Eclipse 2017: Outreach Event of the Decade
A NISENet Webinar

Andrew Fraknoi and Dennis Schatz
The All American Eclipse
Mars’ Moon Phobos Trying to Eclipse the Sun
States Where the 2017 Eclipse is Total:

- Oregon
- Idaho
- Wyoming
- Nebraska
- Kansas
- Missouri
- Illinois
- Kentucky
- Tennessee
- Georgia
- North Carolina
- South Carolina
Total solar eclipse over Oregon

A total solar eclipse will cross the United States from Oregon to South Carolina on **August 21, 2017**. This is the grandest spectacle in the sky and you should see this at least once in your life. To see day turn to night and the majesty of the Sun’s corona, travel to a location inside the path of the eclipse.

Learn more at [GreatAmericanEclipse.com](http://GreatAmericanEclipse.com)
Population Statistics

U.S. = 319 million
Canada = 35 million
Mexico = 119 million
TOTAL = 473 million
We’ll need lots of eclipse glasses...
Or other observing strategies
## Circumstances of the Aug. 21, 2017 Partial Eclipse for the Largest Cities in the U.S.

<table>
<thead>
<tr>
<th>City</th>
<th>Eclipse Starts</th>
<th>Max Eclipse</th>
<th>Eclipse Ends</th>
<th>Fraction of Sun’s Diameter Covered</th>
<th>Percent of Sun’s Area Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York City</td>
<td>1:23 pm</td>
<td>2:45 pm</td>
<td>4:01 pm</td>
<td>0.77</td>
<td>71%</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>9:06 am</td>
<td>10:21 am</td>
<td>11:45 am</td>
<td>0.69</td>
<td>62%</td>
</tr>
<tr>
<td>Chicago</td>
<td>11:54 am</td>
<td>1:20 pm</td>
<td>2:43 pm</td>
<td>0.89</td>
<td>87%</td>
</tr>
<tr>
<td>Houston</td>
<td>11:47 am</td>
<td>1:17 pm</td>
<td>2:46 pm</td>
<td>0.73</td>
<td>67%</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>1:21 pm</td>
<td>2:44 pm</td>
<td>4:01 pm</td>
<td>0.8</td>
<td>75%</td>
</tr>
<tr>
<td>Phoenix</td>
<td>9:14 am</td>
<td>10:34 am</td>
<td>12:00 n</td>
<td>0.7</td>
<td>63%</td>
</tr>
<tr>
<td>San Antonio</td>
<td>11:41 am</td>
<td>1:09 pm</td>
<td>2:38 pm</td>
<td>0.69</td>
<td>61%</td>
</tr>
<tr>
<td>San Diego</td>
<td>9:07 am</td>
<td>10:23 am</td>
<td>11:47 am</td>
<td>0.66</td>
<td>58%</td>
</tr>
<tr>
<td>Dallas/Ft Worth</td>
<td>11:40 am</td>
<td>1:10 pm</td>
<td>2:39 pm</td>
<td>0.8</td>
<td>75%</td>
</tr>
<tr>
<td>San Francisco</td>
<td>9:01 am</td>
<td>10:15 am</td>
<td>11:37 am</td>
<td>0.8</td>
<td>76%</td>
</tr>
<tr>
<td>Indianapolis</td>
<td>12:58 pm</td>
<td>2:25 pm</td>
<td>3:49 pm</td>
<td>0.93</td>
<td>91%</td>
</tr>
<tr>
<td>Washington DC</td>
<td>1:18 pm</td>
<td>2:43 pm</td>
<td>4:02 pm</td>
<td>0.84</td>
<td>81%</td>
</tr>
<tr>
<td>Miami</td>
<td>1:27 pm</td>
<td>2:59 pm</td>
<td>4:21 pm</td>
<td>0.82</td>
<td>78%</td>
</tr>
</tbody>
</table>
## Eclipse Information for Selected Cities
Where the Eclipse Will be Total

<table>
<thead>
<tr>
<th>City</th>
<th>Partial Eclipse Starts</th>
<th>Total Eclipse Starts</th>
<th>Total Eclipse Ends</th>
<th>Partial Eclipse Ends</th>
<th>Sun’s Altitude At Totality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salem, OR</td>
<td>9:05 am</td>
<td>10:17 am</td>
<td>10:19 am</td>
<td>11:38 am</td>
<td>40 degrees</td>
</tr>
<tr>
<td>Casper, WY</td>
<td>10:22 am</td>
<td>11:43 am</td>
<td>11:45 am</td>
<td>1:09 pm</td>
<td>54 degrees</td>
</tr>
<tr>
<td>St. Joseph, MO</td>
<td>11:41 am</td>
<td>1:06 pm</td>
<td>1:09 pm</td>
<td>2:34 pm</td>
<td>62 degrees</td>
</tr>
<tr>
<td>Carbondale, IL</td>
<td>11:52 am</td>
<td>1:20 pm</td>
<td>1:23 pm</td>
<td>2:48 pm</td>
<td>64 degrees</td>
</tr>
<tr>
<td>Nashville, TN</td>
<td>11:58 am</td>
<td>1:27 pm</td>
<td>1:29 pm</td>
<td>2:54 pm</td>
<td>64 degrees</td>
</tr>
<tr>
<td>Columbia, SC</td>
<td>1:13 pm</td>
<td>2:42 pm</td>
<td>2:44 pm</td>
<td>4:06 pm</td>
<td>62 degrees</td>
</tr>
</tbody>
</table>
For free distribution by NSTA

An 8-page summary of the booklet in Solar Science:

Silly me, Hank! I got it backwards... It's CARDBOARD for a SOLAR ECLIPSE and BINOCULARS for a LUNAR ECLIPSE!

"RING OF FIRE" SOLAR ECLIPSE
We’ll need lots of eclipse glasses...
Or other observing strategies
Eclipse Glasses:

[Image of people watching an eclipse]

American Paper Optics:
http://www.eclipseglasses.com/

Rainbow Symphony:
http://www.rainbowsymphony.com/eclipse-glasses

Bulk rates available on 100’s and 1000’s

www.eclipsediscount.com
Highly Discounted glasses are available at:

www.eclipsediscount.com
Projection surface

Heavy cardboard or cardstock with a large hole in the middle

Image of Sun

Aluminum foil covers the large hole. A small pinhole allows sunlight through.
Paper

View port
(point hole toward Sun when viewing)

Pinhole

Aluminum foil
Pinhole Projectors Come in Many Forms
For free distribution by NSTA

An 8-page summary of the booklet in *Solar Science*:

Eclipse Programs for Science Centers and Other Informal Education Settings
Science Center Staff Contemplating Eclipse Outreach Challenges
Professional Development for Teachers

Solar Science
Exploring Sunspots, Seasons, Eclipses, and More

Dennis Schatz
Andrew Fraknoi

NSTA Press
National Science Teachers Association
Eclipse Related Learning Experiences

4.1 – Predicting What the Moon Will Look Like
4.3 – Observing the Moon
4.4 – Modeling the Moon
4.5 – Modeling Eclipses
Professional Development Needs to Occur This School Year
Eclipse Programming Events
In the Months Leading up to the Eclipse

Programming in the weeks and months leading up to the eclipse is MORE IMPORTANT than what you do on the day of the eclipse.
Eclipse Display Area or Bulletin Board

Let's Explore The Moon Phases!

Rocks and Minerals

Types of Rocks

Rocks are Made of Minerals

Identifying Minerals
HOW TO LOOK AT THE SUN AND NOT GO BLIND

DO NOT look directly at the sun. Unfiltered sunlight will damage your eyes and could cause permanent blindness. Sunglasses will not provide sufficient protection. ONLY look at the sun through an approved solar filter. Even safer is to observe indirectly by projecting the sun’s image with a pinhole or binoculars.

SAFE SOLAR VIEWING

- "Eclipse" glasses or welder's goggles rated 14 or higher
- Specially designed solar telescopes or solar binoculars
- Telescopes, cameras and binoculars WITH approved solar filters
- Pinhole projector

A card with a small hole punched in it will project an image of the sun.

A pair of binoculars will also project a solar image. Leave the lens cap on the unused side.

SOURCES: NASA, U.S. NATIONAL PARK SERVICE

KARL TATE / © SPACE.com
Big Dome Planetarium Show
Eclipse Demonstration for Large Groups
Eclipse Workshops for Kids on Weekends, During Camp-Ins or Summer Camps
Ongoing Pinhole Projector Construction
In Maker Space or Craft Area
Distribute Pinhole Projector Cards

Make a Pinhole Projector for a Solar Eclipse

WARNING: Never look directly at the sun! Always use a pinhole projector with your back towards the sun and do not look at the sun through the pinhole.

You need:
- 2 sheets of printing paper or stiff card (paper plates would be fine too)
- A drawing pin

Instructions:

Sun
Moon

pinhole

paper

paper
Pinhole Projectors Come in Many Forms
Sales of Certified Eclipse Observing Glasses in the Gift Shop
Sun Party Events
Evening or Weekend Eclipse Talks
Presentations at Service Clubs
Events on the Day of the Eclipse

- Eclipse Viewing Training Just Before the Eclipse Begins
- Hands-on Activities While Waiting for Maximum Coverage of the Sun
- Eclipse Party During the Time of the Eclipse
What to Do if it’s Cloudy on Eclipse Day

• The partial eclipse lasts over two hours, so glimpses of the Sun may be possible as the cloud cover changes
• Hands-on Activities While Waiting for Maximum Coverage of the Sun
• Have a video setup ready to access TV and social media sources following the event
What to Do if it’s Cloudy on Eclipse Day

Total solar eclipses in 2017 and 2024

Console them by noting the next eclipse going across the U.S. will be on April 8, 2024.
Possible Partners:

NASA
Libraries
Amateur Astronomy Clubs
Park Rangers
Community Colleges
University astronomy departments
Planetariums
American Astronomical Society Ambassadors
Girl Scouts
Coming in early 2017:

WHEN THE SUN GOES DARK

Andrew Fraknoi
Dennis Schatz
Illustrated by Eric Freeberg

NSTA Kids
National Science Teachers Association
Arlington, Virginia
More than 1400 libraries already

www.starnetlibraries.org
1.26 million glasses
Distributed free
Through public libraries
Plus 2 million glasses from google
A Local College or University Astronomer Might Be Able to Help
http://www.aacc.nche.edu/pages/ccfinder.aspx

Community College Finder

Map Search
City Search
Zip Search
Attribute Search
https://aas.org/outreach/roster-aas-astronomy-ambassadors
Over 400 astronomy clubs around U.S. doing community & school outreach
STICHHING TOGETHER THOUSANDS OF IMAGES IN REAL TIME SUPPORTED BY GOOGLE

SEE: ECLIPSEMEGAMOVIE.ORG
We wish you clear skies on August 21!
QUESTIONS?