NAME: _____

Earth Science
Review
Chapter 8

DIRECTIONS- this is an open note/open book review of chapter 8. Please use your resources if you need too!

Matching.

1. _____ meteorology	a. movement of water from the earth's surface, into the air and back to the surface
2. _____ air mass	b. a standoff between air masses where neither one advances
3. _____ evaporation	c. forms when a humid breeze blows over a cold surface causing the air's temperature to drop below dewpoint; forms day or night
4. _____ radiation fog	d. the water that falls to the earth including rain, sleet, hail, and snow
5. _____ advection fog	e. the study of weather and of the atmospheric conditions that produce weather
6. _____ condensation	f. the process of a liquid becoming a gas
7. _____ water cycle	g. a large body of air with relatively uniform temperature, humidity, and pressure
8. _____ precipitation	h. the amount of water vapor in the air
9. _____ air-mass weather	i. a Y-shaped front caused by three air masses
10._____ humidity	j. the process of a gas returning to its liquid state
11._____ stationary front	k. forms when air near ground cools below dewpoint & causes cloud droplets to form; forms only at night
12. _____occluded front	l. air mass that remains stationary over a region for a period of time continuing the same type of weather

13. Explain the difference between weather and climate. _____

_____

_____

14. What is a front? _____

15-16. On what two things do meteorologists base their classification of clouds?

1. _____ 2. _____

Identify.

17. Artificial clouds produced by airplanes- _____

18. Layered balls of ice that form in strong thunderstorms-_____

19. The term given to a mixture of smoke and fog-_____

20. Particles in the air around which water condenses- _____

21. A "lens-shaped" cloud that often forms above a mountain- _____

22. Most familiar shape of snowflake- _____

23. A thunderstorm cloud- _____

24. Drops of water that form on surfaces below dewpoint- _____

25-27. Name the three major factors work together to affect earth's weather?

1._____

2._____

3. _____

28-31. Give the Latin word for each description of these cloud categories:

1. "to extend; to stretch" - _____

2. "curl of hair" - _____

3. "a heap" - _____

4. "cloud" - _____

32-35. Identify the 4 types of droughts according to their descriptions:

1._____- comparing an areas current precipitation with its typical precipitation

2. _____ - the supply of any product/material used by people is affected by lack of precipitation

3. _____ - an area's ground water, lakes, rivers, etc. are considerably decreased due to lack of precipitation

4. _____ - precipitation cannot support an area's crops

35-37. Label the water cycle diagram.

Fill in the type of air mass or the two word description of the air mass in the chart below.

AIR MASS	**DESCRIPTION** (2 words)
38. continental tropical	_____
39. _____	cold, dry
40. Arctic	_____
41. _____	moist, warm

True and False.

42. _____Molecules have more energy at lower temperatures.

43. _____"Fronts" are named for the air mass advancing into the "territory" of another air mass

44. _____When a cold air mass is approaching a warm air mass, it will try to go over it.

45. _____A stratocumulus is the most frequent type of cloud.

46. _____A warm front moves faster than a cold front.

47. _____Rime is the milky part of a hailstone that forms in the upper part of a cloud.

48. _____The collision-coalescence process is how rain forms in clouds with above freezing temperatures.

BONUS!

1. What does the size of a hailstone depend upon? _____

2. Which type of air mass has a higher density- cold or warm? Explain why. **(Must answer BOTH correctly to receive 1 point.)**

NAME: _____

Earth Science
Review
9.1-9.2

DIRECTIONS-this is open book/open note. Use your resources to fill this out!

1-3. Name the three stages of a thunderstorm **IN ORDER**.

1. _____
2. _____
3. _____

4-6. From the above stages of a thunderstorm...

1. what is stage #2 marked by? _____
2. what has formed at the end of stage #1? _____

7. Why do we see lightning before we hear thunder? _____

8-9. What two ingredients are needed to form a hurricane?

1. _____
2. _____

10. What is the first visible sign that a tornado may be forming from a mesocyclone? _____

11. What is the difference between a tornado and a dust devil? _____

_____

_____

12-13. What two combinations of lightning strokes give the impression of a single flickering lightning bolt?

1. _____ 2. _____

14. What type of lightning travels from the negative region of a cloud to a positive region on the earth's surface? _____

15. Explain cloud-to-cloud lightning. _____

_____

Identify

16. First electron stream moving jerkily from cloud to ground- _____

17. The most powerful thunderstorm-_____

18. Term used for a hurricane in the Western Pacific and Indian Oceans-_____

19. The smallest, most intense downburst- _____

20. The minimum temperature of ocean water needed for hurricane formation - _____

21. Swirling, condensed air that's the distinctive visual feature of a tornado - _____

22. Calm center of the hurricane - _____

23. Best suited place for tornado formation in the world -_____

True and False.

24. _____The Coriolis effect "fuels" a tropical cyclone.

25. _____The Saffir-Simpson Wind Scale is used to rank tornado intensity.

26. _____A storm surge involves elevated water levels due to hurricane winds pushing water ahead of the storm.

27. _____ Heat lightning is a form of cloud-to-cloud lightning.

28. _____The eye wall of a hurricane can reach up to 9 miles high.

29. _____ A tropical cyclone is considered to be at the tropical storm stage when its rotating speed is less than 39 mph.

30. _____The stepped leader creates the brilliant flash of light that can be seen when lightning strikes.

BONUS!

1. At least how many mph must a tropical cyclone rotate at to be considered a hurricane? _____

2. What term is used for a "hurricane" in the Philippines? _____

10.1 Intro to the Solar System

- astronomy - the study of God's creation beyond our atmosphere
- astronomers - study the motions of heavenly bodies and the laws that govern those motions

- solar system - the sun and all natural objects that orbit it
  → orbit - circle around due to gravity

10.4 Asteroids, Comets and Meteoroids

- asteroid - a stony or metallic object that is smaller than the planets and orbits the sun
  - Variety of shapes and sizes
    - eros → 21 miles long & 8 miles wide
    - Ida → orbited by a smaller asteroid known as its moon- Dactyl

  - Each asteroid has a specific orbit
    - Most located in → asteroid belt - a large ring of asteroids located between Mars and Jupiter
    - Trojan Asteroids → two asteroid groups that travel in the same orbit as Jupiter
    - near-earth asteroids (NEAs) – asteroids located in the inner solar system
      - ❖ Some will cross paths with earth
        1. explode high in Earth's atmosphere (once a month)
        2. collide with Earth (once every century)

  - planets can pull asteroids out of orbit → causing them to wander into the orbit of another asteroid and collide

- Comet - an asteroid-sized object that is made of rock and frozen materials and forms a bright tail
  - In ancient times → thought to be intruders invading earth or a phenomenon

  - Tycho Brahe →1. observed and studied a comet in 1577
    2. concluded it was a natural part of the solar system

  - Isaac Newton → concluded comets are subject to same orbital laws as planets

  - Edmond Haley - astronomer
    - correctly calculated the orbit of a comet seen in 1682
    - concluded that descriptions of 1531 and 1607 were identical to the one he saw
    - predicted it would be visible again from Earth in 1758 → he was correct
    - astronomers named it Halley's Comet in his honor

  - Halley's Comet
    1. Takes 76 years to orbit the sun
    2. Last appeared in 1986

3. Will return in February 2061

- Comet components:
  1. nucleus - the heart of the comet which is 2/3 ice and 1/3 dust
  2. coma - the cloud of gas and dust around the nucleus
     - Formed when comet nears the sun causing the frozen nucleus to vaporize and release the trapped dust
  3. tail - a highly reflective streamer of dust particles and gas emitted from the comet
     - Formed as the comet travels closer to the sun
     - The solar wind (the stream of highly charged particles sent out by the sun) causes the particles from the comet to drift away from the sun
     - 2 different colors
       1. yellowish tint – reaction of dust reflecting the sun
       2. bluish tint – reaction of gases with the solar wind
     - Always points away from the sun
       → SO can't determine directions comet's moving by looking at its tail
- After traveling many times around the sun → it completely evaporate
- 2 Comet Classifications (based on their periods)
  1. short-period comet – has a period shorter than 200 years
  2. long-period comet – has a period longer than 200 years
     - EX Eucke's Comet - shortest recorded period → 3 years and 4 months
       Hale-Bopp Comet - longest recorded period → 4000 years
- Kuiper Belt - a belt of comets that orbit the sun beyond Neptune
  → also found in this belt are Pluto, Eris, and all other dwarf planets (except Ceres)

- Meteoroid - small chunks of rock or metal in space
  - Size → range from microscopic speck of dust to giant boulder
  - Textures → coarse or smooth
  - Composition → metallic or rocky
  - Meteor - a meteoroid that has entered the Earth's atmosphere
    - As it pushes thru Earth's atmosphere → begins to burn (adiabatic heating)
    - Smaller ones burn completely; larger ones only partially
    - Referred to as a "shooting star"
  - Orbiting comets leave a meteoroid stream - a trail of meteoroid debris
    → when earth passes thru it, it's a meteor shower - meteors falling faster than normal (from tens to thousands may fall)
  - Clusters of meteors located at → specific point on Earth's orbit
    → SO Earth encounters same clusters at same time every year
  - 3 Biggest Meteor Showers
    1. Quandrantids → (Jan 3-4) radiates from constellation Bootes
    2. Perseids → (Aug 12-13) radiates from constellation Perseus
    3. Geminids → (Dec 13-14) radiates from constellation Gemini
  - Meteorites - meteors that land on the earth's surface
    - Tens of thousands hit earth every year
    - Only a few are large enough for scientists to collect and study
    - Have left craters up to 60 miles wide
    - Largest known intact meteorite → the Hoba Meteorite - weighs 66 tons

10.2 Earth's Moon

- The __moon__ is Earth's only __satellite__ - an object that revolves around another object

- Term "__moon__" used for natural satellite of any planet
  - Our moon never given a __name__
  - Other planets' moons have __names__ to distinguish them from one another

- Size → __27__ % of Earth's diameter

- Distance from Earth → __238,900__ miles
  - Being the closest heavenly body to earth → gives it the __appearance__ of being larger than all heavenly bodies
  - Always looks larger at the __horizon__ than when its high in the sky (an illusion)

- Moon's __gravity__ → __weaker__ than Earth's
  - 100 lb person on earth → weighs __16.7__ lbs on the moon

- Temperature → no __atmosphere__ = no __greenhouse__ effect
  - Daytime → up to __260 degrees__
  - Nighttime → fall to __-280 degrees__

- Moon's orbit of Earth:
  - Slighty __elliptical__
  - Moon's period = __29__ days, __12__ hours, __44__ minutes = __1 lunar month__
  - Moon's __rotation__ = moon's period to orbit Earth
    - ❖ SO observers on Earth only ever see one side of the moon → called the __near side__
    - ❖ __far side__ of moon not seen until 1959 → unmanned Soviet spacecraft __photographed__ it while orbiting the moon

Surface of the Moon

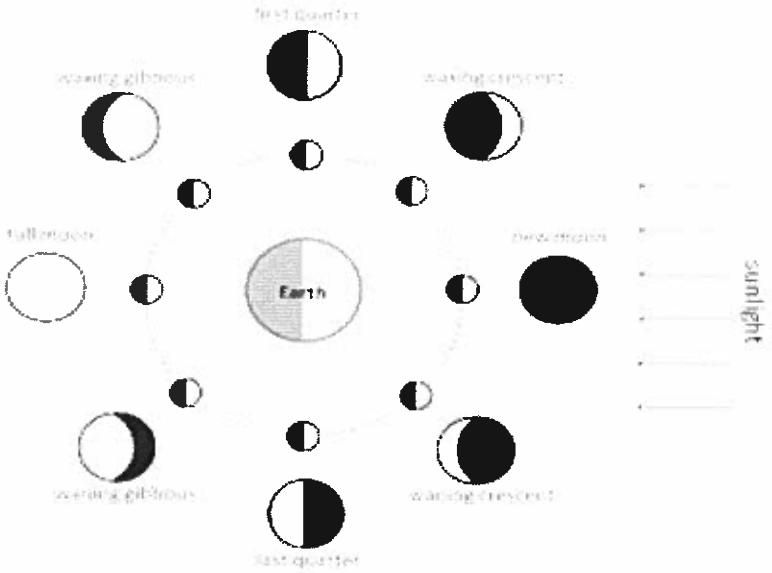
- Covered by → layer of dark gray __dust__ and __rock__; No __water__

- Moon's dark patches are immense __plains__
  - Called __maria__ ("seas")
    - ❖ WHY? Early astronomers thought they were bodies of __water__
  - Individual patches called __marie, sinus__ ("bay")
    - ❖ First moonwalk occurred on __Mare Tranquillitatis__ ("Sea of Tranquility")
  - Now believed that maria → formed by massive craters filled in with __lava__

- Moon is heavily __cratered__
  - Craters named for famous __philosophers__ and __astronomers__
  - The moon's __far side__ is more heavily cratered than its __near side__ BUT has fewer __maria__
  - __rays__ -light-colored streaks radiating from each crater

- Moon has many ___mountains_____ (and ranges)
  - Leibnitz range (at moon's South pole) is __6.8__ miles (taller than __Mt. Everest_____)

Phases of the Moon



- Lunar month begins at → __new moon_____ - when the sunlit side of the moon is turned away from the earth and completely hidden from view
- ___waxing_____ - gradually grow larger
- ___waning_____- gradually decreases in size

Uncommon eclipses

- ___solar eclipse_____ - occurs when a new moon moves directly between the sun and the earth and blocks part or all of the sun from view
  - Happen about __once___ a year
  - Because of Earth's size and position → can only be seen from specific ___locations_____

- ____Partial solar eclipse_____ - occurs when the moon covers only a portion of the sun
  - Gives the sun a ___crescent-shaped_____ appearance
  - EX __annular solar eclipse____ - makes the sun appear as a ring of light

- ___Total solar eclipse____ - occurs when the moon completely covers the normally visible portion of the sun
  - Because sun and moon must be lined up __perfectly___ → only a __narrow_____ portion of earth can experience it
  - __totality_____ - occurs when moon completely covers the sun
    - ❖ Observers on Earth experience → ___darkness__ similar to a moonless night

- ____lunar eclipse_____ - occurs when full moon passes through the earth's shadow causing the moon to darken because it no longer reflects the sun's light
    - ❖ Creates a __copper_____-colored moon
    - ❖ Happens about ___twice_____ a year
    - ❖ Are visible anywhere on earth that it is __night___ during the eclipse

10.5 Constellations

- Because of our viewpoint on Earth, astronomers pretend the earth is surrounded by the __Celestial Sphere__ - an imaginary, giant, hollow sphere with the earth at the center and the sun, moon, stars and other planets on its inner surface

- At any location on Earth, only __half__ of the celestial sphere is visible at once

- The other half is __blocked__ by __the earth__ itself

- The __horizon__ - the line that separates the visible portion of the celestial sphere form the part we cannot see

- The distance between objects of the celestial sphere is measured as an __angle__
  - Observers location is __vertex__; sides stretch out to __stars__
  - Size of __angle__ between two stars is distance between them on the celestial sphere
  - NOTE: 2 objects __close__ on celestial sphere may be very __far__ apart in space

- Due to earth's own __rotation__, the celestial sphere appears to rotate __around__ the earth once a day
  - It appears to rotate on an axis through the __celestial poles__ - points on the celestial sphere directly overhead at the earth's pole
  - At *north celestial pole* is __Polaris__ (called the __North Star__)
  - At *south celestial pole* there is __no__ star (but located by arrangement of stars around it)
  - __celestial equator__ - located directly above earth's equator

- A location's __latitude__ determines:
  - which stars are __circumpolar__ - ("circling the pole") always above the horizon
    - ❖ stars never __rise__ or __set__ as seen at the poles
    - ❖ the __latitude__ of an observer determines what stars will be circumpolar from his vantage point
    - ❖ EX 30° north latitude, the circle of stars within a radius of 30° from __Polaris__ is circumpolar
  - which stars are always __below__ the horizon
    - ❖ every star __rises__ and __sets__ as seen from the equator
    - ❖ EX __Polaris__ appears closer to the horizon at the equator in the northern hemisphere and cannot even be seen in the __southern hemisphere__

Solar System on the Sphere

- Most objects on the celestial sphere remain in a __fixed__ location as it appears to rotate around the earth

- However objects within the __solar system__ move on the celestial sphere as their __actual__ positions relative to earth change

- ecliptic - the imaginary line on the celestial sky that marks the annual path of the sun
  - At an angle of 23 degrees to the celestial equator
  - Crosses it twice a year: once in March & once in September
- Due to monthly orbit around earth, moon appears to travel around celestial sphere once every lunar month (29 1/2 days)
  - Always near ecliptic

- Seven planets and their moons always visible on the celestial sphere
  - Their apparent motions more complex than sun and moon
  - Always near ecliptic

- zodiac - the imaginary band, extending for 8 degrees on either side of ecliptic, in which the sun, moon, and the planets appear

Zones in the Sky

- constellations - 88 zones that astronomers have divided the celestial sphere into
  - 47 named by ancient peoples (usually after people or objects from mythology)
  - Rest named by modern astronomers
  - Includes any celestial objects outside the solar system that are contained within the constellation boundaries
  - Brightest stars in the constellation are connected by "lines"
  - Often do not actually look like object/person named after

- Asterisms - a small group of stars that are used to form a picture or represent an object
  - NOT to be confused with constellations
  - Includes very few stars, most of which are usually bright
  - EX Big Dipper asterism is part of constellation Ursa Major
  - Some include stars from different constellations
    - ❖ EX Summer Triangle includes stars from 3 constellations

- Not ALL constellations are visible from all latitudes
  - Constellations made of stars that are circumpolar (from observer's latitude) will always be above the horizon (but not visible when sun is up)
  - Constellations made of stars that are never visible (from observer's location) will never be visible
  - All other constellations will be above the horizon part of the time BUT not visible if too close to sun's location on celestial sphere (sun's light blocks the view)

- Constellations divided into seasons
  - Assigned to the season in which it is best seen in early evening
  - Best seen when it is directly overhead

10.6 The Sun, Stars and Galaxies

The Sun – a great glowing mass of gases, mostly hydrogen and helium

- The most important star to us here on earth

- Parts of the Sun:
  1. core - the center of the sun
     - Temperature → 27 million degrees
     - hydrogen atoms there → fuse together to form helium
     - RESULT → atomic energy is released creating light and heat

  2. photosphere - ("sphere of light") the visible part of the sun we see
     - covered in granules - ("bubbles") a convection cell in which superheated gas rises at its center, cools, and sinks back beneath surface
       - ❖ each one is 600 miles across (a little larger than Texas)
       - ❖ has a 20 minute lifespan
     - super granules - larger convection cells that last 12-24 hours and 22,00 miles across
     - sunspots - dark patches caused by the sun's magnetic field
       - ❖ cooler than the granules that surround them
       - ❖ Follow an 11 year cycle → as many as 200 sunspots in a cycle

  3. chromosphere - ("sphere of color") the lowest layer of the sun's atmosphere
     - Temperature → 11,000 degrees at bottom; 40,000 degrees at top
     - Visible during solar eclipse → appears as bright reddish-pink fringe around the blackened moon
     - Activity on the chromosphere:
       - ❖ spicules - flamelike columns of gas continually erupting
       - ❖ solar flares - tremendous bursts of energy caused by magnetic stress within sun
       - ❖ solar prominences - streams of dense gas erupting off the chromospheres & returning in a loop-like fashion

  4. corona - ("crown") the outermost layer of the sun's atmosphere
     - a huge, hot blanket of gas up 6 million degrees
     - visible only during total eclipse
     - punctured with coronal holes → the source of solar winds

The Sun's Path and the Seasons

- equinox - ("equal night") the points at which the ecliptic intersects the celestial poles
  - vernal equinox - ("belonging to spring") sun crosses celestial equator from south to north (around March 21st in northern hemisphere)
  - autumnal equinox - sun crosses celestial equator from north to south (around September 23rd in northern hemisphere)
- Solstice - a point on the ecliptic midway between the two equinoxes
  - summer solstice point - the sun reaches its farthest point north of the celestial equator (about June 21st)
  - Winter Solstice point - the sun reaches its half way point between the autumnal equinox and the vernal equinox (about December 21st)

Season on Earth – occur because of the 23.5 degrees tilt of Earth's axis

- On Earth → 4 seasons are recognized

1. spring
2. summer
3. autumn
4. winter

- Season are different in the Northern and Southern hemispheres
  - Spring in one = fall in the other
  - Winter in one = summer in the other

- Each season begins with an equinox or a solstice
  - In the Northern Hemisphere:
    - ❖ Summer begins with June Solstice (93.65 days long)
    - ❖ Autumn beings with September Equinox (89.85 days long)
    - ❖ Winter begins with December Solstice (88.99 days long)
    - ❖ Spring begins with March Equinox (92.75 days long)
  - Length of seasons affected by perihelion and aphelion
    - ❖ During perihelion (closer to sun)→ earth moves faster in orbit (winter)
    - ❖ During aphelion (farther from sun)→ earth moves slower in orbit (summer)

- In Northern Hemisphere's summer → Northern Hemisphere is tilted towards sun
  - RESULT more direct insolation = hotter temperatures

- In Northern Hemisphere's winter → Northern Hemisphere is tilted away from sun
  - RESULT insolation at a shallower angle = heats less efficiently

Stars

- Stellar measurements: units to measure distances to stars
  - light year - the distance light travels in one year
    - ❖ Proxima Centauri (Closest star to Earth other than sun)= 25 trillion miles = 4.2 light years
    - ❖ Milky Way = 590 quadrillion miles = 100,000 light years (visible portion)
  - The distance to nearby stars → measure in parallax - the apparent change in the position of an object caused by the actual change in the position of the observer

  - Half the angle that the star appears to move on the celestial sphere when viewed from opposite sides of Earth's orbit
    - ❖ The larger the stellar parallax, the closer the star is to Earth

  - parasec - ("parallax second") the distance of an object with a stellar parallax of 1 second of arc
    - ❖ 1 parasec = 3.26 light years = 19.2 trillion miles

- Star Magnitude
  - apparent magnitude - the brightness of a star as it appears to an observer on earth
    - ❖ Based on measurement system developed by Hipparchus → a Greek astronomer/mathematician
    - ❖ The lower the apparent magnitude → the brighter the object
      First magnitude = 1 = Brightest stars

Sixth magnitude = 6 = Faintest stars

- absolute magnitude - the apparent magnitude of a star to an observer located 10 parasecs (32.6 light years) from a star

Comparison of:	apparent magnitude	absolute magnitude
Sun	-27	4.8
Sirius	-1.5	1.4
Betelgeuse	0.4	-5.6

- Temperature and Color
  - Star's color depends on its surface temperature

    (Cool) Deep Red → 5,000 degrees
    (Warm) Yellow → 10,000 degrees
    (Hot) Pure White → 20,000 degrees
    (Hottest) Blue-white → 40,000 degrees

  - A star's absolute magnitude depends on its surface temperature and size
    - Usually, the hotter a star's surface → the brighter it will be
    - Betelgeuse is a cooler star that outshine's smaller, hotter stars due to its sheer bulk
    - The brightest stars are huge and hot like Rigel
      → its almost twice as far away from Earth as Betelgeuse but appears brighter

  - Hertzsprung-Russell Diagram (H-R Diagram) - compares and classifies stars by their temperature and amount of light produced (see chart on pg. 358)

- Star Categories (3 Main Groups)

1. Giants and Supergiants - bright (due to size) and cool stars
   - Red supergiants → Betelgeuse and Antares (largest)
     - Some if placed where sun is → planets Mercury thru Jupiter would be inside them
   - Blue-white supergiants → Rigel and Deneb (hottest)
     - Produce more light than red s-g due to higher temps

2. Main Sequence - "average" stars → brightness depends on their temperature with varying properties
   - Hot blue → brightest
   - Red dwarfs → same temperature as red s-g but less light (Proxima Centauria)
   - Yellow → our sun

3. White Dwarves - very hot but dim because of their size

- Star Groups
  - Binary Stars - a system in which two stars are bound together by gravity
    - Sirius → the "Dog Star" made up of *Sirius A* and *Sirius B*
    - Sirius B orbits Sirius A once every 50 years
  - Optical double - a pair of stars that are close on the celestial sphere but far apart in space

- ❖ Algedi "star" in Capricorn → actually 2 stars about 580 light-years apart

- Open Clusters - loose asymmetrical clumps containing ten to hundreds of stars
  EX Pleiades in constellation Taurus

- Stellar Explosions
  - Nova - occurs when a star suddenly flares up to many times its original brightness
    - ❖ Will remain bright for some time then return to original magnitude
    - ❖ So far, only observed in white dwarf binary stars (possible hydrogen gas explosion from larger star)

  - Supernova - an explosion of a star both catastrophic and violent
    - ❖ A once faint star develops into brightest star → light then fades until all that remains is hot, dense core of star surrounded by expanding nebula - a cloud of interstellar gas and dust
    - ❖ Neutron Star - the hot core of star left over after a supernova
    - ❖ Pulsar - a rapidly rotating neutron star that emits directional beams of radio waves
      - ➢ Crab Nebula - a pulsar (remnant of a supernova seen in A.D. 1054) know for releasing pulses of visible light

Galaxies

- galaxy - a massive star system containing millions to billions of stars as well as gas and dust

- Milky Way - the galaxy in which we live, containing over 400 billion stars, including our own sun
  - Until 1900s, thought to be the only galaxy
  - Astronomers estimate 120 billion galaxies in the observable universe

- Galaxies not spread at random throughout universe → but grouped together in orderly, complex structures
  - clusters - smallest of organized galaxies
  - Local Groups - a cluster of 30 galaxies including the Milky Way
    - ❖ Largest galaxy in this group → Andromeda Galaxy (located in constellation Andromeda)
    - ❖ Milky way is slightly smaller than it
    - ❖ *Large Magellanic Cloud* and *Small Magellanic Cloud* → 2 closest galaxies to Milky Way

- Galaxy Shapes

  1. Spiral Galaxies - have a central nucleus resembling a flattened ball to which are attached long curved arms
     - Resembles a pinwheel spinning through space
     - barred spiral galaxy - a particular type of spiral galaxy in which the spiral arms attach to a straight "bar" that runs through the nucleus of the galaxy
       - ❖ Milky Way believed to be a barred spiral galaxy
       - ❖ Our sun → located toward edge of galaxy in one of its spiral arms

- ❖ In center of galaxy → constellation __Sagittarius__ and within it *Sagittarius A**: believed to be a __black hole__ - an object so massive and dense that not even light can escape its gravity

2. __Elliptical galaxies__ - resembles eggs or footballs
   - Less __structured__

3. __Lenticular galaxies__ - flat with a bulging nucleus and has a "solid" disk instead of spiral arms
   - Less __structural__

4. __Irregular galaxies__ - composed of stars clumped together in no definite shape
   - EX *Large Magellanic Cloud* and *Small Magellanic Cloud*

After reading all the notes! (no need to copy them into a notebook). Go do the section reviews in your textbooks for

10.2

10.4

10.5

10.6

Don't do the thought provokers. Just the numbered questionsS