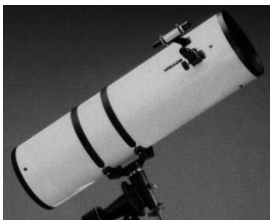
The OBSERVER

The Newsletter of the Twin City Amateur Astronomers, Inc.

April 2003 Volume 28, Number 4



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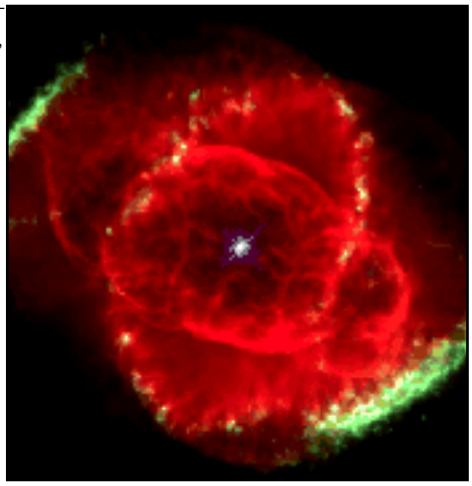
TCAA BOD Meeting
—Carl Wenning

THE NEWLY ELECTED members assembled beginning at 6:02 p.m. to make appointments and plans for 2003-2004. In attendance were Dan Meyer, Neale Lemkuhl, Jim Swindler, Duane Yockey, Carl Wenning, and immediate past president Sandy McNamara. The following appointments were made:



President:
Daniel Meyer
V. President:
Neale Lemkuhl
Secretary:
Carl Wenning
Treasurer:
Duane Yockey

Third, fourth, and fifth directors respectively are Jim Swindler, Duane Yockey, and Carl Wenning. Newsletter editors will continue to be Mike Rogers and Jean Memken; observatory manager will be Dan Meyer; property manager will be Sandy McNamara; historian will be Jean Memken; ISU Planetarium liaison will be Carl Wenning; education coordinator will be Dan Miller; registered agent will be Sharon MacDonald; and Astronomical League correspondent will be Duane Yockey. It was decided that the librarian position would be subsumed under the property manager position as the TCAA

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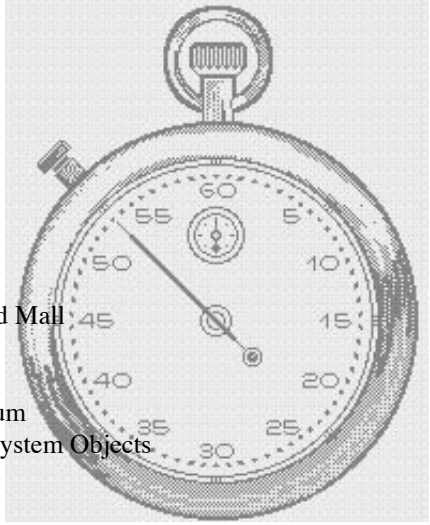
Astronomy Day Cometh!
See p. 3 for Details

TCAA Calendar



Saturday, 3 May, 2003, Image Air
Challenger Center Fundraiser

Saturday, 3 May, 2003, Dusk-???, SGO
MOOS

Saturday, 10 May, 2003, Dusk, SGO
Public Observing Session

Saturday, 10 May, 2003, 10 AM - 4 PM, Eastland Mall
Astronomy Day Exhibit (See p. 3 for details)

Monday, 12 May, 2003, 7:00 PM, ISU Planetarium
TCAA Meeting. Topic: Mars and Other Solar System Objects

The Observer
The Newsletter of the TCAA, Inc.

The Observer is a monthly publication of the Twin City Amateur Astronomers, Inc., a non-profit organization of amateur astronomers interested in studying astronomy and sharing their hobby with the public.

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Articles, ads, etc., are due by the last weekend of each month. Items may be e-mailed to: mprogers@mac.com, or jmemken@ilstu.edu

Dues

$40.00 per household, per year
$25.00 for members over 60
$25.00 for newsletter only
$ 2.50 for a single newsletter copy

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library will be moved to the Sugar Grove Observatory soon. It was decided by the Board that to keep meetings to the legally required minimum of 6 per year, that electronic meetings would be acceptable.

Duane provided a summary of the Treasure's report and gave a preliminary March 31, 2003, total balance of $1,476.04. He noted that $2,975 has been raised thus far from 13 individuals for the purchase of the observatory telescope from among its approximately 80 members. Duane noted that the largest expenses for the fiscal year that the association is well positioned to pay for the major operating expenses: insurance, newsletter, and Astronomical League dues. Sandy noted that she shortly will be sending the Board a request for material expenditures to better outfit the observatory.

The following individuals agreed to host the public observing sessions, with the remaining monthly sessions to be scheduled later: April 5, Dan Meyer and Jim Swindler; May 3, Sandy McNamara and Duane Yockey; May 10 (Astronomy Day), Dan Meyer and Sandy McNamara. It was agreed that the public observing sessions should be more structured. The format will now include the following: a slide show dealing with constellations and possibly focusing on one or two key objects to be observed that evening; a sky lecture under the stars using a bright flashlight pointer; telescope observing with specific objects on selected telescopes. Sandy will provide "cheat sheets" for objects to be observed at the telescopes containing pertinent and interesting information. Dan will arrange for a slide projector to be housed at the SGO; Sandy will provide a light bulb; Carl will try to arrange for slides to be put on loan from the ISU Planetarium.

Sandy noted that Dark Sky Week has an April 5 observing session scheduled, and that the May 10 public observing session coincides with Astronomy Day. Neale will contact Eastland Mall management to see if the TCAA may host its annual display. An effort will be made to include Joe DeHoff's mirror grinding, a continuous presentation dealing with the Challenger Learning Center, and materials from the ISU Planetarium.

Regular meetings held at the ISU Planetarium will now include 15-minute sky lectures if possible, after the business meeting but before the break. The following agenda of meeting topics and speakers was developed during and subsequent to the meeting:

April 14, International Dark Sky Association, Rich Dennis (PAS)
May 12, Mars and other Solar System Objects, Dr. Daniel Holland, NASA Solar System Ambassador (ISU)
June 7, Challenger Learning Center of Central Illinois, Rebecca Wenning, CLC Liaison
July 14, Cosmos, Tom Willmitch, ISU Planetarium
August 11, Dinner and a Movie (TBA)
September 8, MayaQuest: A Virtual Tour of Mesoamerica, Rebecca Wenning
October 13, Travel Logue (TBA)
November 10, Poetry Under the Stars (with space music), Rebecca Wenning
December 8, Greek Astronomy, Carl Wenning
January 13, 2004, speaker and topic TBA
February 2004, Annual Banquet, speaker and topic TBA

Educational outreach includes the following scheduled events: April 4, Dan Meyer and Sandy McNamara will host a Danvers Elementary school group at SGO; April 25, Sandy and others will present a "Spring Fling" presentation dealing with light to Unit 5's Gifted Program (Carl will provide light demonstrations; the topic will be how astronomers extract information from star light); July 2, Mike Rogers will give his Kepler presentation at

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Bloomington Public Library.

It was pointed out by Sandy that Carl and Neale now would become key holders of the SGO now that they are Board members. They need to schedule an orientation session with one of the other key holders. Dan Meyer will look into providing additional promotion for the TCAA by way of brochures; Duane pointed out that free space on the back of the current brochure could be filled with our meeting schedule. Duane will investigate a new zoning ordinance to be put before the Normal Town Council that has some language related to light pollution. Sandy will confirm with Rich Dennis our desire to get together for a TCAA, PAS, SAS and possibly DAAC star party on or about August 24. Carl will get DAAC contact information to Sandy to pass on to Rich. Dan Meyer noted that the TCAA web site needs to be updated with current information; Carl will forward minutes to Mike Rogers so that this can be done. The meeting was adjourned at 7:58 p.m.

Carl J. Wenning, Secretary

Astronomy Day

What: Astronomy Day Celebrations
When: 10 May, 2003, 10:00 AM - 4:00 PM
Where: Eastland Mall*
Why: Because!

* Maybe: traditionally, we have gathered at the Eastland Mall, and hosted a variety of exhibits and activities. As of press time, the editors had not been told whether or not Eastland Mall had consented to let us exhibit this year. We were unable to get in touch with the lead organizer, who we suspect has wandered over to Iowa in honor of Easter weekend.

Remember...

ISU/TCAA Skyline is waiting for you!

438-5007

The Huygens Probe
— JPL

IF YOU WERE TO parachute onto Titan you would disappear into the orange cloudy haze that makes up the atmosphere of this mysterious moon. Would you land on a solid surface, or fall into a splash of gases? Ironically, even if you could precisely maneuver your landing, there is no way to know where you'd land. There aren't maps available of Titan, and very little is known about Saturn's biggest moon. Titan is also the only known moon in the solar system with a dense atmosphere. The only other known moon with its own atmosphere is Neptune's moon Triton .

This artist's conception shows Titan's surface with Saturn appearing dimly in the background through Titan's thick atmosphere of mostly nitrogen and methane. The Cassini spacecraft flies overhead with its high-gain antenna pointed at the Huygens probe as it nears the surface.

Images taken by Voyager I when it flew past Titan in 1980 only show a hazy orange atmosphere with a bluish tinge on its horizon. While the camera couldn't penetrate the thick haze, Voyager's instruments managed to get information on the moon's atmosphere. Data revealed that Titan has an atmosphere of nitrogen thick with carbon compounds. Although Titan is unlike any other moon or planet in our solar system, its atmosphere in many ways resembles the chemical composition of Earth as it was before life began.

The Huygens probe was carefully designed by the European Space Agency (ESA) to take on the daunting task of exploring this fascinating moon and relaying important data back to Earth.

The probe will provide an in-depth study of the clouds, atmosphere and surface of Titan. It is designed to enter and brake in Titan's atmosphere and parachute a fully instrumented robotic laboratory down to Titan's surface. Depending on its condition after impact -- as well as the answer as to whether it will land on hard surface or liquid gas -- the probe might be able to continue transmitting data for up to 30 minutes after it lands.

At the time of its launch in 1997, the Huygens probe was ESA's most ambitious mission, plunging into a planetary atmosphere farther away from Earth than any other deep space probe has gone before.

While traveling onboard the Cassini orbiter throughout the seven-year journey to Saturn, Huygens will undergo a series of special in-flight tests. These tests are targeted toward testing the crucial radio link between the probe and the orbiter. It is imperative that this radio link is working properly, as it is the critical communication device relaying important data about Titan back to the orbiter, and subsequently, back to Earth. The Huygens probe will also undergo health checks every six months to make sure all of its other instruments are in good condition and working properly.

The 318-kilogram (701-pound) Huygens probe will separate from the Cassini orbiter in December of 2004, and will begin a 22-day coast phase toward Titan. Remaining on the Cassini orbiter will be the probe support equipment (PSE), which includes the electronics necessary to track the probe and to recover the data gathered during its descent. The 30-kilogram (66-pound) support equipment will also process and deliver the data to the orbiter. The data will be then transmitted, or "downlinked" to the ground via the Deep Space Network .

Then, in January of 2005, at just 45 minutes before the spacecraft reaches the atmosphere of Titan, timers will wake up the Huygens probe. Its programming must then be smart enough to work automatically, as the distance from Earth is too great to provide signals and commands. During the probe's rapid descent onto Titan's surface, the robotic controls will then fire a pilot parachute to pull out the main parachute, and within a minute the

Purpose:
To descend through Titan's atmosphere to retrieve valuable data

Name:
From Christiaan Huygens: Dutch explorer who discovered Titan in 1655

Mass:
343 kilograms (701 pounds) + 30 kilograms (66 pounds) in Cassini Orbiter

Duration of Parachute Descent:
120-150 minutes

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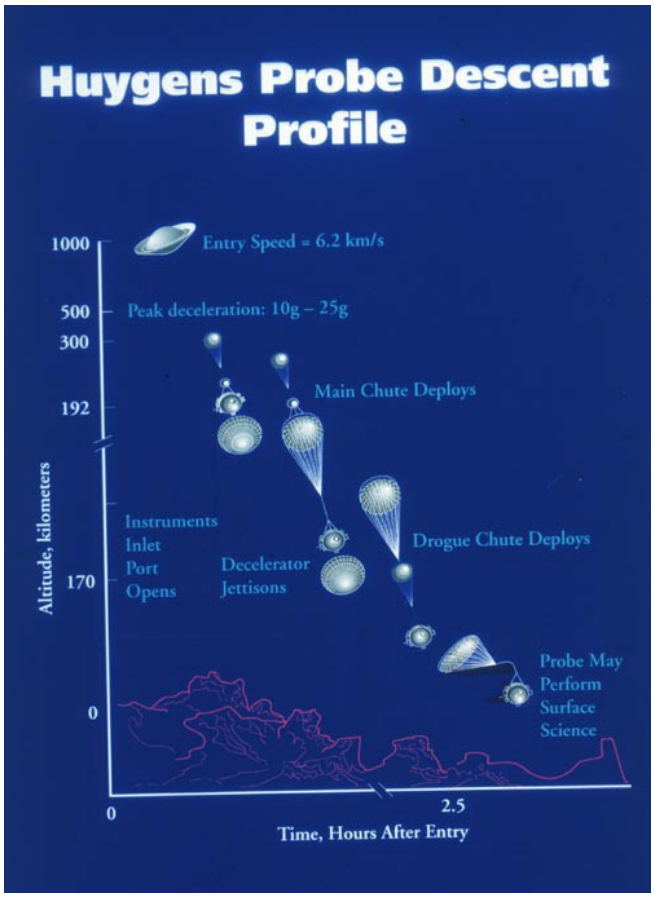
probe will slow down from 20,000 km per hour (12,427 miles per hour) to just 300 km per hour (186.4 miles per hour).

In order to survive the harsh conditions at Titan, the Huygens probe needed more advanced technologies than probes on other missions. Built like a shellfish, the probe has a hard surface and a rather delicate interior. The shell will act as a braking device as well as an advanced thermal shield, designed to protect the probe by the extreme heat generated by the probe's rush into Titan's atmosphere at about 6 kilometers per second (13,400 miles per hour). Temperatures upon descent will soar up to 1,700 degrees Celsius (3,000 degrees Fahrenheit), and could be reached in less than a minute. However, to ensure instruments' functionality, the tile thickness on the front shield of the probe is calculated to ensure that the structure will not exceed 150 degrees Celsius (302 Fahrenheit), which is below the melting temperature of lead. Therefore, tiles similar to those used to protect the Space Shuttle are used to cover the heat shield. They are made of a material known as AQ60, a low density "mat" of fibers.

The rear side of the probe will reach much lower temperatures during the probe's descent - thus, a spray-on layer of a silicon-based foam called "Prosial" was used. The total mass of the probe's thermal protection system is more than 100 kilograms (220 pounds) - about one-third of the entire probe's mass.



Huygens Decent Profile

In addition, the parachute system onboard Huygens is designed to work in conjunction with the thermal protection system to ensure the probe will survive entry into Titan's atmosphere. The main parachute is nearly 9 meters (28 feet) in diameter and will deploy at an altitude of 170 kilometers (105 miles) above the surface. Thirty seconds after parachute deployment, the probe's heat shield system will also be deployed, significantly lightening the load.

The bulk of the data will be captured during the probe's descent into Titan's murky atmosphere. The descent is expected to last between two and two and half hours. The data acquired by the six instruments on board of the probe will be transmitted to the Cassini orbiter, and then subsequently back to Earth.

Titan Facts

Distance from Saturn:
1,226,000 kilometers

Responsible Agencies:
ESA: The Huygens Probe
NASA: The Cassini Orbiter

Period of Orbit (A Day on Titan): 15.95 Days

Mean Distance from the Sun:
120-150 minutes

Diameter of Titan:
5150 kilometers

Science Payload:
6 instruments, 48 kg

Diameter including Upper Atmosphere 5550 km

Diameter (shield): 2.7 meters

Mass: 1/45 of Earth's mass

Deployment toward Titan's Atmosphere: December, 2004

Arrival at Titan: January, 2005

Density Compared to Water:
1.881

Surface Temperature:
-180 degrees Celsius, (+94 Kelvin)

Operations on Surface of Titan:
3-30 minutes

Atmospheric Pressure at Surface:
1.5 times Earth's

Athena Mars Exploration Rovers
— NASA

Here are a series of lesson plans that you can share with area teachers, do with your own children if you happen to have any, or bring to Astronomy Day to help liven up the children's area!

The Incredible Edible Solar System

This is an activity designed by Jean Settle of St. Louis, Missouri. Ms. Settle is a faculty member of the Challenger Center for Space Science Education. The activity is designed for primary grades, particularly K-3, for development of Spatial Intelligence. The Solar System that is constructed gives very general information about the order in which the planets occur, and a few clues about their basic color and size characteristics. The constructed Solar System is not to scale, neither in terms of distance from the Sun nor diameter of each planet.

All you need to construct the Edible Solar System is listed below. The Solar System is constructed by using cake frosting to glue candy of different colors and sizes onto a paper plate. The orbits of the 9 planets are drawn on the plate, then the planets, represented by candies of different colors and sizes, are affixed to the plate using the frosting.

What You Do...
1. Appropriate candies, popsicle stick, and waxed paper square are placed in a ziploc bag - one per student or group.

2. Instructor (or student, depending upon skill level) draws orbits for the 9 planets on the paper plates. A compass can be used to do this. The orbits do not have to be scaled unless the instructor wants to get this point across.

3. Give each student a plate, a bag containing the candy, popsicle stick, and waxed paper.

4. Designate a student to distribute a teaspoon of cake frosting to each participant. The frosting is placed on the waxed paper.

5. Using the popsicle stick, put some frosting "glue" on one side of the butterscotch candy, representing the Sun. Place this candy at the center of the plate.

6. Using the same method, have students affix each of the nine planets to its appropriate orbit. We suggest that Pluto be placed after Neptune, because while Pluto is presently closer to the Sun than Neptune (until 2000), Pluto's average orbit radius is greater than that of Neptune. Instruct students at each step, and tell them a little bit about each planet as they glue it into place. For example, note that Mars is red, Jupiter is the biggest planet, Neptune is blue, we are using yellow for Pluto, but no one knows for sure what color it is, etc.

7. Note that Jupiter is the planet with a big Red Spot. Show the students a picture of Jupiter with the spot Glue the red-hot candy on top of Jupiter (mint) to represent the Red Spot.

8. Note that Saturn is known for its brilliant rings. Have students pass the tube of orange icing around the room; each student can "paint" Saturn's rings onto the candy (yellow lemon-drop) using the orange tube of icing. You might also want to point out that Jupiter, Uranus, and Neptune also have rings, but it is up to you whether to have students use frosting to represent these. Show them pictures of the ringed planets.

9. Now that the Incredible Edible Solar System is complete, the student should take it home. At dinnertime, the student should show it to the family, explain what each candy represents. The family then may EAT the Solar System for dessert!

What you need:
Paper plates
Compass
Different sized hard candies to represent the planets (butterscotch for the sun; red hots, mints, etc.)
Colored, large crystal decorating sugar (for the asteroid belt)
Frosting
Popsicle sticks
Waxed paper

Earth, Moon & Mars Balloons

For a class of 27

How big and how far is the Moon relative to Earth? Typical earth science and astronomy texts typically depict a moon that is much closer and much larger than the real thing. The example below is typical of what is found in textbooks:

The balloon activity described here will allow students the opportunity to construct a scale model of the Earth-Moon system, both in terms of planetary size and distance. In addition, students make a scale model of Mars, and discover how far one might have to travel to visit the most Earth-like planet in our Solar System. This is a good introduction to any study involving Mars or Mars colonization. It is also a good icebreaker at the beginning of a semester, to get students to interact with each other.

What You Do...
1. Obtain balloons. The best are balloons with 2-1/2 inch diameter when deflated, but any balloons will work fine. An easy way to do this activity is to purchase balloons that are colored red, white, and blue, for Mars, Moon, and Earth (using green for Earth and yellow for the Moon are also fine).

2. Discuss the question of size of the

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Earth relative to the Moon. Determine what misconceptions the students may have.

3. Distribute balloons. It is best to provide one third of the class with "Earth" (i.e. blue), one third with "Moon" (i.e., white), and one third with "Mars" (i.e., red).

4. Distribute Planetary Data handout, one per student.

5. Tell students that the Earth balloon will have a diameter of 20 cm. Have them figure out the scale (divide the Earth's actual diameter by 20 cm. Earth is about 63,800,000 times larger than 20cm). Ask students with Earth balloons to inflate their model approximately 20 cm (obviously the balloon is not a perfect sphere).

6. Ask students to look at the handout and calculate the size that the Moon and Mars should be, at the same scale as the Earth model. (Answers: the Moon should be about 5 cm, Mars about 11 cm).

7. Have students inflate the Mars and Moon balloons.

8. Ask students, at this scale, how far apart are the Earth and Moon? The diagrams seen in common textbooks might lead many of them to suggest that the Moon balloon should be held less than a meter from the Earth balloon.

9. Have students calculate the distance from Earth to the Moon at the same scale as the balloon models. The distance is about 6 meters. Have students holding Earth models stand at one side of the room, and a partner holding a Moon model about 6 meters away.

10. Point out to students that they now have a scale model of the Earth-Moon system. Earth and its Moon are considered a double planet. The distance between the two is the distance traversed by the Apollo astronauts who went to the Moon in the 1960s and 70s. (Have students recall the film Apollo 13).

11. Compare the size of the Mars model with the Earth, Moon, and distance between Earth and Moon.

12. Ask students how far away they think Mars will be at this scale. Have students attempt to demonstrate it in the classroom.

13. Have students calculate the distance to Mars at this scale. The answer is about 12,000 cm, which in more familiar terms is 3/4 mile! Have students identify a local landmark that is about 3/4 mile away.

14. Discuss the relative distance between Earth and Mars in the context of a human trip. How long did it take for Apollo astronauts to get to the Moon? (3 days) How long would it take for astronauts using similar technology to get to Mars? Mars Pathfinder, which launched in December 1996, arrived at Mars on July 4, 1997 (7 months). Mars Global Surveyor, which launched in November 1996, arrived at Mars in September 1997 (11 months).

Answers:
Scale Distances (km) divided by 638 = (cm)
Earth Moon 3.84 x 105 600 cm = 20 ft
Earth Mars 7.80 x 107 1.2 x105 cm = 3/4 mi

What you need:
1 bag blue balloons (at least 9 per bag)
1 bag white balloons
1 bag red balloons
27 copies of Planetary Data handout
Rulers/measuring devices in both inches and centimeters

Extensions:

Ask students to make models of the martian moons, Phobos and Deimos, at the same scale as the balloon models. They can calculate their scale diameters from the chart below. It turns out that they are about the same size of a small grain of sand!

Have students convert all metric measurements into the English system.

Body	**Diameter(km)÷638=~Scale (cm)**
Earth	12,756 ~ 20 cm
Moon	3,476 ~ 5 cm
Mars	6,794 ~ 11 cm
Phobos	22 ~ 0.03 cm
Deimos	12 ~ 0.02 cm

Areology: The Study of Mars

This activity is adapted from Mission to Mars materials from the Pacific Science Center in Seattle, WA, and Adler Planetarium. Submitted to Live from Mars by April Whitt and Amy Singel, Adler Planetarium. Teacher's Edition created by ASU Mars K-12 Education Outreach Program.

Objectives:
1. Examine a simulated Martian surface core sample.

2. Learn how an unknown core sample can be identified by matching it with a known sample.

3. Discover how surface core samples can tell us about the history and make-up of Mars.

4. Consume the core sample at the end of the exercise!

What You Do...
1. Distribute one candy bar to each student (use candy at room temperature, or a bit warmer.) Instruct students not to show their brand to anyone else. Ask each student to unwrap their bar and record observations about its surface: color, texture, composition, etc.

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2. Have students take a "core sample" by carefully and steadily drilling a straw into their candy bar. Then ask them to record the number and thickness of layers, as well as color and texture of layers. What are the layers made of? Any repeated layers?

3. Have the students use knives to cut candy in two, so the layers can be viewed more easily in a cross-section. Discuss which layers were made first. How were the layers made?

4. Have the students make a second core sample using the other straw. Two students then exchange core samples. Can they identify a new sample by comparing it with one that is known?

5. Finally, allow the students to consume the samples.

What You Need...
For each student:

- "fun or bite size" candy bar (Snickers, Milky Way, Mounds, Reeses Peanut Butter Cup, etc)
- two 3" long section of clear plastic soda straw
- paper plate
- plastic knife
- graph paper or small ruler
- wet wipes (optional for hand clean-up prior to activity, since edible material is involved)

Student handout:

Directions: You have just received a Martian surface sample. It is your job to observe and determine all the scientific information you can from this sample. You will be taking a core sample from this Martian surface sample and answering the following questions. You will then receive a second core sample to compare to the first. List anything that is similar or different between the two samples.

1) Describe the color of your Mars sample:

2) Describe the surface features of your Mars sample:
3) Draw a picture of any surface features you see on your Mars sample:

4) What is your hypothesis (science guess) about the cause of any texture you see on your Mars sample?

5) How many layers does your Martian core sample contain?

6) Draw a picture showing the layers of your Martian core sample.

7) Which layers were made first, and why?

8) Draw a picture of the second core sample showing any layers and surface features.

9) Compare the two core samples and list any similarities or differences from your first Martian core sample.

10) Would a core sample from Mars be important to the study of Mars? Why?

11) Where would be the best place to study a Martian core sample...on Earth or on Mars? Why?

12) What would account for the samples being different, if both come from Mars?

Edible Mars Spacecraft

Adapted from Jean Settle's "Edible Rockets". In 1996 two spacecraft, Mars Global Surveyor and Mars Pathfinder, were launched to Mars. These spacecraft are kicking off a decade long exploration of the Red Planet. Students can become familiar with the missions and the type of equipment on board each spacecraft through this activity.

Objectives:
1. Students will be able to identify two Mars spacecraft:
a) Mars Global Surveyor
b) Mars Pathfinder & the rover, Sojourner
2. Allow students to design their spacecraft independently. This activity is designed to facilitate creative thinking. There are no right or wrong answers.

3. Students will use creative thinking and problem solving skills to design either one or both of the above spacecraft using a supply of different foods.

What You Do…
To begin the lesson, introduce students to the different Mars spacecraft. After finishing discussion, pass out the materials. The students need to decide which spacecraft they will construct with the materials provided. To minimize messiness students should use the waxed paper surface. Frosting can be distributed by placing a spoonful on each students' sheet of wax paper. Frosting can be used to "glue" pieces together.

Encourage students to use given materials to design all spacecraft and the rover.

Allow students to design their spacecraft independently. This activity is designed to facilitate creative thinking. There are no right or wrong answers.

To reduce cost of supplies try the following:
- Assign each student to bring a different food item
- Ask your PTO or Home School Association to provide funding for the activity.
- Use cooperative learning and have one group of 3-4 students design all spacecraft with one set of materials.

Assessment:
Students display and discuss their models. After completion, have students discuss strategies they used to design their space-

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craft. This will allow them to share their problem-solving strategies. Ask students how this activity helped them learn more about the missions to Mars.

What You Need...
Per Student Team:

3 graham crackers
1 roll of Smarties
6 creme wafer cookies
3 large marshmallows
1 snack-size Kit Kat
1 straw
1 Peppermint Patty
1 plastic knife
6 Rolos
7 toothpicks
8 gumdrops
1 sheet of 18”x12” waxed paper

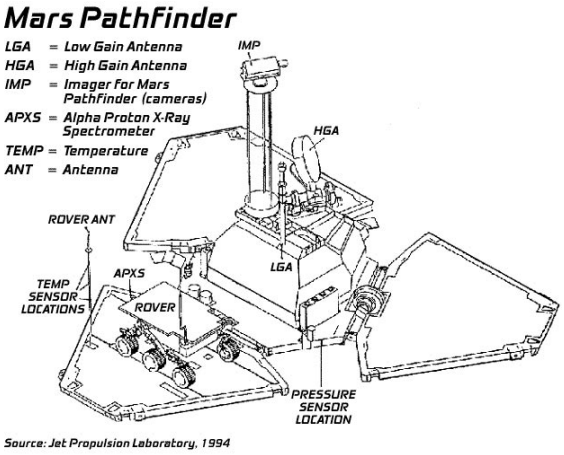
For a class of 25:

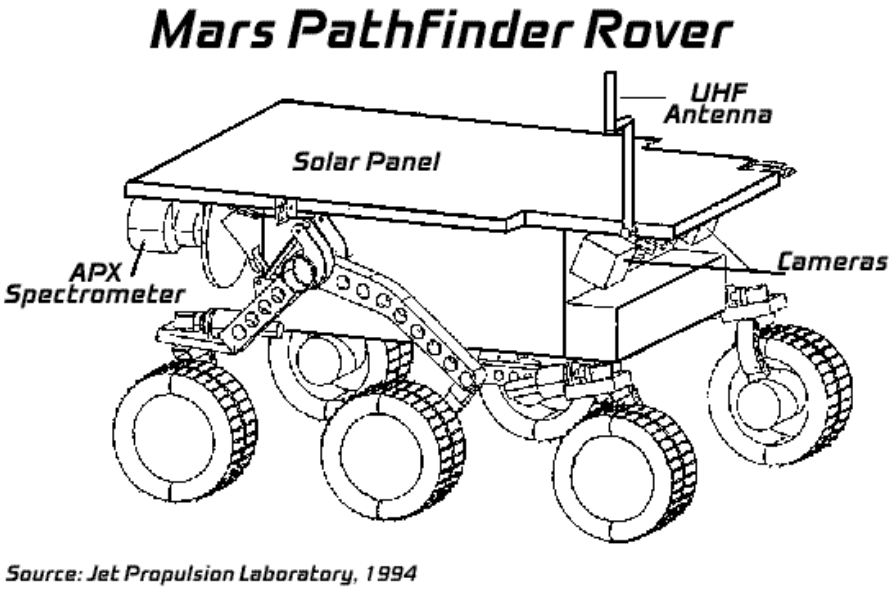
scissors
4 containers of frosting
paper towels
25 copies of Mars Global Surveyor, Mars Pathfinder, and Sojourner handouts

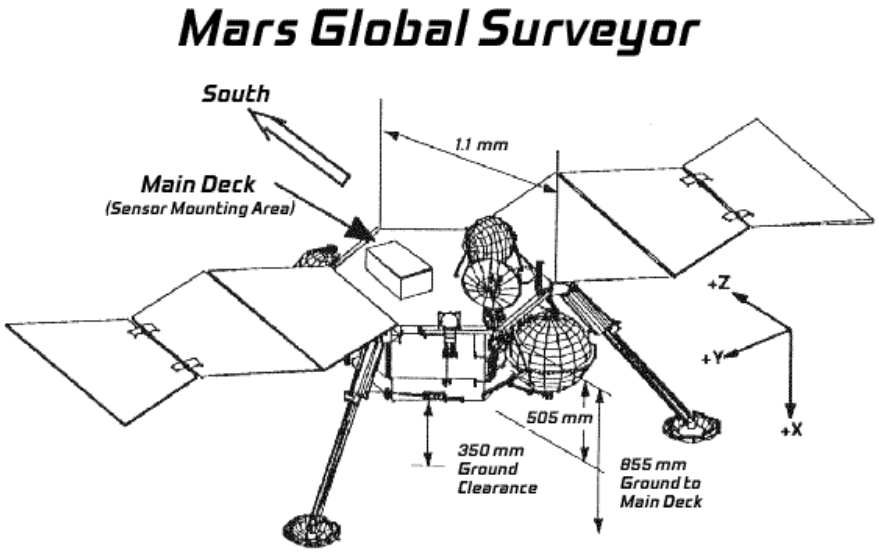
- Ask your PTO or Home School Association to provide funding for the activity.
- Use cooperative learning and have one group of 3-4 students design all spacecraft with one set of materials.

Assessment:

Students display and discuss their models. After completion, have students discuss strategies they used to design their spacecraft. This will allow them to share their problem-solving strategies. Ask students how this activity helped them learn more about the missions to Mars.







TCAA Treasurer's Report — February, 2003

— L. Duane Yockey, Treasurer

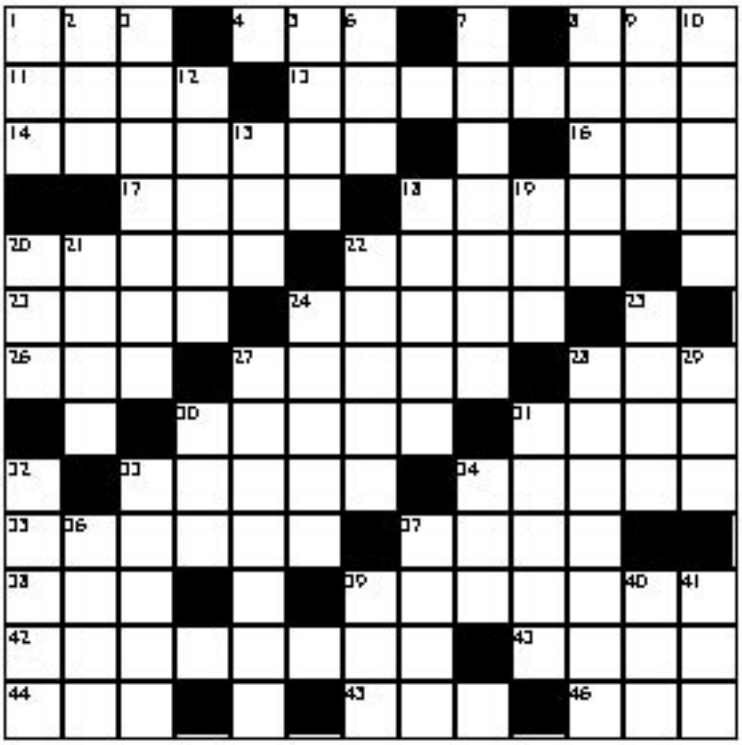
OPERATING FUND BALANCE – January 31, 2003 -	$ 738.91
Income	
Wayne and Beth Kreps (dues renewal) -	$ 25.00
Ed & Karen Duran (dues) -	$ 25.00
Expenses	
None	$ 0.00
OPERATING FUND BALANCE – February 28, 2003 -	$ 788.91
OBSERVATORY FUND BALANCE – January 31, 2003 -	$ 688.23
Income	
None	$ 0.00
Expenses	
None	$ 0.00
OBSERVATORY FUND BALANCE – February 28, 2003 -	$ 688.23
TOTAL TCAA FUNDS – Februry 28, 2003 -	$ 1,477.14

Sugar Grove Observatory Official Keyholders (Paid $10 deposit/$5 renewal)

Jim Swindler (April 2001)
Duane Yockey (April 2001, renewed Jan. 2003)
Sandy McNamara (June 2001, renewed Jan. 2003)
Dan Miller (August 2001)
Michael Rogers (August 2001)
Dan Meyer (February 2002)
William Carney (March 2002, renewed Jan. 2003)
Vic Connor (August 2002)

The Observer Crossword

—Observer Staff

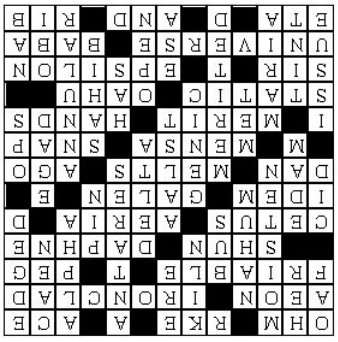


ACROSS

1 The unit of electrical resistance
4 Edmund Scientific eyepieces
8 Very skilled person
11 Great age
13 Unbreakable
14 Crumbly
16 Fastener
17 Keep away from
18 Nymph of Greek myth
20 Constellation : The whale
22 Operatic feature/bright region on Mars
23 As previously given
24 Physician
26 Son of Jacob
27 Thaws
28 Gone by
30 Altar stone
31 Crack
33 Worth
34 Clock pointers
35 Lacking movement
37 Island of Hawaii
38 Title of a knight
39 5th Greek letter
42 The Cosmos
43 Small yeast cake
44 7th Greek letter
45 Besides
46 Curved bone

DOWN

1 Idiot
2 Pronoun
3 Make moist
5 Furnace
6 Before
7 Alternative name for Alpha Scorpii
8 These radiation particles are helium nuclei
9 City in NW France
10 Having an edge
12 Book of the Bible
15 Passenger vehicle
18 4th Greek letter
19 Slender metal fastener
20 Spanish hero
21 Yellow cheese coated with red wax
22 City in central Belgium
24 Arising from a gene
25 Mild oath
27 Deserved
28 A “near-miss” eclipse
29 Roman goddess of plenty
30 Encountered
31 Indian form of address
32 Point in question
33 Lunar ‘seas’
34 Possesses
36 Hue
37 A type of star cluster
39 Ariane’s developer (abbr)
40 Japanese sash
41 Arrest



The Welcome Mat

April showers bring... new members? Maybe not, but let's have a warm round of applause — preferably with sufficient intensity to drive away the clouds — for our 2 newest members!

Sarah & Patrick Rolfs
Bloomington, IL

The OBSERVER
The Newsletter of the Twin City Amateur Astronomers, Inc.

Michael Rogers & Jean Memken, Editors
2206 Case Drive
Bloomington, IL 61701

Dues Due? ☐

The Dues Blues

If you see a check in the box above, it means **your dues are due.** To retain membership -- and with a new observatory, why quit now??? -- please send $40 to our esteemed treasurer:

Duane Yockey
508 Normal Avenue
Normal, IL, 61761

As always, thank you for your support!!