

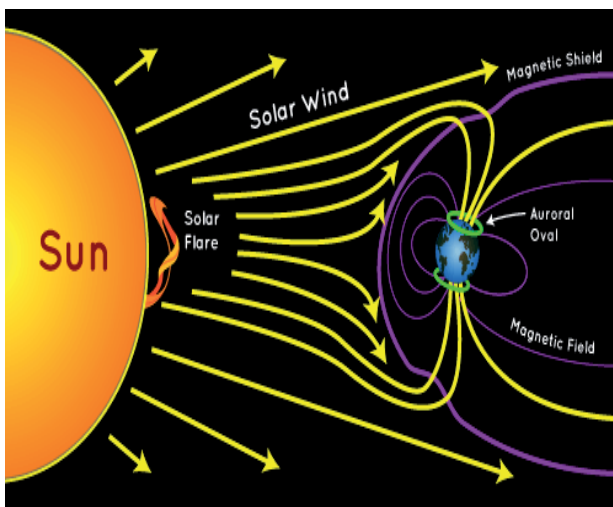
- The Sun's magnetic field is carried out through the solar system by the solar wind—a stream of electrically charged gas blowing outward from the Sun in all directions. Since the Sun rotates, the magnetic field spins out into a large rotating spiral, known as the Parker spiral.
- The Sun doesn't behave the same way all the time. It goes through phases of its own solar cycle. **Approximately every 11 years, the Sun's geographic poles change their magnetic polarity.** When this happens, the Sun's photosphere, chromosphere, and corona undergo changes from quiet and calm to violently active. The height of the Sun's activity, known as solar maximum, is a time of solar storms: sunspots, solar flares, and coronal mass ejections. These are caused by irregularities in the Sun's magnetic field and can release huge amounts of energy and particles, some of which reach us here on Earth. This space weather can damage satellites, corrode pipelines and affect power grids.

3. Correct Option: (d)

Explanation:

Aurora

- When a solar storm (coronal mass ejection) comes toward us, some of the energy and small particles can travel down the magnetic field lines at the north and south poles into Earth's atmosphere. There, the particles interact with gaseous ions in our atmosphere resulting in beautiful displays of light in the sky. Oxygen gives off green and red light. Nitrogen glows blue and purple. This is called Aurora.



- Aurora (the Southern and Northern Lights) primarily occur in the thermosphere due to presence of Charge particles over there.

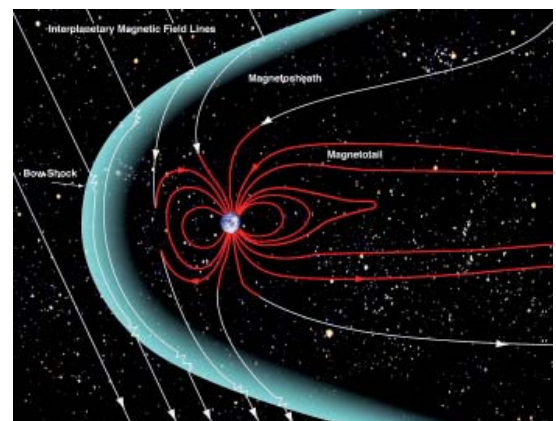
- It mainly occurs near the poles as the magnetic field intensity of the Earth at the poles are strong. It is called an aurora borealis or northern lights if it occurs at the North Pole. If occurred at the South Pole, it is called an aurora australis or the southern lights.
- If other planets have atmosphere and magnetic field, for instance, Jupiter and Saturn, they too can have aurorae.

4. Correct Option: (b)

Explanation:

Van Allen belt

- A magnetosphere is that area of space, around a planet, that is controlled by the planet's magnetic field. The shape of the Earth's magnetosphere is the direct result of being blasted by solar wind. The solar wind compresses its sunward side to a distance of only 6 to 10 times the radius of the Earth. A supersonic shock wave is created sunward of Earth called the Bow Shock. Most of the solar wind particles are heated and slowed at the bow shock and detour around the Earth in the Magnetosheath. The solar wind drags out the night-side magnetosphere to possibly 1000 times Earth's radius; its exact length is not known. This extension of the magnetosphere is known as the Magnetotail. **The outer boundary of Earth's confined geomagnetic field is called the Magnetopause.** The Earth's magnetosphere is a highly dynamic structure that responds dramatically to solar variations. The magnetosheath is the region of space between the magnetopause and the bow shock of a planet's magnetosphere.



- The Van Allen Belts are a region of charged particles held in place by the magnetosphere. Named for their discoverer, James Van Allen, the belts swell and shrink over time. The belts swell when already energetic electrons and protons are