The Universe

Universe - a name used to describe all things that exist in ____________.

- The ________ is made of ____________ of starts, planets, and enormous clouds of gas, separated by gigantic ________ ________.

Galaxies - ________ group together in huge collections called galaxies.

- Our galaxy is known as the ________ ________ ________.
- When early astronomers looked at the sky they noticed a huge band of ________ that looked somewhat like trail of spilled milk. They called this band "gala" which is the Greek word for _________. The term became "galaxy" which means ____________ of stars.
- Our galaxy consists of 100 ____________ stars grouped together.
- Our ____________ ____________ is part of the Milky Way Galaxy.
- There are billions of other galaxies in the ____________ out to 10 billion light-years away.

Galaxy Shapes:

- spiral
  (Milky Way)
- elliptical
- barred spiral
- irregular

Space Measurements:

- Because space distances are so big, we use special measurements.
- ________-__________ is a measure of the distance traveled by light in one year.
- Light travels at a speed of about 186,000 miles per ________, so a light-year is nearly 6 ________ miles!
- Our galaxy measures about 100,000 light years in ____________.
- The Earth and the rest of our solar system lie about 28,000 light-years from the ____________ of the Milky Way.
- ____________ ____________ (AU) The average distance from Earth to the Sun is 93 million miles, which is known as ________ AU.

- If we fit a model of our galaxy on this paper, the ________ would be smaller than the dot at the end of this sentence and the ________ could only be seen through a microscope!
Space Tools:

Scientists use lots of tools to gather information about our solar system, galaxies, and the universe beyond!

- **telescope** - a ______ instrument that can _______ distant objects.
- The scientist who used the _______ to study space in the _______ century was _____________________________. (Although he didn't invent it.)
  - Two kinds of telescopes:
  - ___________________ -
    - Looks like a long, narrow ____________
    - A person would __________ through the tube
    - Inside the tube, light from a distant object is focused by a large ____________ and then magnified by a smaller lens before it reaches your _____________. (see p. E22)
  - ___________________ -
    - Has the same long, narrow, ____________________
    - Inside the tube, light from a distant object is gathered in a curved ____________ at the back of the tube. The mirror ____________ and focuses the light on a smaller mirror near the front of the tube. This small mirror is usually angled to send the image to an eyepiece on the ____________ of the tube. The eyepiece can have different ____________ for different magnifications.

- **Other Space tools:**
  - **radio telescope** - gathers _______ _________ from objects in space.
  - **satellites** - an object that circles another object in _______. Satellites carry ____________ as they move above the earth's surface. They send information back to _____________.
  - **space probes** - an unmanned space _________ sent out into space; space probes do not orbit _________.
  - **observatories** - a place (building) where scientists observe the _____.

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Stars

- A ________ is a gigantic ball of hot gases - so hot that the gases at the star's surface glow producing their own _________. (sun is a star)

- There are four ways stars differ from each other. They are: ________, ______________, ______________, and ________________.

- The color and ______________ of a star are closely related.
  - _______ _______ are the hottest stars 11,000-50,000 degrees C.
  - white stars are the next ________ stars 6,000-7,500 degrees C.
  - _______ ________, like are sun are 5,000-6,000 degrees C.
  - _______ ________, are the coolest stars 2,000-3,500 degrees C.

- The size and ______________ of a star are not closely related.

- All stars produce __________ the same way. Energy is generated by nuclear reactions that convert hydrogen into ___________ in the center of the star. As if millions of bombs were going off every second. The star doesn’t explode because its held together by its own _____________. This exploding energy gives the star heat and ________.

Constellations

- Constellation - a group of ________ that forms a ________ in the night sky.
  - There are a total of ____ constellations that astronomers recognize.
  - Ancient cultures named _________________ after personalities and creatures from their everyday lives, myths, and legends.

- Constellations in the **Northern Hemisphere** received their names from ___________ and Roman mythology.
  - examples: Leo (the ________), Pisces (______ fish), Taurus (the ________), Orion (the ____________)

- Constellations in the **Southern Hemisphere** received their names from explorers from ________________. (We cannot see constellations in the S. Hemisphere)
  - Example: Telescopium (after the ___________) and Tucana (the ____________)

- ___________ ________ - is part of the constellation, Ursa Major, the ________ _________.

- ___________ ________ - is part of the constellation, Ursa Minor, the ________ _________.

- the star at the tip of the Little Dipper's handle is the ______ _______. It almost always lies exactly above the ______ _______.

- constellations are important because they provide us with a ____________________.

**Moving Stars?????**

- **Our planet's _______ makes the stars appear to move each night from E. to W.**
  - _______ - the spinning motion of an object on its axis. It takes about 24 hours for the Earth to make one complete rotation.

- **Earth's revolution around the Sun means that different stars appear in the sky at different times of the ______.**
  - _______ - the movement of an object around another object or point. It takes about ________ days for Earth to make one revolution around the Sun.
  - Earth's revolution around the Sun creates the _______ of the year.

- Different hemispheres tilt toward or away from the Sun at different times of the year, therefore we have different seasons, and see different _______ at different times of the year.

**The Moon**

- The Moon completes one _______ around the Earth approximately every 29 1/2 ________.

- 1/2 of the moon is always in the _______. This half is visible from the Earth. The shape of the moon seems to change because of the moon's _______ around the earth.

- The moon revolves around the earth in a _______ direction.

- As the moon goes through the 8 phases, ______ appears to move across the moon from ______ to ________.

- WAXING - light on the ______ WANING - light on the ________

**PHASES OF THE MOON:**

[Blank circles for drawing the phases of the moon]
Eclipses

- **solar eclipse** - occurs when the _______ _______ is directly between the earth and the _______. Its shadow falls on the Earth and obscures our view of the _________.

  * Solar eclipses only happen about once every five years. Never look directly at an eclipse with your eyes.

- **lunar eclipse** - occurs when the Earth's shadow falls directly on the ________ which blocks our view of the moon.
  * Happen more often, one or two times a year.

Comets, Meteors, and Meteorites

**comet** - “dirty ________”
- the core of a comet is made of ice, ________, ammonia, methane, and other debris. (A small space object)

- comets make **elliptical ________** around a star (sun)

- when a comet gets closer to the sun its body begins to ________. It releases frozen gases into space, forming the ________ of the comet.

**meteors** - “shooting ________”
A portion of a comet that has broken off and is captured (gravitational pull) in the earth's atmosphere. They “burn” into our atmosphere.

**meteorite** - the remaining material of a meteor that falls to a _________.

**(most meteors don't survive to reach the ground)**