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**Knowledge Rich Curriculum Plan**

SCIENCE- Physics Year 10

| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Prior Knowledge:***In order to know this, students need to already know that…* | **Working Scientifically** | **Tiered Vocabulary and Reading Activity** |
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| **Lesson:** **Our Solar System** | * Students will know that the Sun is the star of our Solar System.
* *Students will know that our Solar system contains planets, dwarf planets, asteroids moons and comets.*
* *Students will know that our solar system is part of the Milky Way galaxy.*
* *Students will know that galaxies contain billions of stars*
* *Students will know that moons are natural satellites.*
* *Students will know that moons orbit planets, and planets (and dwarf planets) orbit the Sun.*
 | ***Students need to already know the order of the planets in our Solar system is Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus****Students need to already know that planets within our Solar System orbit the Sun* | *Interpreting data* | *Tier 2:**Celestial: relating to space**Tier 3:**Satellite: an object that is in orbit around a planet**Comet: An icy celestial object that is part of a Solar System* |
| **Lesson:** **Life Cycle of Stars** | * Students will know that a nebula is a cloud of dust and gas
* *Students will know that the cloud of dust and gas is pulled together by gravitational attraction.*
* *Students will know that the dust and gas drawn together by gravity causes fusion reactions*
* *Students will know that fusion reactions lead to an equilibrium between the gravitational collapse of a star and the expansion of a star due to fusion energy.*
* *Students will know that the life cycle of a star depends on the size of the star.*
* *Students will know that a star the same size of the Sun will go from nebula > protostar > main sequence star > red giant > white dwarf > black dwarf*
* *Students will know that a star much bigger than the Sun will go from nebula > protostar > main sequence star > red super giant > supernova > neutron star/ black hole*
* *Students will know that fusion in stars produce all of the naturally occurring elements.*
* *Students will know that elements heavier than iron are produced in a supernova*
* *Students will know that a supernova is an explosion of a massive star*
* *Students will know that the supernova distributes the elements throughout the universe.*
 | * ***Students need to already know that the Sun is a star***
* *Students need to already know that nuclear fusion is where two small nuclei fuse together to form a larger nucleus.*
 |  | *Tier 3:**Nebula: cloud of gas and dust**Supernova: Explosion of a massive star**Black hole: part of the life cycle of a star that has gravitational force so strong that light can’t escape* |
| **Lesson:** **Orbits and Satellites** | * Students will know that gravity provides the force that allows planets and satellites to maintain their circular orbits.
* *Students will know that satellites can be natural (e.g. the moon) and artificial*
* *Students will know that satellites can be either geostationary (position above Earth doesn’t change) or orbital (also known as polar)*
* *Students will know how to explain that velocity changes and speed stays constant*
* *Students will know that as an orbiting object gets closer to the object its orbiting, its speed increases.*
 | ***Students need to already know that planets orbit the Sun.****Students need to already know that moons orbit the planets**Students need to already know that velocity is a vector quantity* | *Interpreting data* | *Tier 2:**Artificial: man-made**Tier 3:**Satellite: object that orbits planets* |
| **Lesson:** **Red-Shift and the Big Bang** | * Students will know that an increase in wavelength of light is observed from most distant galaxies. This effect is called red-shift
* *Students will know that further away galaxies have bigger observed increases in wavelengths. This suggests that they are moving away faster.*
* *Students will know that red-shift provides evidence that the universe is expanding.*
* *Students will know that the Big Bang theory is supported by the evidence of red shift and cosmic microwave background radiation*
* *Students will know that the Big Bang theory suggests that the universe began from a very small region that was extremely hot and dense.*
* *Students will know that observations of supernovae suggests that distant galaxies are moving faster.*
* *Students will know how to explain that the change of each galaxy’s speed with distance is evidence of an expanding universe*
* *Students will know how to explain the evidence for the Big Bang model*
* *Students will know how to explain how scientists are able to use observations to arrive at theories such as the Big Bang theory*
* *Students will know that there is a large amount of the Universe that is still not understood, such as dark mass and dark energy.*
 | *Students need to already know that the Big Bang Theory is the accepted theory of the start of the Universe* | *Interpreting graphs**Evaluating data* | *Tier 3:**Big Bang theory: theory of the beginning of the Universe where it began as a hot dense area.* |