

1. Washing soda is

- (1) Sodium chloride (2) Sodium carbonate  
(3) Sodium bi-carbonate (4) Calcium carbonate

Ans: 2.

Note: (Sodium bi-carbonate – baking soda, Calcium carbonate-marble and Sodium chloride – common salt)

2. Common salt is

- (1) Sodium chloride (2) Sodium bi-carbonate  
(3) Magnesium carbonate (4) Calcium chloride

Ans: 1

3. The most abundant gas in the atmosphere is

- (1) Carbon dioxide (2) Helium (3) Nitrogen (4) Oxygen

Ans: 3 (78% by volume)

4. The major inert gas in the atmosphere is

- (1) Carbon dioxide (2) Argon (3) Nitrogen (4) Oxygen

Ans: 2. Argon = 0.93%

5. The present level of Carbon dioxide in the atmosphere is

- (1) 1% (2) 0.1 % (3) 0.3% (4) 0.039-0.04%

Ans: 4. Many Old and many old articles still mention the level as 0.03% which is not true.

6. The % of gases in the atmosphere can be expressed as

- (1) Nitrogen> Oxygen>Carbon dioxide> Argon  
(2) Nitrogen> Oxygen> Argon> Carbon dioxide  
(3) Oxygen> Nitrogen> Carbon dioxide> Argon  
(4) Oxygen> Nitrogen> Argon> Carbon dioxide

Ans: 2

7. For the production of iron, other than iron ore, other raw materials required are

- (1) Lime stone (2) Coal (3) Both 1 and 2 (4) Rubber

Ans: 3

Note: The raw materials used to produce **pig iron** in a blast furnace are **iron ore, coke, sinter, and limestone**. Iron **ores** are mainly iron oxides and include **magnetite, hematite, limonite**, and many other rocks

8. Milk is an example of

- (1) Suspension      (2) Gel      (3) **Emulsion**      (4) Foam

Ans: 3.

An emulsion is a mixture of two or more liquids that are normally immiscible owing to liquid-liquid phase separation. Emulsions are part of a more general class of two-phase systems of matter called colloids.

The term **emulsion** is often applied to mixed systems that should better be characterized as solutions, suspensions, or gels.

Some familiar emulsions are milk (a dispersion of fat droplets in an aqueous solution) and butter (a dispersion of droplets of an aqueous solution in fat). Emulsions are important in many fields—e.g., in the dyeing and tanning industries, in the manufacture of synthetic rubber and plastics, in the preparation of cosmetics such as shampoos, and of salves and therapeutic products.

Britannica, The Editors of Encyclopaedia. "Emulsion". *Encyclopedia Britannica*, 14 Aug. 2019, <https://www.britannica.com/science/emulsion-chemistry>. Accessed 13 February 2021.

Note: **Milk is an example** of emulsion. These are formed when both the dispersed phase and dispersion medium are liquids in a colloidal system. If a mixture of two immiscible or partially miscible liquids is shaken, coarse dispersion of one liquid on the other is obtained, which is known as emulsion

Milk is essentially an emulsion of fat and protein in water, along with dissolved sugar (carbohydrate), minerals, and vitamins. These constituents are present in the milk of all mammals, though their proportions differ from one species to another and within species. The milk of each species seems to be a complete food for its own young for a considerable time after birth. Milk protein is of high nutritional value because it contains all the essential amino acids—i.e., those which infants cannot synthesize in the necessary quantities. Milk's mineral content includes calcium and phosphorus in quantities sufficient for normal skeletal development, but little iron. Milk contains B vitamins as well as small amounts of vitamins C and D.

<https://www.britannica.com/topic/milk>

9. The function of DNA

- (1) To help in the release of energy      (2) **To control heredity**  
(3) To help in the synthesis of proteins      (4) Biogenesis of the mitochondria

Ans: 2.

**The function of DNA is to store all of the genetic information that an organism needs to develop, function, and reproduce.** Essentially, it is the biological instruction manual found in each of your cells.

The instructions in DNA are written in a simple alphabet that has just four letters—A, T, C, and G. Now of course, these are not really letters. Instead they are molecules called nitrogenous bases that are part of a larger molecule called a nucleotide that forms the basic building block of DNA. The letters of the alphabet are really just abbreviations for the nitrogenous bases: adenine (A), thymine (T), guanine (G), and cytosine (C).

<https://www.ancestry.com/lp/dna-function>

10. To a bird in the sky, the fish in water appears to be at 30cm from the surface. If refractive index of water=1.33, then the true depth of fish is

(1) 30 cm      (2) 22.5 cm      (3) 40 cm      (4) none of the above

Ans:3. (real depth =  $\mu \times$  apparent depth =  $1.33 \times 30 = 40\text{cm}$ )

11. It is 12 Noon at Greenwich. What will be the time at a place situated at 50° east longitude?

(1) 8.40 am      (2) 3.20 pm      (3) 5.00 am      (4) midnight

Ans: 1

Note: 360° covers in 24 hrs, then 1° in = 4 minute. 50°  $\rightarrow 4 \times 50 = 200$  minute, i.e., 3 hr 20 minute ahead.

12. The atomic number of an element is equal to the number of

(1) proton(s)      (2) electrons      (3) neutrons      (4) none of these

Ans: 1

13. A non-metal which is a good conductor of heat and electricity is

(1) Iodine      (2) sulphur      (3) phosphorus      (4) graphite

Ans: 4

14. Why does a drop of liquid assume a spherical shape?

(1) A sphere has the largest surface area for a given volume  
(2) It is easy to form  
(3) Due to surface tension  
(4) Due to gravitation

Ans: 3

15. The product of valence and equivalent weight of an element is equal to its

- (1) Vapour density (2) specific heat (3) atomic weight (4) molecular weight

Ans: 4

#### EQUIVALENT WEIGHT

The equivalent weight of an element or radical is equal to its atomic weight or formula weight divided by the valence it assumes in compounds. The unit of equivalent weight is the atomic mass unit; the amount of a substance in grams numerically equal to the equivalent weight is called a gram equivalent.

<https://www.infoplease.com/encyclopedia/science/chemistry/concepts/equivalent-weight>

16. Covalent bond is formed by

- (1) Gain of electrons (2) loss of electrons  
(3) Sharing of pairs of electrons (4) exchange of electrons

Ans: 3

17. Carbon forms a large number of compounds because of

- (1) Its great reactivity  
(2) Its variable valency  
(3) The ability to form covalent bond with each other  
(4) It forms covalent and electrovalent compounds easily

Ans: 3

18. Asteroids are rocky and metallic objects that orbit around the sun; they move in orbits between

- (1) Mars and Jupiter (2) Mars and Earth  
(3) Jupiter and Saturn (4) Earth and mercury

Ans: 1

19. Transformers are used to

- (1) convert alternating current to direct current  
(2) Convert direct current to alternating current  
(3) step up D.C.voltage  
(4) step up or step down A.C.voltage

Ans: 4

20. The time taken by sunlight to reach Earth is  
(1) 5 minutes 10 seconds (2) 8 minutes 20 seconds  
(3) 6 minutes (4) 9 minutes 30 seconds

Ans:2.

Moonlight takes **approximately 1.26 seconds** to reach Earth's surface. Scattered in Earth's atmosphere, moonlight generally increases the brightness of the night sky, reducing contrast between dimmer stars and the background.  
<https://en.wikipedia.org/wiki/Moonlight>

21. Central Electro Chemical Research Institute (CECRI) a unit of CSIR is located at  
(1) Chennai (2) Bangalore (3) Karaikudi (4) Pune

Ans: 3

Note: ( About 80 km from Trichy in the Trichy - Rameswaram train route)

22. of hemoglobin is  
(1) to transport oxygen through blood to all parts of the body  
(2) destruction of bacteria  
(3) prevention of anemia  
(4) utilization of energy

Ans: 1

23. A mercury barometer reads 76 cm, what would it read if a small hole is made at the top of the barometer?  
(1) The reading will increase four times (2) the reading will be doubled  
(3) The reading will be zero (4) the reading will be halved

Ans: 3. The pressure will be atmospheric pressure.

24. Optic fibres are mainly used for which of the following?  
a. Tele Communication b. Musical instruments  
c. Technical fibre d. Eye Surgery

Ans: a

25. Amnesia is loss of  
a. Appetite b. Blood c. Memory d. None of these

Ans: c

26. A plant cell is distinguished from an animal cell by the presence of  
(1) Nucleus (2) Chloroplasts (3) Cell membrane (4) Cell wall

Ans: 4

Cells are the basic unit of a living organism and where all life processes are carried out. Animal cells and plant cells share the common components of a nucleus, cytoplasm, mitochondria and a cell membrane. Plant cells have three extra components, a vacuole, chloroplast and a cell wall.

#### ANIMAL CELLS

Animals are made up of millions of cells. Animal cells have an irregular structure and are made up of four key parts:

1. **Nucleus** – This contains genetic material (DNA), and controls the cell's activity.
2. **Cell membrane** – A flexible layer that surrounds the cell and controls the substances that enter and exit.
3. **Cytoplasm** – A jelly-like substance where the chemical reactions happen.
4. **Mitochondria** – This is where energy is released from the food molecules- known as power house of the cell.

#### PLANT CELLS

Plants are also made up of millions of cells. Plant cells have a nucleus, cell membrane, cytoplasm and mitochondria too, but they also contain the following structures:

- Cell wall** – A hard layer outside the cell membrane, containing cellulose to provide strength to the plant.
- Vacuole** – A space inside the cell that is used to store substances and help the cell keep its shape.
- Chloroplasts** – Structures that contain the green pigment **chlorophyll**, which are a key part which takes part in **photosynthesis**.

27. Which day is celebrated as world environment day?  
a. June 5 b. July 11 c. October 11 d. December 12

Ans: a

Note: World Environment Day is celebrated on 5 June every year, and is the United Nations' principal vehicle for encouraging awareness and action for the protection of the environment. Since 1974, it has been celebrated every year on 5 June: engaging governments, businesses, celebrities and citizens.

28. Who discovered Penicillin?  
a. Abraham Gesner b. Pauling  
c. Louis Pasteur d. Alexander Fleming

Ans: d

Note: Abraham Gesner -who invented kerosene

**Linus Carl Pauling** -Francis Crick acknowledged **Pauling** as the "father of molecular biology". His discovery of sickle cell anemia as a "molecular disease" opened the way toward examining genetically acquired mutations at a molecular level.

Pauling was one of the founders of the fields of quantum chemistry and molecular biology. He is one of four individuals to have won more than one Nobel Prize (the others being Marie Curie, John Bardeen and Frederick Sanger).

29. A universal donor has the blood group belonging to

- a. A                                      b. B                                      c. O                                      d. AB

Ans: c

Note: **blood group** type O negative **blood** is the variety of **blood** that **has** the lowest risk of causing serious reactions for most people who receive it. Because of this, it's sometimes called the **universal blood donor** type.

#### UNIVERSAL BLOOD TYPE FOR PLATELET TRANSFUSIONS

The universal blood type for platelet transfusions is AB positive (AB+). One of the rarest of all blood types, only 3% of the population has this special blood type. Platelets from AB+ donors can be used for any patient in need. AB+ donors are encouraged to donate Plasma or Platelets.

#### UNIVERSAL PLASMA DONORS

People with AB type blood (positive or negative) are universal plasma donors.

<https://www.oneblood.org/media/blog/target-your-type/what-is-the-universal-blood-type.stml>

For emergency transfusions, blood group type O negative blood is the variety of blood that has the lowest risk of causing serious reactions for most people who receive it. Because of this, it's sometimes called the universal blood donor type.

Blood group types are based on proteins called antigens that are present on red blood cells. There are major antigens and minor antigens coating the red blood cells. Based on the major antigens, blood groups may be classified as one of these four types:

- Type A
- Type B
- Type AB
- Type O

Blood is also classified by rhesus (Rh) factor. If your blood has the Rh factor, you're Rh positive. If your blood lacks the Rh factor, you're Rh negative.

Ideally, blood transfusions are done with donated blood that's an exact match for type and Rh factor. Even then, small samples of the recipient's and donor's blood are mixed to check compatibility in a process known as crossmatching.

In an emergency, type O negative red blood cells may be given to anyone — especially if the situation is life-threatening or the matching blood type is in short supply.

<https://www.mayoclinic.org/tests-procedures/blood-transfusion/expert-answers/universal-blood-donor-type/faq->

20058229#:~:text=Answer%20From%20Rajiv%20K.,the%20universal%20blood%20donor%20type.

30. Which of the following pairing is wrong?

- a. Bihar- Thorium
- b. Kerala - Monazite
- c. Rajasthan- Copper
- d. Tamil Nadu - Bauxite

Ans: a.

**Khetri Copper Complex (KCC) at Khetrinagar, Rajasthan.**  
Khetri is situated at the foothills of the Aravalli Range, which hosts copper mineralization.

The mineral monazite is a reddish-brown phosphate containing rare earth metals and an important source of thorium, lanthanum, and cerium. Because of the presence of thorium within monazite, it can be radioactive. Due to the alpha decay of thorium and uranium, monazite contains significant amount of helium, which can be extracted by heating. The sands of Sankaramangalam in Kerala were found to contain several rare earths like Ilmenite, Zircon and Rutile. The Kerala Minerals & Metals Ltd. (A Government of Kerala Undertaking), Sankaramangalam, Chavara, Kollam, Kerala,

Thorium is more abundant in nature than uranium. It is fertile rather than fissile, and can only be used as a fuel in conjunction with a fissile material such as recycled plutonium. Thorium fuels can breed fissile uranium-233 to be used in various kinds of nuclear reactors.

31. With reference to solar system, choose the incorrect combination

- a. Largest Planet - Jupiter
- b. Brightest Planet - Venus
- c. Fastest Planet - Earth
- d. Nearest Planet - Mercury

Ans: c

32. Vitamin K helps in

- a. Clotting of blood
- b. Development of bones
- c. Keeps away sterility
- d. None of these

Ans: a

33. Normal body temperature of a human is

- a. 34.4°C
- b. 36.4°C
- c. 33.4°C
- d. 37.0°C



Ans: d.  $37.0^{\circ}\text{C} = 98.4^{\circ}\text{F}$

34. At what temperature the readings in the Centigrade and Fahrenheit thermometers will be exactly same

a.  $40^{\circ}$                       b.  $0^{\circ}$                       c.  $-40^{\circ}$                       d.  $-34^{\circ}$

Ans: c

35. The main constituent of the cooking gas (LPG) in India is

a. Butane                      b. Ethane                      c. Methane                      d. Propane

Ans: a

Note: LPG is composed **hydrocarbons** containing three or four carbon atoms. The normal components of LPG thus, are **butane** ( $\text{C}_4\text{H}_{10}$ ) and propane ( $\text{C}_3\text{H}_8$ ).

MOST COUNTRIES HAVE EITHER 100% PROPANE (AUSTRALIA & USA), AN LPG GAS MIXTURE OF 60:40 PROPANE:BUTANE (NZ & BELGIUM) OR PERCENTAGE OF PROPANE AND BUTANE IN LPG AROUND 35:65 PROPANE:BUTANE LPG GAS MIXTURE (INDIA, SPAIN & HUNGARY).

<https://www.elgas.com.au/blog/1972-lpg-contains-which-gases-gases-present-in-lpg-gases-used>

36. The average heartbeat per minute in a human body is

a. 50                      b. 72                      c. 90                      d. 110

Ans: b

37. Which one of the following is the main ozone depleting substance in the earth's stratosphere?

a. Carbon dioxide                      b. Chlorofluorocarbons (CFC)  
c. Nitrogen oxides                      d. Methane

Ans: b

38. The unit for measurement of energy consumption for household appliances and industrial use is

(1) Watt                      (2) Kilowatt                      (3) Kilowatt-hour                      (4) Joule

Ans: 3

39. Among the planets of the solar system the planet which has the largest number of satellites is

(1) Jupiter                      (2) Saturn                      (3) Uranus                      (4) Neptune

Ans: 1

Note: **Saturn has overtaken Jupiter as the planet with the most moons, according to US researchers.**

A team discovered a haul of 20 new moons orbiting the ringed planet, bringing its total to 82; Jupiter, by contrast, has 79 natural satellites.

The moons were discovered using the Subaru telescope on Maunakea, Hawaii.

<https://www.bbc.com/news/science-environment-49962134#:~:text=Saturn%20has%20overtaken%20Jupiter%20as,Subaru%20telescope%20on%20Maunakea%2C%20Hawaii.>

The eight planets from the sun are

- Mercury
- Venus
- Earth
- Mars
- Jupiter
- Saturn
- Uranus
- Neptune

### **Mercury and Venus**

Up first two are Mercury and Venus. Neither of them has a moon.

Because Mercury is so close to the Sun and its gravity, it wouldn't be able to hold on to its own moon. Any moon would most likely crash into Mercury or maybe go into orbit around the Sun and eventually get pulled into it.

### **Earth**

Up next is Earth, and of course we have one moon.

### **Mars**

Mars has two moons. Their names are Phobos and Deimos. Don't you wish our moon had a cool name like that?

### **Jupiter**

Next are the giant outer planets. They have lots of moons. Jupiter, for instance, has 79 known moons!

The most well-known of Jupiter's moons are Io (pronounced *eye-oh*), Europa, and Callisto. Jupiter also has the biggest moon in our solar system, Ganymede.

These moons are so big you can see them with just a pair of binoculars.

### Saturn

Saturn has 53 moons that have been named. Saturn also has 29 moons awaiting confirmation. They're unconfirmed because we're waiting to get more information about them. If all of these moons get confirmed, Saturn will have 82 moons. And that's not counting Saturn's beautiful rings.

Saturn's moons have great names like Mimas, Enceladus, and Tethys. One of these moons, named Titan, even has its own atmosphere, which is very unusual for a moon.

### Uranus and Neptune

Uranus has 27 moons that we know of. Soe of them are half made of ice.

Lastly, Neptune has 14 named moons. One of Neptune's moons, Triton, is as big as dwarf planet Pluto

<https://spaceplace.nasa.gov/how-many-moons/en/>

40. Thermoplastic materials

(1) soften on application of heat

(2) are solvent insoluble

(3) Are heavily branched molecules

(4) none of these

Ans:1

Note: A **thermoplastic** is a plastic polymer material that becomes pliable or moldable at a certain elevated temperature and solidifies upon cooling.

Most thermoplastics have a high molecular weight. Example acrylic, nylon, polycarbonate, polythene, PVC, Polystyrene, etc. Thermoplastics may be reshaped and are typically used to produce parts by various polymer processing techniques such as injection molding, compression molding, calendering, and extrusion, etc.

A thermosetting polymer, resin, or plastic, often called a thermoset, is a polymer that is irreversibly hardened by curing from a soft solid or viscous liquid prepolymer or resin.<sup>1</sup> E.G., Bakelite, Polyurethanes, Urea-formaldehyde

41. Which one of the following is not correctly matched (metal vs ore)?

a. Bauxite - Aluminium

b. Haematite - Iron

c. Galena - Lead

d. Monazite - Anthracite

Ans: d

42. Which one of the following pairs of unit and the parameter being measured is not correctly matched?

a. Cusec- Rate of heat flow

b. Byte - Computer memory

c. Richter scale - Intensity of earthquakes

d. Pascal - Pressure

Ans: a

Note: Cusec is a measure of the rate of flow still commonly used by the irrigation department.

1 cusec is one cubic foot of water flow per second. It translates into **28.32** litre of water per second

43. Which one of the following pairs of instrument and the parameter being measured is not correctly matched?

- a. **Anemometer** - Speed of rotation
- b. Ammeter - Elec. current
- c. Seismograph - Earthquake
- d. Pyrometer - High temperatures

Ans: a

Note: An **anemometer** is a device used for measuring wind speed and direction. It is also a common weather station instrument. Most widely used for wind-speed measurements is the revolving-cup electric anemometer, in which the revolving cups drive an electric generator. The useful range of this device is approximately from 5 to 100 knots.

44. Choose the incorrect combination

- a. Baking soda - Sodium bicarbonate
- b. Bleaching powder - Sodium hypochlorite
- c. Limestone - Calcium carbonate
- d. **Dry ice** - **Solid carbon monoxide**

Ans: d

Note: Baking soda, also known as sodium bicarbonate, is widely used in baking. This is because it has leavening properties, meaning it causes dough to rise by producing carbon dioxide.

45. All of the following diseases are caused by viruses, except

- a. **Jaundice**
- b. Influenza
- c. Typhoid
- d. Mumps

Ans: a

- (Jaundice is caused by a buildup of bilirubin, a waste material, in the blood.
- An inflamed liver or obstructed bile duct can lead to jaundice, as well as other underlying conditions.
- Symptoms include a yellow tinge to the skin and whites of the eyes, dark urine, and itchiness.)

<https://www.medicalnewstoday.com/articles/165749#causes>

Note: Virus diseases - common cold, flu and warts, HIV/AIDS, Ebola, and COVID-19.

- Chickenpox
- Flu (influenza)
- Herpes
- Human immunodeficiency virus (HIV/AIDS)
- Human papillomavirus (HPV)
- Infectious mononucleosis
- Mumps, measles and rubella
- Shingles
- Viral gastroenteritis (stomach flu)
- Viral hepatitis
- Viral meningitis
- Viral pneumonia

<https://www.healthgrades.com/right-care/infections-and-contagious-diseases/viral-diseases>

Bacteria cause disease by secreting or excreting toxins (as in botulism), by producing toxins internally, which are released when the bacteria disintegrate (as in typhoid), or by inducing sensitivity to their antigenic properties (as in tuberculosis). Other serious bacterial diseases include cholera, diphtheria, bacterial meningitis, tetanus, Lyme disease, gonorrhea, and syphilis. Bacteria come in three basic shapes: rod-shaped (bacilli), spherical (cocci), or helical (spirilla).

### **Bacteria vs. Virus**

Bacteria and [viruses](#) are different types of pathogens, organisms that can cause disease. Bacteria are larger than viruses and are capable of reproducing on their own. Viruses are much smaller than bacteria and cannot reproduce on their own. Instead, viruses reproduce by infecting a host and using the host's DNA repair and replication systems to make copies of itself.

### **Sexually Transmitted Bacterial Infections**

Many [sexually transmitted diseases \(STDs\)](#) are caused by harmful bacteria. Sometimes, these infections aren't associated with any symptoms but can still cause serious damage to the reproductive system. Common STDs caused by bacterial infections include:

- Chlamydia
- Gonorrhea,
- Syphilis
- **Bacterial vaginosis,**

[https://www.onhealth.com/content/1/bacterial\\_infections](https://www.onhealth.com/content/1/bacterial_infections)

**Bacterial meningitis, TB**

**Antibiotics**

Antibiotics are medications that fight bacterial infections. They work by disrupting the processes necessary for bacterial cell growth and proliferation.

46. Let the speed of sound in air, water and iron be  $V_a$ ,  $V_w$ , and  $V_i$  respectively. Which is the correct statement?

a.  $V_a > V_w > V_i$

b.  $V_w > V_i > V_a$

c.  $V_i > V_a > V_w$

d.  $V_i > V_w > V_a$

Ans: a

47. Chain reaction / uncontrolled chain reaction in a nuclear reactor is controlled or stopped by

a. Moderator

b. Active hydrogen

c. Control rods

d. Heavy water

Ans: c

48. The non-conventional source(s) of energy is/are

1. Biogas

2. Geothermal

3. Lignite(Thermal)

4. Solar energy

a. 1

b. 1 and 2

c. 2 and 3

d. 1, 2, and 4

Ans: d

49. What does the symbol  ${}_{92}^{235}\text{U}$  represent?

a. 92 electrons, 92 protons, 235 neutrons

b. 92 electrons, 235 protons, 92 neutrons

c. 92 electrons, 92 protons, 143 neutrons

d. 143 electrons, 92 protons, 92 neutrons

Ans: c

50. .... helps slow down the neutrons produced by fission to sustain the chain reaction in a nuclear reactor

a. Moderator

b. Active hydrogen

c. Control rods

d. Heavy water

Ans: a

Note:

The **moderator** helps slow down the neutrons produced by fission to sustain the chain reaction.

**Control rods** can then be inserted into the reactor core to reduce the reaction rate or withdrawn to increase it.

A control rod is a device that is used to absorb neutrons so that the nuclear chain reaction taking place within the reactor core can be slowed down or stopped completely by inserting the rods further, or accelerated by removing them slightly. Essentially, control rods provide real-time control of the fission process, ensuring that it remains active while preventing it from accelerating out of control.

Social Service Society for Education, Perambur