

### Core questions – Physics Unit 8 – Space physics

No.	Question	Answer
1	What orbital bodies are found in our solar system?	Planet; dwarf planets; moons; artificial satellites
2	What defines a planet?	A body that orbits a star, massive enough for its own gravity to make it round
3	What defines a moon?	A natural object which orbits a planet
4	What galaxy is our solar system part of?	Milky Way galaxy
5	How is a star formed?	From clouds of dust and gas drawn together by gravity, which caused fusion reactions to occur
6	What is a nebula?	A cloud of dust and gas
7	What is a protostar?	When dust and gas are pulled together by gravity
8	When does a protostar become a main sequence star?	When gravity is strong enough for nuclear fusion to happen, releasing energy
9	What is the life cycle of a star that is a similar size to our sun?	Nebula; protostar; main sequence star; red giant; white dwarf; black dwarf
10	What is the life cycle of a star that is much bigger than our sun?	Nebula; protostar; main sequence star; red super giant; supernova; neutron star or black dwarf
11	What is nuclear fusion?	When two smaller nuclei fuse together to form one larger nucleus, releasing energy from the reaction
12	What elements are fused together during the main sequence stage of a star life cycle?	Hydrogen nuclei fuse to form helium nuclei
13	Why are stars 'stable' during the main sequence stage?	The outward pressure caused by fusion is balanced by the force of gravity pulling everything inwards
14	What causes main sequence stars to expand and turn in red giants / super giants?	Hydrogen runs out and heavier elements are formed
15	Which elements can be created in a star?	Elements up to iron
16	What is a red giant?	A cooler, bigger star that is formed after hydrogen has run out, and heavier elements are being formed
17	What is a white dwarf?	What is left behind when a star ejects its outer layer of dust and gas to leave behind a hot, dense solid core
18	What is a black dwarf?	What is left behind as a white dwarf cools down and no longer emits a significant amount of energy
19	What is a supernova?	The explosion of a massive star
20	What elements are formed in a supernova?	Elements heavier than iron
21	What is a neutron star?	What is left behind after a supernova has thrown the outer layers of dust and gas into space leaving a very dense core
22	What is a black hole?	What is left behind after the supernova of a massive enough star that is so dense, not even light can escape the gravitational pull

23	What shape is the shape of an 'orbit'?	Circular
24	What is an artificial satellite?	Something man-made which is in orbit of the Earth
25	What is the force that keeps something in orbit?	Gravity
26	In a circular orbit, how can there be changing velocity if the speed is constant?	It is constantly changing direction to remain in the circular orbit
27	What must also be true if an object is constantly changing velocity in circular orbit?	It is also constantly accelerating
28	What happens to the speed of an orbiting object if the radius of its orbit decreases?	It speeds up
29	Why does the speed of an object change depending on how close it is to the thing it is orbiting?	The force of gravity changes so it needs to speed up/slow down to maintain a stable orbit
30	What is the Doppler effect?	The observed change in frequency of the waves emitted by a moving source
31	What is red-shift?	The observed increase of wavelength of light waves coming from distant galaxies
32	What does red-shift tell us about the universe?	That the light source is moving away from us, therefore the universe must be expanding
33	What does it show us that more distant galaxies have greater red-shifts than nearer ones?	More distant galaxies are moving away faster than nearer ones
34	What is the big bang theory?	The universe began from a very small region that was extremely hot and dense
35	How does observed red-shift support the Big Bang theory?	The universe is expanding, so therefore must have once been much smaller
36	What have scientists observed since 1998 to suggest the rate of universe expansion is increasing?	By observing supernovae it shows that distant galaxies are moving away from us faster and faster
37	Why is it important for scientists to keep observing changes in the universe?	Observations allow them to obtain data, which can then either confirm or reject current theories
38	What do scientists currently think the universe is made up of?	Dark matter and dark energy