

# Bendy Bones

Segment 2

## Purpose

To prove the importance of calcium in building and maintaining strong bones

## Background

Our bones get their strength from a hard outer covering that contains the mineral calcium carbonate. The calcium keeps the bones stiff and rigid. The human body needs calcium for building healthy teeth and bones. Without this mineral, our bones would be soft and flexible. Because teeth and bones grow the most during childhood and adolescence, it is especially important for kids to get enough calcium. The more bone mass children can accumulate during these years, the less likely they are to develop serious bone problems in the future. Bones lose calcium over time, so the calcium must be replaced daily. Children, ages 4–8, need 800 mg of calcium per day, while those ages 9–18 need 1,300 mg per day. Consistent low levels of calcium can cause health problems, including the increased likelihood of broken bones, unhealthy teeth and gums, and rickets. As an adult, these low levels can cause osteoporosis, a painful condition caused by a decrease in bone density that often leads to broken hips and other fractures in the elderly. Eating a well balanced diet that includes foods rich in calcium is an important way to keep bones healthy. In this activity, vinegar, an acid, will slowly dissolve the calcium in the bones, making the bones weak.

**NOTE:** This experiment will take place over 3 weeks.

## Procedure

1. Wear your safety goggles and gloves whenever you are performing this activity.
2. Place one chicken bone in each of the four jars.
3. Label the first jar "control."
4. Label the second jar "Vinegar – 1 Week."
5. Label the third jar "Vinegar – 2 Weeks."
6. Label the fourth jar "Vinegar – 3 Weeks."
7. To the "control" jar, add water to completely cover the bone.
8. To the other three jars, add vinegar to completely cover the bones.
9. Put the lids on all four jars and tighten them securely.
10. Place the jars in a safe place. Dispose of gloves properly.
11. After one week, get the "Control" and "Vinegar – 1 Week" jars.
12. Put on your safety goggles and gloves.
13. Remove the bone from the "Control" jar.
14. Rinse the bone off with water from the sink.
15. Try to bend the bone.
16. Use a protractor to measure how much the bone bends with reasonable force. See diagram 1.
17. Record your results on the Bendy Bones Worksheet.
18. Remove the bone from the "Vinegar – 1-Week" jar.
19. Repeat steps 14–17.
20. Put the control bone back in the control jar, tighten the lid, and return the jar to a safe place.
21. Properly dispose of the gloves and contents of the vinegar jar. NOTE: Jars MUST be sanitized before reusing.
22. After the second week, get the "Control" and "Vinegar – 2-Weeks" jars.

## Materials

4 similarly cooked chicken bones (with all meat removed)  
vinegar (approximately 1.5 liters (L))  
4 jars with tight sealing lids  
safety goggles  
gloves  
water  
protractor  
permanent marker  
access to a sink  
Bendy Bones  
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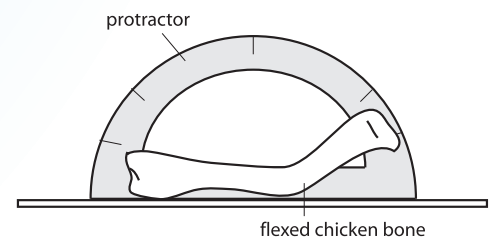


Diagram 1

# Bendy Bones

23. Put on your safety goggles and gloves.
24. Repeat steps 13–17.
25. Remove the bone from the “Vinegar – 2-Weeks” jar.
26. Repeat steps 14–17.
27. Put the control bone back in the control jar and return it to a safe place.
28. Properly dispose of the gloves and contents of the vinegar jar and sanitize jar before reusing.
29. After 1 more week, get the “Control” and “Vinegar – 3 Weeks” jars.
30. Put on your safety goggles and gloves.
31. Repeat steps 13–17.
32. Remove the bone from the “Vinegar – 3 Weeks” jar.
33. Repeat steps 14–17.
34. Properly dispose of the gloves and contents of the control and vinegar jars and sanitize jars before reusing.

## Discussion

1. Which bone was the strongest? Weakest? How do you know?
2. What effect does the vinegar have on the calcium in the bones?
3. As the amount of calcium in a bone decreases, what happens to the bone? How do you know?
4. What are some of the long-term effects of calcium loss?

## Extensions

1. Repeat the activity again to see if you get the same results. How did your results from the two trials compare? Why is it important for scientists to do more than one trial?
2. Ask a local dentist for fluoride. Get two eggs, two jars with tight lids, vinegar, and a paintbrush. Put on your safety goggles and gloves. Fill one jar with vinegar and place an egg in it. Seal the lid tightly and label this jar “control.” Fill the other jar with vinegar. Using the paintbrush, coat the outside of the other egg with fluoride. Place the egg in the vinegar. Seal the lid tightly on the jar and label it “fluoride.” Wait 2–3 days and check the eggs. Remember to wear your safety goggles and gloves. What do you notice about the two eggs? Put the eggs back into the proper jars and allow more time to pass to see if any additional changes occur. Why is fluoride important to keeping teeth healthy?

## BENDY BONES WORKSHEET

Bone In:	Degrees Bones Bend After 1 Week	Degrees Bones Bend After 2 Weeks	Degrees Bones Bend After 3 Weeks
Water (control)			
Vinegar			