

Q1. To sharpen the blade of a knife by rubbing it against a surface, which of the following will be most suitable?

- (a) Stone
- (b) Wooden block
- (c) Plastic block
- (d) Glass block

Q2. Consider the following statement and identify the correct answer using the code given below:

1. In a thermal power station, fuels such as oil, coal, or Natural gas are used to generate electricity.
2. Fuels are burned to heat water and turn it into steam, which goes through a turbine, which spins and turns, generating electricity.

- (a) Statement 1 is correct but statement 2 is not correct
- (b) Statement 2 is correct but statement 1 is not correct
- (c) Both the statements are correct and statement 2 explains statement 1
- (d) Both the statements are correct but statement 2 does not explain statement 1

Q3. The energy dissipated by a 100 W electric bulb in two hours

- (a) 72 kJ
- (b) 7200 J
- (c) 720 J
- (d) 720 J

Q4. Which of the following statements is correct?

A. Frequency of a wave is the number of oscillations of each constituent particle in the vibrating medium per minute.

B. The minimum distance between two points in a wave having the same phase at a particular instant of time is called the wavelength.

- (a) A only
- (b) B only
- (c) Both a and b
- (d) Neither a nor b

Q5. What is the weight of an object of mass 40 kg, if the acceleration due to gravity at that place is 9.8 m/s^2 ?

- (a) 39.2 N
- (b) 392 N
- (c) 40.8 N
- (d) 4.08 N

Q6. With reference to the Laws of thermodynamics, consider the following statements:

A. It deals with the transfer of energy from one place to another and from one form to another.

B. It deals with the bulk system and does not deal with the molecular constitution of matter. Which of the above statements is/are correct?

- (a) A only
- (b) B only
- (c) Both a and b
- (d) Neither a nor b

Q7. Match the columns.

Column – A
– B

Column



Q15. In raising an object to a given height by means of an inclined plane, as compared with raising the object vertically, there is a reduction in

- (a) Force to be applied
- (b) Work required
- (c) Distance covered
- (d) Friction force

Q16. Which one of the following cannot be called "Amphibian of the Plant Kingdom"?

- (a) Spirogyra
- (b) Riccia
- (c) Funaria
- (d) Marchantia

Q17. The colour of cow's milk is slightly yellow due to the presence of

- (a) Xanthophyll
- (b) Riboflavin
- (c) Ribulose
- (d) Carotene

Q18. Trophic level in an ecosystem represents

- (a) Oxygen levels
- (b) Salt level
- (c) Energy level
- (d) Water level

Q19. Which of the following statements about the Modern Periodic Table is correct:

- (a) It has 18 horizontal rows known as Periods
- (b) It has 7 vertical columns known as Periods
- (c) It has 18 vertical columns known as Groups
- (d) It has 7 horizontal rows known as Groups

Q20. An element which is an essential constituent of all organic compounds belongs to

- (a) Group 1
- (b) Group 14
- (c) Group 15
- (d) Group 16

Q21. Point out the incorrect pair:

- (a) Green Revolution – Agricultural Development
- (b) White Revolution – Dairy Development
- (c) Blue Revolution – Development of Fisheries
- (d) Operation Flood – Irrigation Development

Q22. Opposite the micropylar end, is the _____, representing the basal part of the ovule.

- (a) Hilum
- (b) Funicle
- (c) Chalaza

(d) Nucellus

Q23. In unicellular organisms, all functions like digestion, respiration and reproduction are performed by a how many cell(s)?

- (a) 1
- (b) 2
- (c) 3
- (d) 4

Q24. Cattle quickly swallow grass and store it in their _____.

- (a) Rumen
- (b) Esophagus
- (c) Small intestine
- (d) Salivary glands

Q25. Which of the following carries oxygen to various parts of human body?

- (a) Red blood cells
- (b) White blood cells
- (c) Plasma
- (d) Nerves

Q26. Locked jaw disorder is the other name of the disease -

- (a) Tetanus
- (b) Muscular disorder
- (c) Typhoid
- (d) Filariasis

Q27. Which of the following is known a body builder?

- (a) Protein
- (b) Carbohydrates

(c) Vitamins

(d) Fats

Q28. Bamboo is classified as

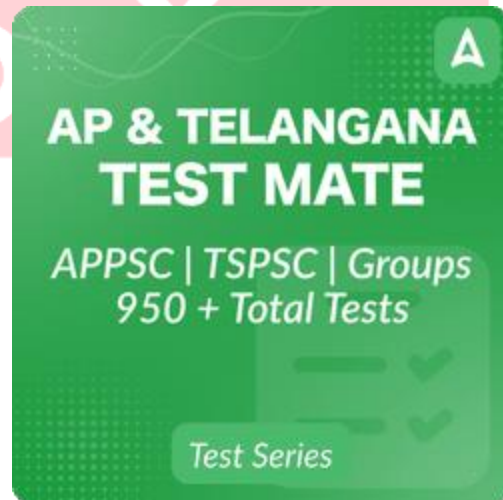
- (a) Herb
- (b) Grass
- (c) Shrub
- (d) None of these

Q29. Which of the following helps us in protecting from infection?

- (a) R.B.C.
- (b) W.B.C.
- (c) Blood plasma
- (d) Hemoglobin

Q30. The most abundant element found in the human body is-

- (a) Iron
- (b) Sodium
- (c) Oxygen
- (d) Iodine



Solutions

Solutions –

S1. Ans.(a)

Sol. To sharpen the blade of a knife on high-frictional surfaces is preferable. The friction between the surface and the blade is greater on harder surfaces. A stone will be more suitable than the blade of a knife by rubbing it against a surface. It will provide a greater reaction and thus a higher friction force, making it easier to sharpen the blade of a knife by rubbing.

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Wooden blocks – Wooden blocks may be considered hard in comparison to plastic wood, but in general, or in comparison to stone wood is not a very hard material.

Plastic blocks – Plastic blocks are easily deformed and thus cannot provide the necessary force to easily remove the dull corroded particles from the surface. Aside from the blades, they could be cut rather than sharpened.

Glass block – Although glass block is somewhat hard by scientific definitions, but it is less hard than stone.

S2. Ans.(c)

Sol. Statement 1

It states that in a thermal power station, fuels such as oil, coal, or natural gas are used to generate electricity. This is accurate because thermal power stations primarily rely on the combustion of fossil fuels to produce heat energy.

Statement 2

It explains the process of electricity generation in a thermal power station. It mentions that fuels are burned to heat water and convert it into steam. The steam then passes through a turbine, which spins and generates electricity. This explanation corresponds to the basic principle of a thermal power station, where the heat energy from burning fuels is utilized to produce steam, which in turn drives a turbine to generate electricity.

S3. Ans.(d)

Sol. Power = 100 W

Time = 2 hours

∴ Energy dissipated by bulb is

$$E = 100 \times 2 = 200 \text{ Wh}$$

$$E = 0.2 \text{ kWh}$$

$$E = 0.2 \times 3.6 \times 10^6 \text{ Joules}$$

$$E = 720 \text{ kJ}$$

S4. Ans.(b)

Sol. Wavelength – It is a measure of the distance between two equal peaks of a crest or trough. It is denoted by the Greek letter 'lambda' (λ). Its SI unit is a 'Meter'. The frequency of a wave is the number of waves passing a point in a second. The unit of frequency is measured in hertz (Hz). There is a relationship between the wavelength (λ), the velocity of the wave, and the frequency of a wave.

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Transverse Waves – The mechanical wave which, when transmitted, vibrates perpendicular to the direction of propagation of the particle of the medium, is called a transverse wave.

Longitudinal Waves – If the particles of the medium oscillate back and forth at their mean position in the direction of propagation of the wave, then such waves produced are called longitudinal waves.

Mechanical Waves – The disturbance produced by throwing bricks in the water of a calm river or pond is called a mechanical wave.

S5. Ans.(b)

Sol. $m = 40 \text{ Kg}$

$$g = 9.8 \text{ m/s}^2$$

$$\text{Weight} = m g = 40 \times 9.8 = 392 \text{ N}$$

S6. Ans.(c)

Sol. Thermodynamics

Statement I

It is a science of the relationship between heat, work, temperature, and energy. In broad terms, thermodynamics deals with the transfer of energy from one place to another and from one form to another. The key concept is that heat is a form of energy corresponding to a definite amount of mechanical

work. It is not concerned about how and at what rate these energy transformations are carried out. It is based on the initial and final states undergoing the change.

Statement II

It is a macroscopic science. This means that it deals with the bulk system and does not deal with the molecular constitution of matter. It explains how thermal energy is converted to or from other forms of energy and how matter is affected by this process. Thermal energy is energy that comes from heat. This heat is generated by the movement of tiny particles within an object, and the faster these particles move, the more heat is generated.

S7. Ans.(c)

Sol. I – D, II – C, III – B, IV - A

S8. Ans.(b)

Sol. A constellation is an area on the celestial sphere in which a group of visible stars forms a perceived outline or pattern, typically representing an animal, mythological person or creature, or an inanimate object.

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Ursa Major is also called the big dipper, saphrishi, or the great bear and looks like a spoon. It has 7 stars, 3 in the handle and 4 in the mouth of the spoon.

Orion is also known as the hunter. It has 8 bright stars, 3 in the belt, and the rest are arranged in the shape of a quadrilateral.

Leo Major is the 12th largest constellation in the sky. It has 13 bright stars arranged in a shape of a crouching Lion.

S9. Ans.(b)

Sol. Liquefied Petroleum Gas

On liquefaction, petroleum gas changes into a liquid which is called liquefied Petroleum Gas (LPG). The main constituent of LPG is butane through it contains smaller amounts of ethane and propane also. It is clear that butane is the main constituent of LPG.

LPG is stored in cylinders. It is mainly used for cooking and hence it is also called cooking gas and the cylinders containing it are called cooking gas cylinders. When a valve provided in the cylinder is opened with the help of a regulator due to a decrease in pressure, LPG changes into a vapour. This vapour flows to the burners through rubber tubing attached to the regulator.

Information Booster**Advantages of LPG**

1. It is a high calorific value fuel (50 KJ/g)
2. It burns without smoke and is pollution less.
3. It is a neat and clean fuel.
4. It is convenient to store.

S10. Ans.(b)

Sol. Viscosity is a measure of resistance to flow which arises due to the internal friction between layers of fluid. This resistance to fluid motion is like internal friction analogous to friction when a solid moves on a surface. Strong intermolecular forces between molecules hold them together and resist the movement of layers past one another.

Although plasma is mostly water, it also contains other molecules such as electrolytes, proteins, and other macromolecules. Because of molecular interactions between these different components of plasma, it is not surprising that plasma has a higher viscosity than water.

S11. Ans.(a)

Sol. Vitamins are an organic non-protein substance that is required by an organism for normal metabolic but cannot be synthesized in sufficient quantity by that organism. These can be divided into two categories – fat-soluble and water-soluble.

Fat-Soluble vitamins

Fat-soluble vitamins are soluble in fats. They are absorbed by fat globules that travel through the small intestines and into the general blood circulation within the body. Unlike water-soluble vitamins, fat-soluble vitamins are stored in the body when they are not in use. Vitamins A, D, E, and K are fat-soluble.

Water-Soluble vitamins

Water-soluble vitamins dissolve in water, which means these vitamins and nutrients dissolve quickly in the body. Unlike fat-soluble vitamins, water-soluble vitamins are carried to the body's tissues, but the body cannot store them. Any excess amounts of water-soluble vitamins pass through the body. Vitamins B and C are water-soluble.

S12. Ans.(d)

Sol. The pressure is defined as the force per unit area (Pressure = Force/Area). The S.I. unit of pressure is 'Pascal' and it is denoted by Pa. 1 Pascal equals the pressure of 1 newton per square meter and the formula is as follows: $1 \text{ Pa} = 1 \text{ N/m}^2 = 1 \text{ Kg/m}$

The Pascal is the SI-derived unit of pressure used to quantify internal pressure, stress, Young's modulus, and ultimate tensile strength. It is named after the French polymath Blaise Pascal.

S13. Ans.(d)

Sol. Gene is a basic unit of heredity and a sequence of nucleotides in DNA that encodes the synthesis of a gene product, either RNA or protein. Thus, Gene is the basic unit of inheritance. The transmission of genes to an organism's offspring is the basis of the inheritance of phenotypic traits. These genes make up different DNA sequences called genotypes.

S14. Ans.(d)

Sol. Mineral acids are substances that are obtained from minerals. They are also obtained from other inorganic sources. The mineral acids are also known as strong acids. They readily dissolve in water and release H^+ ions. Examples of mineral acids are hydrochloric acid, sulphuric acid, nitric acid, phosphoric acid, Hydrobromic acid, and hydroiodic acid, etc.

S15. Ans.(a)

Sol. In raising an object to a given height by means of an inclined plane, as compared with raising the object vertically, there is a reduction in the amount of force required.

To raise an object in an inclined plane, the required force is equal to the sine component of weight. Since sine is less than 1, the required force to raise an object in an inclined plane will be less than the required force to raise it vertically. The amount of force required to raise an object using an inclined plane depends on the slope of the plane.

S16. Ans.(a)

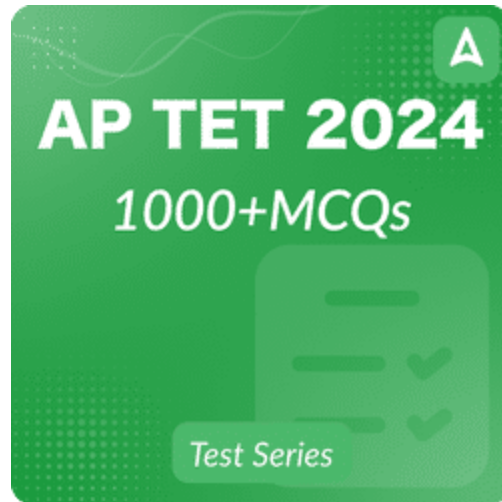
Sol. Spirogyra is an alga and is from one of the species of free-floating green algae. Spirogyra consists of a cell wall, mucilaginous sheath, cytoplasm, a protein-containing body called pyrenoids, and chloroplast which helps it to make its own food, cell membrane, and vacuole.

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Riccia is a liver wart or Hepaticopsida plant which comes under the category of Bryophyta. Bryophyta plants are found both on land and in water hence they are amphibians.

Funaria is a genus of about 210 species of mosses. Species of this genus are known as cord-moss because of the rope-like way in which the stalks twist and curl with changes in humidity.

Marchantia, a genus of liverworts in the order Marchantia, a genus of liverworts in the order Marchantiales, are commonly found on moist soils or silty soils, especially on recently burned land in the Northern Hemisphere.



S17. Ans.(d)

Sol. The amount of yellow colour in cow's milk depends upon the amount of green feed eaten by cows or given to cows. The colour of cow's milk is slightly yellow due to the presence of carotene.

Carotene is a fat-soluble compound and is responsible for not only the yellow colour of milk but also cream, butter, ghee and other fat-rich dairy products. Besides contributing to the colour of milk, carotene acts as a precursor of vitamin A and also as an antioxidant.

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Xanthophyll – These are the oxygen-containing derivatives of carotenes. It is yellow in colour and the yellowish colour of autumnal foliage is due to xanthophyll.

Riboflavin – It is commonly known as vitamin B2. It is orange-yellow in colour and upon reduction changes to a colourless form. Milk, eggs, cheese, green vegetables, etc. are good sources of vitamin B2.

Ribulose – It is a ketopentose sugar. A 5-carbon-containing monosaccharide with a ketone functional group. Ribulose is synthesized through the pentose phosphate pathway from arabinose. It plays a significant role in the formation of different types of bioactive compounds.

S18. Ans.(c)

Sol. The trophic level is the relative position of an entity in the food chain. It forms the feeding positions in a food web or chain. All food webs and chains have at least two or three trophic levels. An ecological pyramid depicts how energy and biomass decrease from lower to higher trophic levels.

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A food chain outlines who eats whom. A food web is all of the food chains in an ecosystem. Each organism in an ecosystem occupies a specific trophic level or position in the food chain or web. Producers, who make their own food using photosynthesis or chemosynthesis, make up the bottom of the trophic pyramid.

S19. Ans.(c)

Sol. It has 18 vertical columns known as Groups

Periodic Table – It is an arrangement of all the known elements. All elements are arranged (from left to right and top to bottom) in order to increase the atomic number and recurring chemical properties. All the rows represent periods. All the columns represent groups. Elements in the same group have the same valence electron configuration and therefore same chemical properties. Elements in the same period have an increasing order of valence electrons. The elements are arranged in 7 horizontal rows, called periods, and 18 vertical columns, called groups.

S20. Ans.(b)

Sol. Carbon can very easily form long chains and high-mass structures by forming covalent bonds with the other carbon atoms. Carbon is most vastly present in a number of organic compounds. The atomic number of carbon is 6. The electronic configuration of carbon: 2, 4

S21. Ans. (d)

Sol. Operation Flood, launched in 1970 is a project of the National Dairy Development Board (NDDB), which was the world's biggest dairy development program.

S22. Ans. (c)

Sol. In plant ovules, the chalaza is located opposite the micropyle opening of the integuments. It is the tissue where the integuments and nucellus are joined. Nutrients from the plant travel through vascular tissue in the funiculus and outer integument through the chalaza into the nucellus.

S23. Ans. (a)

Sol. A unicellular organism, also known as a single-celled organism, is an organism that consists of only one cell. The main groups of unicellular organisms are bacteria, archaea, protozoa, unicellular algae, and

unicellular fungi. These organisms live together, and each cell in the colony is the same. However, each individual cell must carry out all life processes (digestion, respiration and reproduction etc.) to survive.

S24. Ans. (a)

Sol. When the cow first eats, it chews the food just enough to swallow it. The unchewed food travels to the first two stomachs, the rumen and the reticulum, where it is stored until later.

S25. Ans. (a)

Sol. Hemoglobin is the protein inside red blood cells that carries oxygen. Red blood cells also remove carbon dioxide from our body, transporting it to the lungs to exhale.

S26. Ans. (a)

Sol. Tetanus, commonly called locked jaw, is a bacterial disease that affects the nervous system. Locked jaw syndrome is a disorder that is related to our jaw joint. It causes severe pain and sometimes cannot open the mouth.

S27. Ans. (a)

Sol. Proteins are large biological molecules consisting of one or more chains of amino acids, are essential nutrients for the human body. They are one of the building blocks of body tissue, and can also serve as a fuel source.

S28. Ans. (b)

Sol. Bamboo is a type of Grass.

S29. Ans. (b)

Sol. White blood corpuscles (WBCs) are disease-fighting cells found in blood. When our blood is infected by any harmful bacteria or virus at any in the body, white blood corpuscles reaches there and eats up or destroys these harmful outsiders.

S30. Ans. (c)

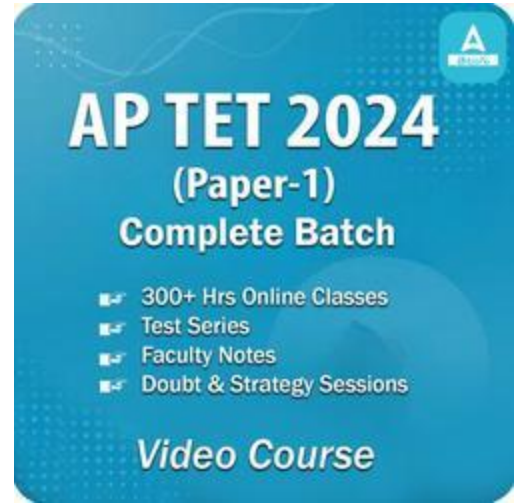
Sol. Nearly 99% of the mass of human body consists of just six chemical elements: oxygen, carbon, hydrogen, nitrogen, calcium and phosphorus. Oxygen is the most abundant element in the human body. It is mainly found in the form of water.



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