

Rajasthan Board Class 10 General Science 2016 Question Paper with Solutions

PART-A

1. Write the two components of Baking Powder.

Answer: Baking powder is a combination of baking soda and mild edible acid, like the tartaric acid.

2. Write the name of the reproductive process in the plants, which have lost the capacity to produce seeds.

Answer: Plants without the capacity to produce viable seeds can propagate via the method of vegetative propagation. This is the process used for cultivation of the new plants when the seeds cannot produce new plants. In this method, the vegetative parts of the plant are used for the production of new plants. There are natural and artificial methods of vegetative propagation.

3. Write the atomic weight of the chlorine isotopes.

Answer: Chlorine has multiple isotopes, of which the two stable ones are C^{35} and C^{37} , with their respective atomic weights at 35 and 37, respectively.

4. In the following, the strong acid and the strong alkaline base is _____

- a. Acetic Acid or Hydrochloric Acid
- b. Sodium hydroxide or Calcium hydroxide

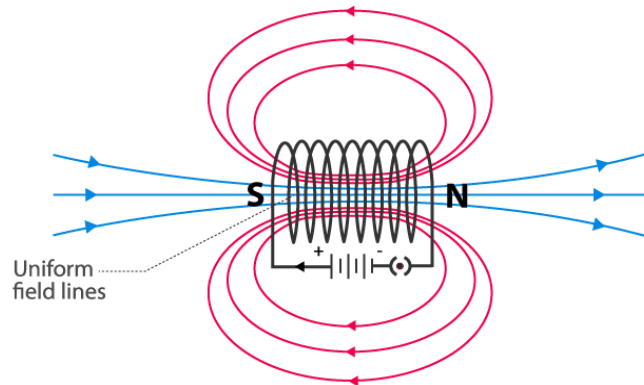
Answer: Strong acids and bases are completely ionised when it is dissolved in water. Meanwhile, the strength of an acid or base is decided by the pH of the solution. The total pH scale from 1 to 14, with 7 taken as the neutral. A pH less than 7 is acidic, while a pH greater than 7 is basic or alkaline.

(a) The pH of Hydrochloric acid (HCl) is 3.01, and of acetic acid is 4.76. So, HCl is a strong acid. Lesser pH value will be stronger acid.

(b) Alternatively, Sodium Hydroxide has pH13, and that of Calcium hydroxide is at 12.20. As the pH of NaOH is stronger, sodium will be a strong base.

5. The magnetic field in a given region is uniform. Draw a diagram to represent it.

Answer:



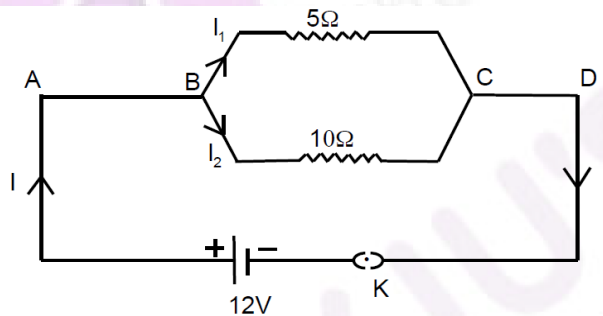
6. Write the name of acidic oxides, which are responsible for acid rain.

Answer: Acid rain is mostly caused by gaseous sulphur dioxide and gaseous nitrogen dioxide.

7. A current through a horizontal power line flows east to west direction. What is the direction of the magnetic field at a point directly below?

Answer: Direction of the magnetic field is from south to north. Check out [the explanation](#) here.

8. In the given circuit diagram, calculate the current I_2 through the resistor 10 Ohm.



Answer: The voltage difference in this scenario remains the same, as the resistances between points B and C are in a parallel combination.

Hence, apply the formula, $V = IR$.

$$I \times 5 = I_2 \times 10$$

Therefore, $I_1 = 2 I_2$ and the equivalent resistance, $R = (5 \times 10) / (5+10) = 50/15 = 10/3$

Now, for current $I = I_2 / R = (12 \times 3) / 10 = 36/10 = 3.6 \text{ A}$

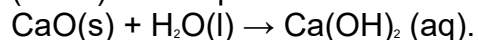
$$\text{Find } I = I_1 + I_2 = 3 I_2$$

Then calculate the current passing through 10 Ohm, $I_2 = I/3 = 3.6 / 3 = 1.2 \text{ Ampere}$.

PART - B

9. What is the combination reaction? Write a combination reaction of quick lime with water.

Answer: In a combination reaction, two or more reactants combine to form a single product. When calcium oxide is mixed in water, it dissolves and forms calcium hydroxide (basic). The equation is as follows:



10. Write four characteristics of the good source of energy.

Answer: Given here are some characteristics of a good source of energy:

- Good source of energy should be renewable and sustainable
- Optimum heat production per unit of volume/mass used
- Should be easy to transport and economical
- The source of energy should be less polluting

11. In the night, which type of beam of light is used by the drivers and why? Explain it.

Answer: During the night, the visibility is pretty low when there are no street lights. While driving across these roads at night, the drivers are advised to use high beam/ full beam. However, if they are near (say some 30 km) from another vehicle, either from behind or front, the drivers should dim their high beams. A sudden flash of the high beam is dangerous, as, at night, the eyes may not be able to see correctly because of the bright lights or the dazzle.

12. Describe homologous organs with the help of an example.

Answer: Homologous organs are defined as the organs of different animals that are having a similar structure but differ in their functions. The structure of the two different animals resemble, but the functions of their organs vary. Examples of homologous organs are the forelimbs of frog, man, and the flippers of the whale. The structure of these animals are the same, but they function differently. The flippers are used for swimming, the forelimbs of frogs are used for jumping and propping, and the forelimbs of man are used for writing, eating, holding things, and so on.

13. Why do we have two eyes for vision and not just one? Explain the facts based on _____

- a. **Field of view**
- b. **Dimensional view**

Answer: Read up about [why we have two eyes for vision](#) and get the facts on the basis of the field of view or the dimensional view.

14. Write the definition of fossils and explain the process of dating the fossil.

Answer: Fossils are the remains or traces of ancient life that have been preserved by natural processes, from spectacular skeletons to tiny seashells. Examples of fossils include shells, bones, stone imprints of animals or microbes, exoskeletons, objects

preserved in amber, petrified wood, coal, hair, oil, and DNA remnants. There are five types of fossils:

1. Body Fossils
2. Molecular Fossils
3. Trace Fossils
4. Carbon Fossils
5. Pseudofossils

Hence, a fossil can be defined as a remnant, impression, or trace of an organism of past geologic ages that has been preserved in the earth's crust. Meanwhile, find here about the process of [dating the fossil](#).

15. (a) Write the chemical reaction of photosynthesis and the events that occur during the process.

(b) Which type of mirror is used in the headlights of a vehicle?

Answer: (a) Find here the [chemical reaction of photosynthesis](#). Also, learn about the [events that take place during the process](#).

(b) Concave Mirror is used in the headlights of a vehicle because concave mirrors can produce a powerful parallel beam of light when the light source is placed at their principal focus.

16. (a) Which hormone is secreted by the Adrenal glands? Write any one function of this hormone.

(b) Write any two functions of batteries in vehicles.

Answer: (a) The hormone Adrenaline is secreted by the Adrenal glands. It triggers the flight or fight response. In other words, this is a stress hormone that helps the organism to either face a dangerous situation or to avoid it altogether. It does this by:

- Increasing blood sugar levels
- Increasing the blood supply to the muscles, particularly to the limbs.
- Dilating the pupils
- Increasing the heart rate
- Tightening the jaw muscles.

(b) i) An automotive battery is a rechargeable battery, and it provides the electric energy to an automobile. It also functions as a stabiliser, thus evening out any potentially-damaging voltage spikes.

(ii) Other than starting the engine, the battery also supplies the extra power as required when the electrical requirements of the vehicle exceed the supply from the charging system.

17. What is the redox reaction? In this reaction, $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$, which substance gets oxidised? Which substance is reduced?

Answer: In Redox reaction, the reduction and oxidation take place simultaneously. While one product is reduced, another one gets oxidised.

Take the example of $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$. Here, Carbon is oxidised to CO, as oxygen is added. Meanwhile, ZnO gets reduced to Zinc, as the oxygen is removed. Hence, it is a redox reaction.

18. (a) Write down the formula for the magnification obtained by a spherical mirror.

(b) Name a mirror that can give an erect and enlarged image of the object.

(c) Define the principle focus of a convex mirror.

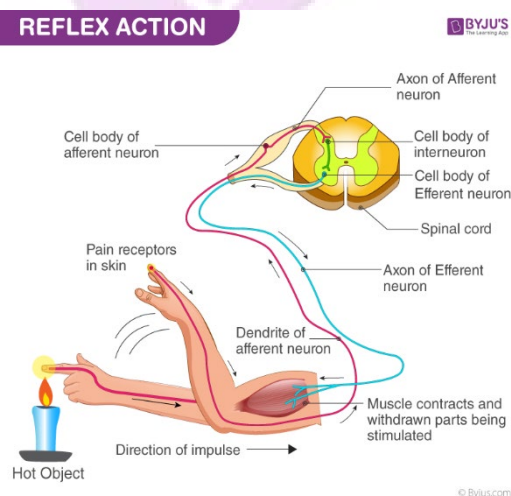
Answer: (a) Magnification is the increase in the image size produced by spherical mirrors with respect to the object size. It is the ratio of the height of the image to the height of the object and is denoted as m . The magnification, m produced by a spherical mirror can be expressed as, $m = h / h_1$, where h is the height of the image and h_1 is the height of the object. Meanwhile, magnification is also equal to the ratio of image distance to the object distance. That is $m = v/u$. As the object is always above the principal axis, the height of the object is always positive. But a sign for image height may vary according to the type of image formed. The height of virtual images should be taken positively while the height of real images should be taken negatively.

(b) Concave mirror can give an erect and enlarged image. When an 'object' is placed very close to the mirror the enlarged erect image can be obtained.

(c) The light rays that converge on the principal axis after reflecting from a convex mirror and are parallel to the principal axis are called principal focus of a convex mirror. They either actually meet or appear virtually to meet. The virtual image is not formed on the screen.

19. Draw a labelled diagram of a reflex arc and explain reflex action.

Answer: The reflex arc is the nerve pathway that is followed by reflex action. An example of the reflex arc is it happens when we accidentally touch something hot. The temperature change is detected by the receptor first. Then electrical impulses are sent to the relay neuron which is located in the spinal cord. Sensory neurons are connected to motor neurons by sensory neurons. An effector receives electrical impulses through the motor neuron. The effector produces a response.



20. Match the column X to column Y

Column X(Physical Quantity/ Law)	Column Y (Formula)
(i) Electric Current	(a) $R = R_1 + R_2 + R_3$
(ii) Potential Difference	(b) $\rho = RA / \ell$
(iii) Ohm's Law	(c) $1/R = 1/ R_1 + 1/R_2 + 1/R_3$
(iv) Resistivity	(d) $V= W/Q$
(v) Series combination of resistor's	(e) $I =QT$
(vi) Parallel combination of resistor's	(f) $V=IR$

Answer:

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21. If an egg is not fertilised, then what happens? Explain it.

Answer: Ovulation takes place once a month. The ovary releases one egg every month, and the uterus starts the preparation to receive the fertilised egg. The endometrium lining becomes thick, spongy and rich in blood and tissues. However, when the egg is not fertilised, the inner lining of the uterus known as the endometrium lining breaks, causing the discharge of blood and mucus through the vagina as menstrual bleeding. The cycle for discharge could last for about 5 to 7 days, till all the debris of endometrium along with blood is discharged.

22. (i) Write Newland's Law of Octaves.

(ii) Write the name of an element having similar properties of the following:

- (a) Nitrogen
- (b) Lithium

Answer: (i) The [law of octaves](#) states that every eighth element has similar properties when the elements are arranged in the increasing order of their atomic masses.

(ii) (a) Phosphorus is an element from the same group as nitrogen (group 15), and it has properties similar to Nitrogen.

(b) Sodium is an element that has similar properties as Lithium.

23. What is the pH scale? Explain that pH change of the mouth is the cause of tooth decay.

Answer: The pH scale is a logarithmic scale that is used to measure the acidity or the basicity of a substance. The possible values on the pH scale range from 0 to 14. The term 'pH' is an abbreviation of 'potential for hydrogen' or 'power of hydrogen'. Acidic substances have pH values ranging from 1 to 7 (1 being the most acidic point on the pH scale) and alkaline or basic substances have pH values ranging from 7 to 14. A perfectly neutral substance would have a pH of exactly 7. The change in pH causes tooth decay. Tooth decay starts when the pH of the mouth is lower than 5.5. Tooth enamel gets corroded when the pH in the mouth is below 5.5.

24. An electric refrigerator rated 600 W operates 8 hours a day. What is the cost of the energy to operate it for 30 days at 4.00 per kWh?

Answer: Presume that power of the refrigerator = 600 W = 0.6 kW

And the total hours it worked = $8 \times 30 = 240$ hours

Now for the total electric energy or the work done, (W)

$W = 0.6 \times 240 = 144$ kWh

Then, total cost for the energy to operate is = $(144 \times 4.00) = 576$ Rs.

PART-C

25. (a) What do you mean by food chain?

(b) Explain the food chain in grassland with an example.

(c) Explain the energy flow in an ecosystem with the help of a diagram.

Answer: (a) A food chain explains which organism eats another organism in the environment. The food chain is a linear sequence of organisms where nutrients and energy is transferred from one organism to the other. This occurs when one organism consumes another organism. It begins with the producer organism, follows the chain and ends with a decomposer organism. After understanding the food chain, we realise how one organism is dependent upon another species for survival. All food chains may not process if bacteria are absent on the earth.

Now, let's look at the other aspects of a [food chain](#), to get a better understanding.

(b) The food chain in the grassland starts with green plants, passes through herbivores and then to carnivores. In a grazing food chain, energy in the lowest trophic level is acquired from photosynthesis. In this type of food chain, the first energy transfer is from plants to herbivores. This type of food chain depends on the flow of energy from autotrophs to herbivores. As autotrophs are the base for all ecosystems on earth, the majority of ecosystems in the environment follow this kind of food chain.

A classic example of a food chain starts with plants, in this case, grass. See, the chain below.
Grass - Grasshopper - mice - snake - eagles

Now, when the eagle dies, the fungi breaks the body down and converts it into nutrients. These nutrients, along with the sun and water, cause the grass to grow again.

(c) Here, find the explanation [for the energy flow in the ecosystem along with the diagram](#).

26. (a) Which metal exists in a liquid state at room temperature?

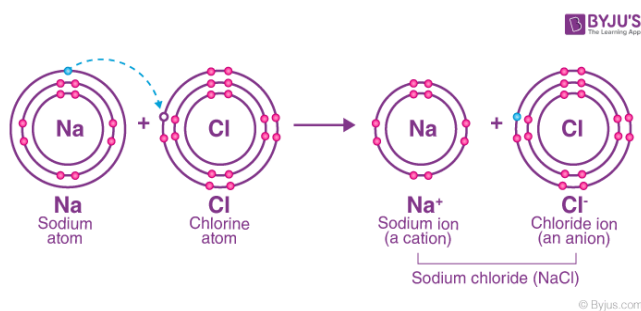
(b) Write the electronic configuration of nitrogen and chlorine atoms.

(c) Show the formation of sodium chloride by the transfer of electrons between the atoms.

Answer: (a) Mercury is the metal that exists in a liquid state at room temperature.

(b) Nitrogen, the 7th element has a total of 7 electrons. While writing the electron configuration for the element nitrogen, the first 2 electrons are placed in the 1s orbital. Since 1s can only hold two electrons, the next 2 electrons for N goes in the 2s orbital, and the remaining 3 electrons will go to the 2p orbital. Therefore, the N electronic configuration will be $1s^2 2s^2 2p^3$. Now, while writing the electronic configuration of Chlorine, Cl, the first 2 electrons will be accommodated in the 1s orbital. And seeing as 1s can hold about 2 electrons, the next 2 will go in the 2s orbital. And the last 6 electrons can be found in the 2p orbital, as the p orbital can hold up to 6 electrons. The 2 electrons after this will go to the 3s orbital. Since 3s can hold only 2, the next electrons will go to 3p, which can hold almost 5 electrons. So the electronic configuration for chlorine will be $1s^2 2s^2 2p^6 3s^2 3p^5$.

(c)



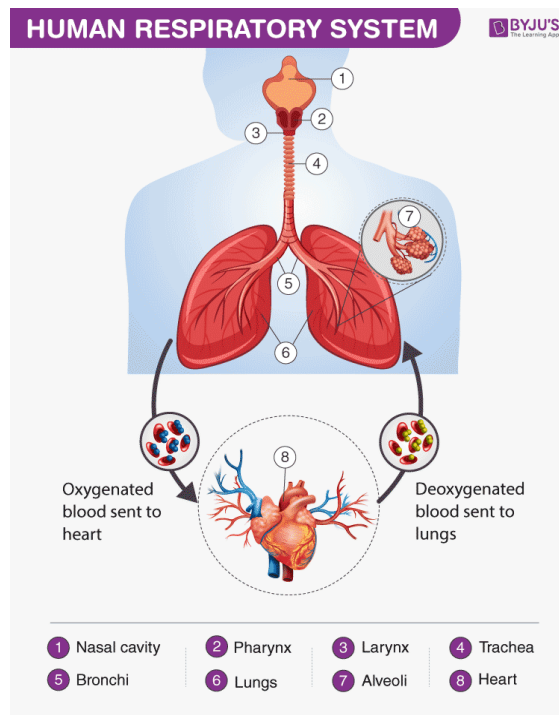
27. Define the alternating current and explain the working of the device which produces it. Draw a labelled diagram. Describe the change in the direction of the current.

Answer: Alternating current can be defined as a current that changes its magnitude and polarity at a regular interval of time. It can also be defined as an electrical current which repeatedly changes or reverses its direction opposite to that of Direct Current or DC, which always flows in a single direction, as shown below. The charged particles in AC tend to start moving from zero. It increases to a maximum and then decreases back to zero, completing one positive cycle. The particles then reverse their direction and reach the maximum in the opposite direction after which AC again returns to the original value completing a negative cycle. The same cycle is repeated and again. Alternating currents are also accompanied usually by alternating voltages. Besides, alternating current is also easily transformed from a higher voltage level to lower voltage level.

Alternating current can be produced or generated by using devices that are known as alternators. However, alternating current can also be produced by different methods where many circuits are used. One of the most common or simple ways of generating AC is by using a basic single coil AC generator which consists of two-pole magnets and a single loop of wire having a rectangular shape.

See here for the working of the [AC generator with the labelled diagram](#).

28. (a) Draw a labelled diagram of a human respiratory system.
 (b) Explain the transportation of oxygen and carbon dioxide in human beings.
 Answer: (a)



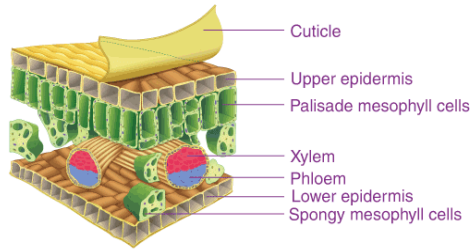
(b) The respiratory system helps in breathing, known as pulmonary ventilation. The air inhaled through the nose moves through the pharynx, larynx, and trachea into the lungs. The air is exhaled back through the same pathway. Changes in the volume and pressure in the lungs aid in pulmonary ventilation. Inside the lungs, the oxygen is exchanged for carbon dioxide waste through millions of microscopic sacs called alveoli. The inhaled oxygen diffuses into the pulmonary capillaries, binds to haemoglobin and is pumped through the bloodstream. The carbon dioxide from the blood diffuses into the alveoli and is expelled through exhalation. The blood carries the oxygen from the lungs around the body and releases the oxygen when it reaches the capillaries. The oxygen is diffused through the capillary walls into the body tissues. The carbon dioxide also diffuses into the blood and is carried back to the lungs for release.

Or

- What is respiration?
- Draw a labelled diagram of a cross-section of a leaf.
- Explain the transportation of food and other substances in the plant.

Answer: (a) Respiration is defined as a metabolic process wherein, the living cells of an organism obtains energy (in the form of ATP) by taking in oxygen and liberating carbon dioxide from the oxidation of complex organic substances. Every living species, from a single-celled organism to dominant multicellular organisms, perform respiration.

(b)

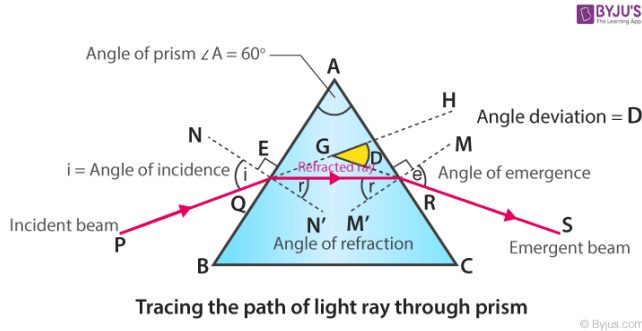


(c) [Transportation](#) is the process that involves the movement of water and necessary nutrients to all parts of the plant for its survival.

29. (a) Draw a ray diagram of refraction of light through a prism and explain the phenomenon of dispersion of light.

(b) Write the formula for lens power and define its unit.

Answer: (a)



Find details about the [dispersion of light](#) here.

(b) Find here the formula for the [power of a lens](#).

Or

a. Explain the following:

(i) Atmospheric refraction and advance sunrise.

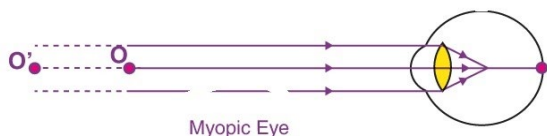
(ii) Tyndall effect

(iii) Draw the ray diagram of an eye suffering from short-sightedness

Answer: (a) (i) Learn about [atmospheric refraction](#) and get to know more about [advance sunrise](#) here.

(ii) What is the Tyndall [effect](#)?

(iii)



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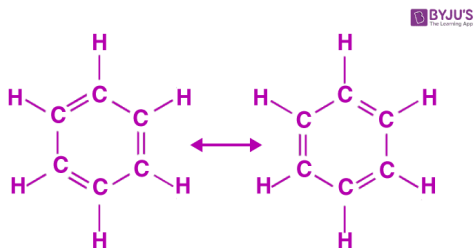
30. (a) Write molecular formula for benzene

- b. Draw the structure of benzene and write the number of triple bonds present in it.
c. Which is ethane in the following? Write the number of co-operative bonds present in it.

(i) C_2H_2 (ii) C_2H_4 and (iii) C_2H_6

Answer: (a) Molecular formula of the benzene is C_6H_6

(b)



There are no triple bonds. In the molecular structure, you can find 3 double bonds and 9 single bonds.

(c) (iii) C_2H_6 is ethane. There are 7 co-operative bonds.

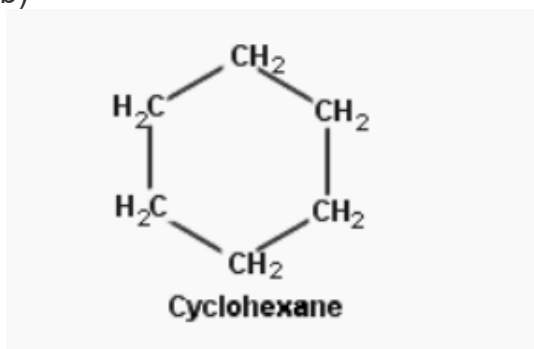
Or

- a. Write the molecular formula for cyclohexane.
b. Draw the structure formula of cyclohexane and write the no-of co-operative bonds present in it.
c. Which is ethene in the following? Write the number of co-operative bonds present in it.

(i) C_2H_2 (ii) C_2H_4 and (iii) C_2H_6

Answer: (a) C_6H_{12} is the molecular formula for cyclohexane.

(b)



There are 16 co-operative bonds in it.

(c) C_2H_4 is the molecular formula for ethane. There is one double bond in this structure.