

Visit the "Scouting with Mr. R." web site at
www.relia.net/~thedane/scouting.html

7	2	2	4
1			5
1			5
3	6	6	8

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 (revised March 2005)

"The Stars" by H. A. Rey



THE ZODIAC

(Greek: Animal)

The zodiac is a belt 8° wide on either side of the ecliptic (the path the sun, the moon, and the planets pass through the sky). Within this 16° belt lie the twelve common constellations of the zodiac: *Pisces, Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpius, Sagittarius, Capricornus, Aquarius.*

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PRECAUTIONS (1)

Describe the proper clothing and other precautions for safely making observations at night and in cold weather.

Tell how to safely observe the Sun, objects near the Sun, and the Moon.

Explain first aid for injuries or illnesses, such as:

hypothermia (Body temperature drops below 96° F.)
Symptoms: Slow or irregular speech; shallow or very slow breathing; fatigue; confusion; slow pulse; weakness or drowsiness; shivering; cold pale skin.

dehydration (Body does not have enough fluids to function properly. Often caused by fluid loss improper intake, vomiting, diarrhea or excessive urination).

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ASTRONOMY

N N M A G N I T U D E S O K C
 Y O G B H Z T S E Z C T I L N
 F I I W J H O S M O O E H E M
 Z T T T P L P D R U W L S K S
 E A S U A I I P I A J E U D J
 E C S E L L I G X A G S O Y S
 I I S C S O L I H N C C B M Y
 E F E U N A N E I T E O B I J
 S I R X N G H T T S Y P I R B
 L N M O O N C P N S K E G R Y
 E G O V N A D E R E N T A O K
 V A Z A R L L P E A S O Q R R
 R M M F E C E I P E Y E C W A
 B R E P L A N E T U K M R M T
 F R T W G N I N A W I X Z C S

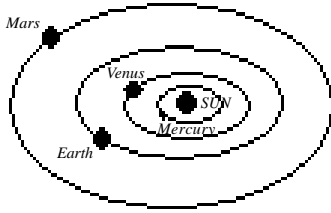
CONSTELLATION	MAGNIFICATION	SCORPION
CRESENT	MAGNITUDE	STAR
ECLIPSE	MIRROR	SUN
EYEPIECE	MOON	TELESCOPE
GIBBOUS	PHASES	WANING
LENS	PLANET	WAXING
LIGHTYEAR	REFRACTING	ZODIAC

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 Y O G B H Z T S E Z C T I L N
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 E A S U A I I P I A J E U D J
 E C S E L L I G X A G S O Y S
 I I S C S O L I H N C C B M Y
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 S I R X N G H T T S Y P I R B
 L N M O O N C P N S K E G R Y
 E G O V N A D E R E N T A O K
 V A Z A R L L P E A S O Q R R
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LIGHTYEAR	REFRACTING	ZODIAC

FYI



The star **Antares** is a red giant that is expanding as it slowly dies out. It's diameter is over 150,000,000 miles across. That's larger than the entire orbit of Mars around our Sun!

Our spacecraft have traveled up to 22,000 mph. In order for us to reach the nearest star, Alpha Centari (4½ light years away), it would take us about 91,000 years--and that's one way!



On a good clear night, we can only see about 2,000 stars with the naked eye!

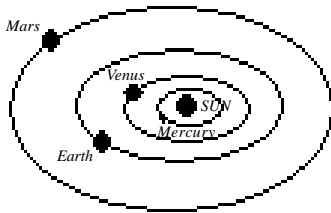


The companion star to Sirius is a white dwarf (a star that has imploded). It weighs about 2½ tons per cubit inch!

An interesting way to know whether the moon is in the waxing or waning stage is to remember the Celtic Goddess symbol. The waxing moon on the left represents **maiden**; the full moon, **mother**; and the waning moon on the right, the **crone**.



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insect bites (Spiders, ticks, ants, horseflies, etc.) *Symptoms: Puncture wound, red spots, swelling, usually accompanied itching or a quick sharp pain).*



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eye damage (that could occur during observation: lazer pointers, accidentally viewing the sun without proper filtration) *Symptoms: Smarting in eyes, blurred vision, seeing spots before their eyes, etc.*

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LIGHT POLLUTION (2)

What is light pollution? _____

How does it and air pollution affect astronomy? _____

TELESCOPES (3)

With the aid of diagrams or real telescopes:
a. Explain why binoculars and telescopes are important astronomical tools. _____

Demonstrate or explain how these tools are used. _____

Denebola

M66 M65

The Lion (Leo)

Regulus

M44

The Crab (Cancer)

NGC 3628

M66 M65

The Leo Triplet

Castor

Pollux

The Twins (Gemini)

Magnitude 0 1 2 3 4 5

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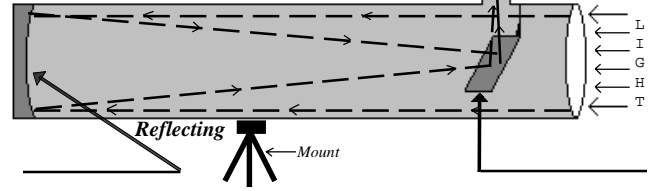
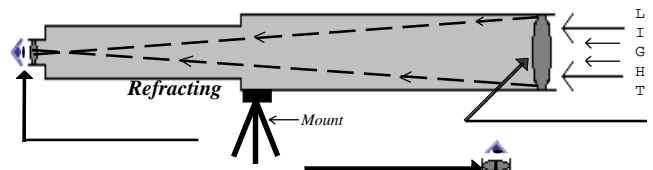
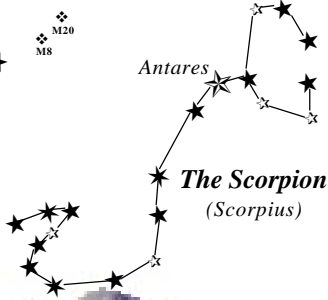
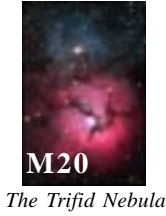
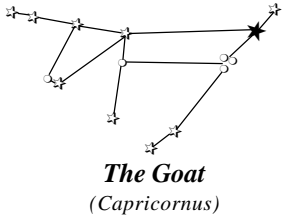
The Leo Triplet

Castor

Pollux

The Twins (Gemini)

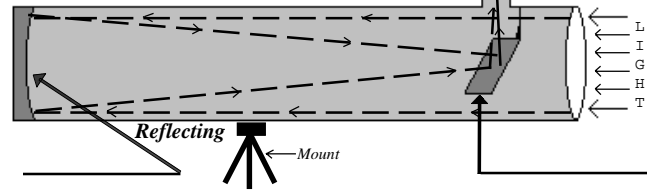
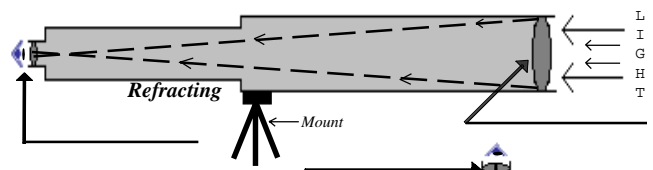
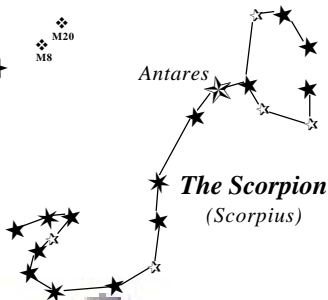
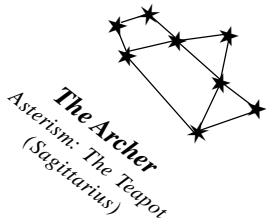
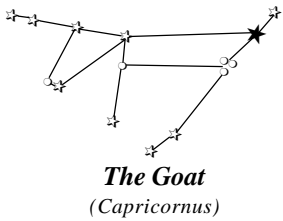
Magnitude 0 1 2 3 4 5



b. Describe the similarities and differences of several types of astronomical telescopes.

c. Explain the purposes of at least three instruments used with astronomical telescopes.

Instrument	Purpose



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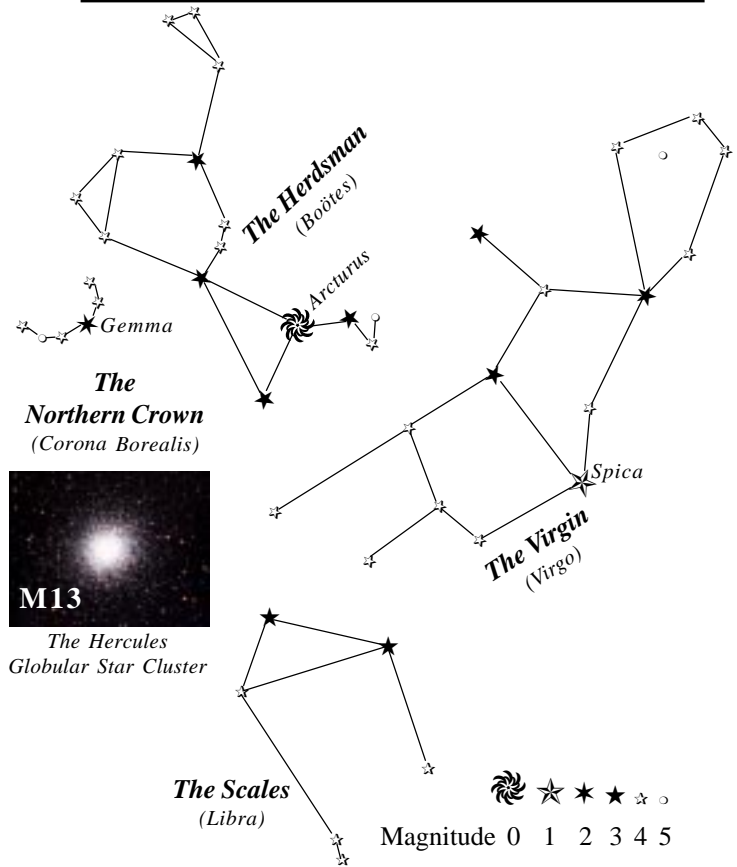
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These constellations can be seen during the summer. You are required to **point out and name ten (10) constellations** of which **4** must be part of the Zodiac.

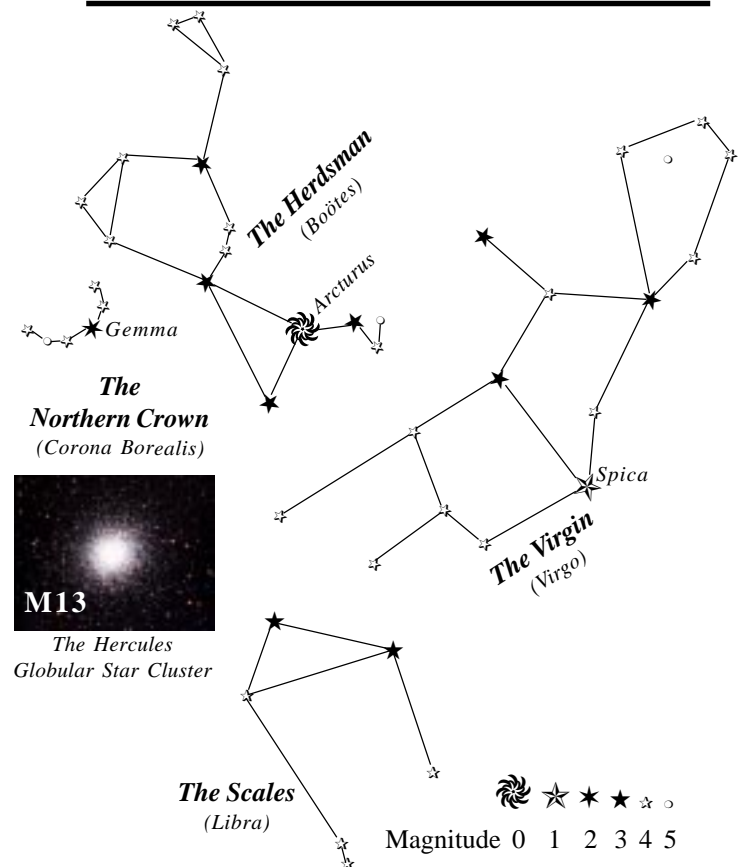
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 - * **LITTLE BEAR** *Ursa Minor; The Little Dipper*
 - * **DRAGON** *Draco*
 - * **The “W”** *Cassiopeia, The Queen*
 - KING** *Cepheus*
 - ANDROMEDA**
 - PERSEUS**
 - * **SWAN** *Cygnus, The Northern Cross*
 - * **EAGLE** *Aquila*
 - HARP** *Lyre*
 - HERCULES** *{The Keystone or Bowtie}*
 - * **HERDSMAN** *Boötes*
 - * **NORTHERN CROWN** *Corona Borealis {Smile}*
 - *^z **LION** *Leo*
 - *^z **VIRGIN** *Virgo*
 - ^z **SCALES** *Libra*
 - *^z **SCORPION** *Scorpius {The Fishhook}*
 - *^z **ARCHER** *Sagittarius {The Teapot}*
 - ^z **GOAT** *Capricornus*
- (* denotes the most easily seen; ^zdenotes part of the Zodiac)

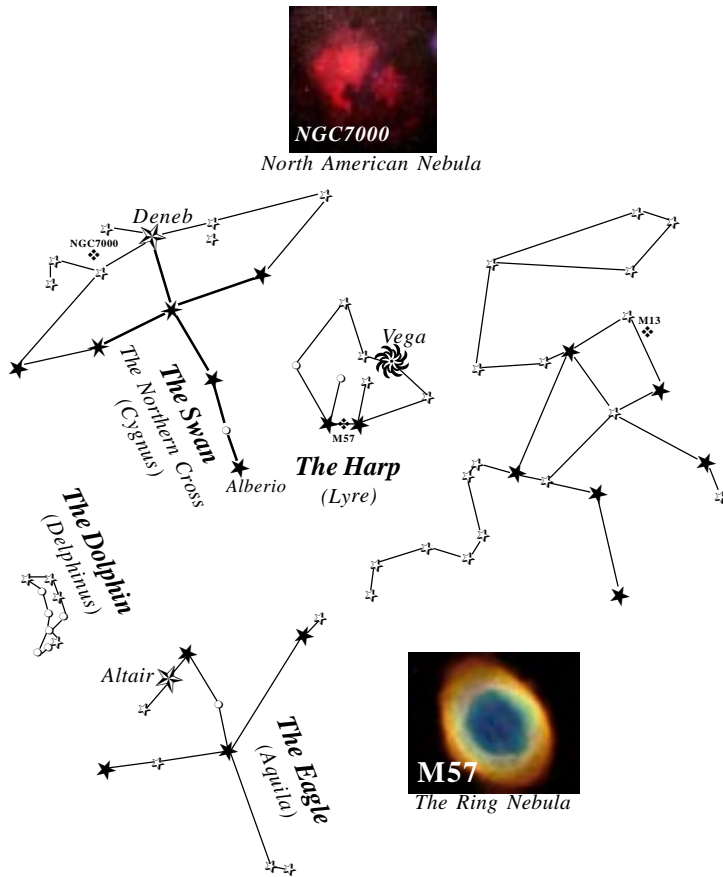


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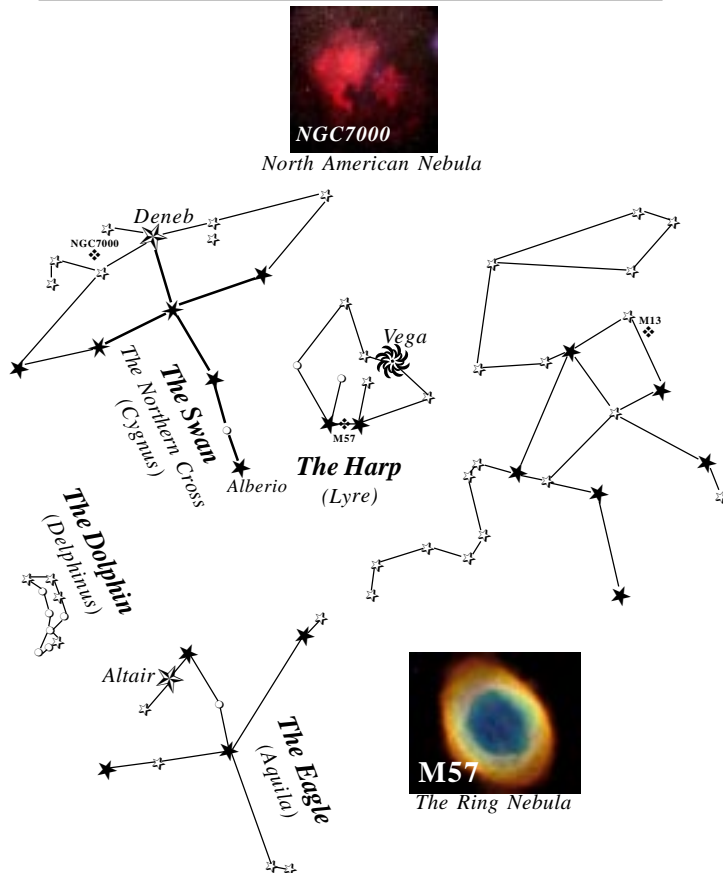




STARS (4b)

These stars can be seen during the summer. You are required to **point out and name eight (8) stars** of which **5** must be **1st** magnitude or higher (the bold number following a star's name is its apparent magnitude). Also identify at least one star that is **blue**, one that is **red**, and one that is **yellow** and explain the meanings of these colors.

- { **ALCOR (5)** *The Big Dipper* (Color: **White**)
- { **MIZAR (2)** *The Big Dipper* (Color: **White**)
- { **MERAK (2)** *The Big Dipper* (Color: **White**)
- { **DUBHE (2)** *The Big Dipper* (Color: **Orange**)
- POLARIS (2)** *The Little Dipper* (Color: _____)
- { **ALBIREO (3)** *The Swan* (Colors: _____/_____)
- { **DENEK (1)** *The Swan* (Color: _____)
- { **VEGA (0)** *The Harp* (Color: _____)
- { **ALTAIR (1)** *The Eagle* (Color: _____)
- ANTARES (1)** *The Scorpion* (Color: _____)
- SPICA (1)** *The Virgin* (Color: _____)
- GEMMA (2)** *The Northern Crown* (Color: _____)
- REGULUS (3)** *The Lion* (Color: _____)
- ARCTURUS (0)** *The Herdsman* (Color: _____)
- CAPELLA (0)** *The Charioteer* (Color: _____)



STARS (4b)

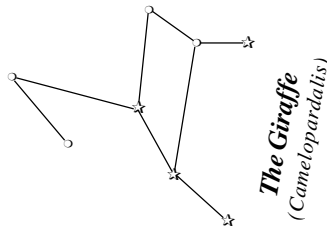
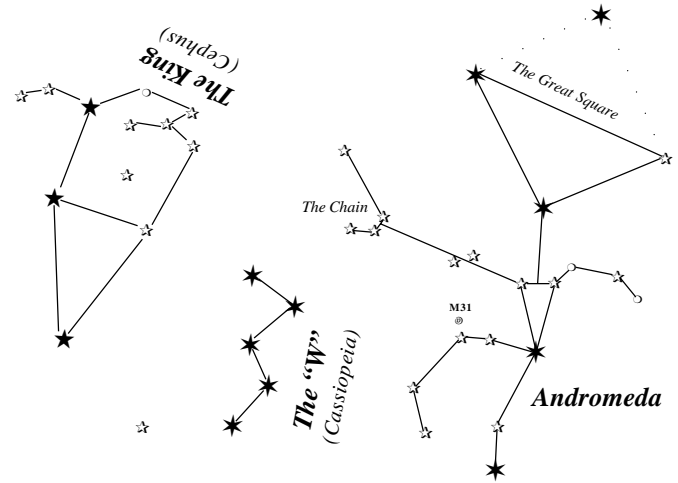
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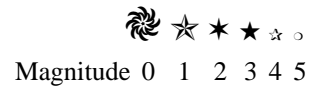
BIG DIPPER DRAWINGS (4c)

Sketch the Big Dipper, the North Star, and the horizon, showing their orientation in the early evening sky. Several hours later, sketch the Big Dipper's position again. Record the date and time each sketch was made.

Polaris
(The North Star)
★



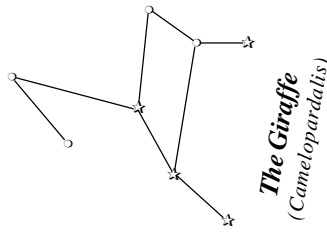
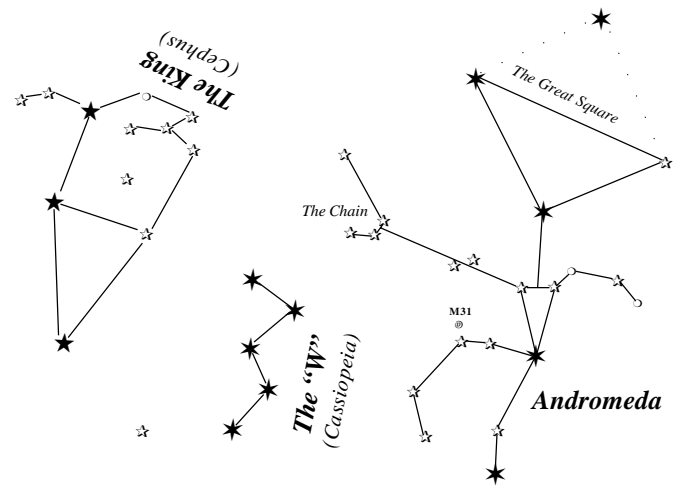
M31
The Andromeda Galaxy



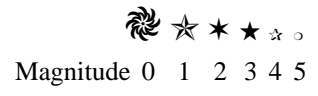
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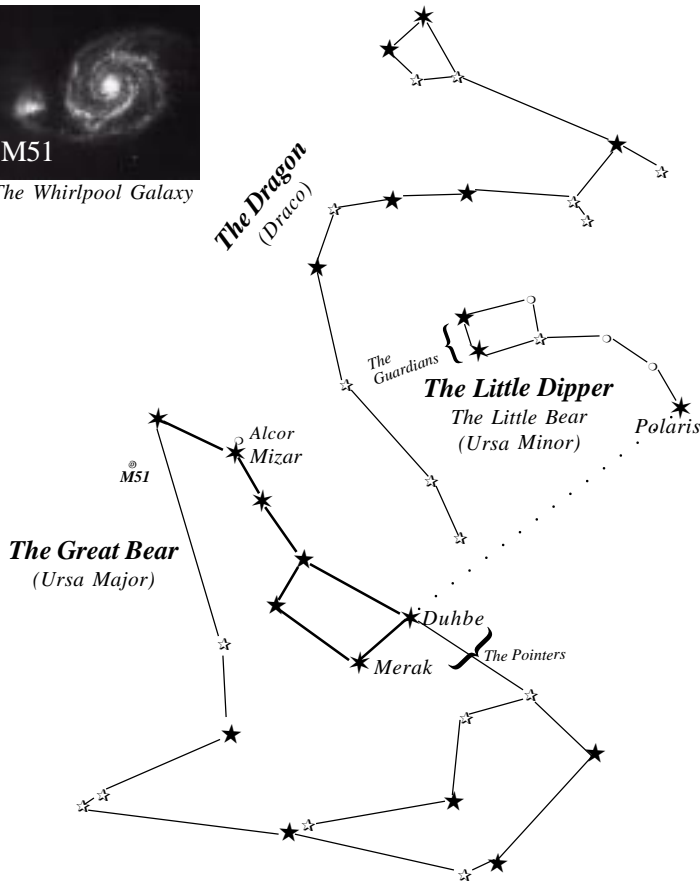


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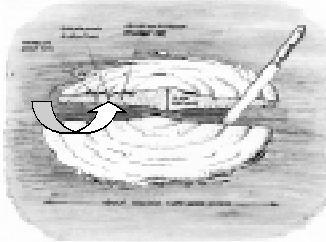


M51
The Whirlpool Galaxy



THE MILKY WAY (4d)

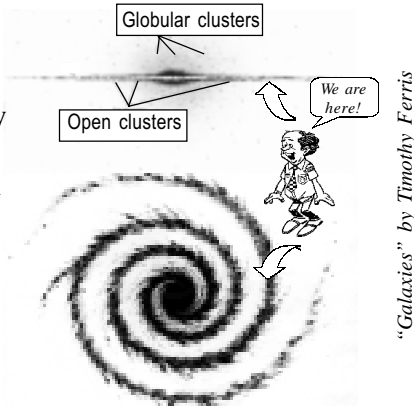
"The Stars" by H. A. Rey



Our solar system (the sun and all its planets) is part of the Milky Way Galaxy. We are located about half way out from the center. When we look at the Milky Way in the night sky we see

a fuzzy grey band. We are really looking *sideways* through our galaxy and see millions of stars lined up behind each other. We can also see open star clusters, double stars, and nebulae.

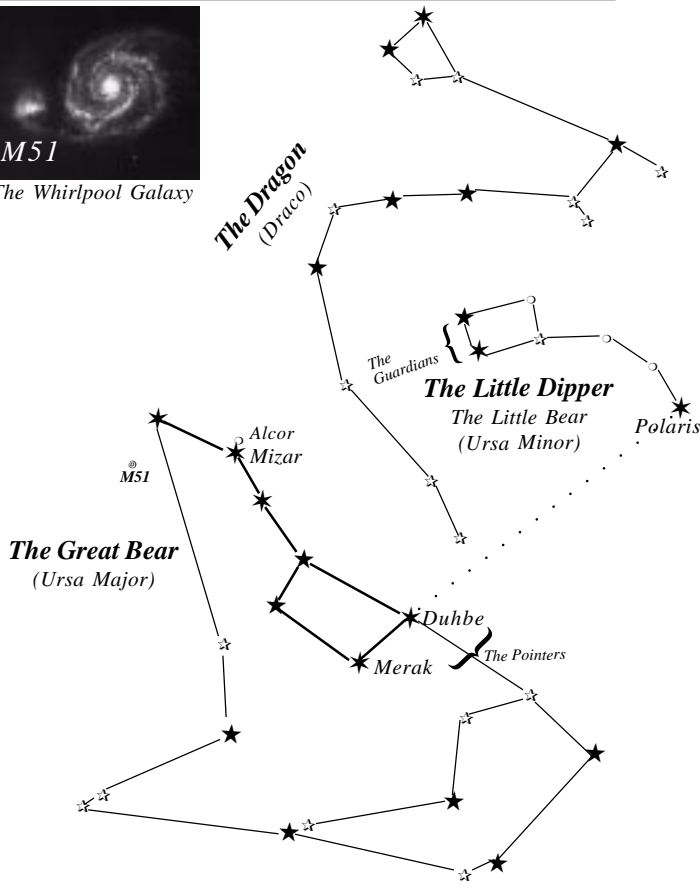
When we look away from the Milky Way we see far fewer stars, and can see a number of globular star clusters (groups of stars that never were drawn into the swirl of the Milky Way).



"Galaxies" by Timothy Ferris

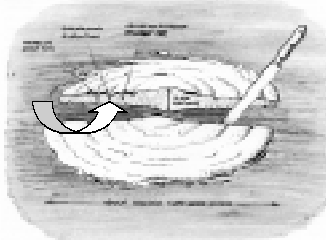


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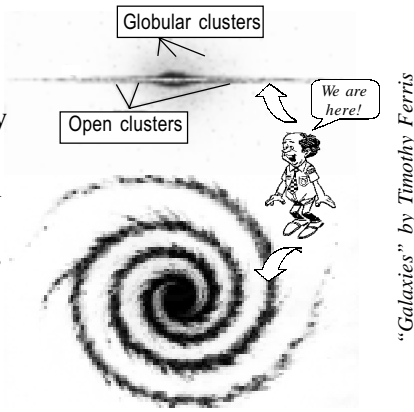
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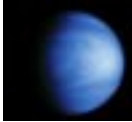


"Galaxies" by Timothy Ferris

PLANETS (5)

a. List the five most visible planets

M	J
V	S
M	

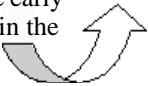


Which ones can appear in phases similar to lunar phases and which ones cannot?

Planets with phases	Planets without phases

Explain why: _____

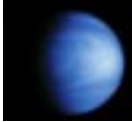
When (or where) will each of the five most visible planets be observable in the evening sky during the next **12** months. Compile this information in the adjoining chart. Show whether each planet will be visible during the early morning (**M**), evening (**E**), or not observable (**O**) in the night sky for that time of year. (Example: Gem-E)



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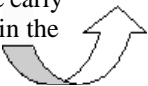


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CAREERS (10)

List at least three different career opportunities in astronomy:

Explain how to prepare for **one** of them. _____

List the high school or college courses that might be useful for such a career:



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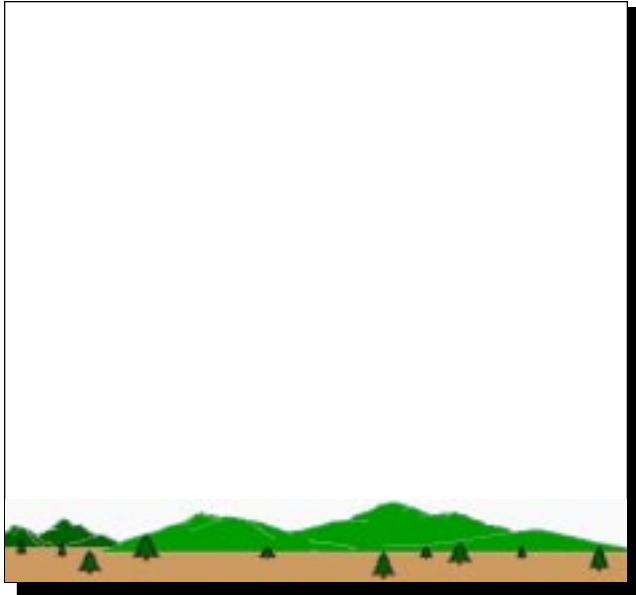


Locations of the five most visible planets for the next year (5b)	M	V	M	J	S
2005 June					
July					
August					
September					
October					
November					
December					
2006 January					
February					
March					
April					
May					
June					
July					
August					

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July					
August					

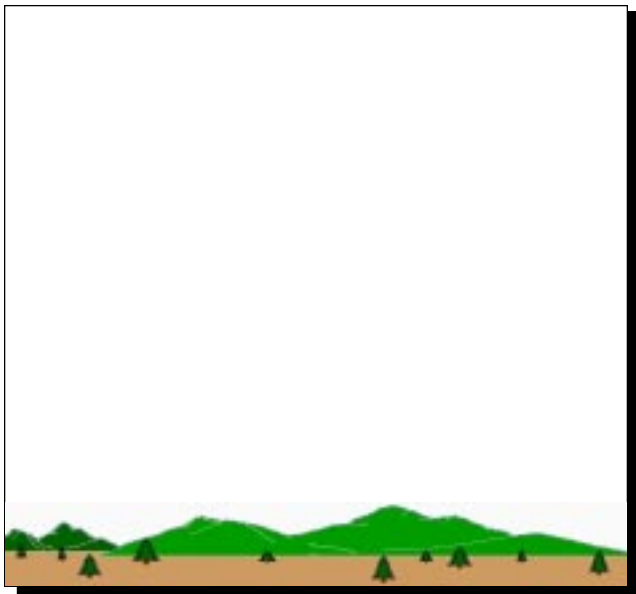
PLANET MOVEMENTS (6)

At approximately weekly intervals, sketch the position of Venus, Mars or Jupiter in relation to the stars. Do this for at least **four weeks** and at the *same time of night*. On your sketch, record the **date** and **time** next to the planet's position. Use your sketch to explain how planets move.



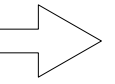
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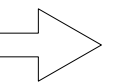
- c. Plan and host a star party for your Scout troop or other group such as your class at school. Use binoculars or a telescope to show and explain celestial objects to the group.
- d. Help an astronomy club in your community hold a star party that is open to the public.
- e. Personally take a series of photographs or digital images of the movement of the Moon, a planet, an asteroid or meteoroid, or a comet. In your visual display, label each image and include the date and time it was taken. Show all positions on a star chart or map. Show your display at school or at a troop meeting. Explain the changes you observed.

Use the next page to make your log or notebook for your project if you do option 9a or 9b.



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PROJECT (9)

Do **ONE** of the following:

☐ a. Visit a planetarium or astronomical observatory. Submit a written report, a scrapbook, or a video presentation afterward to your counselor that includes the following information:

1. Activities occurring there
2. Exhibits and displays you saw
3. Telescopes and instruments being used
4. Celestial objects you observed.

☐ b. Plan and participate in a three-hour observation session that includes using binoculars or a telescope. List the celestial objects you want to observe, and find each on a star chart or in a guidebook. Prepare an observing log or notebook. Show your plan, charts, and log or notebook to your counselor before making your observations. Review your log or notebook with your counselor afterward.

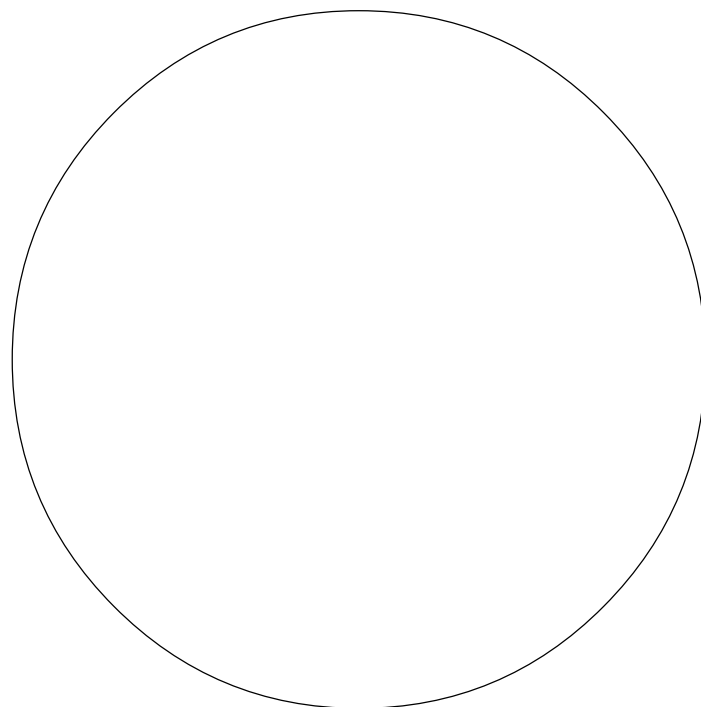
**PROJECT (9)**

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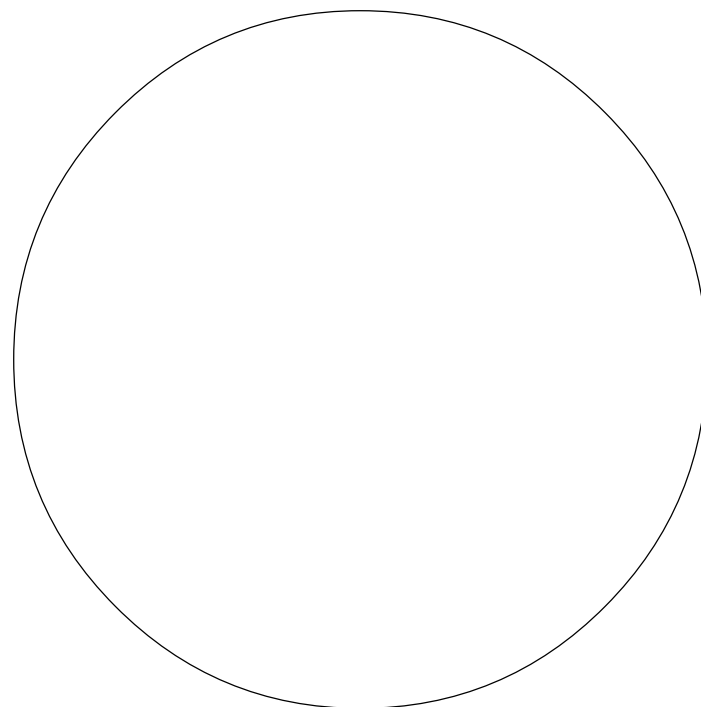
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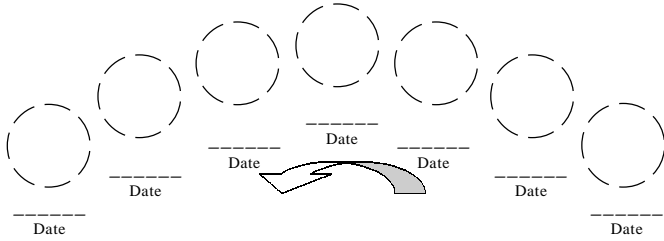
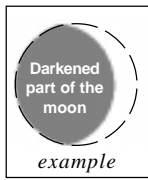
**THE MOON (7)**

a. Sketch the face of the moon and indicate *at least five* (5) seas and *five* (5) craters. **Label** these landmarks.

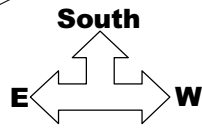
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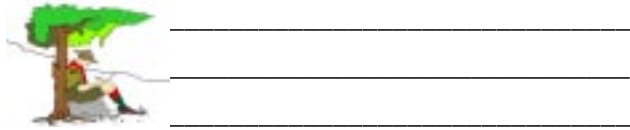
b. Sketch the phase and the daily position of the Moon at the same hour (time: _____) and place, for a week. Include landmarks on the horizon such as hills, trees, and buildings.



<Sketch Landmarks>



What changes did you observe? _____



STAR COLORS (8)

b. Identify at least one red star, one blue star, and one yellow star (other than the Sun). Explain the meaning of these colors. (Draw lines to match star colors with their meanings and earthly examples.)



Name a blue star:



Name a yellow star:



Name a red star:

Very large,
low temperature

Average size
and temperature

Usually small,
extremely hot

Very old

Young in
age

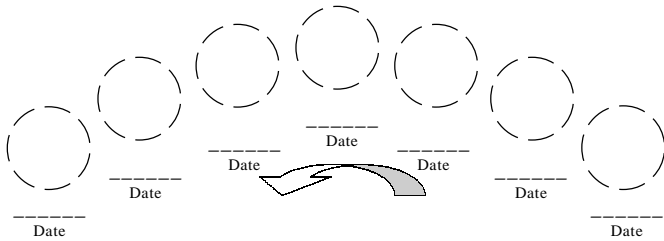
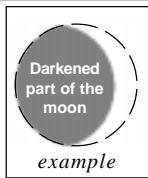
Middle
age

Like hot coals
in a fire

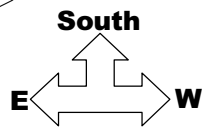
Like a large
bonfire

Like a bright
welder's torch

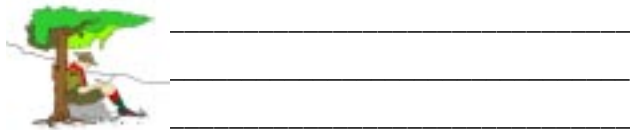
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SUN PROPERTIES (8)

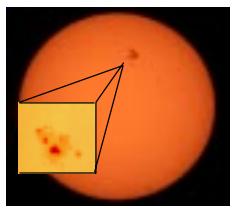
a. What is the sun composed of? _____

How does our sun compare to other stars? _____

How does the sun's radiation effect the Earth's weather? _____

What are sunspots? _____

Describe some of the effects sunspots may have on solar radiation. _____



SUN PROPERTIES (8)

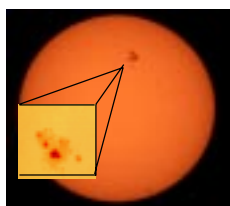
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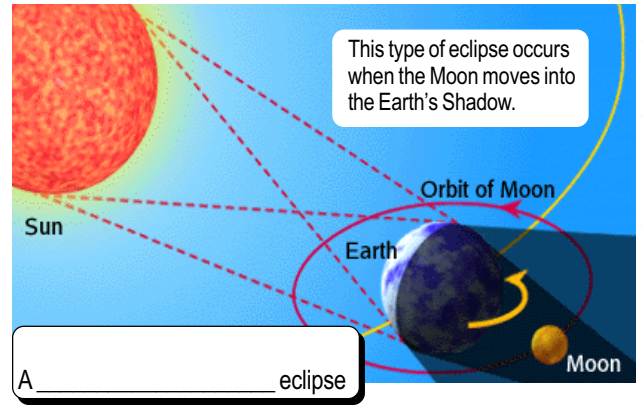
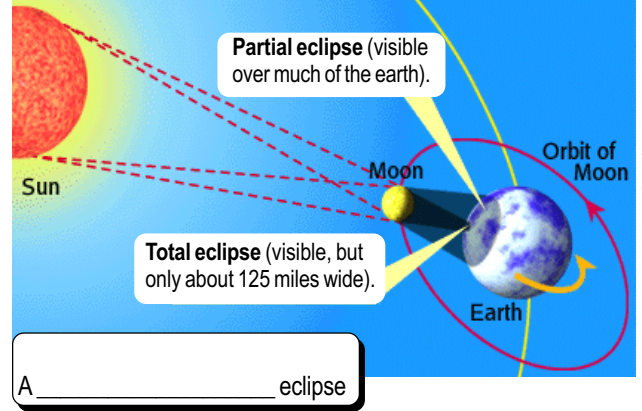
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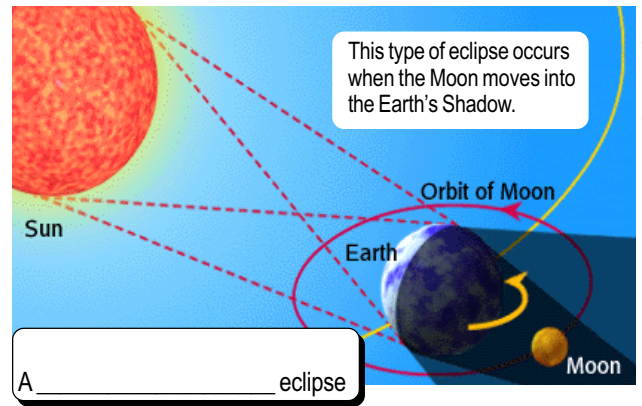
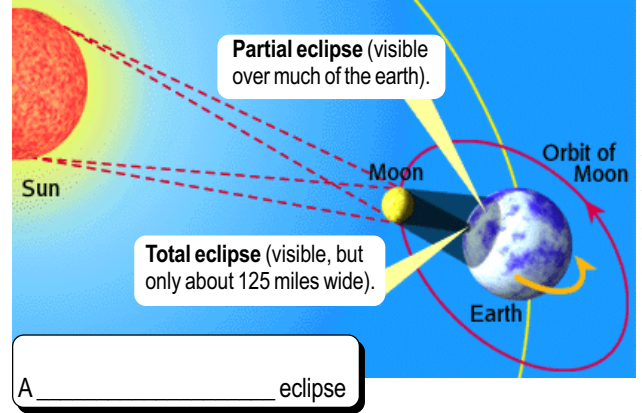


d. Eclipses

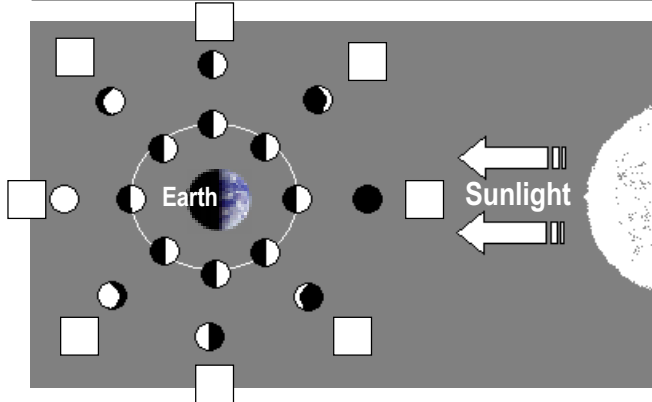


http://spaceboy.nasa.gov/jp/note/tentai/e/ten08_e.html

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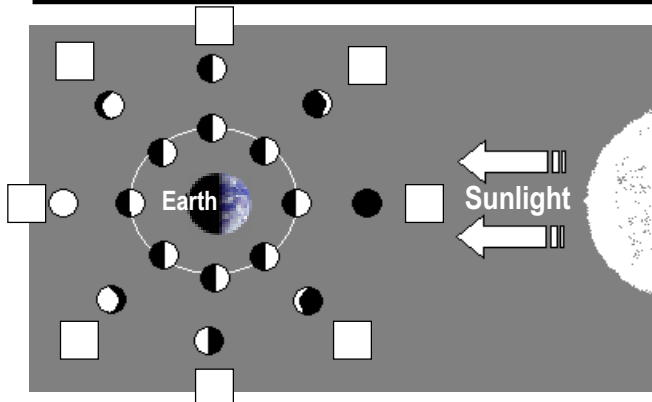


Explain the relative positions of the sun, earth, and moon at the times of new, first quarter, full, and last quarter phases of the moon (fill in boxes with the numbers at the right).

c. What keeps the moon in orbit around the Earth?



G _____ + I _____ = C _____ Force



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MOON PHASES (7d cont.)

- 1) Waxing Crescent
- 2) Waning Crescent
- 3) First Quarter
- 4) Third Quarter
- 5) Waning Gibbous
- 6) Waxing Gibbous
- 7) New Moon
- 8) Full Moon

(may be used more than once!)

Waxing means _____ aring
 Waning means _____ autious
 Crescent means _____ than half (1/2) showing
 Gibbous means _____ than half (1/2) showing

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