show half-centimeter increments.

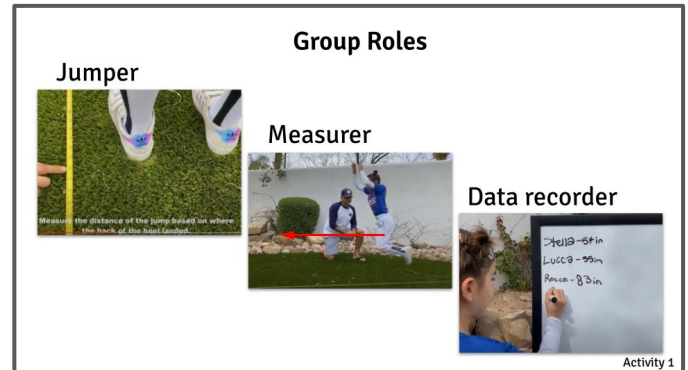
# Activity 1 - Broad Jump Measurement and Histogram (3 of 6)

## Introducing Small Group Activity: Measuring & Recording Broad Jump

Assign each small group of 2-3 youth to one measuring station. Youth will work together to measure each group member's broad jumps. Youth will record their broad jump distances on **Worksheet 1**.

Youth will rotate between the following roles: **jumper**, **measurer**, and **data recorder**.

- The **jumper** will line their toes up with the "0 cm" mark on the tape measure, then jump as far as they can using the techniques introduced by the facilitator (see next page).
- After the jumper lands, the **measurer** will read the measurement at the landing point (where the back of the jumper's heel landed).
- The **data recorder** will record the distance as read by the measurer.



Broad Jump Youth Slides, Slide 8

Broad Jump

### Worksheet 1 - Broad Jump Distances

For each round, record the Broad Jump Distance of each group member.

Round	Jumper's Name:	Jumper's Name:	Jumper's Name:	Jumper's Name:
Round 1 no instruction	___ cm	___ cm	___ cm	___ cm
Round 2 swinging arms	___ cm	___ cm	___ cm	___ cm
Round 3 bending knees	___ cm	___ cm	___ cm	___ cm
Round 4 leaning forward	___ cm	___ cm	___ cm	___ cm

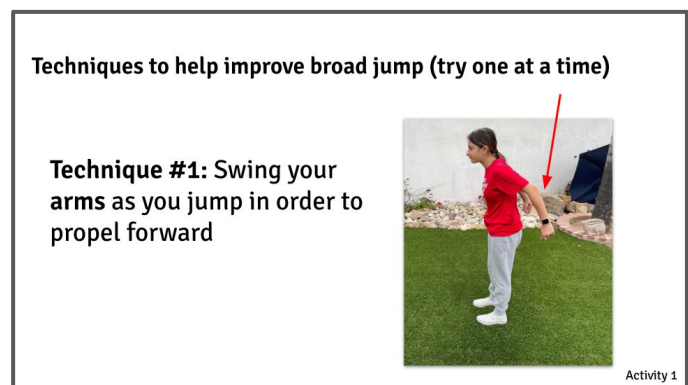
Which technique (swinging arms, bending knees, leaning forward) was most helpful? Explain.

How did practice help increase broad jump distance?

If youth are working in pairs, the measurer can also act as the data recorder. If there are more than three group members, additional youth can act as spotters to ensure the jumper has a clear path and lands safely, time keepers to keep the group on task, or other roles as assigned by the facilitator.

## Techniques to Help Improve Broad Jump

Youth try different techniques to improve their broad jump. Introduce and demonstrate these techniques one at a time to delineate the different strategies and support the growth mindset discussion in Activity 2.



Broad Jump Youth Slides, Slide 9

- **Round 1:** Youth do their first jump without any instruction.
- **Round 2:** Introduce the first technique (swinging arms). Youth attempt a second jump, swinging their arms as they jump to propel themselves forward!

# Activity 1 - Broad Jump Measurement and Histogram (4 of 6)

## Techniques to Help Improve Broad Jump (Cont.)

- **Round 3:** Introduce the second technique (bending knees). Youth attempt a third jump, bending their knees as they prepare to jump to create a “spring” motion.
- **Round 4:** Introduce the third technique (leaning forward). Youth attempt a fourth jump, leaning forward as they are about to jump to create momentum.

Each technique, or a combination of all of them, together with practice, will improve broad jump distance!

Activity is complete when each youth has jumped four times and recorded the data on **Worksheet 1** (see Youth Slide 12). Remember to have youth try each technique before moving on to the next round.

## Whole Group Discussion: Applying Techniques to Improve Broad Jump Distance


Once youth have recorded their broad jump measurements on **Worksheet 1**, ask youth to share what they notice about applying the techniques above and the role of practice on the outcome.

- Which technique was the most helpful?
- How did practice help you increase your broad jump distance?



Techniques to help improve broad jump (try one at a time)

**Technique #2:** Bend your knees as you prepare to jump to create a “spring” motion




Activity 1

Broad Jump Youth Slides, Slide 10

Techniques to help improve broad jump (try one at a time)

**Technique #3:** Lean forward as you are about to jump to create momentum

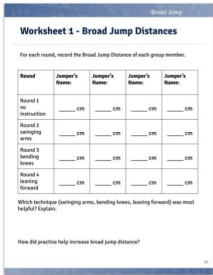


Activity 1

Broad Jump Youth Slides, Slide 11

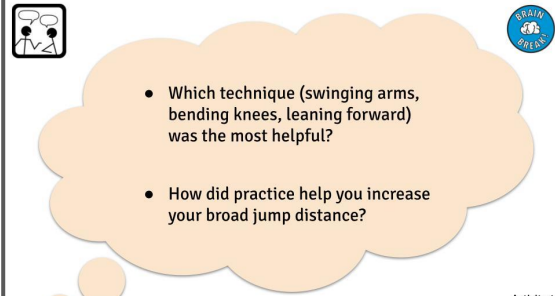
In your group of 3-4 youth:

1. **Round 1:** Measure each person’s broad jump without instruction in centimeters.
2. **Round 2:** Apply the first technique (swing arms) and record each person’s broad jump in centimeters.
3. **Round 3:** Apply the second technique (bend knees) and record each person’s broad jump in centimeters.
4. **Round 4:** Apply the third technique (lean forward) and record each person’s broad jump in centimeters.



Activity 1

Broad Jump Youth Slides, Slide 12



- Which technique (swinging arms, bending knees, leaning forward) was the most helpful?
- How did practice help you increase your broad jump distance?

Activity 1

Broad Jump Youth Slides, Slide 13

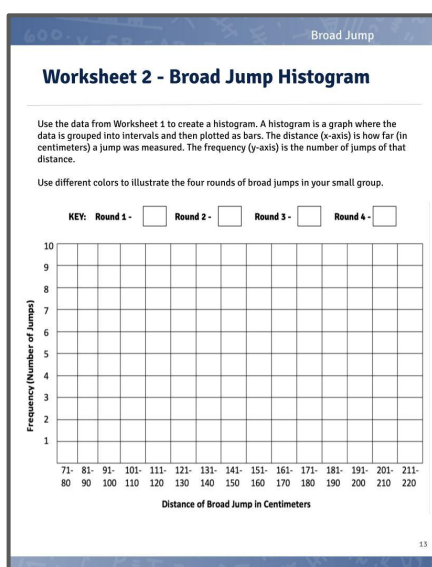


# Activity 1 - Broad Jump Measurement and Histogram (5 of 6)

## Whole Group: Plotting Measurement Data on a Histogram

On **Worksheet 2**, youth will use the measurement data from their broad jumps to create a histogram that shows the distances jumped by each member of their small group. Ask youth to plot each of their group members' broad jump measurements on the histogram, using a different colored marker or colored pencils to show each round. Youth will color in blocks to mark the frequency, or number of times that each distance was recorded.

Explain that the increments on the x-axis of the histogram represent a range of 20 centimeters of distance. The y-axis displays the frequency in increments of 1 jump.



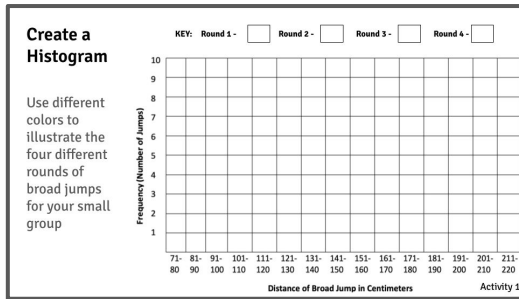
Use Slides 14-18 to show youth how to plot their data on a histogram.

- First, plot the data from **Round 1** by coloring in blocks to show the frequency of jumps that fell within each increment; use a color such as blue (see Slide 15). For example, if in Round 1, one youth jumped 81 cm, they would color up to 1 on the y-axis within the 81-100 cm increment. Youth will repeat this for the other measurements, for example, a jump of 101 cm is plotted in the 101-120 cm increment, and a jump of 133 cm is plotted in the 121-140 cm increment.
- Next, plot the data from **Round 2** in the same way, stacking new data above the data from Round 1 when new data falls within the same increment (see Slide 16). Use a new color, such as black, for Round 2 data.
- Repeat this for **Round 3** data, again using a new color, such as green (see Slide 17).
- Finally, plot the data from **Round 4**, using a new color such as red (see Slide 18). Now you should be able to clearly see the total frequency of broad jump distances within each increment, color coded by round.

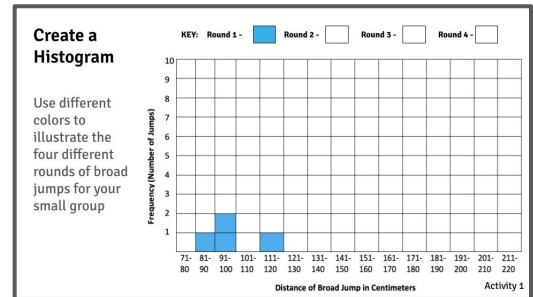
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# Activity 1 - Broad Jump Measurement and Histogram (6 of 6)

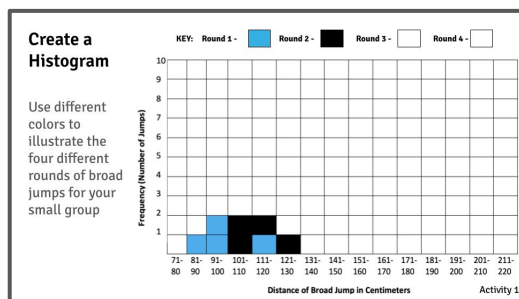
## Youth Slides 14-18



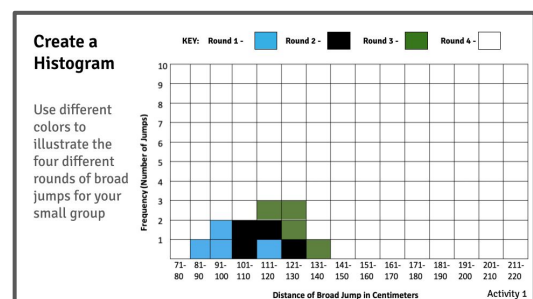
Broad Jump. Youth Slides, Slide 14



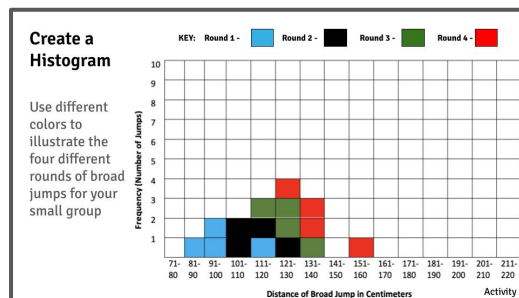
Broad Jump Youth Slides, Slide 15



Broad Jump Youth Slides, Slide 16



Broad Jump Youth Slides, Slide 17



Broad Jump Youth Slides, Slide 18

## Whole Group Discussion: Histograms



Ask youth to observe the data plotted on their group's histogram and to share what they notice about the distribution of measurements.

- What do you notice?
- In which round did we jump the least distance? The farthest distance?
- Why do you think that is?
- How do athletes combine technique and practice to improve their skills?

Activity 1

Broad Jump Youth Slides, Slide 19

## Activity 2 - Improving Through Practice (1 of 1)

### Description:

Youth are introduced to Jackie Robinson, a legendary athlete best known for breaking the color barrier in professional baseball. A short video about Jackie Robinson's abilities provide a backdrop for discussion on improving through practice, which connects to the Growth Mindset principle "effort and persistence."

### Whole Group: Jackie Robinson

Share the story of Jackie Robinson, who was the first African American player to play Major League Baseball (Brooklyn Dodgers). But baseball was not his only sport. Jackie played football, baseball, basketball, and ran track & field at UCLA. He was the 1940 NCAA Champion in the long jump.

Share the following video about Jackie Robinson's career at UCLA.

#### VIDEO: Jackie Robinson made history

<https://youtu.be/7MQjO8mWNm>  
A (1:00)

### Whole Group Discussion

**Ask youth to reflect** on Jackie Robinson's career as an athlete. Provide opportunities for youth to talk in small groups or with a partner, and then to share their ideas with the whole group:

- What skills did Jackie Robinson need to practice to improve in each sport?
- How do you relate to Jackie Robinson's story?

### Activity 2: Improving Through Practice

[Jackie Robinson Made History as UCLA's First 4-sport Athlete](#)



Talk with a partner:  
What are Jackie's accomplishments?

Activity 2

Broad Jump Youth Slides, Slide 19

- What skills did Jackie Robinson need to practice to improve in each sport?
- How do you relate to Jackie Robinson's story?

Activity 2

Broad Jump Youth Slides, Slide 19

# Worksheet 1 - Broad Jump Distances

For each round, record the Broad Jump Distance of each group member.

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Round 3 bending knees	_____ cm	_____ cm	_____ cm	_____ cm
Round 4 leaning forward	_____ cm	_____ cm	_____ cm	_____ cm

Which technique (swinging arms, bending knees, leaning forward) was most helpful? Explain.

How did practice help increase broad jump distance?



# Worksheet 2 - Broad Jump Histogram

Use the data from Worksheet 1 to create a histogram. A histogram is a graph where the data is grouped into intervals and then plotted as bars. The distance (x-axis) is how far (in centimeters) a jump was measured. The frequency (y-axis) is the number of jumps of that distance.

Use different colors to illustrate the four rounds of broad jumps in your small group.

**KEY:** Round 1 -  Round 2 -  Round 3 -  Round 4 -

