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ISB-49

28504

General Science & Ability

Q3. a) Black hole:

Enough length but insufficient headings

Draw diagrams

Write complete logic and steps for math portion

Paper presentation is fine

A black hole is a region of space which has extremely strong gravity, such that, it does not let any particle escape from it, not even light. The strong gravity occurs because matter has been pressed into a tiny space. This compression can take place at the end of a star's life. Black holes cannot be observed directly due to their small size and because no light is emitted from them, but they can be detected by the effects that is made by their intense gravitational field on nearby matter. Some examples of black hole are Cygnus X-1 and Sagittarius A.

Formation of black holes:

Black hole formation takes place when massive stars die. When the life of a massive star ends, its

core becomes unstable and collapses and its outer layers get blown away. The weight of matter falling from all sides compresses the star such that its volume becomes zero and density becomes infinite. Hence, a black hole is formed.

3.b) Cyclone:

It is a system of winds rotating inwards at a high speed with the area of low pressure in the middle. Cyclone Biparjoy, which is expected to generate wind speeds of 125-135 kmph with gusts reaching upto 150 kmph by the time it reaches land, is a tropical cyclone.

Tropical cyclone:

Tropical cyclones are those which develop in the regions between the Tropics of Capricorn and Cancer. They are the most devastating storms on Earth. Such cyclones develop when *thunderstorm activity starts

building close to the centre of circulation, and the strongest winds and rain are no longer in a band far from the centre.

Formation of cyclone:

Tropical cyclones are formed only over warm ocean waters near the equator. When warm, moist air over the ocean rises upward from near the surface, a cyclone is formed. When the air rises up and away from the ocean surface, it creates an area of lower air pressure below. It causes the air from surrounding areas with higher pressure to move towards the low-pressure area which further leads to warming up of the air and causes it to rise above.

As the warm, moist air rises and cools the water in the air forms clouds. The complete system of clouds and wind spins and grows, along with the ocean's heat and water evaporating from the ocean surface.

As the wind system rotates with increasing speed, an eye gets formed in the middle. The centre of a cyclone is very calm and clear with very low air pressure. The difference of temperature between the warm, rising and the cooler environment causes the air to rise and become buoyant.

c. Flood:

A flood is an overflow of water onto land that is normally dry. Flood can happen almost anywhere. They can cover an area with just a few inches of water or they can bring enough water to cover the roof of a house. Floods can be dangerous for communities, lasting days, weeks, or sometimes even longer.

Causes of Flood:

Severe flooding is caused by atmospheric conditions that lead to heavy rain or the rapid melting

of snow and ice. Geography can also make an area more likely to flood. For example, areas near rivers and cities are often at risk for flash floods.

Many different situations can cause a flood, such as:

- Heavy rain fall
- Ocean waves coming on shore, such as a storm surge.
- Melting snow and ice, as well as ice jams
- Dams or levees breaking.

d. Sun's Energy formation in Sun:

Sun generates a large amount of heat and energy. Sun is the center of the solar system and it provides heat and light to the whole planet, living organisms, plants, etc.

Nuclear fusion is the nuclear reaction where two or more lighter nuclei fuse together to generate a heavier nucleus. In fusion reaction, when two nuclei combine then it

releases high energy. Therefore, the sun produces energy through the concept of nuclear fusion.

~~Factors affecting sun's gravity:~~

Factors responsible for sun's gravity:

According to Newton, the planets orbit the Sun is related to why objects fall to Earth when we drop them. Gravitational force is a force which pulls the objects. That's why, the Sun's gravity pulls on the planets same as the Earth's gravity pulls down anything that is not held ^{up} by some other force. Heavier objects produce a bigger gravitational pull than the lighter ones thus the sun exerts the strongest gravitational pull.

The gravitational field of any object is determined by two things: mass of the object & the distance.

Thus, the Sun's gravity can hold up to nine planets and also some dwarf planets. The Sun's gravitational pull is approximately 25 times more than the Earth. The Sun's gravity pulls the

planet toward the sun changing the direction of the orbit into a curve.

Solar wind:

The solar wind is a stream of charged particles released from the upper atmosphere of the sun, called the corona. This plasma mostly consists of electrons, protons and alpha particles with kinetic energy between 0.5 and 10 keV.

Q5a. Electromagnetic Radiations:

Electromagnetic radiations are a form of energy that propagates as both magnetic and electrical waves travelling in tiny packets of energy called photons. There is a spectrum of these radiations with variable wavelengths which gives them their different characteristics.

Types of electromagnetic radiations:

This spectrum consists of radiowaves, microwaves, infrared waves, visible light, ultraviolet radiation, X-rays, and gamma rays. The only part of the spectrum that is visible to the human eye is the visible light spectrum.

Uses of these radiations:

X-rays are used for medical imaging and treatments. They help looking at bones and joints and assist in detecting problems of internal organs. Radio waves are used

for television and FM and AM radio broadcasts, mobile phones, military communication, and various other communication applications. Infrared waves are used in heat sensors, thermal imaging and night vision equipment. Gamma rays are used in medicine for radiotherapy and in industries for sterilization and disinfection. Microwaves have similar uses to that of radio waves. They are used in communications, remote sensing, radar, and in heating appliances.

5b)

What is LED?

A light-emitting diode (LED) is a semi-conductor device that emits light when an electric current flows through it. When current passes through an LED, the electrons recombine with holes emitting light in the process. LEDs allow the current to flow in the forward direction and blocks the current in the reverse direction.



C. Short: ceramics:

A ceramic is an inorganic non-metallic solid made up of either metal or non-metal compounds that are shaped and then hardened by heating at high temperatures.

They are hard, resistant to corrosion and brittle. As they are hard, porous, and brittle, they are used to make pottery, bricks, tiles, cements, and glass.

Types of ceramic includes:

Earthenware, stoneware, porcelain, Glass ceramic, and etc.

Semi-conductors.

These are substances with unique electronic properties that are both insulators and conductors in terms of electrical conductivity. Most popular semi-conductors are silicon, germanium, and gallium arsenide.

They are in two types: intrinsic and extrinsic. Intrinsic are undoped i.e. - the holes are thermally excited

as opposed to doped. Extrinsic are doped by specific impurity which modifies its electrical properties.

5d. Polio:

Polio, or poliomyelitis, is a disabling and life-threatening disease caused by the poliovirus.

The virus spreads from person to person and can infect a person's spinal cord, causing paralysis (can't move parts of the body).

Most people who get infected with poliovirus will not have any visible symptoms. About 1 to 4 people (or 25 out of 100) with poliovirus infection will have flu-like symptoms that can include:

- Sore throat
- Fever
- Nausea
- Tiredness
- Headache
- Stomach pain

These symptoms usually last 2 to 5 days, then go away on their own.

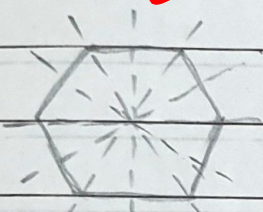
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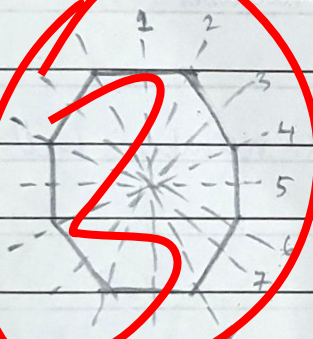
Question: 8

a. $15\text{m} + 1.5\text{m} = 16.5\text{m}$ is the height of the tree.

b. ~~ENGULF, SNACK, FIERCE, POMEGRANATE, PUMPKIN.~~

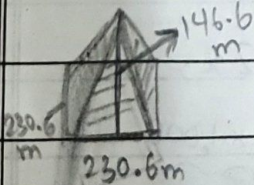
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c.  Lines of symmetry of hexagon are 6

 Lines of symmetry of regular octagon are 8

A circle has an infinite number of lines of symmetry passing through its centre.

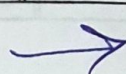
d.



$$V = \frac{1}{3} l \times w \times h$$

$$V = \frac{1}{3} \times 230.6 \times 230.6 \times 146.6$$

$$V = \frac{1}{3} \times 53,176.36 \times 146.6$$



$$V = \frac{1}{3} \times 7,795,654.376$$

$$V = 2,598,551.46 \text{ m}^3$$

Question # 7.

a. If x is the smallest number.

$$\text{Then, } \frac{x + x+1 + x+2 + x+3 + x+4 + x+5 + x+6}{7} = 20$$

$$= \frac{7x + 21}{7} = 20$$

$$= x + 3 = 20$$

$$= \boxed{x = 17}; \text{ smallest number.}$$

Therefore; the largest number will be $\boxed{28}$.

b. The relationship between D and C is that they are Cousins

c. $7 \xrightarrow{+5} 12 \xrightarrow{+7} 19 \xrightarrow{+9} 28 \xrightarrow{+11} 39 \xrightarrow{+13} \boxed{52}$

d. $D = 3x$

So; $B = 2x$

$$C = 3x + 1,000 = 4x$$

$$= 2 \times 1,000$$

$$x = 1,000$$

$$B = \boxed{R = 2,000}$$