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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.* |