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# PRE-Mix

*(Compilations of the Multiple Choice Questions)*

*For*

23rd  
October  
2021

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# Science & Technology

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## Physics of Space

1. Consider the following statements:

1. Sound cannot travel in space because molecules are not close enough together to transmit sound between them.
2. Non availability of oxygen and other gases is the reason for black color of the space.

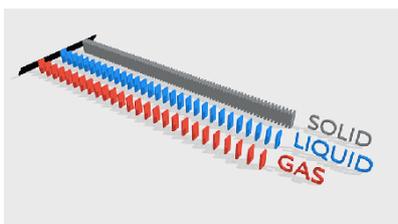
Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

**Answer: C**

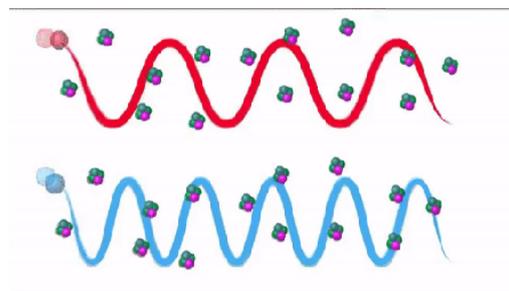
### Explanation

- Sound waves are travelling vibrations of particles in media such as air, water or metal. So it stands to reason that they cannot travel through empty space, where there are no atoms or molecules to vibrate.



- From the perspective of an Earthling, outer space is a zone that occurs about 100 kilometers (60 miles) above the planet, where there is no appreciable air to breathe or to scatter light.

- In that area, blue gives way to black because oxygen molecules are not in enough abundance to make the sky blue.



2. Arrange the following layers of sun in increasing order of their distance from Earth.

1. Photosphere
2. Corona
3. Chromosphere
4. Radiative Zone

Select the correct code.

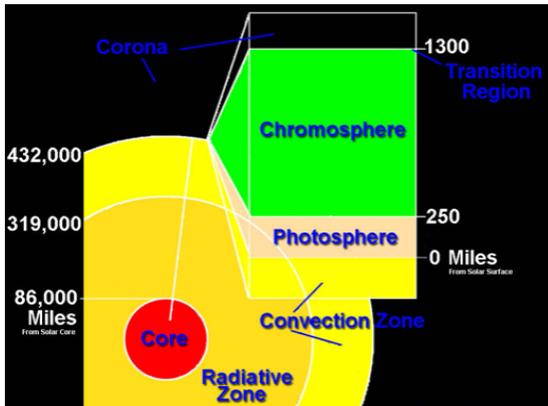
- A. 1-3-2-4
- B. 2-3-1-4
- C. 2-1-4-3
- D. 1-2-4-3

**Answer: B**

### Explanation

- Layers of the Sun is divided in to two layers.
- The inner layers are the Core, Radiative Zone and Convection Zone.

- The outer layers are the Photosphere, the Chromosphere, the Transition Region and the Corona.



- Any degenerate object more massive must inevitably collapse into a neutron star or black hole
- Nobel laureate Subrahmanyan Chandrasekhar, who first proposed the idea in 1931.
- He was awarded the Nobel Prize in Physics in 1983 for his work on the physical processes involved in the structure and evolution of stars.
- The velocity of rotation for spiral galaxies depends on the amount of mass contained in them.
- But the outer arms of the Milky Way are rotating much too fast to be consistent with the amount of matter that we know exists in them.
- Such fast rotation is possible only when there is more mass, and that extra mass is believed to come from the dark matter.

**3. Consider the following statements:**

1. Chandrasekhar Limit is maximum distance from the earth where space shuttle can travel.
2. The velocity of rotation for spiral galaxies depends on the amount of mass contained in them.

Which of the above statements is/are correct?

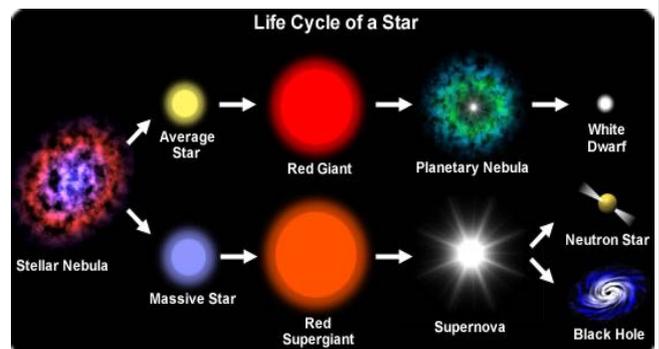
- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

**Answer: B**

**Explanation**

**Chandrasekhar Limit**

- Maximum mass theoretically possible for a stable white dwarf star.
- A limit which mandates that no white dwarf (a collapsed, degenerate star) can be more massive than about 1.4 times the mass of the Sun.



4. The solar wind is a stream of energised, charged particles, primarily electrons and protons, flowing outward from the Sun at high speeds and temperature. Consider the following statements with respect to the same.

1. Corona's temperature causes its particles to move at very high speeds.
2. These particles cannot escape the Sun's gravity.
3. Magnetosphere of a planet prevent these particles from bombarding the surface or atmosphere.

Which of the above statements is/are correct?

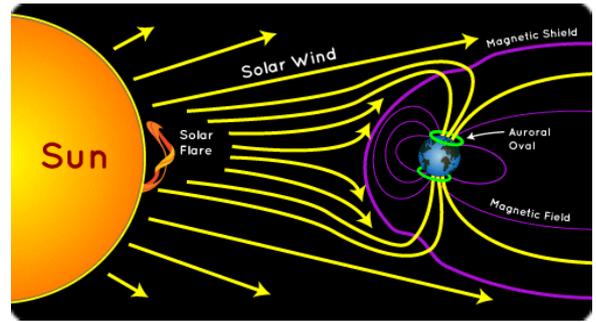
- A. 1 and 3 only
- B. 3 only
- C. 2 and 3 only
- D. 1, 2 and 3

**Answer: A**

**Explanation**

**Solar Wind**

- The solar wind is a stream of energised, charged particles, primarily electrons and protons, flowing outward from the Sun at speeds as high as 900 km/s and at a temperature of 1 million degrees (Celsius).
- It is made of plasma (ionised atoms).
- The corona's temperature causes its particles to move at very high speeds.
- These speeds are so high that the particles can escape the Sun's gravity.
- As the solar wind approaches a planet that has a well- developed magnetic field (such as Earth, Jupiter and Saturn), the particles are deflected.



- This region, known as the magnetosphere, causes the particles to travel around the planet rather than bombarding the atmosphere or surface.

5. Recently, an international team of researchers made the first direct detection of dark energy. Consider the following statements with respect to the same.

1. HETE-2 is the world's most sensitive dark matter experiment and was operated deep underground at the INFN Laboratori Nazionali del Gran Sasso in Italy.
2. Dark Matter makes up about 68% of the universe.
3. Dark Matter attracts and holds galaxies together whereas dark energy repels and causes the expansion of our universe.

Which of the above statements is/are correct?

- A. 1 and 2 only
- B. 3 only
- C. 1 and 3 only
- D. 1, 2 and 3

**Answer: B**

## Explanation

- Dark energy, the mysterious form of energy that makes up about 68% of the universe, has intrigued physicists and astronomers for decades. Dark energy has been noted as “the most profound mystery in all of science”.
- With advanced technologies and newer experiments, scientists have found certain clues about it and, last week, an international team of researchers made the first putative direct detection of dark energy.
- They noticed certain unexpected results in an underground experiment and write that dark energy may be responsible for it.
- The XENON1T experiment is the world’s most sensitive dark matter experiment and was operated deep underground at the INFN Laboratori Nazionali del Gran Sasso in Italy.
- Everything we see – the planets, moons, massive galaxies, you, me, this website – makes up less than 5% of the universe.
- About 27% is dark matter and 68% is dark energy. While dark matter attracts and holds galaxies together, dark energy repels and causes the expansion of our universe.

