

Protocol for the Cottonwood-Seed Investigation (Teacher Master)

Question: Do bigger or smaller cottonwood-tree seeds travel farther in the wind?

Materials

- Package of full-size cotton balls (1 1/4 cotton balls per student) (See Ahead of Time)
- A 12-inch fan
- Butcher paper (approximately 6–7 feet or 2–2.5 meters long)
- Materials to mark where the cotton balls (“seeds”) land on the butcher paper
 - *Option A:* Markers or crayons to draw a circle around the cotton balls and write either a letter *B* (for big) or an *S* (for small) inside the circle
 - *Option B:* Big sticky dots with a letter *B* written on them, and small sticky dots with an *S* written on them to mark where the cotton balls land
 - *Option C:* Glue to glue down the cotton balls where they land

Ahead of Time

Note: Complete these tasks before beginning lesson 3a.

1. Remove as many full-size cotton balls from the package as needed so that each student will have one. These cotton balls represent *big* cottonwood-tree seeds.
2. Place the full-size cotton balls in a plastic baggie or container for use during the investigation.
3. Divide that number of cotton balls by four, round up, and take that many more cotton balls out of the package to make enough smaller cotton balls so that each student will have one. Using scissors, cut the cotton balls in half and then cut each half in half again to get four smaller cotton balls, each roughly the same size. Don’t worry if they aren’t exactly the same size. These quarter-sized cotton balls represent the *small* cottonwood-tree seeds.
4. Place the small cotton balls in a different plastic baggie or container for use during the investigation.

Procedure

1. Remind students that you’re going to use a model of cottonwood-tree seeds and the wind to investigate how far the seeds will fly from the tree. The butcher paper represents the ground. The fan represents the wind blowing the seeds. The line on the butcher paper represents where the tree is standing, and the cotton balls represent cottonwood-tree seeds.
2. Place the fan on the floor and spread out the butcher paper in front of the fan.
3. Tilt the fan up about 20 degrees (or to the first click on the fan). **Note:** Zero degrees would be the line perpendicular to the floor.

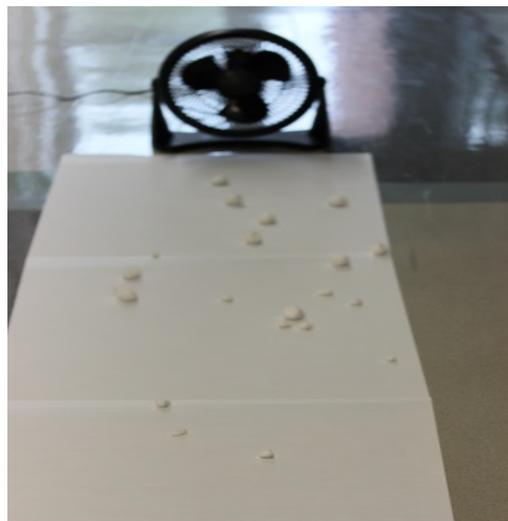


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4. On the butcher paper, draw a line near the edge of the paper nearest the fan and label it “Tree.” You might add some branches or leaves to make it look more like a tree. Remind students that this line represents the tree where the seeds are hanging, and the wind (fan) is going to blow the seeds (cotton balls) away from the tree.
5. Demonstrate again for students how to drop the cotton balls in front of the fan.
 - a. Turn on the fan.
 - b. Hold a **big** cotton ball near the top center of the fan, about 2 inches from the front. The cotton ball should be in the airstream.
 - c. Drop the big cotton ball straight down and let it blow in the breeze.
 - d. Show students how to mark where the cotton ball lands.
 - *Option A:* Make a circle around the cotton ball using a marker or crayon and then remove the cotton ball. Write the letter *B* (for big) inside the circle.
 - *Option B:* Place a big sticky dot (with a letter *B* on it) where the cotton ball landed; then remove the cotton ball.
 - *Option C:* Glue the cotton ball to the butcher paper to mark where it landed.
 - e. Hold the **small** cotton ball near the top center of the fan, about 2 inches from the front of the fan. The cotton ball should be in the airstream.
 - f. Drop the small cotton ball straight down and let it blow in the breeze.
 - e. Show students how to mark where the cotton ball lands.
 - *Option A:* Make a circle around the cotton ball using a marker or crayon and then remove the cotton ball. Write the letter *S* (for small) inside the circle.
 - *Option B:* Place a big sticky dot (with a letter *S* on it) where the cotton ball landed; then remove the cotton ball.
 - *Option C:* Glue the cotton ball to the butcher paper to mark where it landed.
6. **SAFETY NOTE:** Remind students to keep their hands a safe distance from the fan as they drop their cotton balls!
7. Give students their cotton balls. Then ask one student to drop a **big** cotton ball in front of the fan. Have the student mark where it lands on the butcher paper (using the marking method from Option A, B, or C).
8. Next, have the same student drop a **small** cotton ball in front of the fan. Then have the student mark where it lands (using the same marking method).
9. Have one student at a time repeat steps 7 and 8 until all students have dropped their big and small cotton balls in front of the fan and marked where they landed on the butcher paper.
10. Using a meter stick or a straightedge ruler, draw a line from the “tree” to where each cotton ball landed (see example on following page).
11. **Optional:** Ask students to measure some of the distances the big and small cotton balls traveled if you want them to practice measuring and comparing distances. However, measuring distances isn’t necessary for this lesson.

Results from One Seed Investigation

The data table below shows actual distance measurements in centimeters, and the photograph shows the results on butcher paper, using Option A to mark where the cotton balls landed. (**Note:** The results from each investigation will vary, but in general, more small cotton balls should fly farther than big cotton balls, as demonstrated in this example.)

	Big Cotton Balls	Small Cotton Balls
1	80 cm	68 cm
2	91 cm	143 cm
3	16 cm	154 cm
4	32 cm	93 cm
5	58 cm	164 cm
6	45 cm	108 cm
7	102 cm	160 cm
8	74 cm	90 cm
9	33 cm	97 cm
10	67 cm	127 cm
Total	598 cm	1,204 cm
Average	59.8 cm	120.4 cm

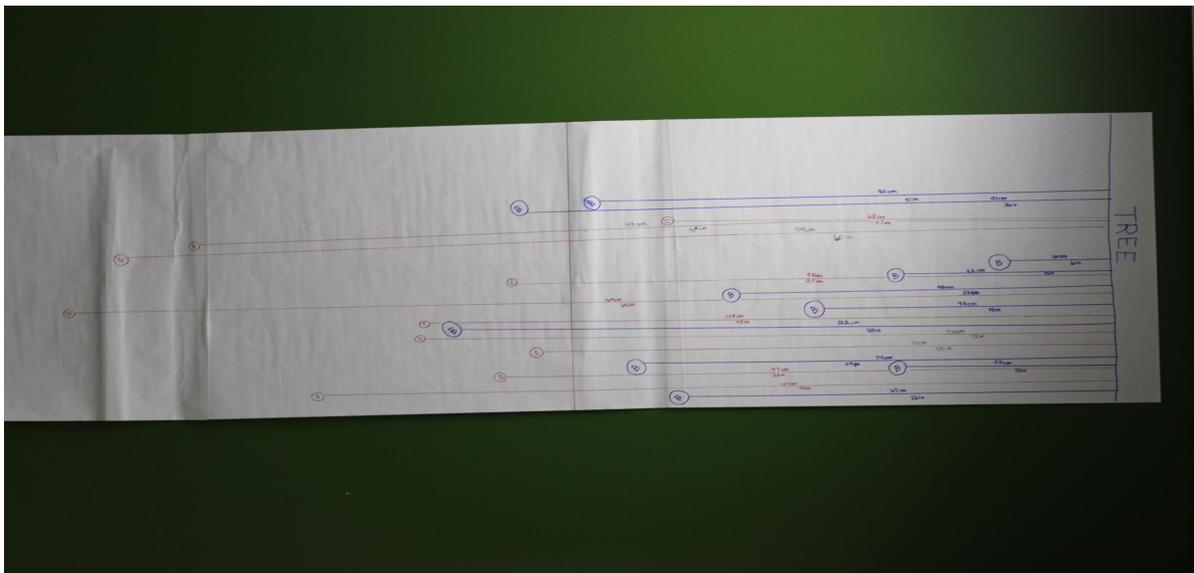


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