COMMON HALF YEARLY EXAMINATION 2023-24

(Chennai District) Class 10 – SCIENCE ANSWER KEY	Prepared by **M.MOHAN**, BT Asst(Science), Chenai Girls Hr.Sec.School, Perambur, Chennai-11 Mobile No: 9444528287, 9790850045

PART - I

1	d) Increase by 300%	7	a) pleura
2	c) zero	8	d) Hypothalamus
3	c) 0.02752m	9	a) copperT
4	a) 17g (14+3x1=14+3=17)	10	a) Radio carbon method
5	c) 16g	11	b) cirrhosis of liver
6	b) Ethers	12	d) scratch

PART – II

13 Traffic signals red in colour
- Red light has longest wavelength and so it is scattered the least by air molecules.
- The red light travels long distance. Therefore red colour is used in traffic signals to stop vehicles.

14
- Electric heating devices like electric iron, toaster, oven heater or geyser
- Fuse wire

15 Rusting of iron: Rusting of iron takes place in the presence of moisture and air. So presence of air and water vapour(in air) are the two necessary conditions for rusting of iron.

16

Reversible reaction	Irreversible reaction
➢ It can be reversed under suitable condition ➢ Both forward and backward reactions take place simultaneously. ➢ It can attain equilibrium. ➢ The reactants cannot be converted completely into products. ➢ It is relatively slow.	➢ It cannot be reversed ➢ It is unidirectional. It proceeds only in forward direction. ➢ Equilibrium is not attained. ➢ The reactants can be completely converted into products. ➢ It is fast.

17 Reaction for photosynthesis

$6CO_2 + 12H_2O \xrightarrow[Chlorophyll]{Light} C_6H120_6 + 6H_20 + 60_2\uparrow$

Carbon dioxide + Water $\xrightarrow[Chlorophyll]{:Light}$ Glucose + Water +Oxygen-↑

18

1) Leukaemia	Blood cancer
2) Leucopenia	Decrease in leucocytes
3) AB blood group	Absence of antibody
4) “O” blood group	Absence of antigen

19
- Thyroid hormone require iodine for its formation.
- If intake of iodine in our diet is low, it causes goiter. It leads to enlargement of thyroid gland which protrudes as a marked swelling in the neck.

20
- Phenotype: It is the external expression of a particular trait. 3:1
- Genotype: It is the genetic expression of an organism. 1:2:1

21 Application of DNA fingerprinting technique.
- It is used in forensic applications like crime investigation such as identifying the culprit.
- It is used for paternity testing in case of disputes.
- It helps in the study of genetic diversity of population evaluation and specification.

22 Three α decay → $_{88}Ra^{226}$ → $_{z-2}Y^{A-4}$ + 3_2H^4

Mass number of parent element = mass number of 3α-particles + mass number of daughter elements.

226 = 3x4 + A

226 = 12 + A

A = 226 – 12

A = 214

Atomic number of parent element = Atomic number of 3α-particles + Atomic number of daughter elements.

88 = 3x2 + z

88 = 6 + z

Z = 88 - 6

Z = 82

Number of neutrons = A – Z

= 214 – 82

= 132

PART – III

23 a) Boyle's law: When the temperature of a gas is kept constant, the volume of a fixed mass of gas is inversely proportional to its pressure. P α 1/V

b)

Ideal Gas	Real Gas
1. Atoms or molecules of ideal gas do not interact with each other. 2. It has negligibly small or nil intermolecular or interatomic force of attraction. 3. Practically, no gas is ideal. 4. Ideal gases obey Boyle's law, Charle's law, and Avogadro's law.	1. Atoms or molecules of real gas interact with each other. 2. It has definite amount of intermolecular or interatomic force of attraction. 3. Practically, all gases are ideal. 4. At very high temperature or low pressure, a real gas behaves as an ideal gas.

24 a) The vibrations with a frequency greater than 20 kHz are called ultrasonic vibrations. Human ear cannot detect this wave. Ex: Waves produced by bats.

b) 1.Mosquito 2.Dogs, 3.Bats

25 a)

- An atom is no longer **indivisible**.
- Atoms of the same element may have **different atomic mass** [isotopes $_{17}Cl^{35}$, $_{17}Cl^{37}$)
- Atoms of the different elements may have **same atomic masses** (isobars $_{18}Ar^{40}$, $_{20}Ca^{40}$)
- Atoms of one element can be transmitted into atoms of other elements. So atom is no longer indestructible. It is called **artificial transmutation.**
- Atoms may not always combine in a simple **whole number ratio** [eg. Glucose $C_6H_{12}O_6$, sucrose $C_{12}H_{22}O_{11}$)
- Atom is the smallest particle that takes part in a **chemical reaction.**
- The **mass** of an atom can be converted into **energy** ($E = mc^2$).

i)

$$\text{Number of moles} = \frac{\text{given mass}}{\text{Atomic mass}} = \frac{27}{27} = 1$$

$$\text{No. of moles} = \frac{\text{Mass}}{\text{Atomic mass}}$$

b) Number of moles of 27 g of Al is **1**

26 a)

$$MgSO_4 \cdot 7H_2O \underset{\text{Cooling}}{\overset{\text{Heating}}{\rightleftharpoons}} MgSO_4 + 7H_2O$$

(Magnesium sulphate heptahydrate) (Anhydrous Magnesium sulphate)

26 b)

Hygroscopic substances	Deliquescence substances
When exposed to the atmosphere at ordinary temperature, they absorb moisture and do not dissolve.	When exposed to the atmospheric air at ordinary temperature, they absorb moisture and dissolve.
Hygroscopic substances do not change its physical state on exposure to air.	Hygroscopic substances do not change its physical state on exposure to air.
Hygroscopic substances may be amorphous solids or liquids.	Deliquescent substances are crystalline solids.
Examples: 1. Conc.Sulphuric acid (H2 SO4). 2. Phosphorus Pentoxide (P2 O5). 3. Quick lime (CaO). 4. Silica gel (SiO2).	Examples: Caustic soda (NaOH), Caustic potash (KOH) and Ferric chloride (FeCl3).

27

1. Blood is sucked by pharynx.
2. Anterior and posterior ends of the body are provided with suckers by which the animal attaches itself to the body of the host.
3. The three jaws inside the mouth, causes a painless Y-shaped wound in the skin of the host.
4. The salivary glands produce hirudin which does not allow the blood to coagulate. Thus, a continuous supply of the blood is maintained.
5. Parapodia and setae are completely absent
6. Blood is stored in the crop. It gives nourishment to the leech for several months. Due to this reason there is no elaborate secretion of the digestive juices and enzymes.

28

- Spinal cord is a **cylindrical structure** lying in the neural canal of the vertebral column.
- It is also covered by **meninges**.
- It extends from the **lower end** of **medulla oblongata** to the **first lumbar** vertebra.
- The posterior most region of spinal cord tapers into a thin fibrous thread like structure called **filum terminale.**
- Internally, the spinal cord contains a cerebrospinal fluid filled cavity known as the **central canal.**
- The **grey matter** of spinal cord is 'H' shaped.
- The upper end of letter **"H"** forms posterior horns and lower end forms anterior horns.
- A bundle of fibres pass into the posterior horn forming dorsal or afferent root.
- Fibres pass outward from the anterior horn forming ventral or efferent root.
- These **two roots** joins to form spinal nerves.
- The **white matter** is external and have bundle of nerve tracts.

29

(I)	a) False – Right statement - Stalk of the ovule is called funiculus b) False – Right statement – LH is secreted by the anterior pituitary.
(II)	Poverty , Illiteracy, Religious Opposition, Lack of cheap and effective methods.

30 a) Insulin deficiency occurs by the destruction of β cells of the pancreas.

b) Lung cancer, Bronchitis & Pulmonary tuberculosis, Emphysema, Hypoxia, Gastric and duodenal

	ulcers, Oral cancer.
31	a) Archaeopteryx is considered to be a link between reptiles and birds because, ❖ It had wings with feathers, like a bird. ❖ It had a long tail, clawed digits and conical teeth, like a reptile b) Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of the local culture of people.
32	i) Structural formula: $CH_3 - CH_2 - CH(OH) - CH_3$ ii) Butan-2-ol (or) 2–Butanol. iii) It is saturated, because all bonds in the structural formula is single.

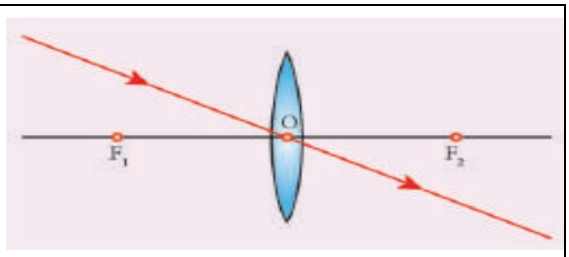
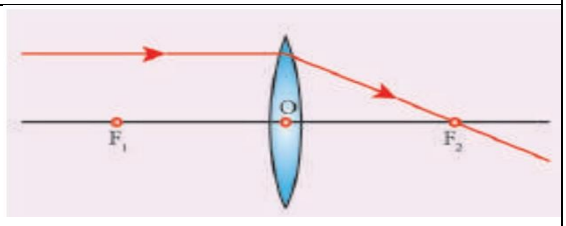
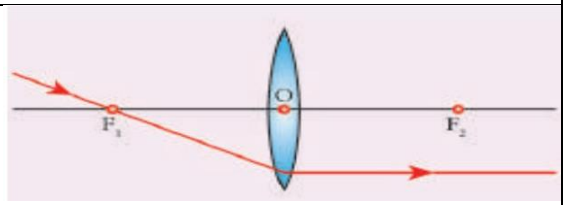
PART – IV

33 a) (I)

PROPERTIES OF LIGHT

1. Light is a form of energy.
2. Light always travels along a straight line.
3. Light does not need any medium for its propagation. It can even travel through vacuum.
4. The speed of light in vacuum or air is, c = 3 × 108 ms–1.
5. Since, light is in the form of waves, it is characterized by a wavelength (λ) and a frequency (v), which are related by the following equation: c = v λ (c - velocity of light).
6. Different coloured light has different wavelength and frequency.
7. Among the visible light, violet light has the lowest wavelength and red light has the highest wavelength.
8. When light is incident on the interface between two media, it is partly reflected and partly refracted

33 (a) (II)

Rule-1: When a ray of light strikes the convex lens obliquely at its optical centre, it continues to follow its path without any deviation.	
Rule-2: When rays parallel to the principal axis strikes a convex lens the refracted rays are converged to the principal focus.	
Rule-3: When a ray passing through the principal focus strikes a convex lens, the refracted ray will be parallel to the principal axis.	

33 (b) (I)

Properties	α rays	β rays	γ rays
What are they?	Helium nucleus ($_2He^4$) consisting of two protons and two neutrons.	They are electrons ($_{-1}e^0$), basic elementary particle in all atoms.	They are electromagnetic waves consisting of photons.
Charge	Positively charged particles. Charge of each alpha particle = +2e	Negatively charged particles. Charge of each beta particle = –e	Neutral particles. Charge of each gamma particle = zero
Ionising power	100 time greater than β rays and 10,000 times greater than γ rays	Comparatively low	Very less ionization power
Penetrating power	Low penetrating power (even stopped by a thick paper)	Penetrating power is greater than that of α rays. They can penetrate through a thin metal foil.	They have a very high penetrating power greater than that of β rays. They can penetrate through thick metal blocks.
Effect of electric and magnetic field	Deflected by both the fields. (in accordance with Fleming's left hand rule)	Deflected by both the fields; but the direction of deflection is opposite to that for alpha rays. (in accordance with Fleming's left hand rule)	They are not deflected by both the fields.
Speed	Their speed ranges from 1/10 to 1/20 times the speed of light.	Their speed can go up to 9/10 times the speed of light.	They travel with the speed of light.

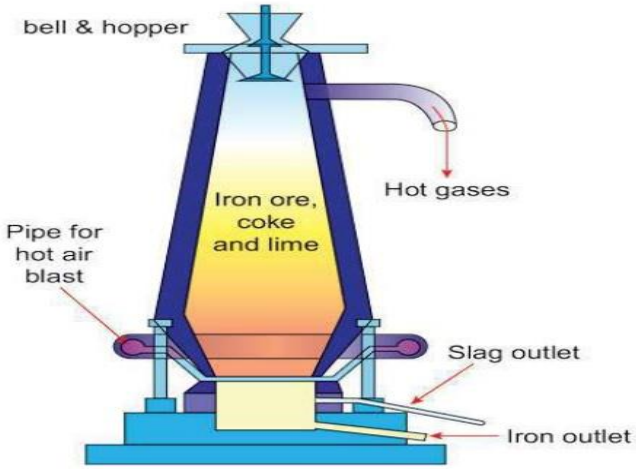
33 (b) (II)

- In 1945, two atom bombs were exploded in Japan.
- The explosion emitted hazardous radiations like gamma rays, which causes genetic diseases.
- Thus, mothers' who are exposed to such radiations give birth to children who develop congenital diseases.

34 (a)

Smelting (in a Blast Furnace):

- The charge consisting of **roasted ore, coke** and **limestone** in the ratio **8:4:1** is smelted in a blast furnace by introducing it through the cup and cone arrangement at the top.
- There are **three** important regions in the furnace.



Blast Farnance

a) The Lower Region (Combustion Zone):

- The temperature is at **1500°C.**
- In this region, **coke** burns with **oxygen** to form CO_2 when the charge comes in contact with a hot blast of air.
- It is an **exothermic reaction** since heat is liberated.

$$C + O_2 \xrightarrow[\Delta]{1500^\circ C} CO_2 + \text{Heat}$$

b) The Middle Region (Fusion Zone):

- The temperature prevails at **1000°C.**
- In this region, CO_2 is reduced to **CO.**

$$CO_2 + C \xrightarrow[\Delta]{1000^\circ C} 2CO - \text{Heat}$$

- Limestone decomposes to **calcium oxide** and CO_2.

$$CaCO_3 \xrightarrow[\Delta]{} CaO + CO_2 - \text{Heat}$$

- These two reactions are endothermic due to absorption of heat.
- Calcium oxide combines with **silica** to form **calcium silicate** slag.

$$CaO + SiO_2 \longrightarrow CaSiO_3$$

c) The Upper Region (Reduction Zone):

- The temperature prevails at **400°C.**
- In this region carbon monoxide **reduces ferric oxide** to form a fairly pure spongy iron.

$$Fe_2O_3 + 3CO \xrightarrow{400^\circ C} 2Fe + 3CO_2$$

- The molten iron is collected at the bottom of the furnace after removing the slag.
- The iron thus formed is called **pig iron.**
- It is remelted and cast into different moulds.
- This iron is called **cast iron.**

34 (b) (I)

Calculate the pH of 1.0×10^{-4} molar solution of HNO_3.

HNO_3 dissociates in water as

$$HNO_{3(aq)} \rightarrow H^+ + NO_3^-$$

Each Nitric acid gives one H^+ ions in water. So 1.0×10^{-4} molar solution of HNO_3 gives 1.0×10^{-4} moles of ions in water.

Therefore $[H^+] = 1.0 \times 10^{-4}$

Formula used:

$pH = -\log_{10}[H^+]$

$$pH = -\log_{10}[H^+]$$
$$= -\log_{10} 1.0 \times 10^{-4}$$
$$= -(-4)\log_{10} 1.0 \times 10^{-4}$$
$$= 4 \log_{10} 10 = 4 \times 1$$
$$\mathbf{pH = 4}$$

pH of 1.0×10^{-4} molar solution of HNO_3 is **4**

34 (b) (II)

- Our body works within the pH range of 7.0 to 7.8.
- Different body fluids have different pH values.
- For example, pH of blood is ranging from 7.35 to 7.45.
- Any increase or decrease in this value leads to diseases.
- The ideal pH for blood is 7.4.

pH in our digestive system:

- HCl present in our stomach helps in digestion.
- During indigestion our stomach produces more acid and this causes pain and irritation.
- pH of the stomach fluid is approximately 2.0.

pH changes as the cause of tooth decay:

- pH of the saliva normally ranges between 6.5 to 7.5.
- White enamel coating (calcium phosphate) is a hard substance in our body.
- When the pH value falls below 5.5, it weathers.
- The basic toothpaste neutralises the excess acid and prevents tooth decay.

pH of soil:

- Citrus fruits require slightly alkaline soil, rice requires acidic soil and sugarcane requires neutral soil.

pH of rain water:

- The pH of rain water is approximately 7.
- If the atmospheric air is polluted with oxides of non-metals, they get dissolved in the rain water and make its pH less than 7.
- As its pH value is less than 7, then it is called acid rain.
- When this rain water reaches river water, the survival of aquatic life becomes difficult.

35 (a) (I)	• **Bolting** is production of a flowering stem in plants. • Treatment of rosette plants with gibberellin induces **sudden shoot elongation** followed by flowering. This is called bolting.
35 (a) (II)	• Estrogen is produced by the **Graafian follicles** of the ovary. **Role of estrogen in the human body:** • It brings about the changes that occur during **puberty.** • It initiates the process of **oogenesis.** • It stimulates the **maturation of ovarian follicles** in the ovary. • It promotes the development of **secondary sexual characters** (breast development, high pitched voice etc).
35 (b) (I)	• Overcome the rapid depletion of **ground water levels.** • To meet the increase demand of water. • **Reduce flood** and **soil erosion.** • Used for **drinking purpose.**
35 (b) (II)	• Untreated sewage or wastewater generated from domestic ad industrial process is the leading polluter of water sources in India. • Sewage pollute water source in India. Sewage water results in **agricultural contamination** and **environmental degradation**

Class :10

Register Number

COMMON HALF YEARLY EXAMINATION - 2023-24

SCIENCE

Time Allowed : 3.00 Hours] [Max. Marks : 75

PART – 1

Choose the correct answer. 12x1=12

1. In the Earth shrinks to 50% of its real radius its mass remaining the same, the weight of body on the Earth will
   a) decrease by 50% b) increase by 50% c) decrease by 25% d) increase by 300%
2. If a substance is heated or cooled the change in mass of that substance is
   a) Positive b) Negative c) Zero d) none of the above
3. It a sound wave travels with a frequency of 1.25×10^4 Hz at 344 ms^{-1}, the wavelength will be
   a) 27.52m b) 275.2m c) 0.02752m d) 2.752m
4. The gram molecular mass of NH_3 is
   a) 17 g b) 44 g c) 18 g d) 36 g
5. Solubility of NaCl in 100 ml water is 36 g. If 20 g of salt is dissolved in 100 ml of water how much more salt is required for saturation.
   a) 12 g b) 11 g c) 16 g d) 20 g
6. Which of the following are used as anaesthetics?
   a) Carboxylic acid b) Ethers c) Esters d) Aldehydes
7. The membrane that is present around the lungs is
   a) Pleura b) Capsule c) Pericardium d) None of the above
8. A person who met with on accident lost control of body temperature, water balance and hunger, which of the following part of brain is supposed to be damaged?
   a) Medulla oblongata b) Cerebrum c) Pons d) Hypothalamus
9. Which one of the following is an IUCD?
   a) Copper T b) Oral pills c) Diaphragm d) Tubectomy
10. The best way of direct dating fossils of recent origin is by
    a) Radio - carbon method b) Uranium lead method
    c) Potassium - Argon method d) Both (a) and (c)
11. Excessive consumption of alcohol leads to
    a) Loss of memory b) Cirrhosis of liver
    c) State of hallucination d) Suppression of brain function
12. Which software is used to create animation?
    a) Paint b) PDF c) Ms word d) Scratch

Part - II

Answer any seven questions. Q.No. 22 is compulsory. 7x2=14

13. Why are traffic signals red is colour.
14. Name any two devices, which are working on the heating effect of the electric current?
15. State two conditions necessary for rusting of iron.
16. Write any two differences between reversible and irreversible reactions.
17. Write the reaction for photosynthesis.

CH / 10 / Sci / 1

18. **Match.**

1. Leukaemia	-	a) Absense of antibody
2. Leucopenia	-	b) Absense of antigen
3. AB blood group	-	c) Blood cancer
4. O blood group	-	d) Decrease in leucocytes

19. Which hormone requires Iodine for its formation? What will happen if intake of Iodine in our diet is low?
20. What do you understand by the term phenotype and genotype?
21. State the application of DNA finger printing technique.
22. $_{88}Ra^{226}$ experiences three α- decay. Find the number of neutrons in the daughter element.

PART – III

Answer any seven questions. Q.No: 32 is compulsory. **7x4 = 28**

23. a) State Boyle's law.
    b) Distinguish between ideal gas and real gas.
24. a) What do you understand by the term "ultrasonic vibration?
    b) Name three animals which can hear Ultrasonic Vibrations?
25. a) Give any two salient feature of Modern atomic theory.
    b) Calculate the number of moles in 27g of Al.
26. a) What happens when $MgSO_4 . 7H_2o$ is Heated?
    b) In what way hygroscopic substances differ from deliquescent substances. (any two)
27. List the parasitic adaptations in leech.
28. Describe the structure of spinal cord.
29. i) State whether the following statements are true or false. If false correct the statement.
    a) Stalk of the ovule is called pedicle.
    b) LH is secreted by the posterior pituitary.
    ii) Why are family planning methods not adopted by all the people of our country?
30. a) Why is Archaeopteryx considered to be a connecting link?
    b) Define Ethno botany.
31. a) How does Insulin deficiency occur?
    b) Mentions the diseases caused by tobacco smoke.
32. The molecular formula of an alcohol is $C_4H_{10}O$. The locant number of its OH group is 2.
    i) Draw its structural formula ii) Give its IUPAC name
    iii) It is saturated or unsaturated?

PART- IV

Answer all the questions in detail. **3x7=21**

33. a) i) List any two properties of light.
    ii) Explain the rules for obtaining images formed by a convex lens with the help of ray diagram.

    (OR)

    b) i) Compare the properties of alpha, beta and gamma radiations.
    ii) In Japan, some of the new born children are having congenital diseases. why?
34. a) Explain smelting process.

    (OR)

    b) i) Calculate the P^H of $1.0x10^{-4}$ molar solution of HNO_3.
    ii) How does P^H play an important role in everyday life.
35. a) i) What is bolting?
    ii) Where are estrogens produced? What is the role of estrogens in the human body.

    (OR)

    b) i) What is the importance of rainwater harvesting?
    ii) What are the environmental effect caused by sewage?

CH / 10 / Sci / 2