



# winter NIGHTS

**SCIENCE ACTIVITIES**

**BROUGHT TO YOU BY:**



# The Moon Illusion

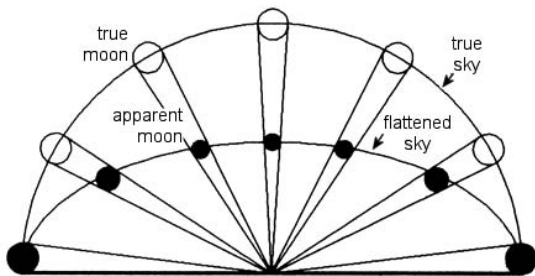


Visit <http://aa.usno.navy.mil> to find the date and time when the next full moon will rise.

Step outside at sunset on the date of the full moon and look east. You'll see a giant moon rising in the east. It looks like Earth's moon, round and cratered. The Man in the Moon is in his usual place, but something's wrong. This full moon is strangely inflated. It's huge!

You've just experienced the Moon Illusion.

When you look at the moon, rays of moonlight converge and form an image about 0.15 mm wide in the back of your eye. High moons and low moons make the same sized spot. So, why does your brain think one is bigger than the other?



Maybe it's the shape of the sky. Humans perceive the sky as a flattened dome, with the zenith nearby and the horizon far away. It makes sense: Birds flying overhead are closer than birds on the horizon. When the moon is near the horizon, your brain, trained by watching birds, miscalculates the moon's true distance and size.

Another theory states foreground objects trick your brain into thinking the moon is bigger than it really is.

## Moon Illusion Activity

- 1.) Look at the moon close to the horizon with your eyes only.
- 2.) Now look at the moon through a narrow opening of some kind, such as a plastic straw. Note the size.

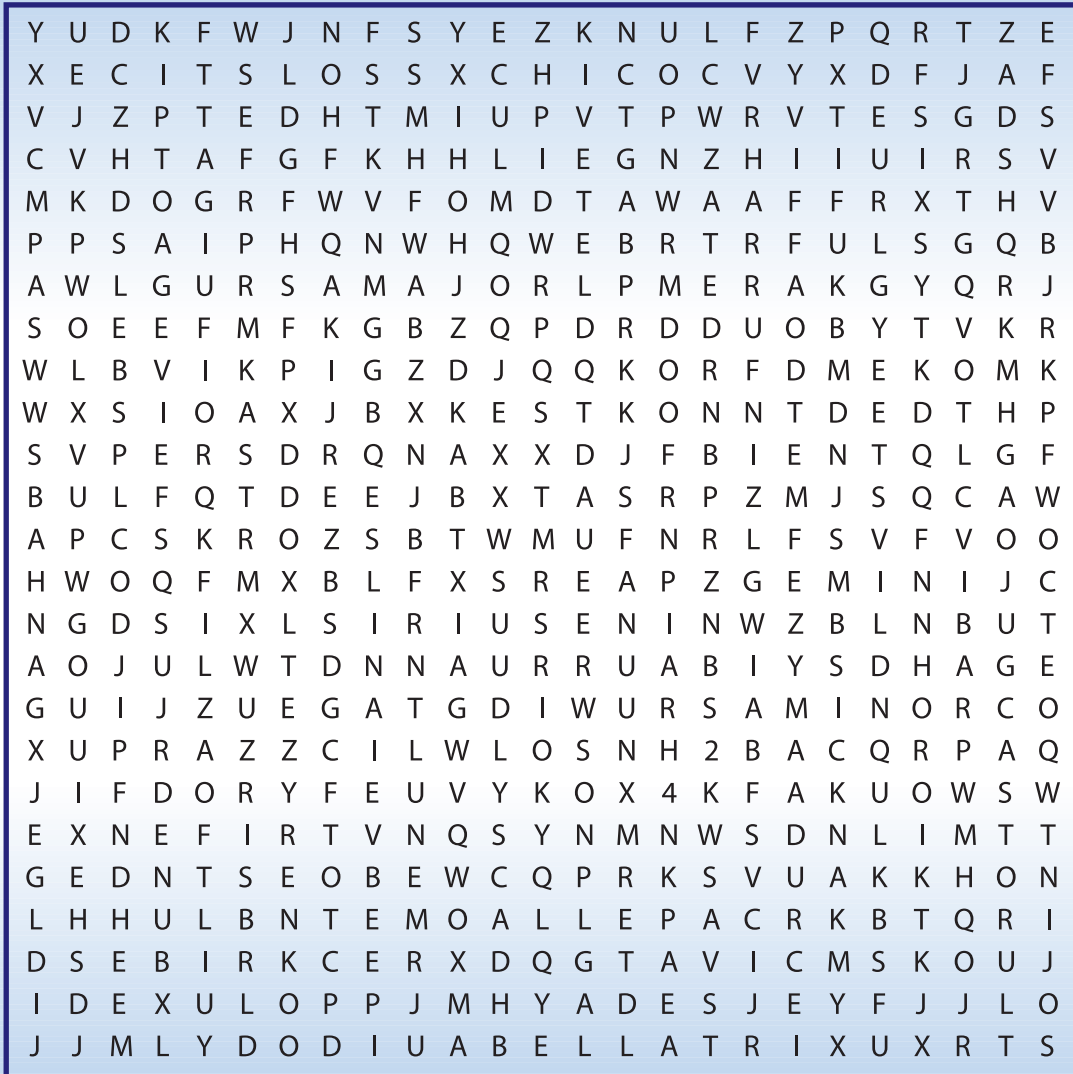
Look at the moon again three hours later. You will notice the moon is located higher in the sky and looks smaller. Look at it with your eyes, then through the straw. Does the straw make the optical illusion vanish?





# winter NIGHTS

The words at the bottom of this page are words you will hear about in the Dassault Systèmes Planetarium show *Winter Nights*. Look for these words across, down, and diagonally. Some words may even be spelled backwards.



ALDEBARAN  
AURIGA  
BELLATRIX  
BETELGUSE  
CANIS MAJOR  
CANIS MINOR

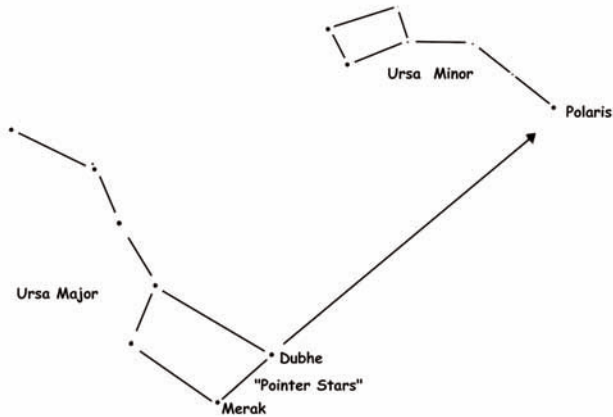
CAPELLA  
CASTOR  
DUBHE  
GEMINI  
HYADES  
M42

MERAK  
ORION  
PLEIADES  
POLARIS  
POLUX  
PROCYON

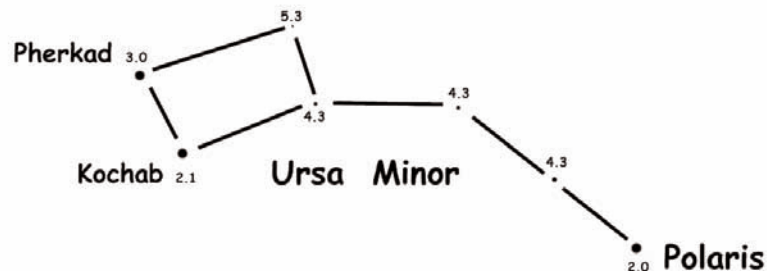
RIGEL  
SAIPH  
SIRIUS  
SOLSTICE  
TAURUS  
URSA MAJOR  
URSA MINOR

# How Dark is Your Sky?

See the stars of Ursa Minor, the Lesser Bear (also known as the Little Dipper) from your backyard with this activity. Learn how light pollution affects your view of the night sky by observing how many stars you can see with unaided eyes.



Go outside an hour after sunset and adjust your eyes to the dark. This can take up to 15 minutes. Be sure outside lights on your home are turned off. Use the Pointer stars of the Big Dipper in the constellation Ursa Major, the Great Bear. Draw a line away from the bottom of the cup through the Pointer stars until you reach Polaris, the North Star. Polaris is the tip of the Little Dipper's handle, located in Ursa Minor, the Lesser Bear.



1st Magnitude - Brightest Star

6th Magnitude - Dimmest Star Seen with unaided eye

The map above lists the brightness of each star in Ursa Minor. The higher the number, the dimmer it is and harder to see. If all seven stars can be observed, you have a great night sky and a low amount of wasted light. If you can see only Polaris and the stars at the other end of Ursa Minor, you have a lot of wasted light shining in sky. This is called light pollution by astronomers and lighting engineers. To learn more about light pollution and how to save the night sky, go to the International Dark Sky Association's web site.

<http://www.darksky.org/>





## **Amateur Astronomy & Skywatching Web Sites**

Check out these web sites for additional information related to this planetarium show.

### **[www.boonhill.net](http://www.boonhill.net)**

Michigan Astronomy Clubs master web site. Find an astronomy club near you!

### **[www.boonhill.net/faac](http://www.boonhill.net/faac)**

Ford Amateur Astronomy Club web site

### **[www.boonhill.net/was](http://www.boonhill.net/was)**

Warren Astronomical Society web site

### **[www.heavens-above.com](http://www.heavens-above.com)**

Get sky maps and info on how you can see the Space Station.

### **[www.skymaps.com](http://www.skymaps.com)**

Download a map of the current night sky.

### **[www.amateurastronomy.com](http://www.amateurastronomy.com)**

*Amateur Astronomy* magazine for and by amateur astronomers.

### **[www.skytonight.com](http://www.skytonight.com)**

Started in 1936, *Sky and Telescope* magazine, is the oldest and longest running astronomy magazine in the United States.

### **[www.astronomy.com](http://www.astronomy.com)**

Started in 1973, *Astronomy magazine* is published by Kalmbach Publishing.

### **[www.backyard-astro.com](http://www.backyard-astro.com)**

Learn how to explore the Universe from your backyard.

### **[www.astronomyboy.com](http://www.astronomyboy.com)**

*Astronomy Boy* provides resources for amateur astronomers.

### **[www.weasner.com/etx/menu.html](http://www.weasner.com/etx/menu.html)**

Learn how to improve and upgrade your Meade ETX telescope.

### **[www.atmsite.org](http://www.atmsite.org)**

A guide to Amateur telescope making resources.

### **[www.stellarium.org](http://www.stellarium.org)**

Planetarium software for Windows/Mac/Linux computers that shows what can be seen when you look up at the stars. It's easy to use and free.

### **[www.celestron.com](http://www.celestron.com)**

Manufacturer of Celestron telescopes, binoculars and astronomy accessories.

### **[www.meade.com](http://www.meade.com)**

Meade Instruments manufacturer of telescopes, binoculars and astronomy accessories.

### **[www.fourmilab.ch/yoursky/](http://www.fourmilab.ch/yoursky/)**

An interactive map of the night sky by the founder of AutoCAD software – John Walker.

### **[www.sky-map.org/](http://www.sky-map.org/)**

An interactive map of the evening sky with star and celestial object identification using your mouse over the object on the map.