

Moon Phases

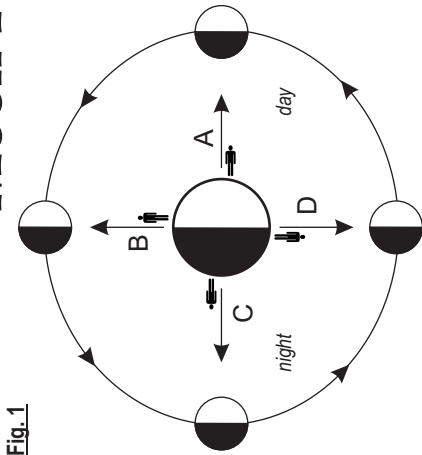






Fig. 1

Imagine you are the little person in the illustration and you are looking up at the moon in the sky. Would it look like the drawings below?

Fig. 2

- A  New Moon
- B  First Quarter Moon
- C  Full Moon
- D  Last Quarter Moon

The Moon orbits the Earth about every 27.3 days.

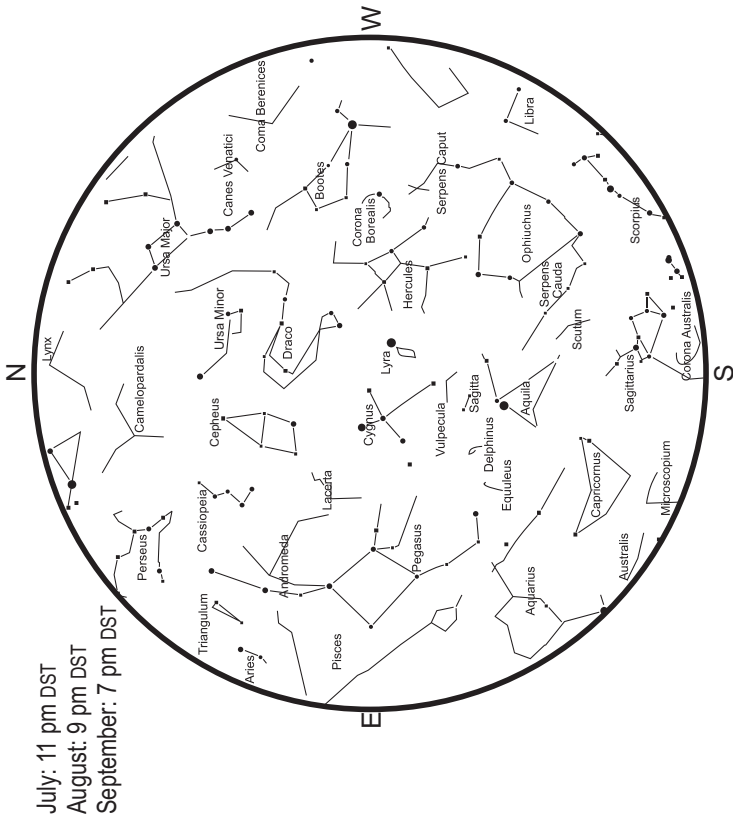
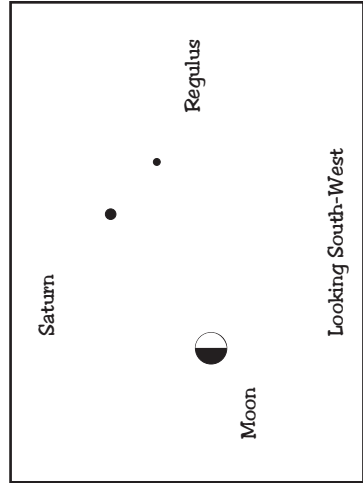
Figure 1 illustrates this motion. Figure 2 shows how the Moon would look to a person standing on Earth, at four different places in the Moon's orbit. Notice the Moon is always half in sunlight and half in shadow (Fig. 1). It is only our changing view of these two areas of the Moon that create the familiar moon phases. The time for the Moon to complete a full set of phases is about 29.5 days. A month is roughly equal to one complete cycle of moon phases.

Learn more about the Moon at <http://www.nineplanets.org/luna.html>

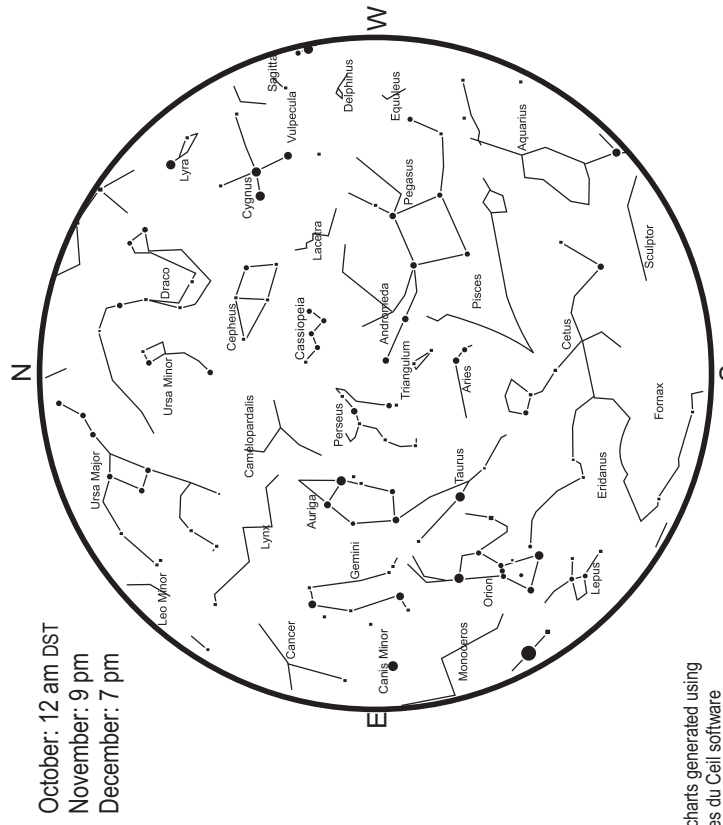
SIDEWALK ASTRONOMER OBSERVATION:

Use a calendar that shows moon phases. Observe the moon phases as close to the date marked on the calendar as possible. Draw the Moon on your observing form as you see it in the sky. Write down in which direction (north, east, south, west) you observe the Moon in the sky. Make notes on your observing form about what you see. (a minimum of 2 moon phase observations are required)

Location: 111 Tabor Blvd, Prince George, BC
 Date: May 12, 2008
 Time: 10:30 pm PDT
 Weather Conditions: scattered cloud
 Object Viewed: 1st quarter moon
 Notes: I spotted the 1st quarter moon in the South West sky. Saturn and Regulus were close by. The moon looked like it was split down the middle... half was lit and half was dark.



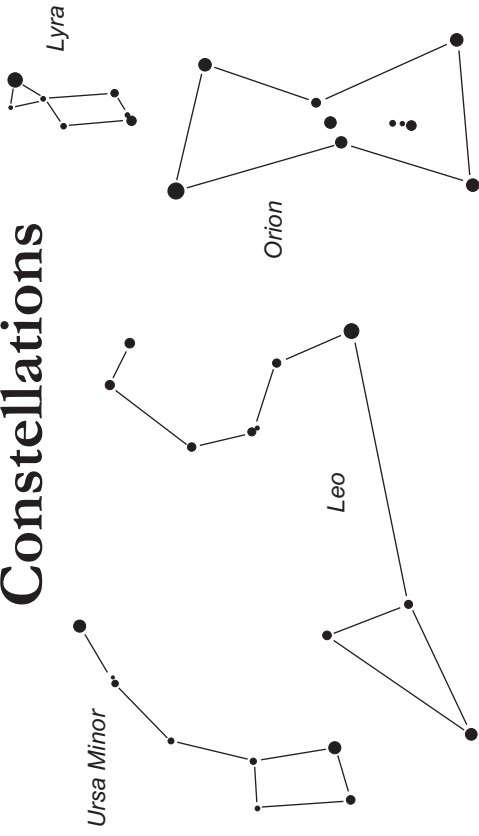
July: 11 pm DST
 August: 9 pm DST
 September: 7 pm DST



October: 12 am DST
 November: 9 pm
 December: 7 pm

Sky charts generated using
 Cartes du Ciel software
<http://www.ap-i.net/skychart>

Constellations



Constellations are the “sign posts” of the night sky. Imagined by ancient people hundreds of years ago as aids in navigation, planting and harvesting, time keeping and celebration, the constellations have been our constant companions.

The stars that make up constellations are the brightest in the night sky. They are often visible even under poor viewing conditions. In fact, it is much easier to learn the constellations from a location with a small amount of light pollution as they will be the only stars visible. When astronomers draw star maps they use different size dots to represent the stars. Larger dots represent brighter stars.

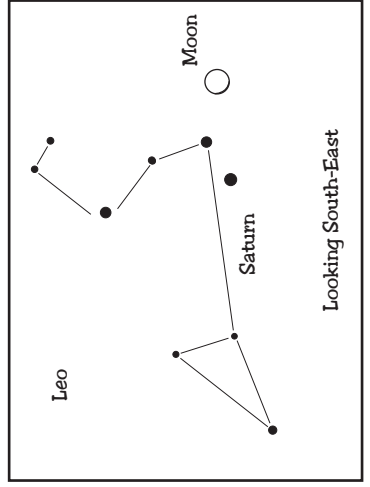
The entire night sky has been divided into constellations. Learning the constellation patterns is your key to locating objects in the night sky. Use the sky charts at the back of this booklet to start finding your way around the night sky.

Learn more about the constellations at <http://www.astro.wisc.edu/~dolan/constellations>

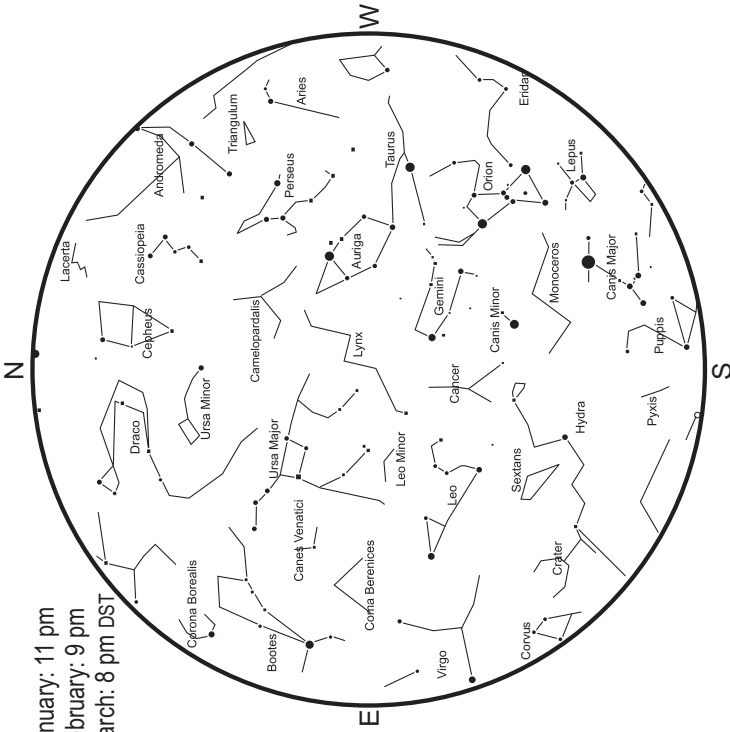
SIDEWALK ASTRONOMER OBSERVATION:

Using the sky charts at the back of this booklet locate as many constellations as you can. Draw their shape and position in the sky and make notes about what you see. (a minimum of 2 constellation observations are required)

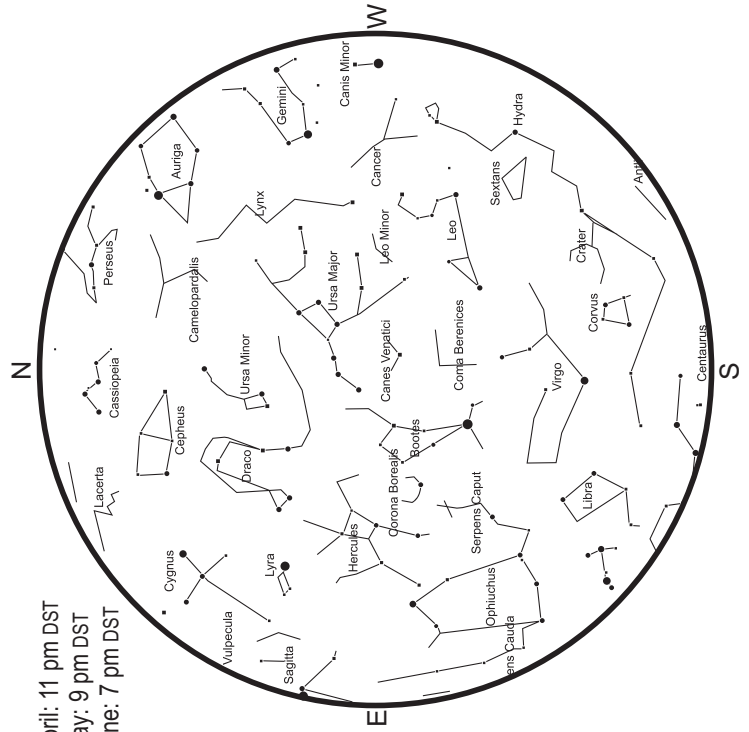
Location: 111 Tabor Blvd., Prince George, BC
 Date: March 18, 2008
 Time: 10:00 pm PDT
 Weather Conditions: mostly clear
 Object Viewed: Leo, Moon, Saturn
 Notes: The Moon and Saturn were close together in the constellation Leo.
The glare from the almost Full Moon made seeing the faint stars in Leo difficult.



January: 11 pm
 February: 9 pm
 March: 8 pm DST



April: 11 pm DST
 May: 9 pm DST
 June: 7 pm DST



Use the map for the month and time you are viewing. “DST” stands for Daylight Savings Time. A Star-Finder you can set for any day and time may be downloaded at <http://www.star-finder.ca>

Sky Maps

The “Classical” Planets

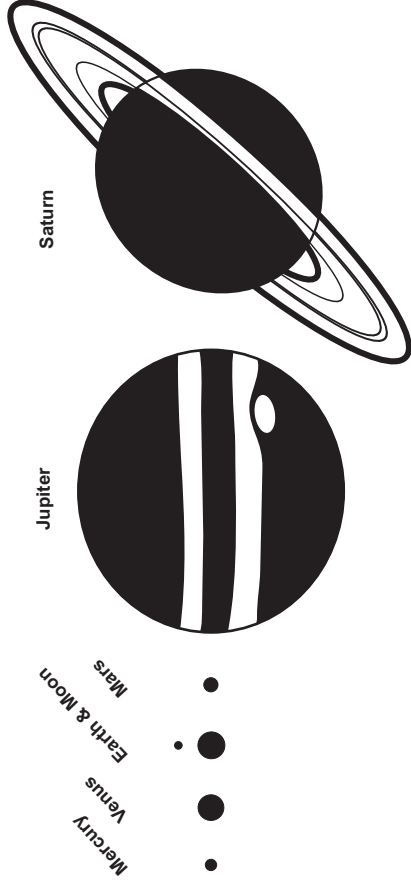


Fig. 3

All five classical “naked eye” planets, plus Earth, drawn at the correct scale for size comparison. Note that distances are NOT to scale. The planets are separated from each other by many millions of kilometres.

Illustration based on NASA image. http://solarsystem.nasa.gov/multimedia/gallery/solarsys_scale.jpg

The people of the ancient world made careful observations of the night sky. They realized that among the many stars, five of them did not move in the same manner as the rest. To the ancient eyes they “wandered” among the stars.

Without the aid of telescopes the ancients could not see any features on the planets. They did know their motions and could predict when each planet would come into view.

The Greeks called them “*planētē*” which means “wanderer”. These five planets, visible to the eye without a telescope, were among the first objects known other than stars.

Learn more about the planets at <http://www.nineplanets.org>

SIDEWALK ASTRONOMER OBSERVATION:

How many of the classical planets can you see? Locate as many as you can. Draw their position in the sky and make notes about what you see. If you make careful drawings and chart them again in a month or so you may notice them “wandering” among the stars too! (*a minimum of 2 planet observations are required*)

Location: 111 Tabor Blvd., Prince George, BC

Date: May 6, 2008

Time: 9:00 pm PDT

Weather Conditions: clear skies!

Object Viewed: Mercury and New Moon

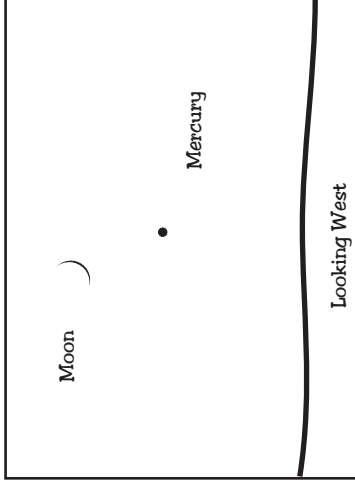
Notes: The almost new moon was low

on the western horizon. Mercury was

very close by, to the lower right of

the moon. The crescent moon was a

thin “slicer”.



Astronomy Dictionary

Astronomical Unit (AU): the average distance from the Sun to the Earth. It is about 150 million kilometres.

Black Hole: a very small, very massive object with gravity so strong nothing, not even light, can escape it. Stellar black holes are the collapsed cores of exploded stars. Super massive black holes are the highly-condensed central regions of galaxies.

Galaxy: an immense group of stars, gas and dust many light years across.

Light Year: the distance light travels in a year. Almost 10 trillion kilometres!

Light Pollution: any harmful effect of artificial light. Including sky glow, glare, light trespass, light clutter, decreased visibility at night, and energy waste.

Meteor: commonly called ‘shooting’ or ‘falling’ stars. They are a small piece of rock or dust debris from space which enters the atmosphere. Meteors are often seen streaking across the night sky. When the piece is in space it is called a **Meteoroid**. If a piece hits the ground it is called a **Meteorite**.

Milky Way: the spiral galaxy containing our Sun as well as a few hundred billion other stars. It is about 100,000 light years across and 1,000 light years thick.

Nebula: a very large cloud of gas and dust in space. There are several types of nebula. New stars are created from condensing nebulae, while dying stars cause expanding nebulae.

Orbit: the path an object takes as it moves around another object. Johannes Kepler revolutionized astronomy in 1609 by discovering that most orbits are elliptical (oval-shaped) rather than circular.

Planet: a large spherical object orbiting a star. The four inner planets (Mercury, Venus, Earth, Mars) in our solar system are known as the “rocky” or “terrestrial planets”. The four outer planets (Jupiter, Saturn, Uranus, Neptune) are “gas giants”. Smaller bodies include the three known “dwarf planets” (Ceres, Pluto, Eris). There are also many smaller objects known as “minor planets” or “asteroids”.

Star: a large, very hot, ball of gas. A star creates light through the process of nuclear fusion at its core.

Solar System: a star and the planets, asteroids and comets that orbit it.

Telescope: a tool to gather and focus light from a distant object. It allows an observer to see distant objects in greater detail. A reflecting telescope uses mirrors to gather the light. A refracting telescope uses lenses. In 1609 Galileo Galilei was the first to use a telescope for astronomical purposes. His telescope was a refracting telescope.

Universe: everything that exists. All matter and energy.

Year: the length of time it takes the Earth to complete one orbit around the Sun. About 365.25 days.

Zenith: the highest point in the sky directly overhead of an observer.

Astronomy On the Web

ORGANIZATIONS

RASC: Royal Astronomical Society of Canada <http://www.rasc.ca>

FAAQ: Site de la Fédération des Astronomes Amateurs du Québec
<http://www.faaq.org>

CASCA: Canadian Astronomy Society <http://www.casca.ca>

National Research Council: <http://www.nrc-cnrc.gc.ca>

International Year of Astronomy: <http://www.astronomy2009.org>

International Year of Astronomy, Canadian Node:
<http://www.astronomy2009.ca>

International Dark Sky Association: <http://www.darksky.org>

KIDS

NASA Space Place: <http://spaceplace.nasa.gov/en/kids>

KidsAstronomy.com: <http://www.kidsastronomy.com>

GENERAL INTEREST

Canadian Astronomy News: <http://astrocanada.blogspot.com>

Nine Eight Planets: <http://www.nineplanets.org>

Heavens Above, artificial satellite tracking:
<http://www.heavens-above.com>

Astronomy Picture of the Day: <http://apod.nasa.gov/apod>

Spaceweather: <http://spaceweather.com>

PUBLICATIONS

SkyNews: <http://www.skynewsmagazine.com>

RASC Publications: <http://www.rasc.ca/publications>

Astronomy Magazine: <http://www.astronomy.com>

Sky & Telescope: <http://www.skyandtelescope.com>

CHARTS & SOFTWARE

Star-Finder: <http://www.star-finder.ca>

Skymaps: <http://www.skymaps.com>

Mag-7 Star Atlas Project:
http://www.cloudynights.com/item.php?item_id=1052

Cartes du Ciel / Sky Charts: <http://www.ap-i.net/skychart>

Hallo Northern Sky: <http://www.hnsky.org/software.htm>

Virtual Moon Atlas: <http://ap-i.net/avl/en/start>

Finding the Planets

Use the charts below to find the approximate location of a planet. The constellations listed may not always be visible. Compare the constellation's stars you see in the sky to the star charts on pages 10 and 11. The bright "star" that is not printed on the star chart will be the planet.

Look for Mercury and Venus near the horizon in the morning about an hour before Sunrise (East) or in the evening about an hour after Sunset (West). Venus will be very bright. Look for Mercury about a week before or after the date listed. Here is a tip: planets do not "twinkle"; stars do.

An easy to use monthly star chart showing constellations, planets and other objects may be downloaded from <http://www.skymaps.com>

To make your own accurate sky charts and find the exact location of a planet on any day from any location in the world, you can download the following free planetarium software. Cartes du Ciel: <http://www.ap-i.net/skychart>
Hallo Northern Sky: <http://www.hnsky.org/software.htm>

Data for the charts below was created using the following websites:
Mercury <http://www.Fourmilab.ch/images/3planets/elongation.html>
Venus, Mars, Jupiter & Saturn <http://www.astro.wisc.edu/~dolan/Planets/>

2012

	JAN	FEB	MAR	APR	MAY	JUN
MERCURY	Not Visible	Not Visible	5th Eve.	18th Morn.	Not Visible	Not Visible
VENUS	Evening	Evening	Evening	Evening	Evening	Not Visible
MARS	Leo	Virgo	Leo	Leo	Leo	Leo
JUPITER	Pisces	Aries	Aries	Aries	Aries	Taurus
SATURN	Virgo	Virgo	Virgo	Virgo	Virgo	Virgo

	JUL	AUG	SEP	OCT	NOV	DEC
MERCURY	1st Eve.	16th Morn.	Not Visible	26th Eve.	Not Visible	4th Morn.
VENUS	Morning	Morning	Morning	Morning	Morning	Morning
MARS	Virgo	Virgo	Virgo	Libra	Ophiuchus	Sagittarius
JUPITER	Taurus	Taurus	Taurus	Taurus	Taurus	Taurus
SATURN	Virgo	Virgo	Virgo	Virgo	Virgo	Virgo

2013

	JAN	FEB	MAR	APR	MAY	JUN
MERCURY	Not Visible	16th Eve.	31st Morn.	Not Visible	Not Visible	12th Eve.
VENUS	Morning	Morning	Not Visible	Not Visible	Evening	Evening
MARS	Capricornus	Aquarius	Aquarius	Pisces	Aries	Taurus
JUPITER	Taurus	Taurus	Taurus	Taurus	Taurus	Taurus
SATURN	Libra	Libra	Libra	Libra	Libra	Virgo

	JUL	AUG	SEP	OCT	NOV	DEC
MERCURY	30th Morn.	Not Visible	Not Visible	9th Eve.	18th Morn.	Not Visible
VENUS	Evening	Evening	Evening	Evening	Evening	Evening
MARS	Taurus	Gemini	Cancer	Leo	Leo	Virgo
JUPITER	Gemini	Gemini	Gemini	Gemini	Gemini	Gemini
SATURN	Virgo	Virgo	Libra	Libra	Libra	Libra

_____’s Observing Log Form

Download extra observing forms at: www.rasc.ca/sidewalkastronomer

Location: _____
Date: _____
Time: _____
Weather Conditions: _____
Object Viewed: _____
Notes: _____

Location: _____
Date: _____
Time: _____
Weather Conditions: _____
Object Viewed: _____
Notes: _____

Location: _____
Date: _____
Time: _____
Weather Conditions: _____
Object Viewed: _____
Notes: _____

Name: _____
Address: _____
Phone No: _____ Email: _____

Location: _____
Date: _____
Time: _____
Weather Conditions: _____
Object Viewed: _____
Notes: _____

Location: _____
Date: _____
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Weather Conditions: _____
Object Viewed: _____
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