

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 |

This passport belongs to:



© 2000 Kerry Rasmussen, Mr. R.
 (revised 2005)



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 belt lie the twelve common constellations of the zodiac: *Pisces, Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpius, Sagittarius, Capricornus, Aquarius.*

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 |

This passport belongs to:



© 2000 Kerry Rasmussen, Mr. R.
 (revised 2005)



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 belt lie the twelve common constellations of the zodiac: *Pisces, Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpius, Sagittarius, Capricornus, Aquarius.*

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).

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).

CHECK-OFF LIST

Check each requirement as you passed it off to your merit badge counselor or instructor:

All 1

All 2

All 3a, 3b, 3c

All 4a, 4b, 4c, 4d

All 5a, 5b

All 6

All 7a, 7b, 7c, 7d

All 8a, 8b

Do **ONE** 9a, 9b, 9c, 9d, 9e

All 10

CHECK-OFF LIST

Check each requirement as you passed it off to your merit badge counselor or instructor:

All 1

All 2

All 3a, 3b, 3c

All 4a, 4b, 4c, 4d

All 5a, 5b

All 6

All 7a, 7b, 7c, 7d

All 8a, 8b

Do **ONE** 9a, 9b, 9c, 9d, 9e

All 10

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 |

heat exhaustion (Body encounters excessively high temperatures that it can't manage. Body temperatures that are very high, but usually less than 104°F.) *Symptoms: Signs of dehydration, weakness, headache, and nausea.*

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



stings (Bees, ants, etc.) In some people this can be life threatening! *Symptoms: Puncture wound, red spots, swelling, usually accompanied with pain or itching.*

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.*

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 |

heat exhaustion (Body encounters excessively high temperatures that it can't manage. Body temperatures that are very high, but usually less than 104°F.) *Symptoms: Signs of dehydration, weakness, headache, and nausea.*

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



stings (Bees, ants, etc.) In some people this can be life threatening! *Symptoms: Puncture wound, red spots, swelling, usually accompanied with pain or itching.*

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.*

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. _____

Denebula

M65

M66

Regulus

The Lion (Leo)

M44

The Crab (Cancer)

NGC 3628

M66

M65

The Leo Triplet

Pollux

Castor

The Twins (Gemini)

Magnitude 0 1 2 3 4 5

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. _____

Denebula

M65

M66

Regulus

The Lion (Leo)

M44

The Crab (Cancer)

NGC 3628

M66

M65

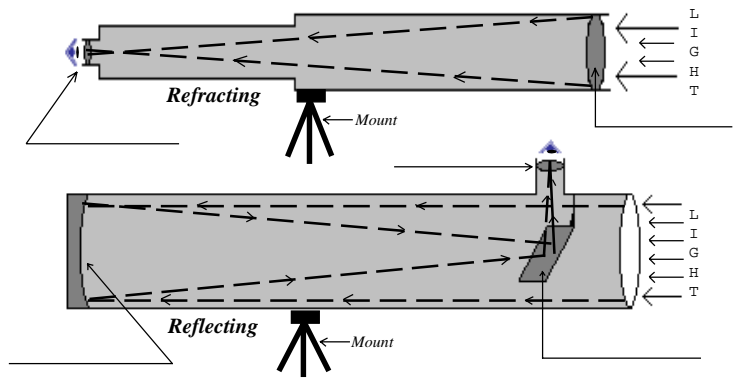
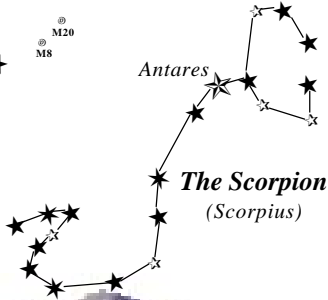
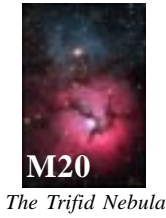
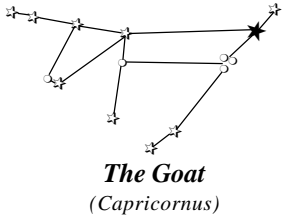
The Leo Triplet

Pollux

Castor

The Twins (Gemini)

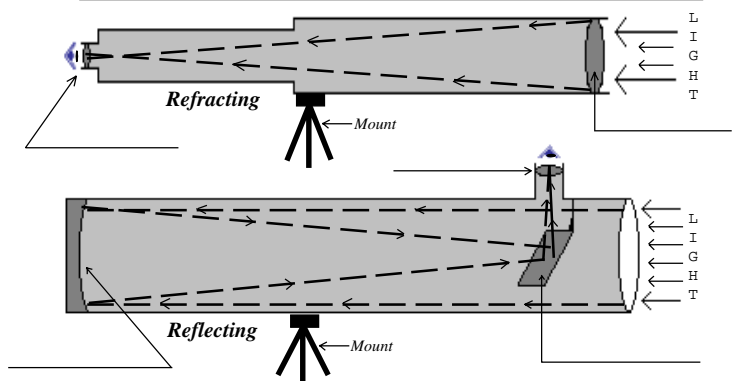
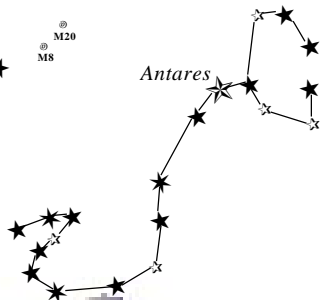
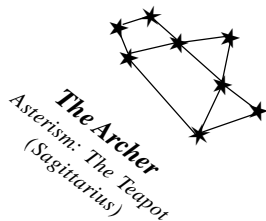
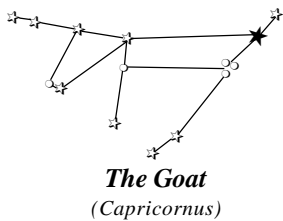
Magnitude 0 1 2 3 4 5



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 |
|------------|---------|
| | |
| | |
| | |



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

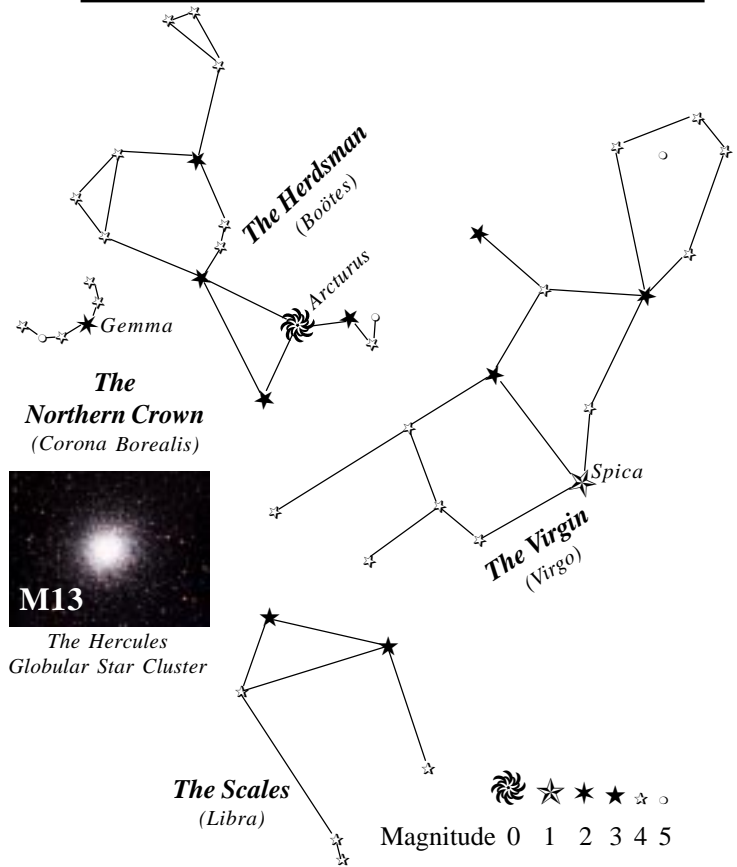
c. Explain the purposes of at least three instruments used with astronomical telescopes.

| Instrument | Purpose |
|------------|---------|
| | |
| | |
| | |

CONSTELLATIONS (4a)

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.

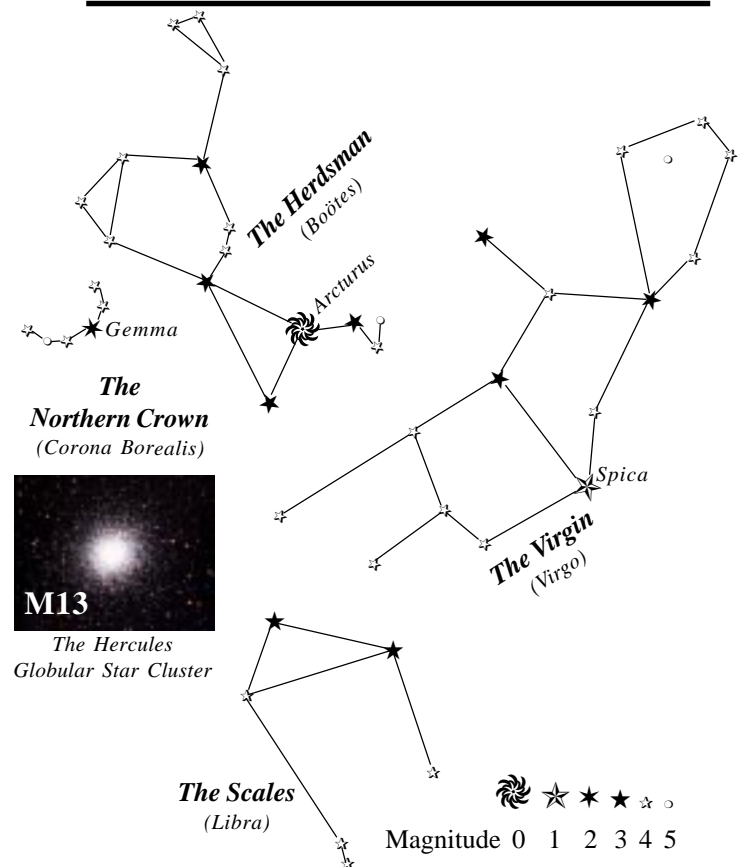
- * **GREAT BEAR** *Ursa Major {The Big Dipper}*
 - * **LITTLE BEAR** *Ursa Minor, The Little Dipper*
 - * **DRAGON** *Draco*
 - * **The "W"** *Cassiopeia, The Queen*
 - KING** *Cepheus*
 - ANDROMEDA**
 - PERSEUS**
 - * **SWAN** *Cygnus, The Northern Cross*
 - * **EAGLE** *Aquila*
 - HARP** *Lyre*
 - 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; z denotes part of the Zodiac)

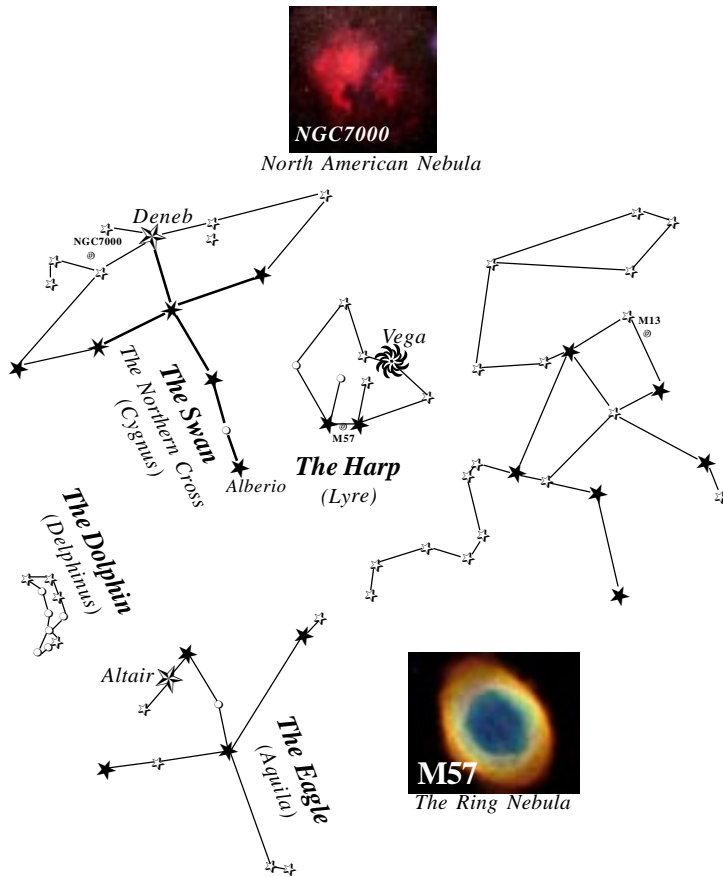


CONSTELLATIONS (4a)

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.

- * **GREAT BEAR** *Ursa Major {The Big Dipper}*
 - * **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; z denotes part of the Zodiac)

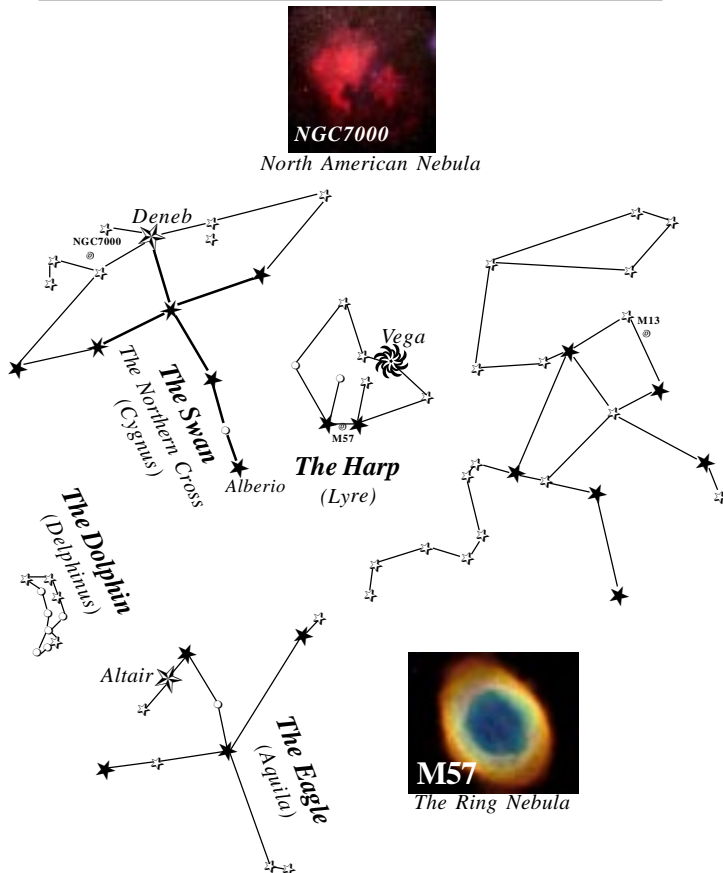




STARS (4b)

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)

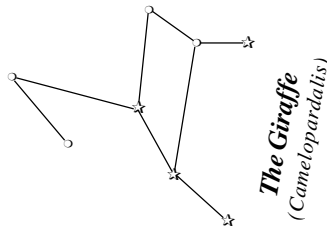
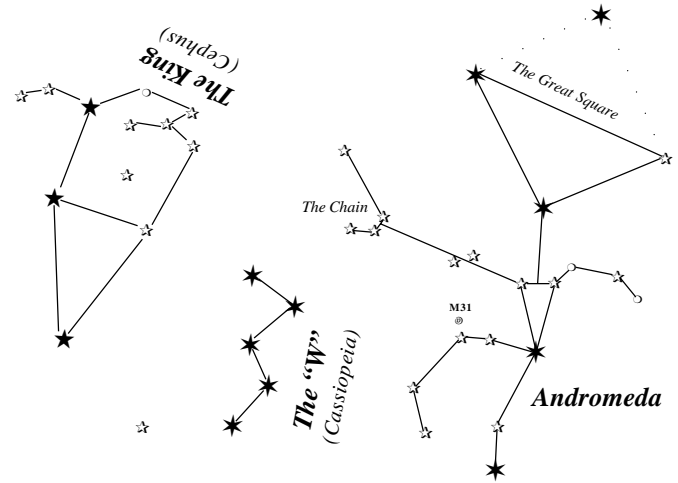
These stars can be seen during the summer. You are required to **point out and name eight (8) stars** of which **5** must be **1st** magnitude or higher (the bold number following a star's name is its apparent magnitude). Also identify at least one star that is **blue**, one that is **red**, and one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

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)
★



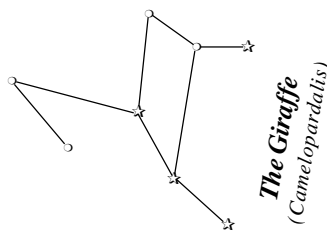
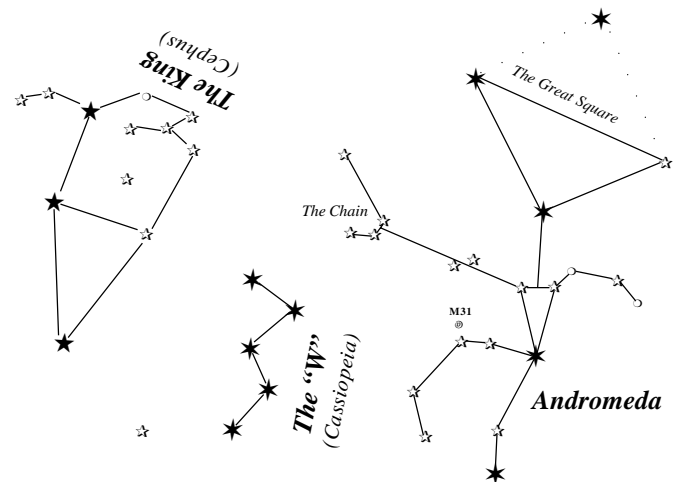
M31
The Andromeda Galaxy

★ ★ ★ ★ ★ ○
Magnitude 0 1 2 3 4 5

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)
★

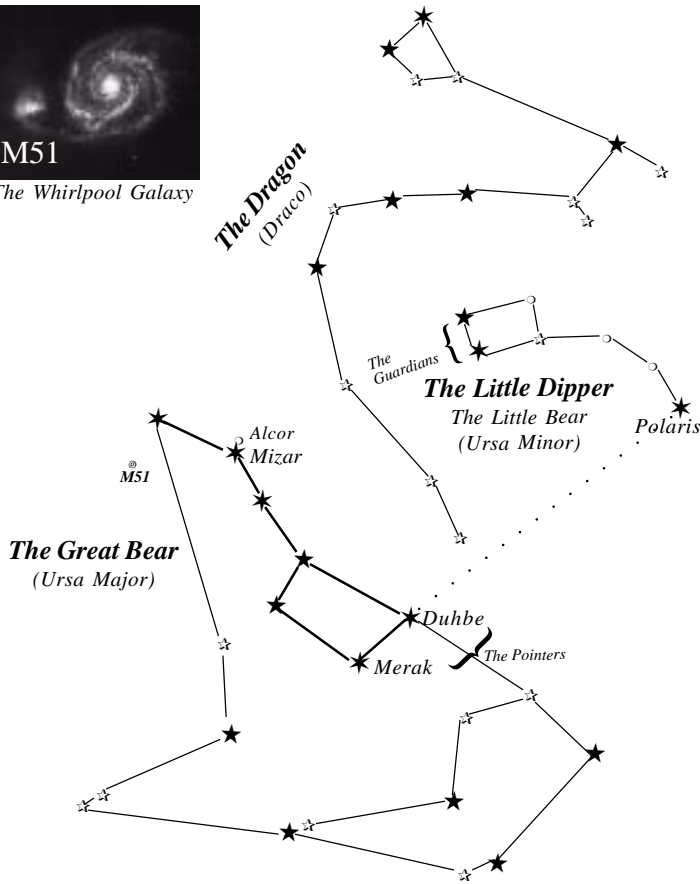


M31
The Andromeda Galaxy

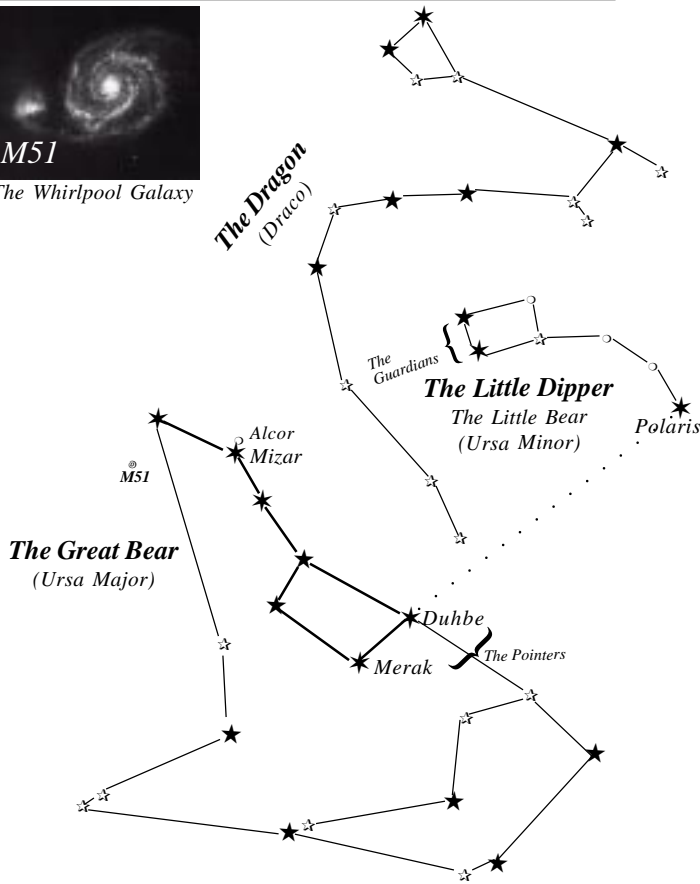
★ ★ ★ ★ ★ ○
Magnitude 0 1 2 3 4 5



M51
The Whirlpool Galaxy

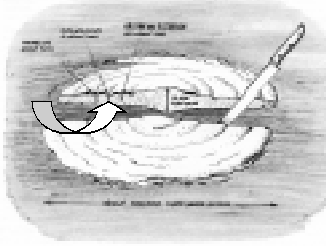


M51
The Whirlpool Galaxy



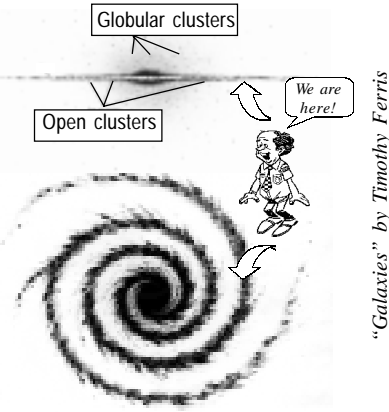
THE MILKY WAY (4d)

"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 two-thirds out from the center. When we see the Milky Way in the

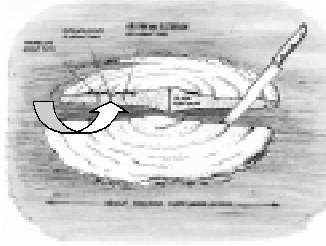
night sky, we are looking *sideways* through the galaxy, and we see millions of stars, open star clusters, and nebulae. When we look away from the Milky Way we see far fewer stars, but we can see a number of globular star clusters (groups of stars that never were drawn into the swirl of the Milky Way).



"Galaxies" by Timothy Ferris

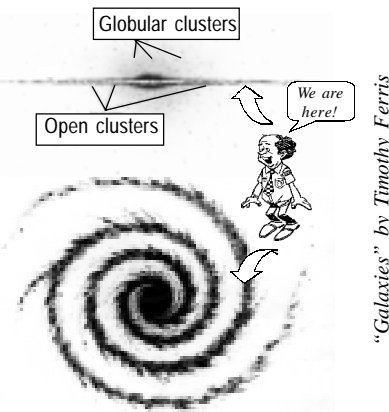
THE MILKY WAY (4d)

"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 two-thirds out from the center. When we see the Milky Way in the

night sky, we are looking *sideways* through the galaxy, and we see millions of stars, open star clusters, and nebulae. When we look away from the Milky Way we see far fewer stars, but we can see a number of globular star clusters (groups of stars that never were drawn into the swirl of the Milky Way).



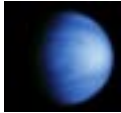
"Galaxies" by Timothy Ferris

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**)



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 |
|---------------------|------------------------|
| | |
| | |
| | |

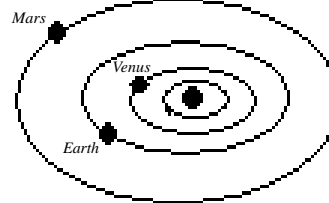
Explain why: _____

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**)



FYI

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 in the middle, **mother**; and the waning moon on the right, **crone**.



The Scorpion contains the star **Antares**, 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 20,000 mph. In order for us to reach the nearest star, Alpha Centari (4½ light years away), it would take us about 91,500 years--and that's one way!



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

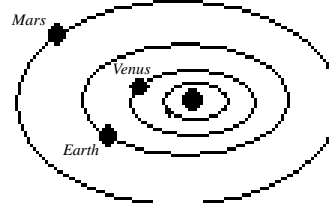


The companion star to Sirius is a white dwarf (a star that has imploded). It weighs about 2½ tons per cubit inch!



FYI

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 in the middle, **mother**; and the waning moon on the right, **crone**.



The Scorpion contains the star **Antares**, 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 20,000 mph. In order for us to reach the nearest star, Alpha Centari (4½ light years away), it would take us about 91,500 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!



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:



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:

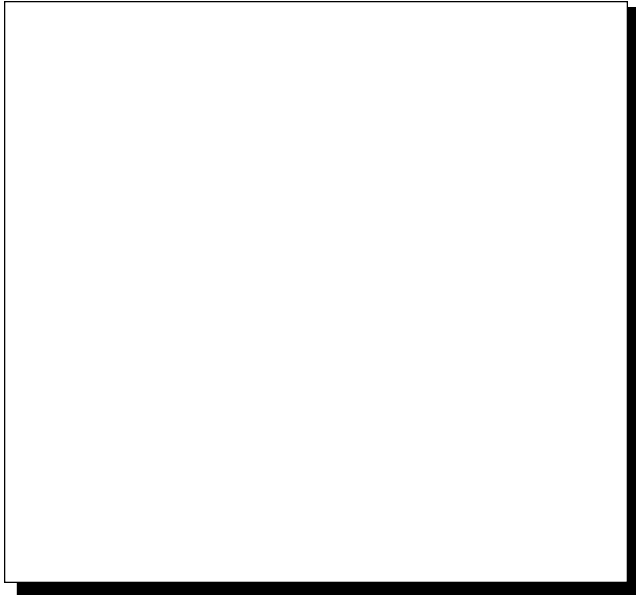


| Locations of the five most visible planets for the next year (5b) | M | V | M | J | S |
|---|---|---|---|---|---|
| 2005 June | | | | | |
| July | | | | | |
| August | | | | | |
| September | | | | | |
| October | | | | | |
| November | | | | | |
| December | | | | | |
| 2006 January | | | | | |
|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

| 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 | | | | | |

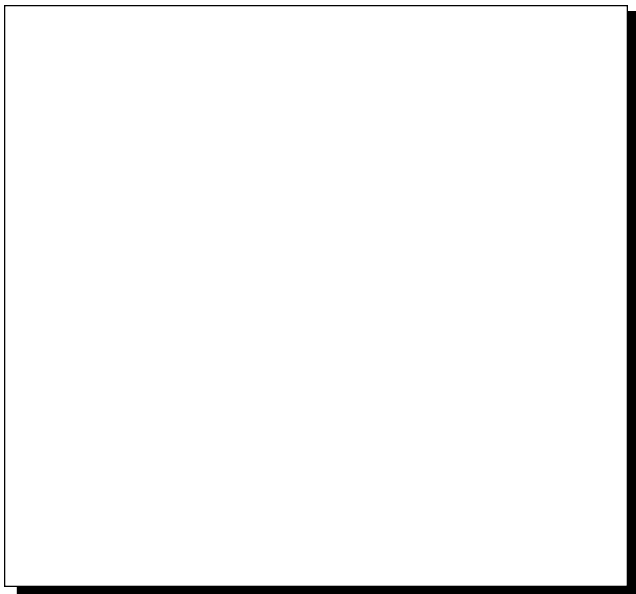
PLANET MOVEMENTS (6)

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.



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.



- 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.



- 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.



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)

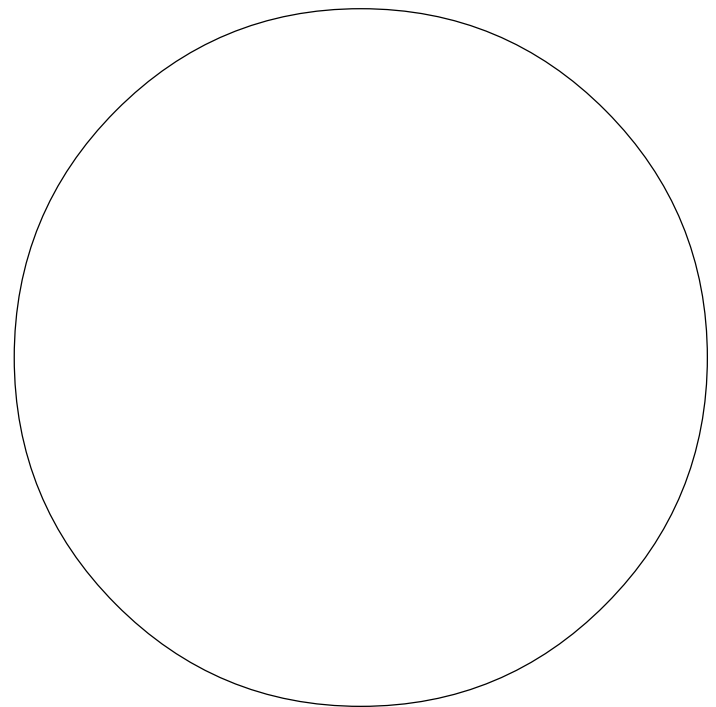
Do **ONE** of the following:

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:

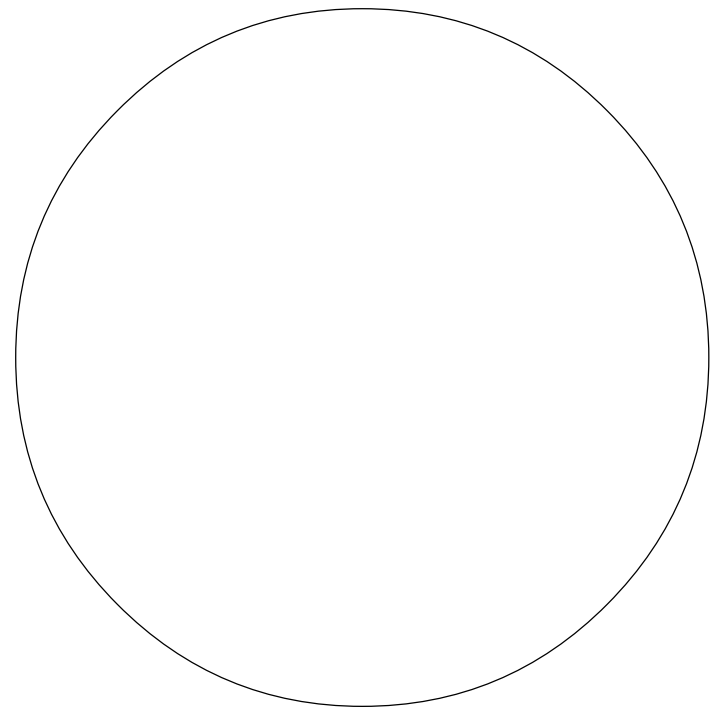


1. Activities occurring there
2. Exhibits and displays you saw
3. Telescopes and instruments being used
4. Celestial objects you observed.

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.

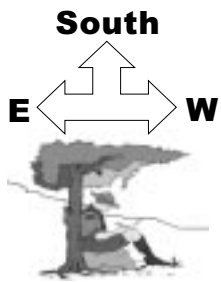
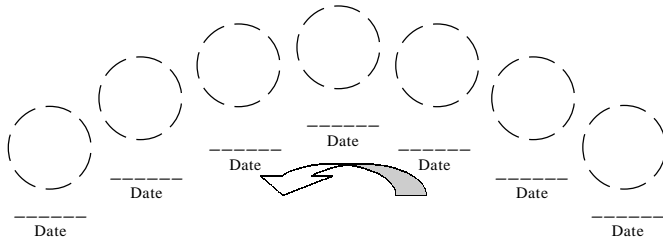
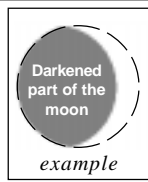
THE MOON (7)

7a. Sketch the face of the moon and indicate *at least* five (5) seas and five (5) craters. **Label** these landmarks.

THE MOON (7)

7a. Sketch the face of the moon and indicate *at least* five (5) seas and five (5) craters. **Label** these landmarks.

7b. 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.



<Landmarks>

What changes did you observe?

STAR COLORS (8b)

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:

Very large,
low temperature

Average size
and temperature

Usually small,
extremely hot



Name a yellow star:

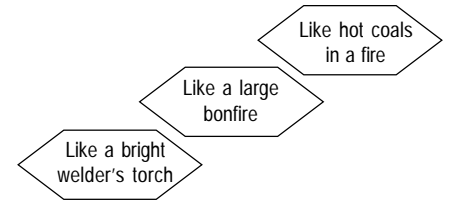
Middle
age

Young in
age

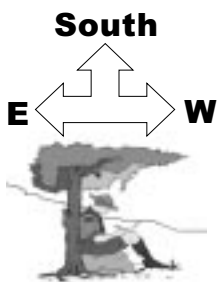
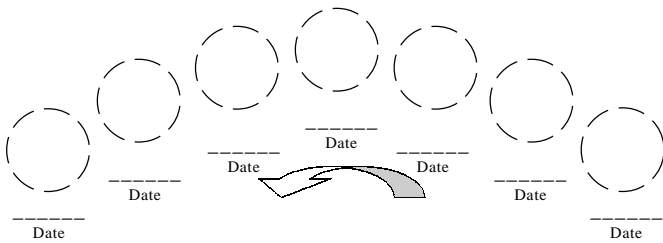
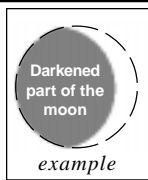
Very old



Name a red star:



7b. 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.



<Landmarks>

What changes did you observe?

STAR COLORS (8b)

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:

Very large,
low temperature

Average size
and temperature

Usually small,
extremely hot

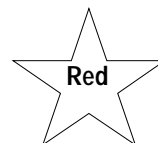


Name a yellow star:

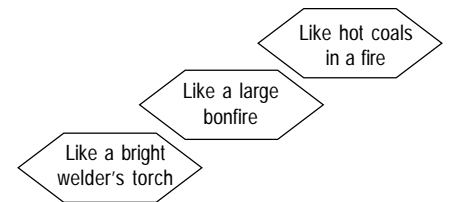
Middle
age

Young in
age

Very old



Name a red star:



SUN PROPERTIES (8a)

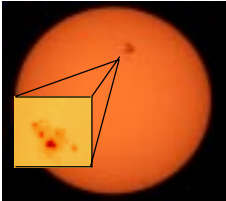
What is the sun composed of? _____

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 (8a)

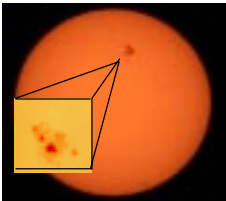
What is the sun composed of? _____

How does our sun compare to other stars? _____

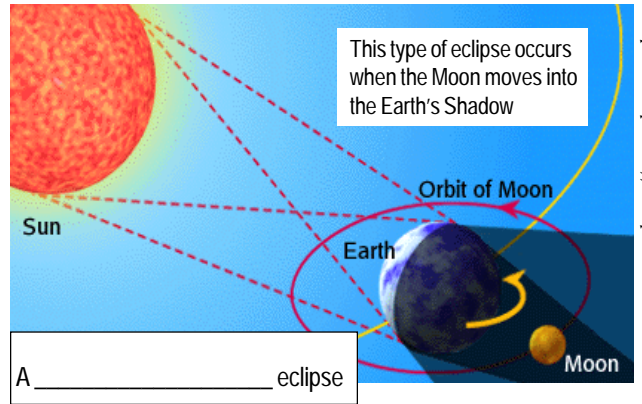
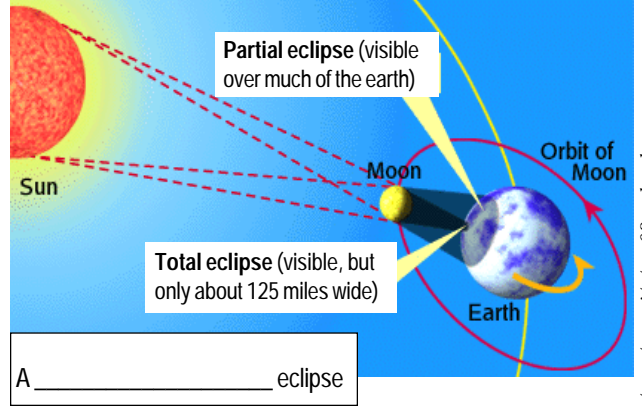
How does the sun's radiation effect the Earth's weather? _____

What are sunspots? _____

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

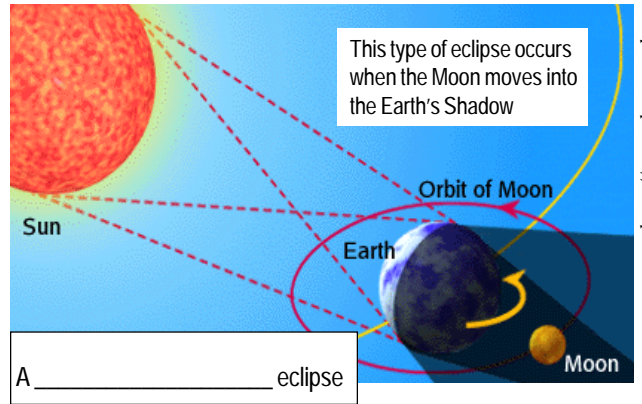
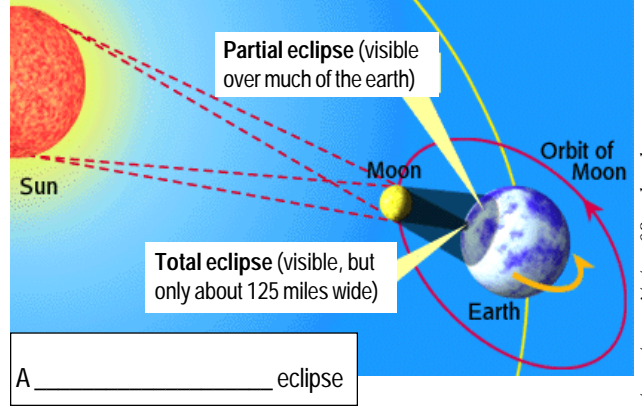


7d. Eclipses



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

7d. Eclipses



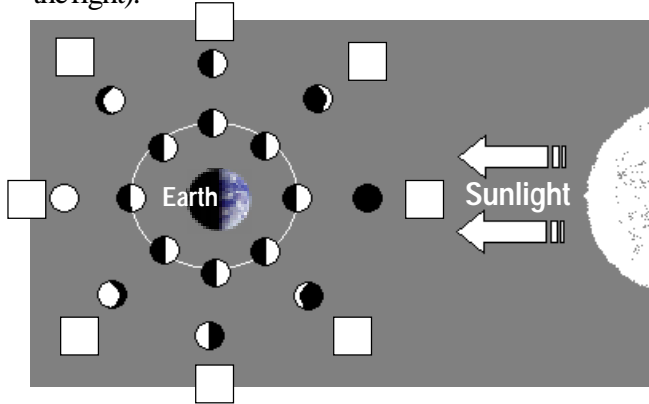
http://spaceboy.nasa.gov/jp/note/tentai/e/ten08_e.html

7c. What keeps the moon in orbit around the Earth?



G _____ + I _____ = C _____ Force

7d (cont). 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 (use numbers to the right).

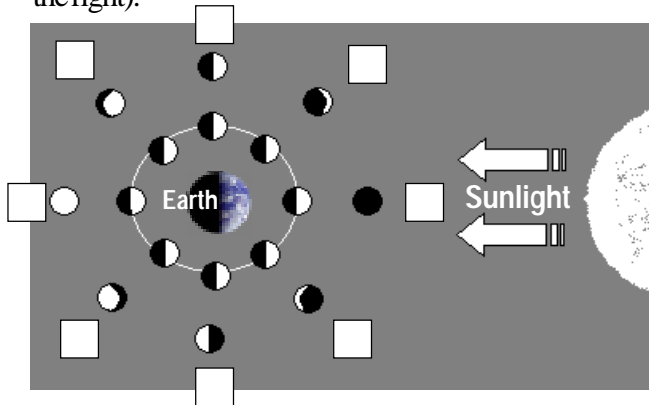


7c. What keeps the moon in orbit around the Earth?



G _____ + I _____ = C _____ Force

7d (cont). 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 (use numbers to the right).



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
Cresant means _____ than half (1/2) showing
Gibbous means _____ than half (1/2) showing

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