

Chapter: 19

Q.1 Fill in the blank and rewrite the completed statements

12

1 Milky way is a galaxy.

Ans Milky way is a **spiral** galaxy.

2 There are about stars in our galaxy.

Ans There are about **10^{11}** stars in our galaxy.

3 The masses of other stars are measured relative to the mass of the

Ans The masses of other stars are measured relative to the mass of the **sun**.

4 The speed of light is km/s.

Ans The speed of light is **3,00,000** km/s.

5 The larger the mass of a star the faster is its

Ans The larger the mass of a star the faster is its **evolution**.

6 The number of fuels used in the life of a star depends on its

Ans The number of fuels used in the life of a star depends on its **mass/initial mass**.

7 The end stage of the Sun will be

Ans The end stage of the Sun will be **white dwarf**.

8 Our galaxy is called

Ans Our galaxy is called **Milky way**.

9 Stars are spheres of gas.

Ans Stars are spheres of **hot** gas.

10 For measuring large distances is used as a unit.

Ans For measuring large distances **light year** is used as a unit.

11 Light takes to reach us from the Sun while it takes to reach us from the moon.

Ans Light takes **8 minutes** to reach us from the Sun while it takes **1 second** to reach us from the moon

12 Stars are born out of clouds.

Ans Stars are born out of **interstellar** clouds.

Q.2 State True or False

6

1 The Sun will end its life as a white dwarf.

Ans True

2 Light year is used to measure time.

Ans False - Scientists use the unit of light year for measuring large distances in space.

3 Only light can emit from the black hole.

Ans False - The density and the gravitational force of Black hole are so high, that it does not allow the light to escape from inside it.

4 A star ends its life as a neutron star when the pressure of its electrons balances its gravity.

Ans True

5 The Sun will pass through the supergiant stage during its evolution.

Ans False - The sun will pass through red giant stage and become white dwarf.

6 End stage of a star depends on its initial mass.

Ans True

Q.3 Answer the following

18

1 If you are the Sun, write the properties in your own words.

Ans

- I am star and a gigantic sphere of hot gas
- Hydrogen makes up for 72% of my mass while helium makes up for 26%. The rest 2% is made up of elements heavier than helium
- My mass is 2×10^{30} kg (about 3.3 lakh times that of the earth) while my radius is 695700 km (100 times that of the earth)
- My surface temperature is 5800 K while the temperature at my centre is 1.5×10^7 K
- I am present here in our solar system from last 4.5×10^9 years

2 Describe white dwarfs

Ans

- White dwarfs are formed at the end stage of the stars having initial mass less than 8 times the mass of the Sun.
- Stars in this group undergo huge expansion and their radius increases by a factor of 100 to 200 and are called as red giant stars.
- At the end of its evolution, these stars explode and their outer gas envelope is thrown out. The inner part contracts and its size becomes similar to the size of the earth.
- In this state, pressure due to electrons in the star becomes independent of temperature and is able to balance the gravitational force forever.
- The star looks white and due to its small size, it is called a white dwarf.
- After this, its temperature keeps decreasing but its size and mass remain unchanged forever and so white dwarf is the end stage of stars in this mass range.

3 Which types of stars end their life as a neutron star?

Ans

- Stars having mass between 8 and 25 times the mass of the Sun, end their life as neutron star
- These stars go through red giant stage and later through the supergiant stage during which their size may increase 1000 times
- The huge explosion called supernova explosion occurs
- The central portion which is left behind after the explosion are completely made up of neutrons and hence they are called neutron stars
- The pressure of these neutrons is independent of temperature and is capable of balancing the gravitational force forever

4 Why was the name black hole given?

Ans

- The black hole is a place where gravity pulls so much that even light cannot get out
- All the nearby objects get attracted towards these stars. Also the light falling on these stars does not get reflected
- The physicist Jon Wheeler is credited with the term 'black hole' which he first used in 1967

5 Why do stars evolve?

Ans

- Evolution of a star means change in its properties with time resulting in its passing through different stages.
- The reason for the evolution of the stars is the burning of fuel in their centre, leading to the decrease in the amount of fuel.
- When the fuel in the centre finishes, the energy generation stops.
- As a result, the temperature of the star starts decreasing.

- v. The amount of fuel used by the star depends on the mass of the star.
- vi. Higher the mass of the star, higher is the number of fuels used and faster is the rate of evolution.

6 How are stars formed?

- Ans**
- i. Huge clouds of gas and dust are present in the empty spaces between stars in the galaxy called interstellar clouds.
 - ii. Due to some disturbance, these clouds start contracting.
 - iii. Because of the contraction, their density starts increasing and their temperature also starts to increase and a dense sphere of hot gas is formed from the cloud.
 - iv. Once the temperature and density at the center of the sphere increases sufficiently, nuclear energy generation starts.
 - v. Because of this energy generation, the gas sphere becomes self-luminous and a star is formed.
 - vi. In the Sun, this energy is generated by the fusion of hydrogen nuclei to form helium nuclei. This means that, the hydrogen at the center acts as a fuel and energy is generated by the burning of this fuel.

Q.4 Answer the following in detail

5

1 Explain three end stages of star.

Ans Stars can be classified based on their mass and their end stages:

- a. Stars having initial mass less than 8 times the mass of the Sun:
 - i. The stars in this group undergo huge expansion and their radius increases by a factor 100 to 200. In this stage they are called as red giant stars
 - ii. At the end of its evolution, these stars explode and their outer gas envelope is thrown out
 - iii. In this stage, the star looks white and due to its small size, it is called a white dwarf
- b. Stars having initial mass between 8 and 25 times the mass of the Sun:
 - i. These stars also go through the red giant stage and later through the supergiant stage during which their size may increase 1000 times
 - ii. The huge explosion, called the supernova explosion is very powerful
 - iii. The central portion of the star which is left behind after the explosion, contracts and its size becomes small
 - iv. In this state, the stars are completely made up of neutrons and are called neutron stars
 - v. Neutron star is the end stage of these stars
- c. Stars having mass larger than 25 times the mass of the Sun:
 - i. These stars evolve like the stars in the second group but after the supernova explosion, no pressure is capable of balancing their huge gravitational force and they continue contracting forever
 - ii. All the nearby objects get attracted towards these stars. Also, any light falling on these stars does not get reflected and gets absorbed inside the star
 - iii. Thus, we cannot see the star at all but can probably see a minute black hole at its place
 - iv. This end stage of the star is therefore, called a black hole.