

## SP6 & 7 Radioactivity and Astronomy Revision Questions

Ask someone to ask you these questions (answers are on the back)

1. What surprising thing happened when Rutherford fired alpha particles into gold
2. List 2 sources of background radiation.
3. What type of radiation is stopped by 3mm of aluminium?
4. What type of radiation is most ionising?
5. Complete this nuclear equation:  ${}_{53}^{131}\text{I} \rightarrow {}_{-1}^0\text{e} +$
6. Strontium has a half-life of 29 years. What does this mean?
7. What fraction of the Strontium remains after 116 years?
8. What type of source ( $\alpha, \beta$  or  $\gamma$ ) used for tracers in underground pipes, and why?
9. State one effect of ionising radiation on the human body?
10. What is used to slow down neutrons before they initiate a nuclear fission reaction?
11. What is the job of the control rods?
12. Which element is made when 2 hydrogen atoms fuse?
13. Why is it difficult to fuse 2 hydrogen atoms?
14. What shape is the orbit of a planet around the sun?
15. Which force keeps the planet travelling in this orbit?
16. What is a geocentric model?
17. What happens to a nebula of gas and dust before fusion starts?
18. During what stage of a star's life cycle does the gravitational force balance the outward pressure from hot gases in the star?
19. What happens to a red supergiant directly after fusion stops?
20. How does the wavelength of an ambulance siren change as it drives past you?
21. The further away a galaxy is, the greater its red-shift. What does this tell us about the speed at which it's moving?
22. Which theory (ies) is this evidence for, and why?
23. What theory suggests that the Universe has always existed, is expanding and that new matter is being created continuously within it?
24. What does CMB stand for?
25. What causes CMB?

## SP6&7 ANSWERS

1. A few were reflected back, suggesting the presence of a dense mass (the nucleus)
2. Rocks (some giving out radon gas), medical equipment, cosmic rays, food, nuclear material
3. Beta particles (electrons)
4. Alpha particles, because they have most mass
5. 131 at top, 54 at the bottom.
6. After 29 years, the number of undecayed Strontium atoms has halved, OR the count-rate has fallen to half of its original value.
7. After 116 years(4 half-lives), the fraction left is  $1/16^{\text{th}}$
8. Gamma is used as a tracer in underground pipes because it can penetrate the ground above the pipe.
9. Ionising radiation can cause damage to skin, burns, mutate DNA in cells and cause cancer.
10. A moderator eg graphite, water
11. Control rods absorb neutrons (which might otherwise start new nuclear fission reactions)
12. Two hydrogen atoms fuse to make Helium
13. Difficult because the protons in the individual atoms repel, so you need to use a large force to overcome this.
14. An ellipse
15. Gravity (towards the sun)
16. Geocentric model has the earth at the centre and all other celestial bodies moving around it.
17. Gravity causes nebula to pull together into a protostar (no fusion) and then into a main sequence star (fusion starts)
18. During the main sequence
19. Red supergiant collapses (due to gravity), then there is a great explosion called a supernova in which dust is flung out.
20. Wavelength increases as the ambulance moves away from you.
21. Greater redshift means that the more distant galaxies are receding faster away from us. (This tells us that the universe is expanding.)
22. Both the Big Bang and the Steady State theory state that the universe is expanding.
23. Steady State
24. Cosmic microwave background (radiation)
25. Theory suggests that huge amounts of radiation must have been emitted in the big bang. As the radiation has travelled its wavelength has increased and we detect it as microwaves and from all directions.