Grade 10 Science Karnataka 2015

PART - A

Q1. Electronic configuration of silicon is

(A) $1s^2, 2s^2, 2p^6, 3s^2, 3p^2$

(B) $1s^2, 2s^2, 2p^6, 3s^2, 3p3$

(C) $1s^2, 2s^2, 2p^6, 3s^2$

(D) $1s^2, 2s^2, 2p^6, 3s^2, 3p^4$

Solution:

(A) $1s^2, 2s^2, 2p^6, 3s^2, 3p^2$

The atomic number of silicon is 14.

Q2. A cyclist bends towards the centre while going in a circular path to

(A) Move the cycle slowly

(B) Gain necessary centrifugal force

(C) Gain necessary centripetal force

(D) Increase the friction.

Solution:

(C) gain necessary centripetal force

When a cyclist takes a turn along a circular path, they lean inward (toward the center of the curve) to maintain balance which is done by gaining gain necessary centripetal force.

Q3. Which of the following is not a form of solar energy?

(A) Fossil fuel energy

(B) Wind energy

(C) Hydro energy

(D) Nuclear energy.

Solution:

D) Nuclear energy.

Nuclear energy is produced from nuclear fission (splitting of atomic nuclei, usually uranium or plutonium) and does not rely on the sun.

Q4. The alloy that contains copper and zinc as its constituents, is

(A) Brass

(B) bronze

(C) German silver

(D) gunmetal.

Solution:

(A) brass

The alloy that contains copper and zinc as its constituents is brass.

Q5. The measure to reduce energy crisis is

(A) Wastage of water

(B) Using fluorescent tube lights
(C) Luxurious lifestyle
(D) Each individual uses his own vehicle

Solution:

(B) Using fluorescent tube lights

Among the given options, the correct measure to reduce energy crisis is using fluorescent tube lights

Q6. The reaction that is considered to be the source of solar energy is
(A) Radioactivity
(B) Thermonuclear fusion reaction
(C) Nuclear fission reaction
(D) Chemical reaction.

Solution:

(C) nuclear fission reaction

The Sun produces energy through thermonuclear fusion, where hydrogen atoms combine to form helium under high temperature and pressure. This process releases a huge amount of light and heat, which reaches Earth as solar energy.

Q7. The reducing agent used in the extraction of silicon is

(A) Magnesium

(B) Silica
(C) Phosphorus

(D) Sulphur.

Solution:

(A) Magnesium

The silicon from the ore silica (SiO_2) extracted using magnesium (Mg) as a reducing agent. The reaction is:

$SiO_2 + 2Mg \rightarrow Si + 2MgO$

Q8. The apparent change in frequency of wave motion due to the relative motion between the source and the observer is known as
(A) Raman effect

(B) Doppler effect
(C) Electromagnetic effect

(D) Tyndall effect.

Solution:

(B) Doppler effect

The Doppler effect is the change in a wave's frequency caused by the movement of the source or the observer.

Q9. An example for a pentavalent dopant is

(A) Boron

(B) Antimony

(C) Gallium

(D) Indium.

Solution:

(B) Antimony

Q10. The alkane among the following is

(A) C_2H_2

(B) C_2H_4

(C) C_6H_6

(D) C_2H_6

Solution:

(D) C_2H_6

Fill in the blanks:

Q11. The device that converts solar energy into electrical energy is _____.

Solution:

The device that converts solar energy into electrical energy is solar cell (or) photovoltaic cell

Q12. The lightly doped region of a transistor is _____.

Solution:

The lightly doped region of a transistor is base region.

Q13. The device used by the traffic control authorities to detect vehicle crossing speed limit is _____.

Solution:

The device used by the traffic control authorities to detect vehicle crossing speed limit is radar gun (or) speed radar.

Q14. Match the names of hydrocarbons given in Column-A with their molecular formulae given in Column-B.

Column-A	Column-B
(a) Benzene	(i) C_4H_{10}
(b) Propyne	(ii) C_3H_4
(c) Butene	(iii) C_3H_6
(d) Butane	(iv) C_6H_6
	(v) C_4H_8
	(vi) C_4H_6
	(vii) C_2H_2

Solution:

Column-A	Column-B
(a) Benzene	(iv) C_6H_6
(b) Propyne	(ii) C_3H_4
(c) Butene	(v) C_4H_8
(d) Butane	(i) C_4H_{10}

Q15. Write the balanced chemical equation for the following chemical reaction:

"Magnesium reacts with dilute hydrochloric acid"

Solution:

$$Mg(s) + 2HCl(aq) - -> MgCl_2(aq) + H_2(g)$$

Q16. What is cracking?

Solution:

Cracking in petroleum refining is the process where large hydrocarbon molecules are broken down into smaller ones using heat, pressure, and sometimes catalysts.

Q17. Define half-life period of a radioactive element.

Solution:

The half-life of a radioactive substance is the time it takes for half of its original amount to decay. This means the substance loses energy or mass by emitting radiation. After a certain period, only half of the initial mass remains.

Q18. What is uniform circular motion?

Solution:

When a body moves in a circular path with uniform speed or constant speed, its motion is known as Uniform Circular motion.

Q19. Write the uses of a diode.

Solution:

A diode is used for the following purposes:

- Converting AC to DC voltage (rectification)
- Separating signals from a power supply
- Controlling the strength of a signal
- Combining (or) mixing signals together

Q20. Name the system used to represent the brightness of a star.

Solution:

Brightness of stars, apparent and absolute magnitude is measured by convention, taking another star as a standard. The scale called "apparent magnitude" is the usual measure.

Q21. What is induced radioactivity? Explain with an example.

Solution:

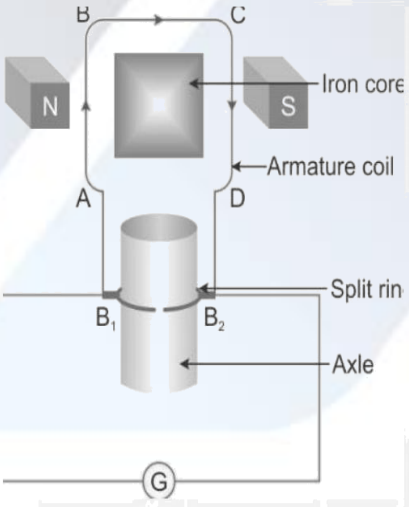
Induced radioactivity is a form of artificial radioactivity. It occurs when a new radioactive isotope is created by using a known element.

Example:

In magnesium, the change is represented as:

$_{12}Mg^{24} + {}_{2}He^{4} \longrightarrow {}_{14}Si^{27} + {}_{0}Si^{1}$

Q22. Draw the diagram of a D.C. dynamo & label the parts.



Q23. What are propellants? How do they work in vacuum?

A propellant is a substance that produces energy or pressurized gas to move a fluid or propel a vehicle, missile, or other object. Common propellants include fuels like gasoline, jet fuel, and rocket fuel, along with an oxidizer. These propellants burn or break down to create the gas needed for propulsion. Some propellants are liquids that easily turn into gas.

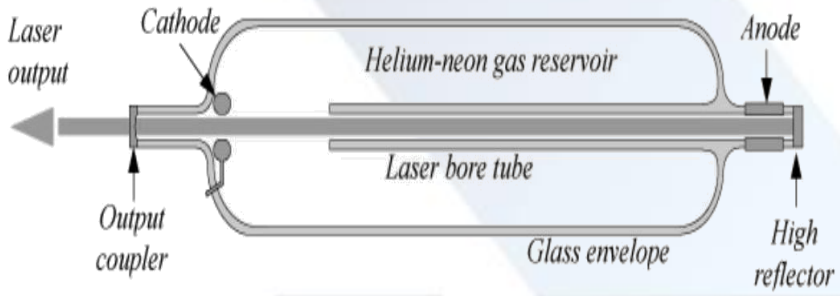
Q24. Write any four methods of conservation of water.

Solution:

Four methods of conservation of water are the following:

- Protection of Water from Pollution.
- Redistribution of Water.
- Rational Use of Groundwater.
- Use of Modern Irrigation Methods.

Q25. Draw the diagram of Helium-Neon laser tube and label the parts.



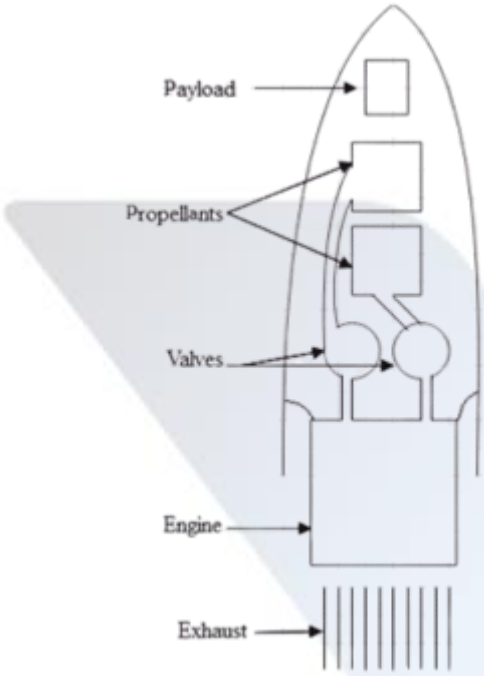
Q26. Write the differences between A.C. dynamo and D.C. dynamo.

Solution:

A.C. Dynamo	D.C. Dynamo
It generates Alternate Current (A.C.) electric power	It generates Direct Current (D.C.) electric power
It has full rings	It has split rings
Electrical current reverses direction periodically.	Electrical current flows only in one direction.
They are useful to generate very high voltages	They are used to generate lower voltages
AC generators are very efficient as the energy losses are less.	DC generators are less efficient as the energy losses are more.

Q27. Draw the diagram of a single stage rocket and label the parts.

Solution:



Q28. "Soaps are eco-friendly than detergents." Justify this statement.

Solution:

Soaps are more eco-friendly than detergents because:

Biodegradable: Soap molecules have straight hydrocarbon chains that bacteria in sewage water can break down easily. In contrast, detergent molecules have branched chains, which bacteria can either break down very slowly or not at all.

Less harmful: Soaps are generally non-toxic to plants and animals, while some detergents can be harmful to aquatic life.

Sustainable: Soaps are made from renewable resources like plants or animals, whereas detergents often use chemicals derived from non-renewable resources.

Q29. Laser is used in eye surgery and industries. State the property of laser related to these uses.

Solution:

Lasers are used in the medical field, and they are used in eye surgery and industries because of its high precision and concentration of energy.

- In eye surgery, lasers can focus on very small areas, allowing for accurate treatments without affecting surrounding tissues.
- In industries, lasers are used for cutting, welding, and carving due to their ability to deliver concentrated, intense energy to a specific point.
- Reshaping the cornea to improve vision.
- Cleaning blocked arteries, removing cavities, and whitening teeth.

Q30. What is polymerization? Name one example of each of the two types of synthetic polymers.

Solution:

Polymerization is a process where small molecules, called monomers, join together to form a large, chain-like or network molecule called a polymer. The monomers can be the same or different.

There are two main types of polymerizations:

(a) Condensation polymerization

(b) Addition polymerization.

Here are two examples for each type of polymerization:

(a) Addition Polymerization:

Polyethylene – Commonly found in plastic bags and bottles.

Polystyrene – Used in packaging materials, disposable cups, and insulation.

(b)Condensation Polymerization:

Nylon – Used in textiles, ropes, and carpets.

Polyesters (like Terylene) – Found in clothing and plastic bottles.

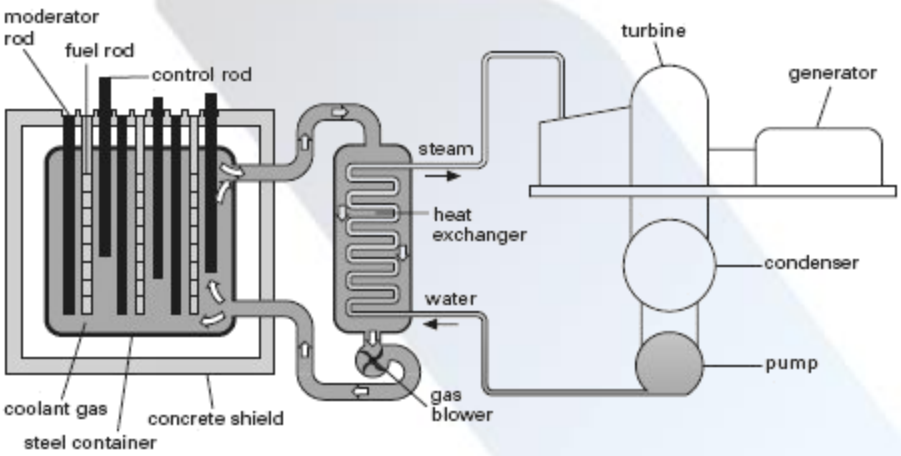
Q31. What is Raman Effect? Write the differences between Raman Effect and Rayleigh scattering.

Solution:

The Raman Effect is a phenomenon where light is scattered by molecules, causing a change in the wavelength (or energy) of the scattered light. This happens when a photon interacts with a molecule, causing a shift in the molecule's energy levels, which leads to light being scattered at different wavelengths.

Raman Effect	Rayleigh Scattering
Raman scattering is a form of inelastic scattering,	Rayleigh scattering is an example of elastic scattering,
It can happen in all types of matter, including solids, liquids, and gases.	It happens when light interacts with particles or molecules that are much smaller than the wavelength of the light.
Raman scattering causes the wavelength of the scattered light to change.	In Rayleigh scattering, the scattered light has the same wavelength as the incoming light, meaning there is no change in wavelength.

Q32. Draw the diagram of a nuclear reactor and label the following parts:
(a) Moderator
(b) Heat exchanger.



Q33. (a) State Universal law of gravitation.

Solution:

Universal law of gravitation states that every object in the universe attracts every other object with a force directed along the line of centres for the two objects that is proportional to the product of their masses and inversely proportional to the square of the separation between the two objects."

(b) The distance between the two bodies is increased by two times. Explain with the help of mathematical formula of gravitational law, whether the gravitational force between two bodies increases or decreases and by how many times.

Solution:

Formula of gravitational law

$$F = \frac{Gm_1 m_2}{r^2}$$

F = Gravitational force

G = Gravitational constant

m_1 & m_2 = Masses of the two bodies

r = Distance between the two bodies

The gravitational force decreases by 4 times when the distance between the two bodies is doubled.

Q34. (a) What are galaxies? Name three types of galaxies.

Solution:

A galaxy is a vast group of gas, dust, and billions of stars, including their solar systems, all held together by gravity. Our galaxy is called the Milky Way. When we look at the stars in the night sky, we are seeing other stars in the Milky Way.

There are three main types of galaxies:

(1) Elliptical galaxies

(2) Spiral galaxies

(3) Irregular galaxies

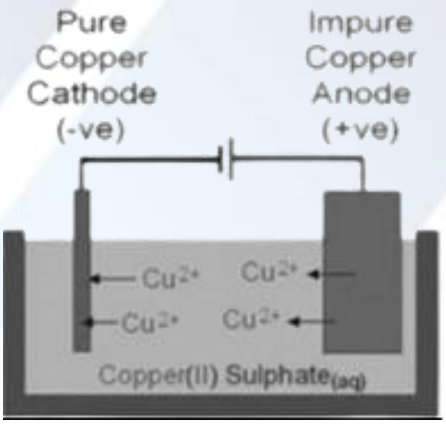
(b) Why do the sunspots appear dark in colour?

Solution:

Sunspots are extremely hot, but they are cooler than the surrounding areas of the Sun. When viewed through a very dark filter (the only safe way to look at the Sun), the Sun appears less bright, and sunspots look darker in comparison.

Q35. Draw the diagram of an electrolytic cell used in the extraction of copper and label the following parts:
(a) Cathode (b) Anode (c) Copper sulphate solution.

Solution:



Q36. (a) Write the formula to calculate the efficiency of a heat engine.

Solution:

The efficiency of a heat engine

Efficiency $= \frac{W_{net}}{Q_h} = Q_h - \frac{Q_c}{Q_h}$

$= 1 - \frac{Q_c}{Q_h}$

W_{net} = Net work done by engine.

Q_h = Energy added as heat

Q_c = Energy removed as heat.

(b) Mention any three advantages of an internal combustion engine.

Solution:

The following are a few advantages of an internal combustion engine which is also called as a petrol engine

- It is compact and lightweight.
- It can start instantly whenever needed.
- It is also safe to use.

PART - B (Biology)

Four alternatives are given for each of the following questions / incomplete statements. Only one of them is correct or most appropriate.

Choose the correct alternative and write the complete answer along with its letter in the space provided against each question. $5 \times 1 = 5$

Q37. _____ is commonly called personality hormone.

(A) Adrenaline

(B) Thyroxine

(C) Insulin

(D) Glucagon.

Solution:

(B) Thyroxine

Thyroxine, a hormone released by the thyroid gland, is known as the "personality hormone" because it helps control metabolism, energy levels, and overall growth. It also affects mood, behavior, and cognitive functions, which contribute to personality traits.

Q38. Which of the following vertebrates do not have teeth?

(A) Amphibia

(B) Aves

(C) Mammals

(D) Reptiles.

Solution:

(D) Aves

Aves (birds) do not have teeth. Instead, they have beaks or bills adapted to their feeding habits.

Q39. The red pigment present in Polysiphonia is

(A) Phycoerythrin

(B) Phycocyanin

(C) Chlorophyll

(D) Xanthophyll.

Solution:

(A) Phycoerythrin

The red pigment present in Polysiphonia is phycoerythrin. This pigment helps in helps in absorbing light for photosynthesis

Q40. The number of chambers in the heart of fish are

(A) four

(B) three

(C) two

(D) one.

Solution:

(C) two

Q41. The processes involved in oxygen cycle are

(A) Nitrification, Respiration

(B) Nitrification, Denitrification

(C) Photosynthesis, Denitrification

(D) Respiration, Photosynthesis.

Solution:

Respiration, Photosynthesis

The oxygen cycle involves two main processes:

Photosynthesis: Plants and some other organisms make their own food using sunlight and release oxygen into the air.

Respiration: Living organisms, including humans, animals, and plants, use oxygen to breathe and get energy, releasing carbon dioxide in return.

These two processes keep the balance of oxygen in the environment.

Q42. Match the names of epithelial tissues given in Column-A with their structure and location given in Column-B. Write the correct answer in the space provided:
$4 \times 1 = 4$

Column-A	Column-B
(a) Squamous epithelium	(i) elongated cells, larynx
(b) Columnar epithelium	(ii) ciliated cells, small intestine
(c) Ciliated epithelium	(iii) elongated cells, sweat gland
(d) Cuboidal epithelium	(iv) ciliated cells, sweat gland
	(v) flat cells, oesophagus
	(vi) cube shaped cells, salivary gland
	(vii) flat cells, small intestine

Solution:

Column-A	Column-B
(a) Squamous epithelium	(v) Flat cells, oesophagus
(b) Columnar epithelium	(ii) Ciliated cells, small intestine
(c) Ciliated epithelium	(i) Elongated cells, larynx
(d) Cuboidal epithelium	(vi) Cube shaped cells, salivary gland

Q43. It is hard to detect the colour of objects during the night in dim light. Give a reason.

Solution:

The retina has two types of receptor cells: cones and rods. Cones are responsible for detecting color, while rods help in sensing light intensity (brightness or dimness). In bright light, cone cells are more sensitive than rod cells, which makes it harder to perceive colors in low-light conditions.

Q44. What is food adulteration?

Solution:

Food adulteration is the process where the quality or nature of a food item is compromised by adding harmful or inferior substances, or by removing essential components. It involves the presence of foreign, often lower-quality chemicals in

food, which can be harmful or undesirable. Typically, during food adulteration, small amounts of non-nutritious substances are deliberately added to enhance the food's appearance, texture, or shelf life.

Q45. Human pinna is flexible. Why?

Solution:

Human pinna is flexible because it is found in places where we need some support and structure, but a bit of flexibility as well. This includes places such as our joints, our ears, and our nose, as well as in between the vertebrae in our spinal column.

Q46. Fibres are used to make gunny bags. Why?

Solution:

Fibers are used to make gunny bags because they are strong, durable, and breathable. They can hold heavy items without tearing and allow air to pass through, keeping stored goods fresh.

Natural fibers like jute are also eco-friendly and biodegradable. Jute is used to make gunny bags because jute is a very strong material.

Q47. Write any two characteristic features of reptiles.

Solution:

- Most reptiles lay eggs- Reptiles are amniote animals, which mean that the eggs, laid by females, contain an elastic sac within which the embryo develops.
- The skin of reptiles is covered with Scales (or Scutes)
- The scales of reptiles, which develop from the epidermis, the outermost layer of skin, are small, hard plates made of the protein keratin

Q48. What are the observations to be noted while purchasing packed fruit juice?

Solution:

When buying packed fruit juice, check the following:

Expiry date: Ensure it is not expired.

Ingredients: Look for natural ingredients and avoid harmful additives.

Preservatives & added Sugar: Choose juices with no (or) minimal preservatives and added sugar.

Packaging condition: The pack should be sealed properly and not damaged.

FSSAI mark: Look for food safety certification to ensure quality.

Q49. Forests help to reduce global warming. Justify.

Solution:

Forests help in reducing global warming by:

Absorbing Carbon Dioxide: Trees take in CO_2 from the atmosphere, lowering greenhouse gas levels.

Producing Oxygen: They release oxygen, improving air quality.

Cooling the Surroundings: Trees provide shade and release moisture, helping to reduce heat.

Preventing Soil Erosion: Forests keep the soil intact, contributing to climate stability.

Therefore, forests play a vital role in controlling global warming by decreasing CO_2 and maintaining a cooler environment.

Q50. Mention any two disadvantages of using genetically modified foods.

Solution:

- Genetically modified (GM) foods are made by adding genes from other organisms. This can be harmful to humans because these added genes might contain allergens that cause allergic reactions.
- GM foods may also have lower nutritional value. Genetic modification mainly focuses on increasing production, extending shelf life, and resisting pests, which can reduce the nutrients in some crops.

Q51. Write any two differences between reservoir pool and exchange pool.

Reservoir pool	Exchange pool
It is the primary source of the element or the nutrient storehouse of the chemical.	It is characterized by Rapid exchange of element.
In this pool, chemical element is locked or retained for a long period of time.	Exchange pool holds the element for a short period of time. and is represented by the biotic factors which come in minor part of abiotic face

Generally, reservoirs are large and are abiotic factors.	Generally, exchange policy small It is represented by the biotic factors which come in minor part of abiotic phase.

Q52. A monocot leaf is more vulnerable to wear and tear than a dicot leaf. Why?

Solution:

A monocot leaf is more easily damaged than a dicot leaf because:

Parallel veins: Monocot leaves have straight, parallel veins, which provide less support than the strong network of veins in dicot leaves.

Thinner structure: Monocot leaves are usually softer and thinner, making them more fragile.

No secondary growth: Monocots do not develop extra support over time like dicots do.

Because of these reasons, monocot leaves tear more easily than dicot leaves.

Q53. Explain the functioning of the human ear.

Solution:

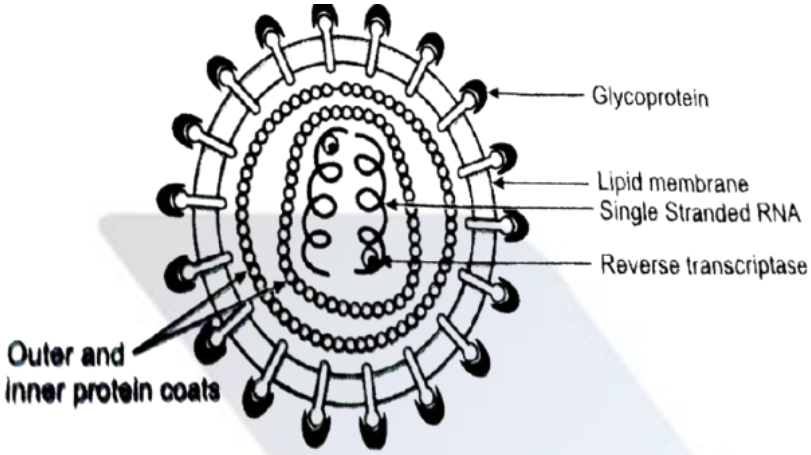
The ear has two main functions: hearing and maintaining balance. It is divided into three parts, each with a specific role:

(i) Outer ear (pinna): Acts like a funnel, collecting sound waves and directing them through the ear canal to the middle ear.

(ii) Middle ear: Contains the vestibular window, which separates it from the inner ear.

(iii) Inner ear (cochlea): A delicate, fluid-filled structure lined with hair cells. These hair cells move in response to sound waves, similar to grass swaying in the wind. This movement creates electrical signals that are sent to the brain, which then recognize the sounds.

Q54. Draw a diagram showing the structure of HIV and label any two parts.



Structure of HIV

Q55. Draw a diagram showing the vertical section of human eyeball and label the following:

(a) Lens (b) Optic nerve