

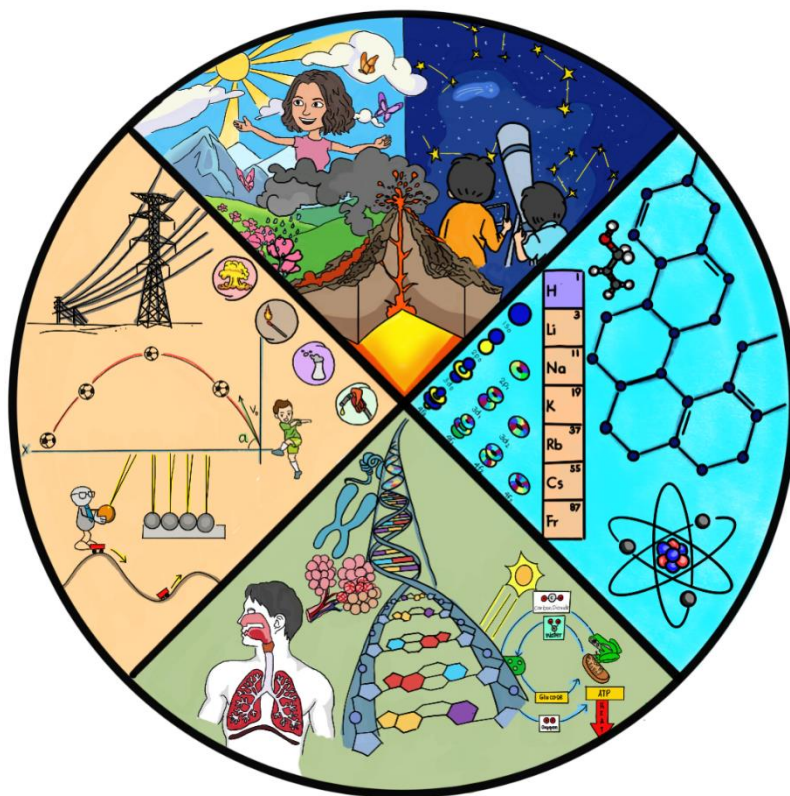
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Department of Education
National Capital Region
SCHOOLS DIVISION OFFICE
MARIKINA CITY

Science

Quarter 3 - Module 6

Constellations

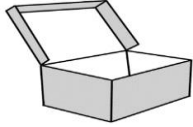


Alma L. Aparece
Catherine C. Balanga



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What I Need to Know

The purpose of this module is to help you know more about star patterns called constellations. This will provide you a better grasp on how the earth's position along its orbit is related to the constellations visible in the sky at different times of the year.

The module contains the following lessons:

Lesson 1- Characteristics Stars and Constellations

Lesson 2- Constellations

After going through this module, you are **expected to show which constellations may be observed at different times of the year using models.**
S9ES-III-f-35

Specifically, you are expected to:

- describe stars and constellations;
- describe the apparent movement of the stars in the sky; and
- explain why some constellations are not seen at certain months



What I Know

Read each question carefully and encircle the letter of the correct answer.

1. It is an astronomical object consisting of luminous spheroid of plasma held together by its own gravity.
A. Planet B. Moon C. Star D. Asteroid
2. A group of visible stars that form a pattern when viewed from earth.
A. Constellation B. Solar system C. Nebula D. Satellite
3. The motion of the stars that you see over several weeks or months is due to _____.
A. The earth orbiting the sun.
B. The earth rotating on its axis.
C. The changes in the position of the sun.
D. The changes in the location of earth's moon.



- How do stars appear to move in the night sky?
 - From east to west
 - From north to south
 - From west to east.
 - From south to north.
- Which of the following is the most alarming effect brought by global warming?
 - climate change
 - deforestation
 - pollution
 - rising temperature
- Which constellation indicates that the cold season is coming in the northern hemisphere?
 - Andromeda
 - Lynx
 - Orion
 - Ursa Major
- Why can we see different parts of the sky at different times of the year?
 - Due to the rotation of the earth
 - Due to the revolution of the earth
 - Due to the tilt of the earth's axis
 - Due to the revolution of the moon
- Which constellation helps sailors navigate?
 - Pisces
 - Polaris
 - Sagittarius
 - Ursa minor
- What local constellation signifies the start of rainy season in the Philippines?
 - Balara
 - Buwaya
 - Lepu
 - Balatik
- Constellations may only be visible during certain seasons due to the earth's orbit around the _____.
 - Earth
 - Mars
 - Planets
 - Sun



Lesson 1

Characteristics of Stars and Constellations



What's In

When we look at the night sky, we only see thousands of stars but in reality, there are billions of them in the sky. Let us recall how much you know about a star. Write your answer on the space provided.

Astronomy	Constellation	Galaxy
Gases	Solar System	Star

1. A star begins as _____.
2. A gravitationally bounded system of stars is called _____.
3. A hot glowing ball of gases is called _____.
4. Earth Science that deals with the study of stars is _____.
5. Group of stars that form patterns are called _____.



What's New

Stargazing is one of the best learning activities during summer when the sky is clear. Let's recount how much you remember about the stars in the following activity.

Characteristics of Stars



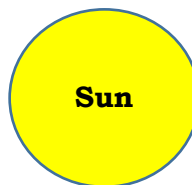
Aludra

Blue star
Super giant
15, 000 K
2.45
magnitude/
brightest



Sirius

White star
Dwarf star
9,940 K
-1.46
magnitude/
brighter



Sun

Yellow star
Giant star
5,778 K
-26.74
magnitude/
dimmer



Betelguese

Red star
Super Giant star
3,500 K
0.58
magnitude/
dimmer



Guide Questions:

1. Why do stars differ in colors??

2. How does a stars' brightness related to its distance from earth?

3. Why is the sun considered as the brightest star from Earth?

4. Do stars have different chemical composition? Why do you think so?

5. In your own words, describe a star.



What Is It

Star is a large ball of glowing hot plasma in space held by its own gravity. The nearest star to Earth is the sun. Many other stars are visible to the naked eye at night, but due to their distance from Earth they appear as fixed points of light in the sky. They are made mostly of hydrogen and helium that produce light and heat from the churning nuclear furnace inside their cores. Characteristics used to classify stars include **color**, **temperature**, **size**, and **brightness**.

Star Sizes. Stars come with different sizes which ranges from super giant stars to white dwarf stars. Neutron stars can be 20 to 40 km in diameter, whereas white dwarf stars can be very similar to the size of the Earth which has a diameter of 12, 742 km. Super giants can be more than 1500 times larger than our Sun.

Star Temperature. The temperature of a star ranges from 2000 K to over 40,000 K. The sun has a surface temperature of approximately 5,778 K.

Star Color. The temperature of a star is indicated by its color. Blue or blue white stars are the hottest while red stars are the coolest.

Star Brightness. The brightness of a star depends on its composition and how far it is from the planet. Astronomers define star brightness in terms of



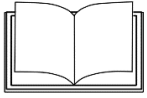
apparent magnitude (how bright the star appears from Earth) and absolute magnitude (how bright the star appears at a standard distance of 32.6 light-years). The apparent magnitude of star ranges from a magnitude of 1 to 6. A magnitude of one (1) is equal to a brightness factor of 2.512 times dimmer. The higher the magnitude, the dimmer the star. The luminosity of stars measures the light energy being emitted by the star over a period of time.

Table 1: Characteristics of Some Stars

Star	Color	Size	Surface Temperature in Kelvin	Apparent Magnitude
Alniam	Blue	Super giant	27,000	1.7
Sirius	White	dwarf	10,000	-1.46
Sun	Yellow	giant	5,700	-26.74
Epsilon Eridani	Orange	dwarf	4,600	3.73
Proxima Centuari	Red	dwarf	2, 300	11.05
KY Sagittarii	Red	Super Giant	3,720	1.43
Gamma Crucis	Red	Giant	3,626	1.63

Constellation is from the Latin word *cōstellātiō* which means “set of stars”. There are 88 constellations recognized by the International Astronomical Union. These constellations are divided into three types, circumpolar, zodiacal and seasonal. Circumpolar constellations can be seen year-round and never disappear like the Polaris, Ursa Major, Ursa minor, Draco the dragon, and Cassiopeia the Queen. In the Philippines, constellations have local names such as Baha for Taurus; Pandawara for Pleiades; Balatik for Orion, Gibbang for Gemini; Malara for Canis Minor; Lepu for Aquila and Buwaya which signifies the start of the rainy season during the month of June.



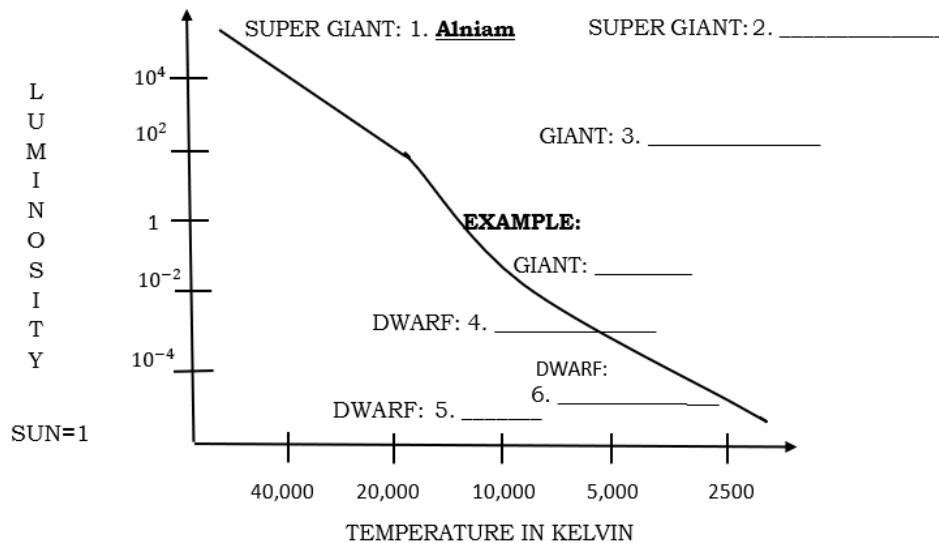


What's More

Activity: Characteristics of a Star

Objective: Describe the characteristics of stars

What to do: Refer to table 1 “Characteristics of Some Stars” in answering the activity. Given the star’s luminosity and temperature, write the name of the star being identified on the space provided. The first one is done for you



What I Have Learned

Star color ranges from red to blue and indicates its surface temperature. Rank the stars according to **increasing temperature** by writing numbers 1 to 5 (1 being the lowest).

Stars	Color	Approximate Temperature in Kelvin	Rank of stars based on increasing temperature
Vega	White	7,500 - 10,000	
Sun	Yellow	5,000- 6,000	
Proxima Centuan	Red	2,000 - 3,600	
Rigel	Blue	11,000- 28,000	
Hamal	Orange	3,600 - 4000	





What I Can Do

Activity: Which Stars are the Brightest in the Sky?

The apparent magnitude of a star is a measure of its brightness as it is seen in the sky. The table below shows the stars in the constellation Canis Major and their apparent magnitude.

NAME OF STAR	APPARENT MAGNITUDE
Sirius	-1.5
Adhara	1.5
Murzim	2.0
Aludra	2.5
Wezen	1.8

1. Which star is the brightest? Why?

2. Which star is the dimmest? Why?

3. Arrange the stars on the table based on its apparent magnitude. Start from the highest to the lowest.

1. _____
2. _____
3. _____

4. _____
5. _____



Assessment

Read each question carefully and encircle the letter of the correct answer.

- A star is a glowing ball of hot _____.
A. Dust B. Metal C. Liquid D. Gas
- The following are reasons on why stars are important, **EXCEPT**.
A. Source of energy C. Navigation
B. Ocean Tides D. Telling time and season
- Which constellation located on the North pole help sailors in their navigation?
A. Orion B. Polaris C. Pisces D. Lynx



4. The difference in apparent magnitude and absolute magnitude is due primarily to the star's _____.
 A. Diameter
 B. Surface temperature
 C. Distance from earth
 D. Motion through the universe
5. Which characteristic of a star tells us its composition?
 A. Absolute magnitude
 B. Apparent magnitude
 C. Luminosity
 D. Spectrum



Additional Activities

Constellations have practical uses in agriculture, navigation, human behavior, and religion. Based on what you have learned create and draw your own constellation. State the meaning and significance of your created constellation.

CATEGORY	4	3	2	1
Presentation	The drawing clearly communicates the main idea and strongly promotes awareness.	The drawing communicates some of important ideas and slightly promotes awareness.	The drawing indirectly communicates the idea and hardly promotes awareness.	The drawing do not sufficiently communicate any idea that can promote awareness.
Creativity and Originality	All the drawing reflects an exceptional degree of student ingenuity in their creation.	Most of the drawing reflect student ingenuity in their creation.	The drawing is made by the student but were copied from the designs or ideas of others.	The drawing is not made by the student.
Required Elements	The drawing includes all required significances as well as additional information.	All required significances are included.	Few required significances are included.	Required significances are missing.



Lesson 2

Characteristics of Stars and Constellations



What's In

Identify and write the name of the constellation shown below.



1. _____



2. _____



3. _____

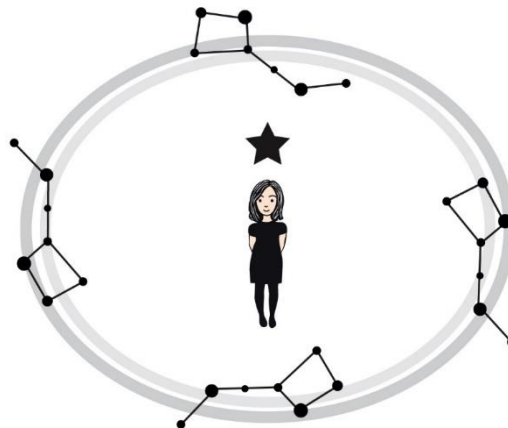


4. _____



What's New

The illustration below shows the position of the big dipper at different times of the year.



Guide Questions:

1. Describe the position of the big dipper at different times of the year?
2. Why is the big dipper seen in different positions at different times of the year?





What Is It

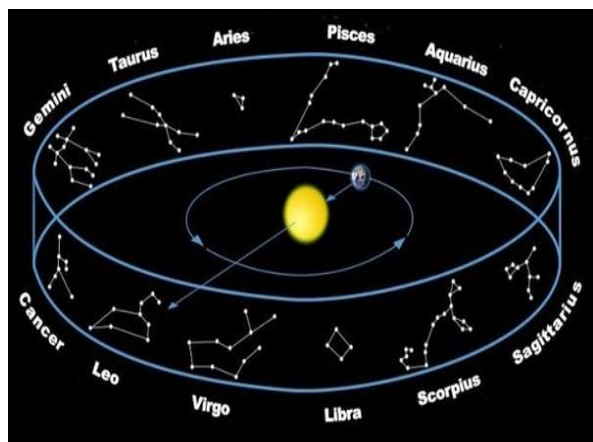


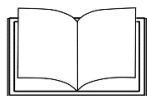
Figure 1. Constellations

<http://bit.ly/30swBEI>

versa. Observers near the equator will gradually see most of the constellations in the sky at different times of the year.

The position of the constellations changed due to the rotation of the Earth to its axis and its revolution around the sun. The star rises at the East and moves like the sun from West to East. This apparent motion of stars in reference to an observer is caused by the rotation and revolution of the Earth

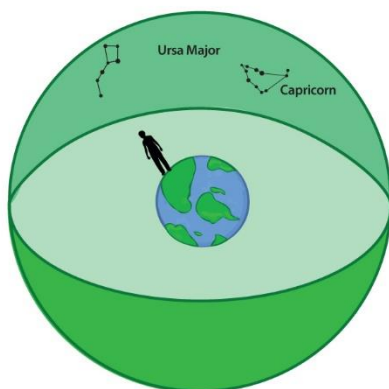
The observed position of a constellation depends on the observer's location. Constellations in the northern hemisphere are not visible to observers in the southern hemisphere or vice



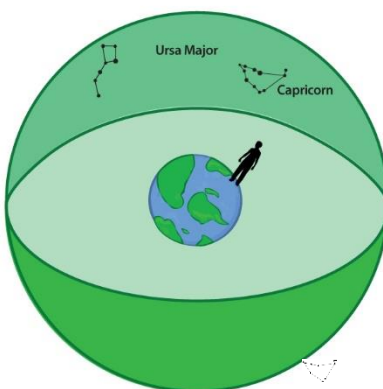
What's More

Activity: Position of constellation

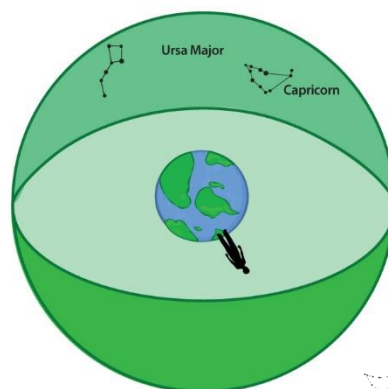
Situation A: You and your friends are in different parts of the world observing constellations at the same day and time at night.



Friend A
(North Pole)



You
(Equator)



Friend B
(South Pole)



Guide Questions:

1. What are the constellations visible near the Equator?

2. What constellations are visible to friend A?

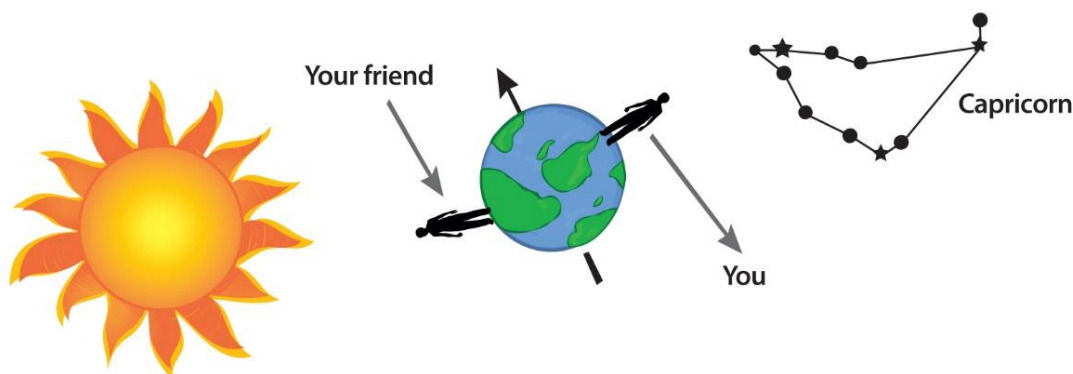
3. What constellations are visible to friend B?

4. Why is Ursa Majora not visible to friend B?

5. Why is the Crux not visible to friend A?

6. Why do you see different constellations depending on your location?

Situation B: You and your friend are in the same location on Earth near the Equator but in opposite directions and both of you agreed will observe the position of Capricorn at the same date and time at night in both locations as shown in the diagram below.

**Guide Questions:**

1. Based on the above illustration, will your friend see the constellation Capricorn on his location? Why?

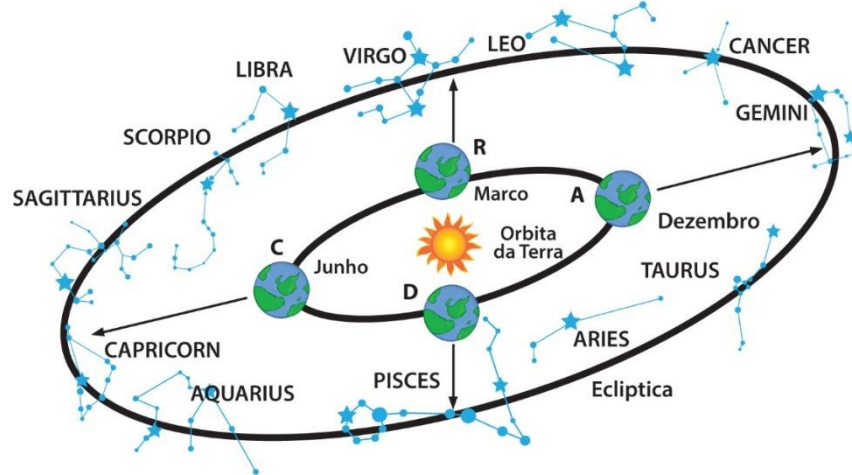
2. Will you be able to see the constellation Capricorn? Why?

3. Will the position of the constellation Capricorn change when your friend observed at night? Why?

4. Why do stars appear to move across the earth?



Situation C: The Earth's Location at Different Times of the Year.



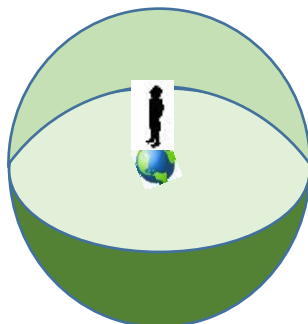
Guide Questions:

1. What is/are the constellation/s visible at location A?
2. Why are constellations Libra and Scorpion not visible at location A?
3. What constellations are possibly visible at location C?
4. Why are some constellations not visible at certain months?

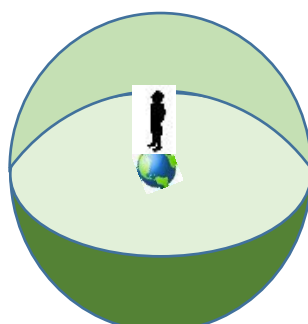


What I Have Learned

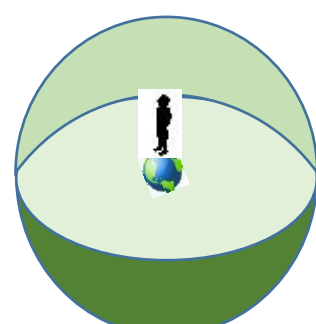
The Taurus constellation or Baha as it is named in the Philippines, signifies the clearing of the forest and is visible from December to February. Draw the position of Baha on the surface of the sphere at different months.



December



January



February



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What I Can Do

Ancient Filipinos use constellations to mark the beginning of different activities. The table below shows how stars and constellations are being related to activities in agriculture.

Philippine constellations	Month of Appearance	Agricultural Activity
1. Sipat and Tudong		Prayers and ritual to bless the rice seedlings
2. Balatik	February	Start of planting and setting of traps to protect the crops from animals
3. Malihe	March	Planting of corn, vegetables, and rice
4. Lepu	Late of May	Time to clean or clear the fields while waiting for harvest time
5. Pandarawa	January	Start of planning what kind of crops to plant and how wide the area for planting should be

Guide Question:

Why did our ancestors used constellations to mark the beginning of different activities?



Assessment

Read each question carefully and encircle the letter of the correct answer.

1. Why do the position of constellations change?
 - A. Because of the changes in the position of the sun
 - B. Because of the changes in the location of earth's moon
 - C. Because of the earth's rotation on its axis
 - D. Because the earth is orbiting around the sun
2. Why are some constellations **NOT** visible in the sky over the course of the year?
 - A. Due to the tilt of the earth's axis
 - B. Due to the revolution of the earth
 - C. Due to the revolution of the moon
 - D. Due to the rotation of the earth

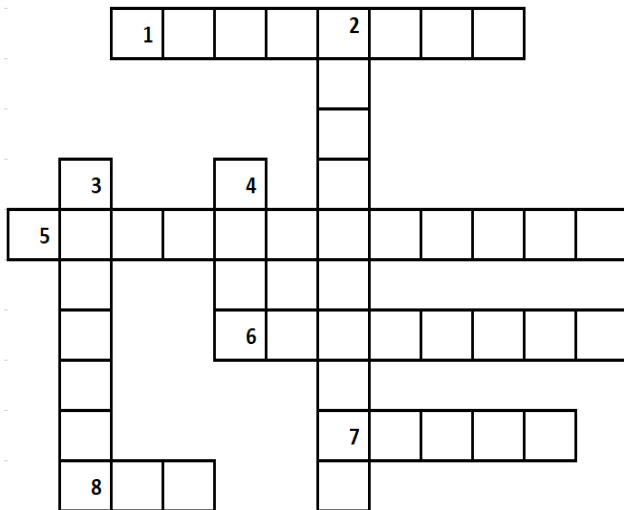


3. Which is **NOT** a significant use of a constellation?
- A. Use for prayers and rituals C. Use for navigation
B. Use for economic progress D. Use for agriculture
4. As the earth rotates on its axis, the constellations and stars appear to _____.
- A. Move across the sky C. Stand still in the sky
B. Move around each other D. Rotate
5. Constellations may be visible only during a certain time of the year because the earth orbits around the _____.
- A. Earth B. Mars C. Planets D. Sun



Additional Activities

Fill the crossword puzzle with appropriate terms based on its description.



ACROSS

1. A zodiacal constellation
2. "the water bearer".
5. group of stars
6. when a star appears to move across the sky.
7. a seasonal constellation composed of Rigel and red Betelgeuse and known as "The Hunter"
8. earth revolves around this yellow star

DOWN

2. a constellation's change in position
3. a circumpolar constellation that is used in navigation
4. mainly composed of gases like Hydrogen and Helium





Posttest

Read each question carefully and encircle the letter of the correct answer.

1. The type of constellation/s that never disappears is _____.
A. Zodiacal B. Seasonal C. Circumpolar D. Both A and B
2. Why do the positions of constellations change at the course of the year?
A. Because of the position of the Sun and stars.
B. Because of the rotation of the earth to the stars.
C. Because of the revolution of the earth to the sun.
D. Because of the rotation of earth to the stars and sun.
3. As the earth rotates on its axis, the constellations and stars appear to _____.
A. Move across the sky C. Move around each other
B. Stand still in the sky D. Rotate
4. The stars in a constellation appear to be close to each other to form a shape, but may be _____ in space.
A. Very close C. Great distances apart
B. Some are close D. Some are great distances apart
5. Constellations may only be visible during certain seasons due to the Earth's orbit around the _____.
A. Earth B. Mars C. Planets D. Sun
6. What constellation indicates that the coldest season is coming?
A. Andromeda B. Lynx C. Orion D. Ursa Major
7. Which color of star is the hottest?
A. Blue B. Red C. White D. Yellow
8. The stars that we always see the whole year are found on _____.
A. On the horizon C. Over the north pole
B. In the larger constellation D. Inside other galaxies
9. The closest star to Earth is _____.
A. The sun B. The moon C. The Orion D. The constellation
10. What do we call a group of stars that forms a pattern in the sky?
A. Galaxy B. Constellation C. Supernova D. Superstars





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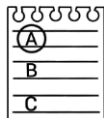
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<http://mcdonaldobservatory.org/sites/default/files/ScaleDistancesSolarSystem-teacher.pdf>





Answer Key

Assessment

1. D
2. B
3. B
4. C
5. C

What's In Lesson 2

1. Orion

2. Ursa Major or Ursa Minor

3. Cassiopeia

4. Capricorn

What's New

1. Big dipper/ Ursa Major has different position in a course of the year.

2. The observer on earth moves as the Big dipper/ Ursa Major remains in place.

What's More

1. The Ursa Major, Capricorn, and

Crux can be seen by the observer near the equator.

2. The Ursa major and Capricorn.

3. The Crux and Capricorn.

4. Because Friend B is in the southern hemisphere.

5. Because Friend A is in the Northern hemisphere.

6. Yes, The earth rotates on its own orbit and the

position of north pole and south pole cannot be

interchange.

B.

1. Yes, Because the Earth Rotates on its own axis.

2. Yes, Because the location of the observer is at

night.

3. No, because it is the same day.

C.

1. Aries, Taurus, Gemini, and Cancer

2. Because it is found on opposite direction of the

Earth.

3. Sagittarius, Capricorn, and Aquarius

4. Because some constellations are seasonal due to

revolution of earth

Module 6 Lesson 1 What's In

1. Gases
2. Galaxy
3. Star
4. Astronomy
5. Constellation

What's New

1. Because they have different composition and temperature.

2. It depends on the star distance from earth, and

its size.

3. The sun is the nearest star to the earth which

make it brighter than other stars.

4. Yes, they are composed of different gasses like

Helium, and Hydrogen

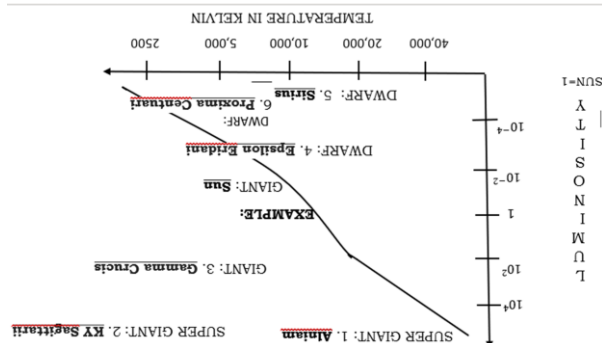
5. The star is a large ball of glowing hot plasma in

the space.

What Is It

Characteristics used to classify stars are: Size, Temperature, Color, Brightness

What's More

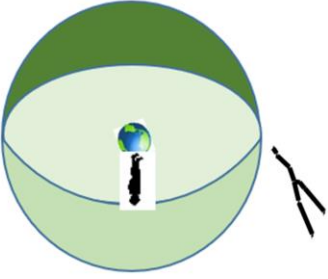


What I can do

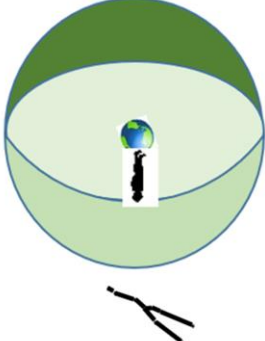
Activity 1.2
1. Sirius
2. Aludra
3. Sirius, Adhara, Wezen, Murzim, Aludra
Activity 1.3
1. Seasonal
2. Circumpolar
3. Seasonal/ zodiacal
4. Circumpolar
5. Seasonal



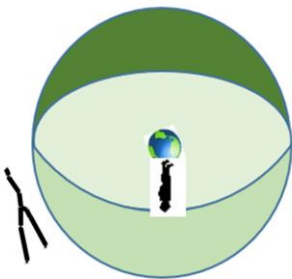
What I Have Learned



December



January

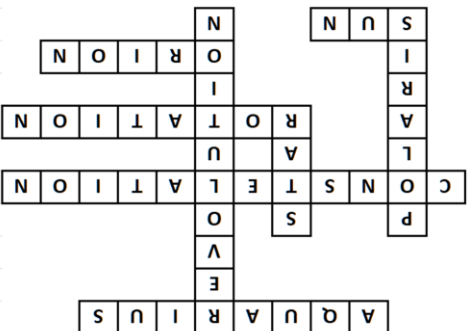


February

Assessment

1. Sipat an Tudong
2. Because constellations signify change in season which help farmers decide what plants they will cultivate and when they harvest their crops. Constellations signify the occurrence of constellation in specific month.

ADDITIONAL ACTIVITY



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