

STRUCTURES: WEB BUILDING

WHY

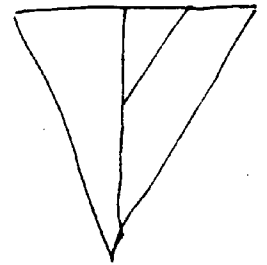
To explore the relationship between structure and function in nature.

MATERIALS NEEDED

- # two different colors of yarn
- # newspaper or rubber ball (the size of a tennis ball)
- # scissors

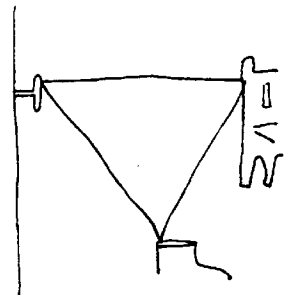
HOW

- # You'll work with a partner to construct an orb spider web, then test the web to see if it will signal when a prey is present.
- # Work with a partner and follow the directions for the spider. You'll use yarn. Instead of silk to construct your web. Because you are much larger than a real spider, your web can be much larger than a real spider's web. Look around the room or your house for a location. You need at least three places to tie your web, and you want to be sure people won't bump into it.
- # The spider begins by building a framework. The shape of the framework fits the place where the web is constructed.
- # Building the framework:
 - Starting at an upper point, the spider stretches silk across to an opposite point to form a bridge.
 - Next, the spider stretches strands of silk down from the ends of the bridge to form a framework. You can also use two or three strands, depending on whether you would like a framework with three or four corners.
 - The spider constructs the orb-shaped part of the web inside the framework.



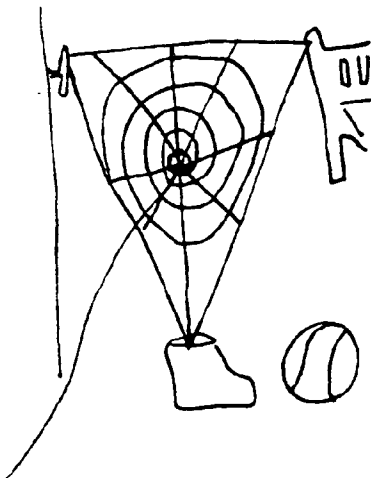
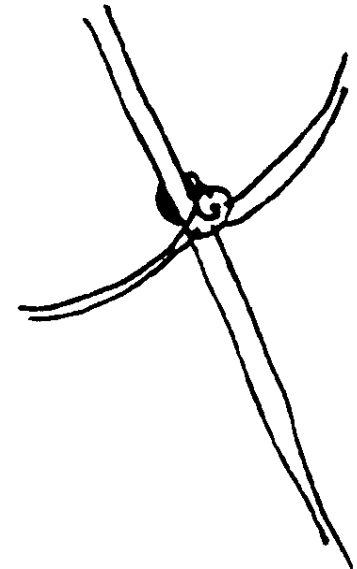
Building the orb web:

- # The spider walks about halfway across the bridge and drops a strand of silk to the lower part of the frame.
- # Next, the spider travels about half way back up this vertical strand. This marks the center of the web.
- # The spider pulls a new strand from the center up to the bridge and attaches it to one side of the first strand. You now have 3 radii.
- # The spider continues adding radii, working from the center out, alternating from side to side to keep the web equally balanced. The number of radii varies. For your web 8-12 radii are sufficient.
- # Beginning in the center, the spider makes a closely spaced spiral for a short distance. This is the hub. It is a work platform for the spider, and helps hold the radials in place until the web is completed.



Finishing the web:

- # The silk the spider uses for the final spiral is usually sticky. You may want to use a different color yarn to show this.
- # The spider moves to a place in the framework where a radial attaches and begins a spiral from the framework to the hub.
- # The spider attaches the silk for the spiral to each radial it crosses. You can do this if you tie your yarn around each radii (see right).
- # The spider stops the sticky spiral a short distance from the hub, leaving a little space between the first small spiral and the larger sticky spiral. The orb web is finished. Now the spider will wait for an insect to land on the web.



Use a ball of newspaper to test your web.

To test your web:

- # Attach a length (about 1 meter or 1 yard) of yarn to the hub of your web. *Tie your yarn around each radii.*
- # You will need a ball or a rolled ball of newspaper. The ball represents the spider's prey.
- # You and your partner each have a role - one of you will be the spider, the other the prey.
- # The person who is the spider stretches the signal line to a hiding place. The line should be taut. Your partner will "land" an insect on the web by tossing the ball at the web.
- # Don't peek! The spider should be able to feel the landing insect through the signal line. Switch roles with your partner.

A LITTLE INFORMATION ABOUT SPIDERS ...

Spider have 2 main body parts. The cephalothorax (bearing the spider's legs, fangs, mouth and eyes) is the first part. Spiders have 8 legs, and most have 8 eyes. The second spider body part, the abdomen is where the silk producing glands are located. Silk leaves the spider body through the spinnerets located at the end of the abdomen. Spiders may produce several qualities of silk, some strong, others sticky. Some silk may be stronger than steel. It is used to travel, to prevent spiders from falling, to mark a path, to wrap-up leftover food, to encase their eggs, to make a hiding place and to construct webs. Orb weaving spiders usually build their webs at night.

Bibliography

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