# P8 Space

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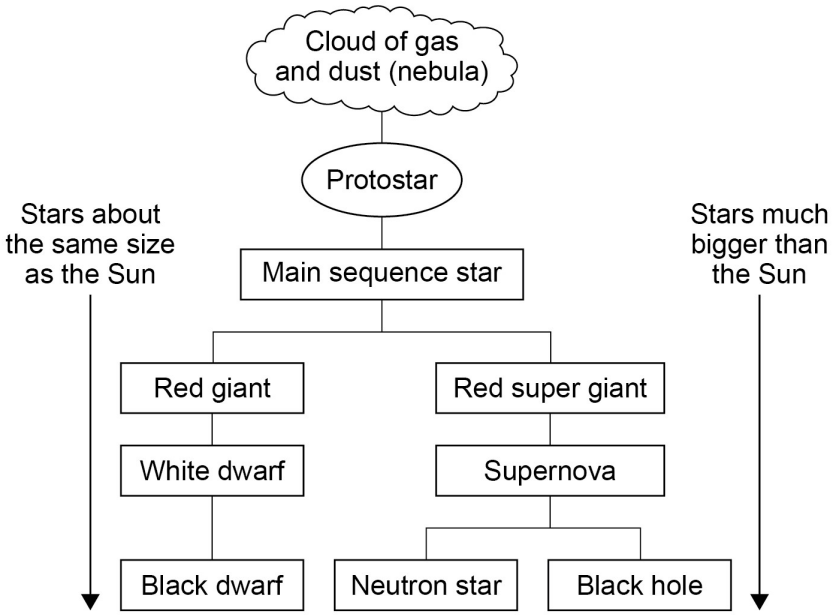
| 4.8.1.1 Our solar system | Within our solar system there is one star, the Sun, plus the eight planets and the dwarf planets that orbit around the Sun. Natural satellites, the moons that orbit planets, are also part of the solar system.<br><br>Our solar system is a small part of the Milky Way galaxy.<br><br>The Sun was formed from a cloud of dust and gas (nebula) pulled together by gravitational attraction.<br><br>Students should be able to explain:<br><br>• how, at the start of a star's life cycle, the dust and gas drawn together by gravity causes fusion reactions<br>• that fusion reactions lead to an equilibrium between the gravitational collapse of a star and the expansion of a star due to fusion energy. | Green | Amber | Red |
| 4.8.1.2 The life cycle of a star | A star goes through a life cycle. The life cycle is determined by the size of the star.<br><br>Students should be able to describe the life cycle of a star:<br><br>• the size of the Sun<br>• much more massive than the Sun.<br><br>  <br><br><br>Fusion processes in stars produce all of the naturally occurring elements. Elements heavier than iron are produced in a supernova.<br><br>The explosion of a massive star (supernova) distributes the elements throughout the universe.<br><br>Students should be able to explain how fusion processes lead to the formation of new elements. | Green | Amber | Red |

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| 4.8.1.3 Orbital motion, natural and artificial satellites | Gravity provides the force that allows planets and satellites (both natural and artificial) to maintain their circular orbits.<br>Students should be able to describe the similarities and distinctions between the planets, their moons, and artificial satellites.<br>(HT only) Students should be able to explain qualitatively how:<br>• (HT only) for circular orbits, the force of gravity can lead to changing velocity but unchanged speed<br>• (HT only) for a stable orbit, the radius must change if the speed changes. | Green | Amber | Red |
| 4.8.2 Red-shift (physics only) | There is an observed increase in the wavelength of light from most distant galaxies.<br>The further away the galaxies, the faster they are moving and the bigger the observed increase in wavelength.<br>This effect is called red-shift.<br>The observed red-shift provides evidence that space itself (the universe) is expanding and supports the Big Bang theory.<br>The Big Bang theory suggests that the universe began from a very small region that was extremely hot and dense.<br>Since 1998 onwards, observations of supernovae suggest that distant galaxies are receding ever faster.<br>Students should be able to explain:<br>• Qualitatively, the red-shift of light from galaxies that are receding<br>• that the change of each galaxy's speed with distance is evidence of an expanding universe<br>• how red-shift provides evidence for the Big Bang mode<br>• how scientists are able to use observations to arrive at theories such as the Big Bang theory<br>• that there is still much about the universe that is not understood, for example dark matter and dark energy. | Green | Amber | Red |