

Solutions

2.1 One star, the Sun; eight planets; dwarf planets; natural satellites – moons – orbiting planets.

2.2 The inward pull of gravity is balanced by the outward pressure from fusion – the two forces are in equilibrium, so the star neither collapses nor expands.

2.3 In a supernova – the explosion of a massive star; the explosion distributes them throughout the universe.

3.1 Nebula of dust and gas pulled together by gravity; protostar forms and heats as it contracts; main sequence – fusion of hydrogen, balanced by gravity; red supergiant when the hydrogen runs out; supernova, leaving a neutron star or, for the most massive, a black hole.

3.2 (a) X: white dwarf; Y: white dwarf; Z: neutron star or black hole after a supernova.
(b) Fusion in Z builds elements up to iron; elements heavier than iron form during the supernova explosion; the explosion throws them out, distributing them throughout the universe.

3.3 A nebula – a cloud of dust and gas – is pulled together by gravitational attraction; the contracting cloud forms a protostar that heats up; when the temperature is high enough, fusion begins; the star joins the main sequence, with fusion pressure balancing gravity.