Learning on the Edge Newsletter

Winter 2010 Issue

Fun Facts

On turkeys: There are between 5,000 and 6,000 feathers on an adult turkey's body. Turkeys can also run at speeds over 25 mph.

On going to the moon: Arctic terns may migrate a distance equivalent to flying to the moon and back three times over their 30 year life span.

On groundhogs: Woodchuck and groundhog are common terms for the same animal, the rodent with the scientific name of *Marmota monax*. Most closely related to squirrels, woodchucks actually can climb trees and also swim.

On lightning: At any given second, there are approximately 100 lightning strikes on the Earth's surface.

Upcoming 2010 - 2011 Dates

- **Dec 14 - South Pole first Reached**
- **Dec 17 - Wrights Brother's Day**
- **Dec 18 Project WET Workshop**

  www.texasstateaquarium.org
- **Dec 25 - Merry Christmas**
- **Dec 27 Louis Pasteur's Birthday**
- **Jan 5 - National Bird Day**
- **Jan 17 - Ben Franklin's Birthday**
- **Jan 21 - Estuaries in the Classroom**

  www.CBBEP.org
- **Feb 2 - Groundhog Day**

Delta News

Hawks have been migrating through the area. We've seen Broad-winged Hawks, a Northern Harrier, Harris Hawks, Turkey Vultures, a Peregrine Falcon, a Red-shouldered Hawk, a Sharp-shinned Hawk, and an Osprey in just a few trips to the Delta! Hawks migrate through our area from mid-August until mid-October.

Field Trips are filling up quickly! We had a very full October with 12 trips! November was a very busy month with a nice break for Thanksgiving. Don't forget to sign up now while we still have room. There is an automated form on our website **(click here)** to request field trip dates. We hope to see you soon!

Booking Information/Questions: education@cbbep.org

Equatorial Sundial Activity

National Science Education Standards
• Content Standard in 5-8 Earth and Space Science (Earth in the solar system)
• Content Standard in 5-8 Science as Inquiry (Abilities necessary to do scientific inquiry)

Egyptian Stonehenge

When summer arrives in the northern hemisphere, the Sun appears farthest north for the entire year.

In centuries long past, skywatchers around the world watched for the solstice at special observatories — circles of stones. The most famous is Stonehenge in England, but circles of much smaller stones were found in the Americas, too.

The oldest of these stone observatories may have been built in southern Egypt, at a site called Nabta. It was used 6,000 years ago, and perhaps even earlier — at least a thousand years before Stonehenge.

Anthropologist Fred Wendorf of Southern Methodist University discovered the site in 1973. Last year, studies by Wendorf and Colorado astronomer J. McKim Malville confirmed that Nabta had an astronomical function.

Among other artifacts, the site contains a 12-foot-wide "calendar circle" of small stones. Two pairs of stones stand across the circle from each other. If you look through the spaces between each pair, you'll see the point where the Sun rose on the summer solstice thousands of years ago. This alignment was important to the people who lived at Nabta because monsoons brought a few inches of rain to the region soon after the solstice.

Over the centuries, though, the rains dried up and Nabta was abandoned. But the people of Nabta may have left a legacy. Their culture may have stimulated the formation of Egypt's Old Kingdom — the civilization that built the great pyramids.

This is the transcript of a StarDate radio episode that aired June 22, 2003. Script by Damond Benningfield, ©1998, 2003.

One of astronomy's first tools to measure the flow of time, a sundial is simply a stick that casts a shadow on a face marked with units of time. As Earth spins, the shadow sweeps across the face. There are many types of sundials; an equatorial sundial is easy to make and teaches fundamental astronomical concepts. The face of the sundial represents the plane of Earth's equator, and the stick represents Earth's spin axis.

Preparation

First, find your latitude and longitude and an outdoor observing site in a clear (no shadows) area. Determine north (from a map, or by finding the North Star at night and marking its location). Assemble the equipment as described below. Use a flashlight to demonstrate how to position and read the sundial indoors before going outside.

Materials and Construction

Each student team needs a copy of the following page and a drinking straw. Have the students cut out the Dial Face Template. Fold and glue the template, making sure the dial faces are lined up. Cut a cross in the center hole where the straw will be snuggly inserted. Mark the straw using the latitude strip as a guide. First mark the bottom of the straw at one end, then mark a line corresponding to your latitude. Place the straw in the template hole at the line marking your latitude. The south face of the template should aim toward the bottom of the straw. Make sure the stick and template are perpendicular. The straw should fit snugly; tape it in place if necessary.

Experiment

On a sunny day, take the sundial outside. Set it on a flat horizontal surface with the bottom of the straw and the folded edge of the template both resting on the ground. Aim the straw with the top pointing due north. (If done correctly, the straw will point at the celestial north pole, where we see the North Star at night.) Record the time on the sundial at least four times in one day, with measurements at least an hour apart. Each time, also record the "clock" time for your date and location. Try this experiment during different months.

Analysis

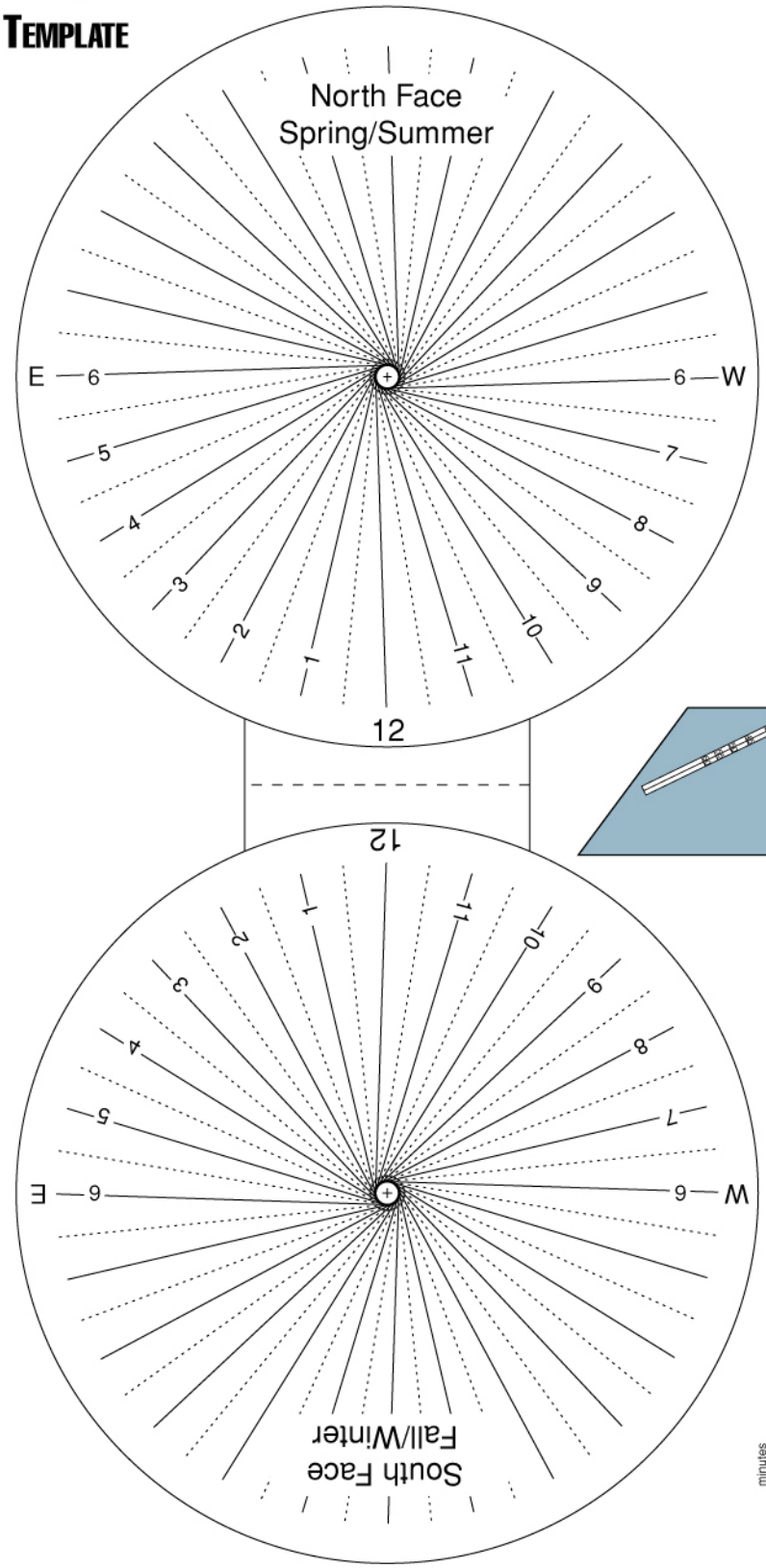
1. If the sundial time did not match clock time, explain why.
2. Why does this sundial have front and back dial faces?

Answers

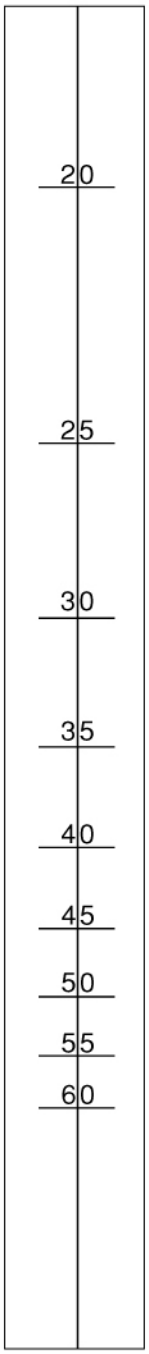
1. For each degree east or west of the center of your time zone (your longitude difference from the center of the time zone), there is a correction of four minutes. Also, the Sun's location in the sky changes with the seasons, and a correction of up to about 15 minutes for the "equation of time" must be made. Read the correction from the graph on the next page. Daylight Saving Time changes results by one hour.

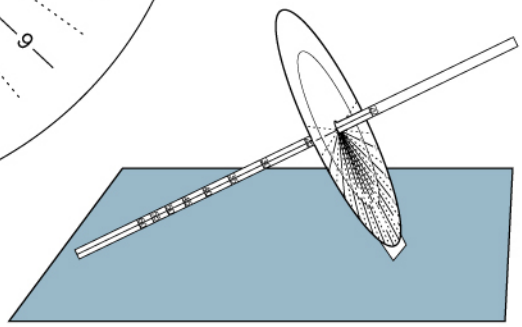
2. The shadow of the straw is cast on the north face from March 21 to September 21, and the south face from September 21 to March 21. The plane of the template is aligned with the celestial equator. The Sun is north of the celestial equator during the first period (spring and summer) and south of the celestial equator during the second (fall and winter).

Dial Face Template

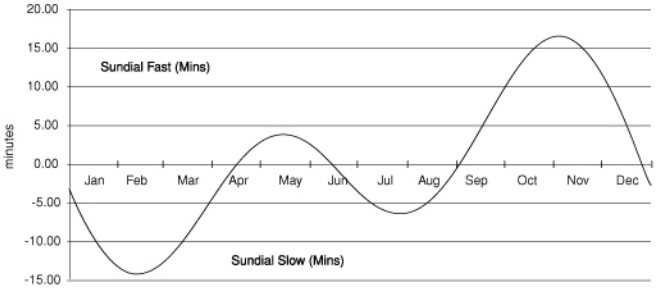


Latitude Strip





Finished Sundial



Correction for the "Equation of Time"

Great Possessions- An Awakening

Grade Level:
Grades K-12

Subjects:
Science

Materials:
- Large clock with movable hands or digital times on cards
- Bird Name Cards with mnemonic information and time
- Binoculars (optional)
- Bird identification guide (optional)
- *A Sand County Almanac* by Aldo Leopold (can be found on Google books or click here)

Objectives:
This activity can be used as a 10-minute workshop "energizer" to change pace and revitalize the group when energy levels drop- or it can become a lively way to introduce students to a study of birds.

About the Activity
In his essay, Great Possessions, Aldo Leopold describes the succession of bird songs he hears at the Shack on a summer morning in Wisconsin. Participants will use mnemonic sounds to imitate bird songs as they "recreate" the dawn chorus described by Aldo Leopold.

Setting the Stage
Leopold arose early to enjoy his morning coffee and make notes of the "tenants" on his farm. He recorded the time and sequence of the songs as each species of bird began proclaiming its territory.

Preparation
The following is a list of birds in the order that Leopold recorded, the initial time of singing and the mnemonic sound that can be used to mimic the birdcall.

Record the information for each bird species on a separate index card (Time, name, call). Prepare multiples so that there are enough for each participant to receive a card.

Place pictures and identification information on the backs of cards and laminate for repeated use.

TIME	BIRD	MNEMONIC SOUND
3:35 am	Field Sparrow	Tew…tew….tew. Tew, tew, tew, tew
3:40 am	American Robin	Cheerup, cheerily, cheerily
3:45 am	Baltimore Oriole	Pidoo tewdi tewdi yewdi tew tidew
3:50 am	Indigo Bunting	Sweet sweet chew chew chew
4:00 am	House Wren	Churff chrff chrff chrff
4:05 am	Rose-breasted Grosbeak Brown Thrasher Yellow Warbler	Chink Chink Chink What's Up What's Up (x2) Sweet, sweet, sweet, I'm so sweet
4:10 am	Eastern Bluebird White-eyed Vireo Red-eyed Vireo	Cheer, cheerful charmer Chick-per-a-weeo-chick Look-up, over-here, see-me, up-here
4:15 am	Rufous-sided Towee Northern Cardinal	Drink you Teee, Drink your teee What-cheer! What-cheer! What-cheer!

Prepare one index "Time Card" for each of the indicated times, or obtain a clock with movable hands.

Procedure

- Introduce the July essay, Great Possessions.
- Lead a general discussion about bird song. Why do birds sing? When are birds most actively singing?
  Birds sing to establish territories and to call mates. Birds most actively sing in the morning, but some birds will sing throughout the day.
- Randomly distribute bird cards, one to each participant and ask them to find others in the group with the same bird.
- Ask them to read the bird name and practice simulating the birdcall using the mnemonic information printed on the card. (Mnemonics are words or phrases that help us remember. In this case they help use remember the rhythm of a birdcall. Mnemonics are different from phonetics, which help us pronounce a word properly.)
- Return to order and be seated.
- Now, using your clock or digital time cards, indicate that the time is 3:30 am. The field sparrows should arise and begin singing. (To avoid that initial embarrassment it's best to have at least two sparrows sing together.)
- As you indicate the passage of time, additional birds join in.
- All birds sing constantly until the full dawn chorus is achieved.

Results

In Leopold's words- a "bedlam" of sound- followed by laughter, smiles and increased awareness of bird song. Who says learning can't be fun?

Conclusions

Many students- and adults- have never experienced the dawn chorus. One of the goals of the Leopold Education Project is to foster connections with the natural world. This activity may raise awareness of the songs that so often fall on deaf ears as we go about our busy lives.

Going a Step Further

Outdoor Opportunities:

- Leopold and his dog, Gus, made observations using many senses. Armed with sharp senses, hunt for the living things that are tenants on the schoolyard.
- Establish a bird feeding station to observe and record data.
- Plan a field trip to a local park, zoo or aviary to observe birds.

Evaluation

Keep nature journals. Use a bulletin board for data collection. Do observations increase over time and become more detailed? Are students more conscious of their environment and the other creatures that share it? Do they ask more questions about what they observe?

**Adapted from Seliesa Pembleton, Minnesota State Coordinator of the Leopold Education Project*

Learning on The Edge News

Announcing!: We are working on a new website: NuecesDeltaPreserve.org. This will be the location for field trip information and other Delta news. Please check back often for updates and new additons.

A new education office will soon be located at the Preserve. The education staff currently commutes between our main office and the teaching spaces at the Preserve. We are lucky to be receiving a temporary building which will allow us to spend more time devoted to education.

LOTE News: We recently had 19 teachers join us for the Weathering & Water Workshop on October 22. The teachers had a great time doing experiments, playing games, getting new materials, examining evidence of weathering and measuring water quality parameters. We hope to see you at an upcoming workshop. In January we will be offering an Estuaries in the Classroom (Jan. 21, 2011) and in March we will be focusing on evolution in a two day workshop (March 10-11, 2011). Registration forms can be found on our website www.cbbep.org/education. Sign up today!

Winter Journaling Topics

1. Make up an alien life form. Sketch it, decide where it lives (in an ocean, on Mars' ice cap, on Saturn's rings), what it eats, what eats it, special adaptations it has (suction cup feet to hang onto the ring). Name your alien descriptively. Older students can use a Latin prefix/suffix book to make a descriptive scientific name for their organism.
2. Have your students pay close attention on the next stormy day. Have them write a journal entry about what it might be like in Jupiter's red spot (a large storm) using things they noticed from a storm here on Earth.
3. Describe where Buzz Lightyear might take you during a space tour. Include sounds, smells and sights.
4. Write about your family as if you just arrived from space. What do they eat for breakfast? Does anyone do silly things during the day (sing in the shower, dance while getting dressed)?
5. Sketch the moon every night for a month. Follow with a class discussion on how rotation of the moon and sun effect what we see.
6. Take a walk outside during class once a week over a season (fall or winter) to the same location. Have students record changes as the season passes (leaves changing & falling off, temperature changes, fewer bugs, different animals, types of clouds).
7. Look at Jupiter each night for a week through binoculars. Map the movement of Jupiter's moons as they orbit. How do you know if they are rotating or not?
8. Go star-bathing! Lay out on a towel in your yard at night. Look at all the stars. Draw a map of all the stars you can see. Play connect-the-dots to see if you can make pictures with stars. Can you find any famous constellations like the Big Dipper? Did you make something else entirely?
9. Collect a bag of leaves of different shapes and sizes. Tell the students to close their eyes and give them each a leaf. Lead them through feeling all the parts of the leaf (lobes, veins, stem). Collect the leaves without the students ever seeing the leaf. Have them draw their leaf just from what they felt.
10. Word Association- Winter. Give students a minute or two so they can list as many words that come to mind when they hear the word winter.

Meet Sara! Sara Bounds has joined the CBBEP staff as an education assistant. She has a B.S. in Marine Biology and taught for a year at an aquarium in Savannah, GA. She is really excited to be working at the Delta with students and teachers.

For more information or classroom presentations contact:
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