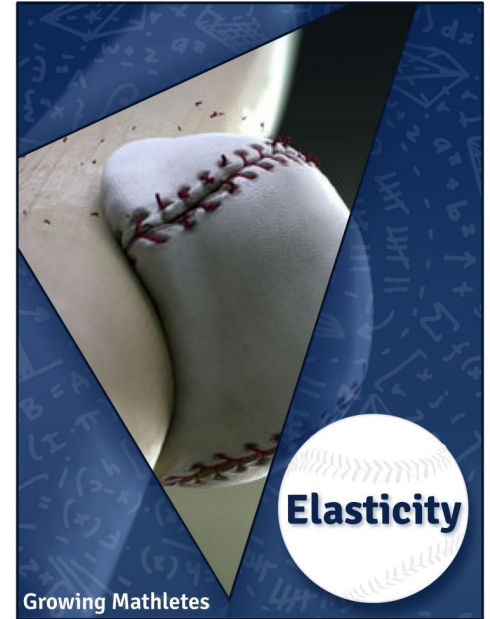
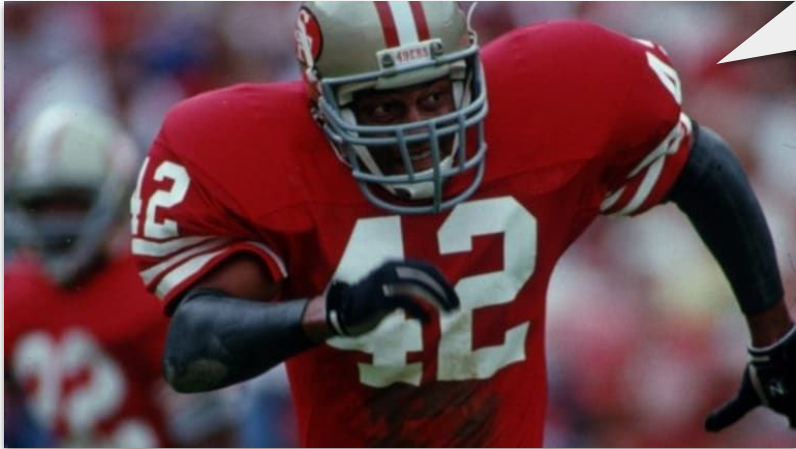


Elasticity

Activity	Time	Description
Activity 1	40 minutes	Youth will explore elasticity by repeatedly measuring how high balls made of different materials will bounce when dropped from the same height.
Activity 2	20 minutes	Youth will learn about how our brains, like balls, can also change and grow through the process of neuroplasticity. Youth will describe the malleability of their brain based on a new skill they would like to learn.



Elasticity



“If you can believe it, the mind can achieve it.” - Ronnie Lott

What does this quote mean to you?

What message is Ronnie Lott trying to send?

Activity 1: Using Repeated Measures to Test Elasticity

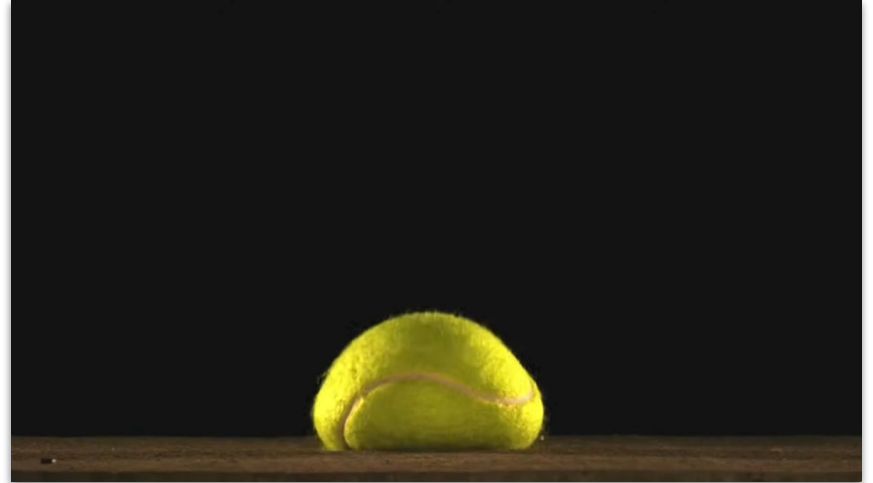
- Why might some balls bounce higher than others?
- What sports use balls that bounce a lot? Balls that do not bounce?
- How does the material it is made from change how high a ball bounces?



Video about Elasticity:

- [The Beauty of Slow Motion - Tennis Ball Bounce](#)

What did you notice about the shape of the ball as it bounced?



Let's Squeeze Each Ball to Feel It's Elasticity



What does this say about the elasticity of each ball?
What does it say about how high each ball might bounce?

VIDEO: Elasticity of Sports Balls

- Activity Demonstration

- Why do we always drop each ball from the same height?
- Why do we test sports balls made of different materials?



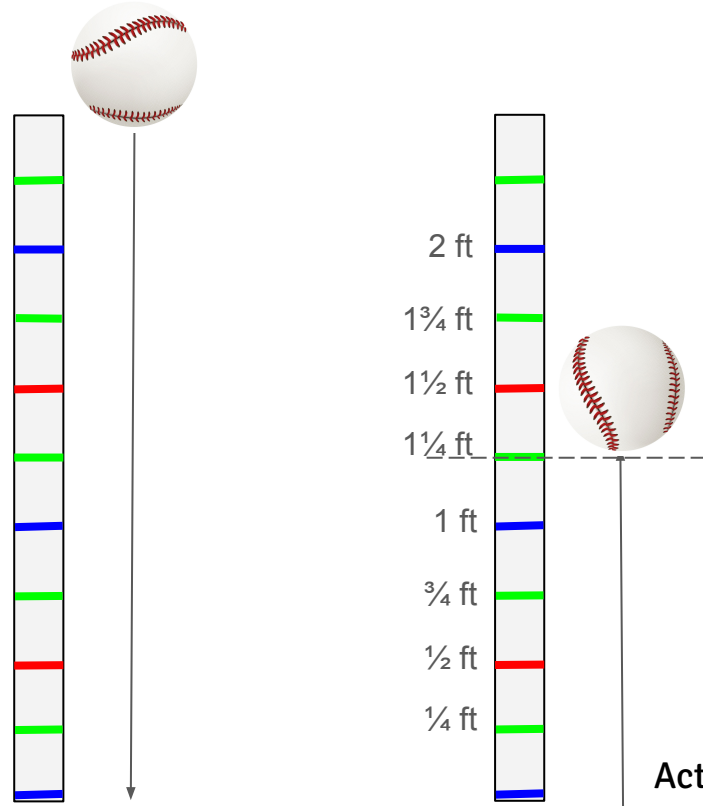
We are going to measure each ball's bounce height in fractions of a foot

- How many inches are in 1 foot?
- How many inches are in **$\frac{1}{2}$ of a foot?**
- How many inches are in **$\frac{1}{4}$ of a foot?**
- How many inches are in **$\frac{3}{4}$ of a foot?**

- How do we measure the bounce height to the nearest $\frac{1}{4}$ of a foot?

Drop each ball from the same height (measuring from the bottom of the ball)

At the highest point of the bounce, find the mark on the measuring tape that lines up with the bottom of the ball

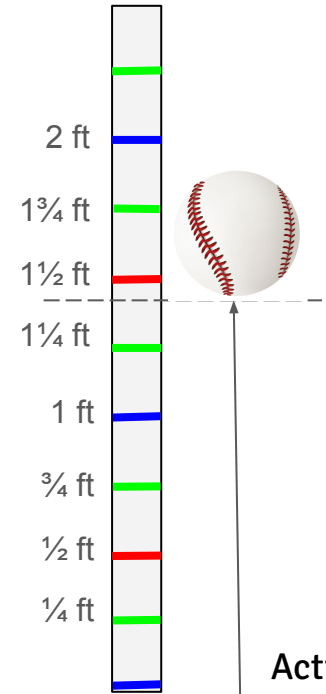


What if the ball bounces to a height that is between marks?

Round the bounce height to the nearest mark, either up or down.



Which mark on the measuring tape is closest to this bounce height?



Worksheet 1a - Ball Bouncing Results

Drop Trials on Hard Surface

Type of Ball	Trial 1 Bounce Height (fraction of a foot)	Trial 2 Bounce Height (fraction of a foot)	Trial 3 Bounce Height (fraction of a foot)
Foam Ball			
Tennis Ball			
Baseball/ Softball			

What do you notice about the bounce heights of the different balls?

You and your partner will drop three different balls from the same height onto a hard surface:

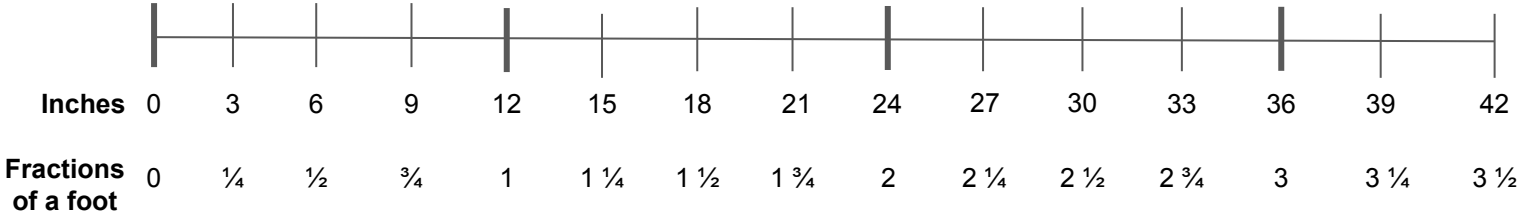
1. Set up your tape measure labeled in fractions of a foot.
2. One person drops a ball from shoulder height while the other person measures the bounce height, and then recovers the ball.
3. Record the bounce height measurement on your worksheet.
4. Drop each ball three times.
5. Switch roles.



- Did each ball bounce the same height? Why do you think that is?
- Did each ball bounce the same height for each trial?

Let's create a class line plot!

- = foam ball
- = baseball/softball
- = tennis ball



Class Line Plot to Represent Ball Bounce Height



- What did you notice about the elasticity of each sports ball?
- Were you surprised that some sports balls bounce higher than others?

You and your partner will drop three different balls from the same height onto a hard surface:

1. Set up your tape measure labeled in fractions of a foot.
2. One person drops a ball from shoulder height while the other person measures the bounce height, and then recovers the ball.
3. Record the measurement on your worksheet.
4. Drop each ball three times.
5. Switch roles.
6. Work with your group to calculate the mean bounce height (in fractions of a foot) for each type of ball.

Worksheet 1b - Ball Bouncing Results

Drop Trials on Hard Surface

Type of Ball	Trial 1 Bounce Height (fraction of a foot)	Trial 2 Bounce Height (fraction of a foot)	Trial 3 Bounce Height (fraction of a foot)	Mean Bounce Height (fraction of a foot)
Foam Ball				
Tennis Ball				
Baseball/ Softball				

Show your work below to find the mean bounce height for each type of ball. Use the formula below to calculate the mean:

$$(\text{Trial 1 height} + \text{Trial 2 height} + \text{Trial 3 height}) / 3 = \text{mean bounce height}$$

Finding the mean (average)

Type of Ball	Trial 1 Bounce Height (fraction of a foot)	Trial 2 Bounce Height (fraction of a foot)	Trial 3 Bounce Height (fraction of a foot)	Mean Bounce Height (fraction of a foot)
Tennis Ball	2 $\frac{1}{4}$ ft	2 $\frac{1}{4}$ ft	2 $\frac{1}{2}$ ft	

Find the mean bounce height for the tennis ball using the formula below:

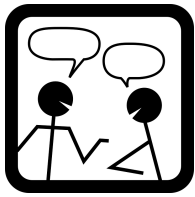
$$\begin{aligned} &(\text{Trial 1 height} + \text{Trial 2 height} + \text{Trial 3 height}) / 3 = \text{mean bounce height} \\ &(2 \frac{1}{4} + 2 \frac{1}{4} + 2 \frac{1}{2}) / 3 = (7) / 3 = ??? \end{aligned}$$

Finding the mean (average)

Type of Ball	Trial 1 Bounce Height (fraction of a foot)	Trial 2 Bounce Height (fraction of a foot)	Trial 3 Bounce Height (fraction of a foot)	Mean Bounce Height (fraction of a foot)
Tennis Ball	$2 \frac{1}{4}$ ft	$2 \frac{1}{4}$ ft	$2 \frac{1}{2}$ ft	$2 \frac{1}{3}$

Find the mean bounce height for the tennis ball using the formula below:

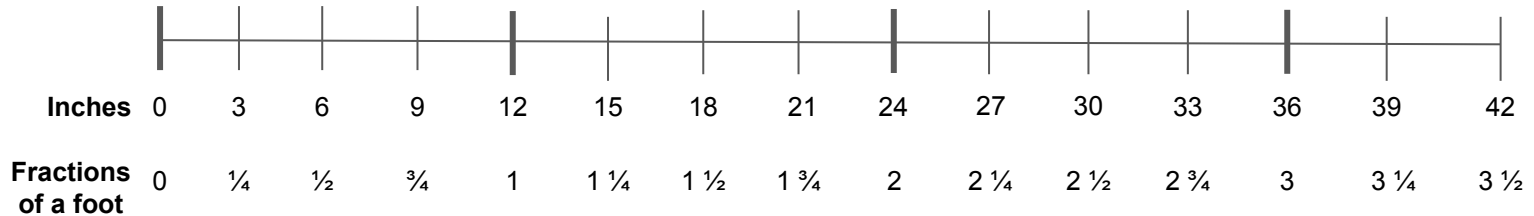
$$\begin{aligned} &(\text{Trial 1 height} + \text{Trial 2 height} + \text{Trial 3 height}) / 3 = \text{mean bounce height} \\ &(2 \frac{1}{4} + 2 \frac{1}{4} + 2 \frac{1}{2}) / 3 = 7 / 3 = 2 \frac{1}{3} \end{aligned}$$



- Did each ball bounce the same height? Why do you think that is?
- Did each ball bounce the same height for each trial?

Let's create a class line plot!

- = foam ball
- = baseball/softball
- = tennis ball



Class Line Plot to Represent Ball Bounce Height



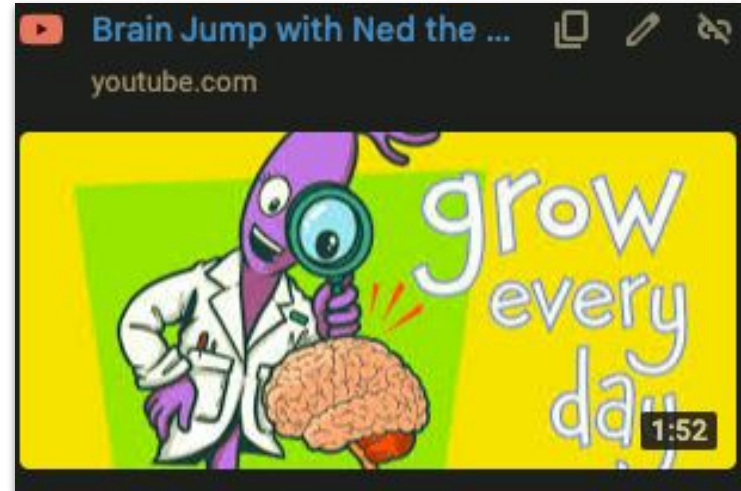
- What did you notice about the elasticity of each sports ball?
- Were you surprised that some sports balls bounce higher than others?

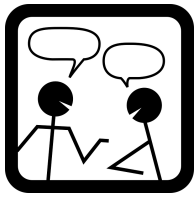
Activity 2: The Malleability of the Brain

VIDEO:

- [Grow Every Day!](#)

- What did you learn about how you can grow and strengthen your brain?





- What new things would you like to learn about?
- How do you usually face challenges? How, if at all, did this video help you to better understand challenges?
- What happens to your brain when you acquire a new skill or learning something new?

Find a partner to share with, and change each round!