

Making Bear Tracks



Grade Level: Appropriate for all grades

Standards:

Minnesota Academic Standards in Science Codes

0.4.1.1.1 - 5.4.1.1.1 – Living things are diverse with many different observable characteristics

0.1.1.2.1, 2.1.1.2.1, 3.1.1.2.1 – Scientific inquiry is a set of interrelated process incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.

5.1.1.2.1 – Scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.

Link Resources:

www.bear-tracker.com/plastertracks.html

http://www.bear.org/website/images/stories/Documents/Black_Bear_Basics.pdf

www.bear.org

www.bearstudy.org

Goal:

Students learn how scientists and trackers make plaster casts of animal tracks. Each student will make a track to paint and take home.

Curriculum Focus:

Science, art

Lesson:

Materials needed:

Rubber bear track molds and replicas

Plaster of Paris

Mixing bowls (metal or plastic is best, but can be disposable)

Spoons and forks (metal or disposable)

Dixie cups

Aluminum pie tins or similar containers (these can be re-used)

Clean sand

Water

Prepare the substrate: Have each student take a pie plate, add sand to a depth of one inch, and then add just enough water to moisten the sand so it sticks together. Mix the sand and water together to get a good consistency. If it's too wet, it won't hold the tracks well, so just add more dry sand and mix it in. Fluff up the sand a bit. The sand should be damp enough to stay in position.

Make the track: Have each press a rubber replica bear track into their sand. Don't press too hard or the imprint will be distorted.

Mix the Plaster of Paris: After each student has a bear track in their sand, have them mix the plaster. Don't mix the plaster up beforehand as it begins to set as soon as mixed and will harden before the students have time to pour it.

Plaster of Paris should be mixed to a ratio of about two parts plaster to one part water. You may want to measure it out with measuring cups to get the right ratio. This could also lead to a short math discussion on ratios while they mix. You could also have the plaster and water pre-measured and set out in front of each student prior to beginning the activity to save time (put the plaster in the disposable bowl and the water in the Dixie cup, with a fork beside them for mixing). Mix the plaster until all lumps are gone. Scrape any lumps off the bottom of the bowl and mix them in. Plaster should be an even consistency, about that of pancake batter.

Pour the plaster: Have the students pour the plaster from their bowls onto the spoon, starting outside the track. Pouring onto the spoon and allowing the plaster to gently run into the track will preserve the track details because the spoon breaks the fall of the plaster. This is the technique you use to make casts of very delicate tracks. They can also use the spoon to scrape out the plaster from the edges of the bowl. Some students may want to just spoon the plaster gradually into the track until it is full. This is fine, but make sure to emphasize that they do it quickly before the plaster sets up. Make sure to fill the track and all the details, including the claw marks. They can overflow the plaster above the track to make a nice solid cast. (As an alternative, you can have them make walls to contain the plaster by pressing thin cardboard strips into the sand around the track prior to mixing the plaster. This will allow them to make a round cast with the track in the center. You can experiment with this beforehand to learn the technique. You can also place large paper clips, bent slightly in the center, in the plaster before it's dry to make a hanger that will allow the cast to be hung on a wall or bulletin board after it's done.)

Clean up: Once everyone has poured his/her casts, have them clean the bowls, utensils, and wash their hands. Plaster on the hands can dry out the skin and cause itching, so it's best to wash up after using it.

Allow casts to dry: The casts should not be moved after this point. The plaster goes through an exothermic (gives off heat) reaction that will evaporate the water and set the plaster into a solid form. Moving the casts at this time will cause them to crack and fall apart once they are dry. While you wait, you can take the students outside on a walk to look for tracks, or do another activity away from the tables where the casts are drying. Give the casts at least half an hour to dry. Longer is better.

Check the casts: If they are soft or wet at all, leave them longer. If the cast gives off a nice ceramic sound when you tap the back with your knuckles, then it is set enough to pick up.

Remove the casts: The students can use a pencil to write their names on the back of their casts at this point. Then, have the students gently remove their casts from the sand.

Rinse the casts: Rinse the casts gently in a pan of water to remove loose sand. Do not scrub.

Allow casts to cure: Plaster takes about three days to cure. Set the track casts aside in an out-of-the-way location for at least three days, or over a weekend. The casts should not be wrapped in plastic, as water needs to escape. It's best to set them out flat in the open air, maybe on some newspaper.

Final cleaning: When the casts feel lighter in weight, they have cured enough to paint. Before painting, brush the casts with a dry brush to remove any remaining sand that loosened during the curing process.

Paint the casts: Acrylic paints work well on plaster. Tempera paint works too, but should be covered with a layer of shellac to keep the paint from washing off. Have the students paint the raised area of the track in one color, including the toes and claw marks. Then, have students paint the background another color so the track stands out. Don't paint the back of the cast, as moisture still needs to escape from the plaster. Once the paint dries, the casts are ready to take home, or hung on a display in the classroom.

Note: If you have a small class, you could use the bear track molds to make the casts instead of making them in sand. However, this only works with one or two students as the plaster takes half an hour to set up in each mold.

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