Children's Discovery Museum of San Jose

Kids' Garden

Teacher's Guide: Grade 3

California Content Standards

Grade 2
- Science: 2a, 6a, 6c, 6d, 6e

What's Going On?

The *Kids' Garden* gives children the opportunity to explore the natural community of which we are all members and is the perfect place for children to explore many different aspects of life science. The activities described in this guide provide opportunities to learn about light and shadow.

Before You Visit

Before You Visit CDM, venture outside the classroom to observe the sun's movement and experiment with shadows.

After Your Visit

After your visit, create a sundial that tells accurate time.

Exploring Shadows

Objective:

Children know that light travels in a straight line and that shadows are created by blocking that light.

What you'll need:

- ❑ Clipboard or other writing surface
- ❑ Student Recording Sheet A – Where is the Sun?
- ❑ Student Recording Sheet B – Special Shadows

What to Do:

1. Take the children outside on a sunny day to explore shadows.
2. Give children time to complete the Student Recording Sheets individually.
3. Gather children together to discuss their observations. Where is the sun in relation to each shadow? How is a shadow created?
4. Pair students. Challenge them to create the special shadows on Student Recording Sheet B.
5. Gather children together again to discuss how they created the special shadows.

Assessment:

Do children's explanations of how they created the special shadows reflect knowledge of the sun's role in creating shadows?

Extensions:

- Find a stationary object outside and trace its shadow with chalk. Return every hour to trace the same shadow and track how it changes over time as the sun moves in the sky.
- Play shadow tag. Rather than touching each other, children step on each other's shadows to tag one another out.
- Use a flashlight to simulate the sun indoors. Experiment with how the size of a shadow changes as the flashlight shifts positions from directly above an object to next to an object; or move the flashlight closer to and farther away from an object.
- Make shadow puppets.

During Your Visit

Guided Exploration of the Exhibit

What you'll need:

- ❑ Hands, eyes, and brains

What to do:

Encourage children to notice the shadows made by different objects in the garden. Think about the following:

- Which plants are behind shadows and which are in the full sun? How might this difference affect how they grow?
- Can you find a place where shadows are used to tell time? How do you think the sundial works?
- Shadows provide shady protection from the sun. Can you find a place with shade just right for a butterfly? Which plants create shade for ants or even smaller creatures?
- If chalk is available in the garden, trace some shadows. Compare the size of the shadows to the size of the actual object.

Making Your Own Sundial

Objective:

Children will make their own sundials to track how the earth moves in relation to the sun.

What you'll need:

For each group of 4 students:

- ❑ Cardboard
- ❑ Protractor
- ❑ Pencil
- ❑ Scissors
- ❑ Masking tape
- ❑ Glue
- ❑ Ruler
- ❑ Adjustable magnetic compass
- ❑ Atlas

What to Do:

1. Remind children of the sundial in the Kids' Garden. Ask them to explain how people use it to tell time. Let the children know that they will be building their own sundials.
2. Help the children find the school's latitude in an atlas.
3. On a piece of cardboard, draw an angle that has the same number of degrees as the school's latitude. Make the length of the base of the angle 3 inches long. Make the length of the other side of the angle 3 ½ inches long.
4. Connect the two sides of the angle with a curved line. Your drawing should look similar to a triangle with two straight sides and one curved side.
5. Draw a 1 inch by 3 inch rectangle connected to the base of the triangle to create a tab. (See the diagram for an example.)
6. Cut out the shape and set it aside.
7. Cut out a 3" X 4" rectangle from another piece of cardboard to form the base of the sundial.
8. Attach the triangle piece to the rectangle by bending the tab on the triangle back and taping it to the cardboard. Make sure that the point of the triangle touches a 3" edge of the rectangle.
9. Put a line of glue on both sides of the triangle where it touches the base of the sundial to make it sturdier.
10. Position your sundial in a sunny spot (indoors or outdoors) so that the tip of the triangle points to true north.
11. Every hour, mark the position of the shadow on the sundial with a dot. Next to the dot, record the clock time.
12. The next day, your sundial will be ready to keep time!

Assessment:

Are children able to explain how the sundial works?

Extensions:

- Compare the time that the sundial keeps to that of a clock over several

Make Your Own Sundial (continued) ☞

weeks or in different seasons to help children notice that the sun's movement changes over time.

- Research different sundial designs and how people in the past used them as accurate timepieces.

Related CDM lesson plans:

The Science of Oz: Ramblin' Rainbows

Weblinks:

www.learner.org/teacherslab/science/light/lawslight/player/index.html

www.nasa.gov/lb/audience/forkids/activities/A_Make_a_Sundial.html

Student Recording Sheet B

Explain (or draw) how you and your partner made the following shadows.

Can you make these shadows?	How?
A shadow with one body and three arms.	
A shadow with one body and four legs.	
Two shadows whose hands are touching while yours are not.	
A shadow that zigzags.	
A shadow that is skinnier than you.	
A shadow that looks like it is grabbing something (a stick or a rock) from the ground.	

Student Recording Sheet A

Record where the sun is when you do each of the following.

When you stand	Where is the sun?
With your shadow in front of you.	
With your shadow behind you.	
With your shadow next to you.	
Under a slide or behind a tree.	