

<input type="checkbox"/>	<input type="checkbox"/>	1.	8	Uses of periodic table in daily life - ① Elements are arranged according to their properties
<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	1.	9	① Metals are generally solids (except Mercury) while non-metals are found in any state. ② Metals are good conductors of electricity, while non-metals are bad conductors (except - Graphite).
<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	1.	10	pH Indicators are the chemical solutions which are used to measure acidity or basicity of a substance. eg. Methyl Bromide, Phenolphthalein etc. The colour of these solutions gets changed according to acid or base.
<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	1.	11	Functions of cell: ① Preparation of food & energy. ② Takes part in respiration & reproduction.
<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>			

1.	12	<p>A balanced diet is diet in which all the essential nutrients are present in a balanced quantity. It is important for healthy development of human body so that all the nutrients are available to the body.</p>
1.	13	<p>Functions of respiration:</p> <ol style="list-style-type: none"> ① Exchange of gases through inhale & exhale. ② Excretion of unwanted gases such as CO_2 ③
1.	14	<p>Diseases related to water & sanitation:</p> <ol style="list-style-type: none"> ① Cholera - through contaminated water. ② Diarrhoea - Contaminated water. ③ Typhoid - <i>Salmonella Typhi</i> virus which transmits through contaminated water & food.
1.	15	<p>Xylem is a conducting tissue found in vascular plants. Its main function is to transport water & nutrients from soil through roots to other parts of the plants. The rings of xylem are counted to measure the age of a tree.</p>

प्रश्न
संख्या

मुख्य परीक्षा उत्तर पुस्तिका
(Mains Answer Sheet)

भारत का नं. 1 संस्थान
कौटिल्य एकेडमी
सफलता का प्रवेश द्वार

2.	1	Gravitational force can be defined as the force between two objects in space which attracts them towards each other.	
<input type="checkbox"/>	<input type="checkbox"/>	e.g. Gravitational force between sun & earth, or between earth & moon.	
<input type="checkbox"/>	<input type="checkbox"/>	<u>Newton's law of Gravitation</u> - According to this, gravitational force or gravity between two objects is proportionally related to the product of their masses & inversely proportional to the square of the distance between the two.	
<input type="checkbox"/>	<input type="checkbox"/>	$F = G \cdot \frac{m_1 m_2}{r^2}$	
<input type="checkbox"/>	<input type="checkbox"/>	$G = \text{Gravity}$	
<input type="checkbox"/>	<input type="checkbox"/>	$G = \text{universal gravitational constant}$	
<input type="checkbox"/>	<input type="checkbox"/>	$m_1, m_2 = \text{masses of two objects}$	
<input type="checkbox"/>	<input type="checkbox"/>	$r = \text{distance between them.}$	
2.	10	Difference between animal & plant cell:	
<input type="checkbox"/>	<input type="checkbox"/>	<u>Plant Cell</u>	<u>Animal Cell</u>
<input type="checkbox"/>	<input type="checkbox"/>	① Bigger in size	① Relatively smaller.
<input type="checkbox"/>	<input type="checkbox"/>	② Cell wall present	② Cell wall absent
<input type="checkbox"/>	<input type="checkbox"/>	③ Centriosome absent	③ Centriosome present
<input type="checkbox"/>	<input type="checkbox"/>	④ plastids present	④ Plastids absent
<input type="checkbox"/>	<input type="checkbox"/>	⑤ Vacuoles are bigger in size	⑤ Relatively smaller in size



2.	4	<p>Properties of magnet -</p> <ol style="list-style-type: none">① They always align withⁱⁿ north-south when left freely in the atmosphere.② They show north-south direction when kept in a magnetic field.③ They attract ferromagnetic elements such as Iron, Aluminium etc.④ Their similar poles repel each other while opposite poles attract each other.⑤ Poles of a magnet cannot be separated.
2.	5	<p>Difference between Nuclear fission & fusion:</p> <ol style="list-style-type: none">① In nuclear fission <u>nucleus splits</u> into two or more nuclei, while in nuclear fusion 2 or more nuclei <u>fuse</u> to form a bigger nucleus.② In nuclear fission <u>energy</u> released is relatively <u>less</u> than nuclear fusion.③ Nuclear fission can be <u>controlled</u> or uncontrolled chain reaction, while nuclear fusion is always <u>uncontrolled</u>.④ Nuclear fission is <u>artificially</u> created eg. Nuclear Reactors. While nuclear fusion occurs <u>naturally</u>. eg. Sun (${}^4\text{He}^+$ fuses with ${}^4\text{He}^+$)⑤ <u>Atom bombs</u> during World War 2 were based on <u>nuclear fission</u> chain reaction. <u>Hydrogen bombs</u> are based on nuclear fusion.

2.	6	<p>Difference between physical & chemical changes:</p>	
		<p><u>Physical change</u></p>	<p><u>Chemical change</u></p>
		<p>① Molecules get rearranged but the composition remains same.</p>	<p>① Composition changes entirely & molecules get rearranged.</p>
		<p>② Only physical changes such as shape, size etc take place.</p>	<p>② Whole chemical structure gets changed.</p>
		<p>③ New substances is not formed.</p>	<p>③ New substance is formed</p>
		<p>④ It can be reversible.</p>	<p>④ Generally irreversible.</p>
		<p>⑤ It is temporary. ex. Boiling of water, melting of wax, etc</p>	<p>⑤ Permanent in nature. ex. Rusting, burning of coal, etc</p>
2.	7	<p>Chemical elements are those substance which <u>can not be further divided</u> into other substance. These are called <u>free substances</u>. They are <u>naturally occurring</u> elements such as Oxygen, Nitrogen, Hydrogen, Helium, etc.</p>	
		<p><u>Chemical symbols of Hydrogen, Sodium & Potassium are -</u></p>	
		<p>① Hydrogen - H</p>	
		<p>② Sodium - Na</p>	
		<p>③ Potassium - K</p>	

3. 1 Light travels in form of waves. When it travels from one medium to another various phenomenon take place such as reflection of light, refraction of light, total internal reflection, etc.

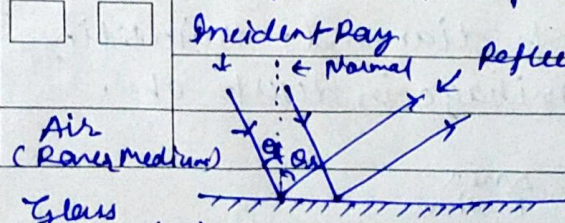
① Reflection of light - When light travels from rarer medium to denser medium some of the light rays comes back to the rarer medium, this phenomenon is called reflection of light.

If the surface of denser medium (eg. glass) is smoother, the reflection of light rays will be regular while reflection from a rough surface will be irregular.

Conditions for reflection of light -

① Light is travelling from rarer to denser medium.

② The ray of incidence, ray of reflection & normal fall into same plane.



Air (Rarer medium)
 Glass (denser medium)
 Fig: Regular Reflection

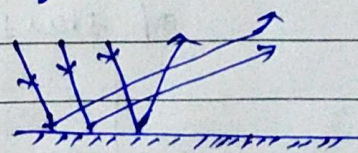
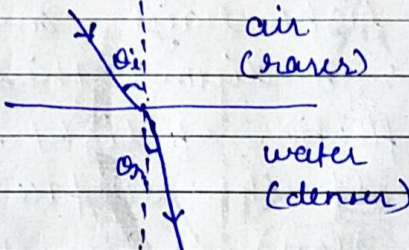
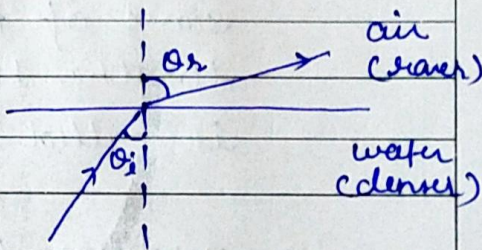
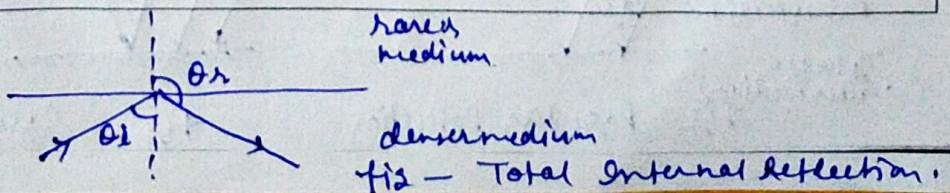


Fig: Irregular reflection

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 (Mains Answer Sheet)

<input type="checkbox"/>	<input type="checkbox"/>	<p>② <u>Refraction of light</u> - When light travels from one medium to another it gets slightly deviated from its path according to density of the medium.</p> <p>When light travels from rarer to denser medium it bends towards the normal. While from denser to rarer medium it bends away the normal.</p>
<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<p>Fig (a) → Light travelling from rarer to denser medium</p>
<input type="checkbox"/>	<input type="checkbox"/>	<p>Fig (b) → light travelling from denser to rarer medium.</p>
<input type="checkbox"/>	<input type="checkbox"/>	<p><u>Total Internal Reflection</u> - When light travels from denser to rarer medium & the critical angle (when angle of refraction is more than 90°) is more than 90° then the light rays reflects back to the same medium, it is called Total internal reflection.</p> <p>Ex. - Shining of diamonds, twinkling of stars, mirage in desert etc.</p>



3.2

① Acids - Acids are those chemical substances which render hydrogen ions (H^+ ions) in aqueous solution.

Properties -

- Release H^+ ions
- Can donate protons
- Can accept electron
- They taste sour.
- They turn blue litmus paper to red.

Examples - Hydrochloric acid (HCl),
Sulphuric acid (H_2SO_4),
Nitric acid (HNO_3), etc

② Bases - Bases are those chemical substances which render hydroxyl ion (OH^-) in their aqueous solution.

Properties -

- Release OH^- ions.
- Can donate electron
- Can accept proton
- They taste bitter
- They turn red litmus paper into blue.

Ex. - $NaOH$, KOH , etc

Salts — These are minerals which are neither acidic or basic. They are called acid-base neutrals.

Properties —

- They are acid-base neutrals.
- can be naturally occurring or made in laboratories.

Ex. — Sodium chloride (NaCl)

Acids, bases & salts are essential constituents of any chemical experiment in laboratories. They have a wide use in industries, medical sector, pharmaceuticals, agriculture (fertilizers, pesticides etc) and as well as daily life of human beings.

3.3 Structure and functioning of body organs:

① Kidney -

Structure - Kidneys are two bean shaped ^{abdominal} organs at lower part of human body.

They are covered by a layer called cortex, which is inside the renal capsule.

Functions - The main function of kidney is excretion. It filters the bloods & excretes the waste material in form of urine.

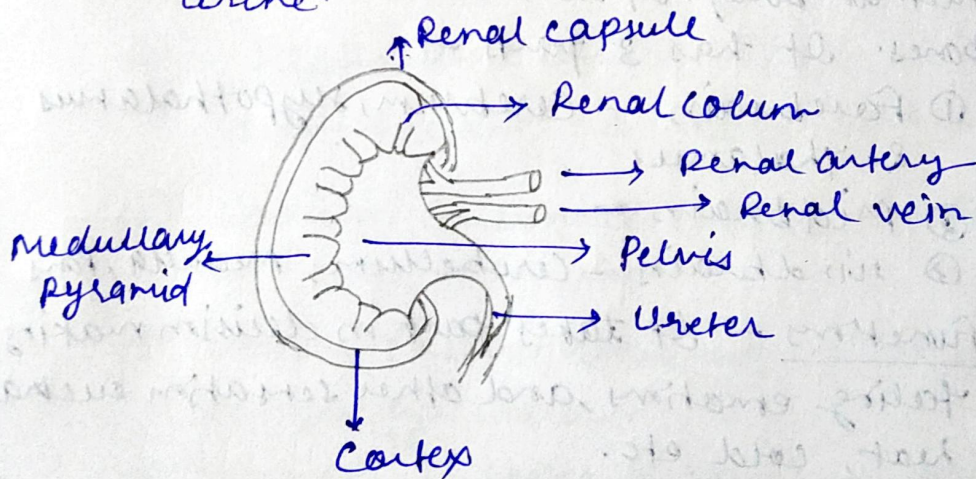


Fig - Kidney in human Body

② Liver -

Structure - It is situated above the kidney (right part) & below the diaphragm. It has 2 lobes & it is connected to stomach.

Functions - The main function of liver is to take part in digestive process. It produces bile juice which helps in digestion of food.

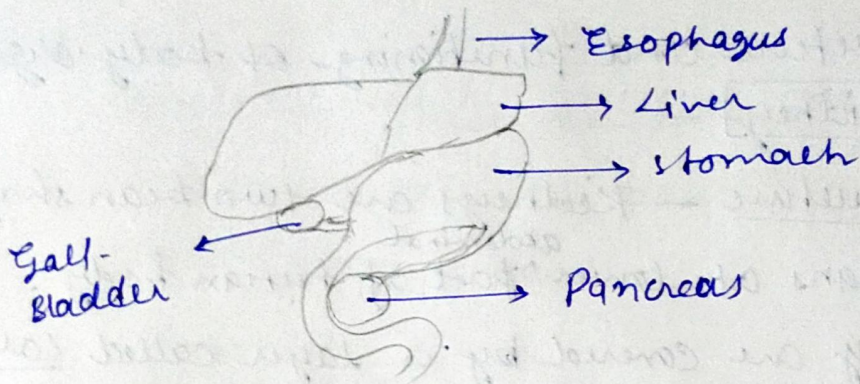


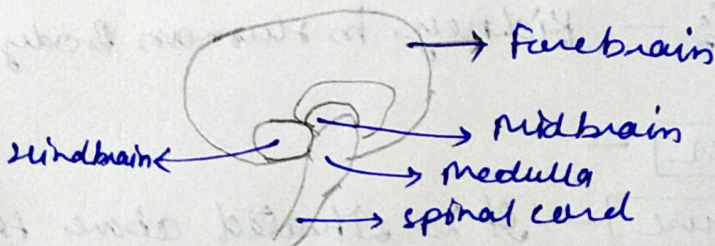
Figure - Liver in Human Body

② Brain

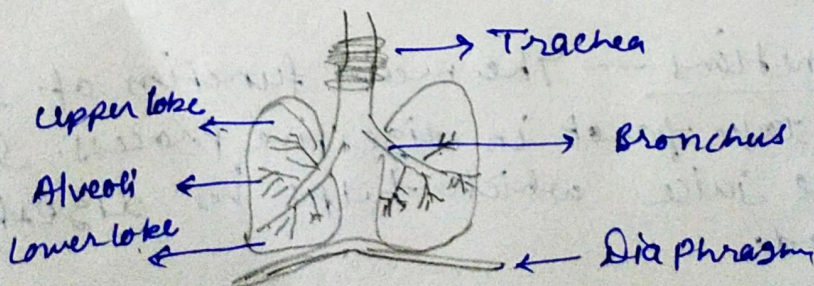
Structure - It is situated at the top of the human body. It is covered with the skull bones. It has 3 parts -

- ① Forebrain - Cerebrum, hypothalamus & thalamus
- ② Midbrain
- ③ Hindbrain - cerebellum, medulla, Pons

functions - It takes part in decision making, feeling emotions, and other sensation such as heat, cold etc.



③ Lungs - Its main function is respiration which involves exchange of gases.



8.4

Electromagnetic spectrum is distribution or arrangement of various electromagnetic radiations or according to their wavelengths & frequencies.

These electromagnetic radiations are in the form of radio waves, microwaves, infrared waves, visible light, ultra-violet rays, gamma rays, x-rays, etc.

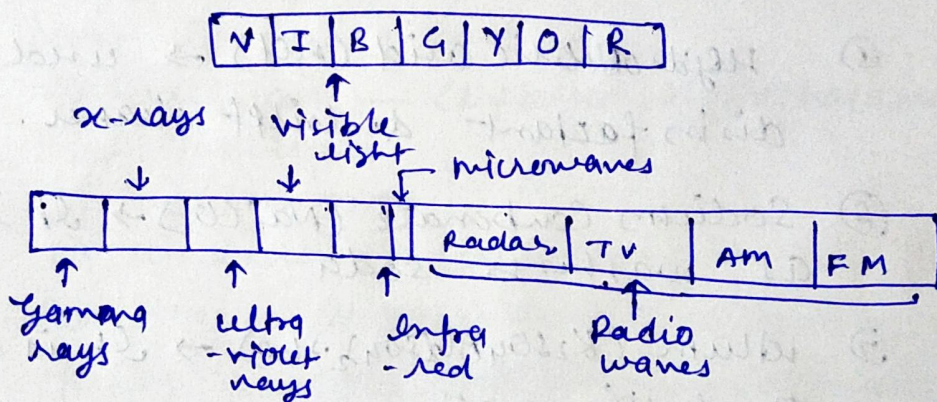


fig - Electromagnetic spectrum

Gamma rays → These are used in astronomy & space studies to detect the space objects & planets. It has lowest ~~freq~~ wavelength & highest frequency in the electromagnetic spectrum. (wavelength → 10^{-14} - 10^{-10} m)

x-rays → These were discovered by Rontgen. These are used in medical sectors widely. (wavelength → 10^{-10} - 10^{-8} m)

Ultraviolet rays - These are present in sunlight. These help in synthesis of vitamin D in human body. (10^{-8} - 10^{-7} m)

Infrared rays - It is used in night vision glasses & space objects studies. (wavelength 10^{-7} to 10^{-9} m)

Microwave - Used by astronomer to understand planets & other objects. Also used in cooking.

Radio waves - These are used in transmission of radio signals and mobile signals. (1 to 10^6 m)

Visible light - These can be detected by human eyes. Sun, stars, light bulb etc emit visible light. (wavelength 3.9×10^{-7} - 7.8×10^{-7} m)

By looking at their application & utility it can be understood that electromagnetic spectrum has vital significance in human life. It not only serves its scientific purpose in experiments & inventions but also has huge relevance & utility in daily life.

3.5

Chemistry plays a vital role in our day to day lives life. There are various chemicals which are used on daily basis. Some of these are -

- ① Sodium chloride (NaCl) → It is used as common salt in food items.
- ② Sodium Bicarbonate (NaHCO_3) → It is used in bakery as baking soda.
- ③ Sodium Benzoate → used as flavoring agent & pickling agent.
- ④ Tartaric acid → used in making pickles
- ⑤ Hydrochloric acid (HCl) → used as disinfectant & toilet cleaner.
- ⑥ Sodium Carbonate (Na_2CO_3) → It is used as washing soda
- ⑦ Alum ($\text{K}_2\text{SO}_4\text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$) → It is used to purify water.
- ⑧ Gypsum & plaster of paris → used in pottery & cement manufacturing