Solution
MOCK EXAM - PAPER 3
Class 10 - Science
Section A

1.

(b) (ii), (iii) and (iv) only
Explanation:
Transpiration is the loss of water in the form of vapour from the living tissues of aerial parts of the plant. It mainly occurs by the process of diffusion through stomata. Rate of transpiration is inversely proportion to relative humidity.

2.

(c) Tt and tt
Explanation:
Tt Tall plant and tt short plant.

3.

(c) (ii) and (iii)
Explanation:
(ii) and (iii)

4.

(d) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)
Explanation:

- Thyroxin is secreted by the thyroid gland to regulate the metabolic rate and help control body temperature.
- Insulin and glucagon are hormones that help regulate the levels of blood glucose in the body secreted by the pancreas.
- The testes are the most essential organs of the male reproductive system. They are the glands where sperm and testosterone are produced.
- Estrogen is a female steroid hormone that is produced by the ovaries.

5.

(c) Both Inorganic substances and climatic factors
Explanation:
An ecosystem consists of biotic components comprising living organisms and abiotic components comprising physical factors like temperature, rainfall, wind, soil, and minerals.

6.

(b) They convert CO_2 and water into carbohydrates in the absence of sunlight
Explanation:
They convert CO_2 and water into carbohydrates in the **presence** of sunlight and chlorophyll. This process is called Photosynthesis.

7.

(d) spinal cord
Explanation:
Reflex action mainly controlled by the spinal cord as it is rapid, involuntary action in response to a specific stimulus.

8.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation:

The fusion of a sperm with an ovum to form a zygote during sexual reproduction is called fertilisation. The zygote is fertilised ovum or fertilised egg. The zygote grows and develops to form a new baby.

9.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation:

Herbivores obtain their food from plants. Hence, are known as first-order carnivores. The carnivores like tiger cannot be preyed upon further, lie at the top of food chain and hence termed as top carnivores.

10. Every species has to constantly struggle for its survival. Natural predators and vagaries of nature keep on removing a large section of the population of a particular species. Moreover, the natural cycle of life and death also removes a section of the population. Reproduction is a way to replenish the lost section of population. Thus, it can be said that reproduction is linked to the stability of population of a species.
11. a. The consequence of the decrease in the number of carnivores in an ecosystem is the Population of herbivores will increase as their predator number is less, leading to imbalances in species composition and trophic dynamics, as well as potential disruptions in ecosystem structure and function.

    b.
    - Top carnivore/ Tertiary consumer
    - They are nonbiodegradable, and while passing from one trophic level to another they keep on accumulating at each level / Biomagnification.

    OR

    i. As uncle is supplying frogs from his village to laboratories so the number of frog population is decreasing. Frogs eat grasshoppers and mosquitoes. But as the number of frogs population is reduced so the population of grasshoppers and mosquitoes are increasing. So malaria is spread in the village by mosquitoes and grasshoppers are causing damage to the crops.

    ii. He must stop the supply of frogs to the laboratories as the reduced frog population is causing an imbalance in the food chain and proper ratio of frogs, grasshoppers and mosquitoes can not be maintained in the ecosystem.
12. Chemical coordination in plants is maintained by plant hormones also known as phytohormones. Some of these hormones promote growth while some inhibit it. Some hormones include auxin, Gibberellins, Cytokinin that promotes growth while, hormones like absesic acid and ethylene inhibit the growth.
13. i. RR for homozygous pure round. And rr for homozygous pure wrinkle pea plant.

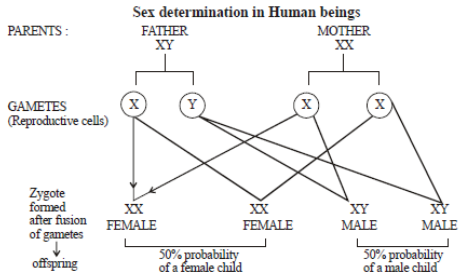
    ii. Rr (hybrid) - heterozygous. All are round since round is dominant over wrinkled.

    iii. 3:1 (phenotypic ratio), 1:2:1 (genotypic ratio) The name of this cross is monohybrid cross.
14. Yes, an experiment set-up by using two-head bottle, water reservior, germinating seed, lime water, beaker and delivery tube.
15. i. The sex of an infant is determined by the type of sex chromosome contributed by the male gamete. Since the ratio of male gametes containing X chromosome and those containing Y chromosome is 50:50, the statistical probability of male or a female infant is also 50 : 50.

    ii. Humans contains 1 pair of sex chromosomes.
    Female contain perfect pair of sex chromosomes i.e. XX.

    iii. Examples of organisms in which sex is not genetically determined are crocodiles, alligators, turtle, Bonellia Viridis.
    For example, in crocodiles, if the egg is incubated at around 30°C, it leads to the development of female whereas if the egg is incubated at around 34^{o}C, it results in the development of the male. Another example may include Bonellia Viridis in which sex is determined by the location of larvae. If larvae make physical contact with a female, it becomes male. If it is located on the bare sea floor, it becomes female.

OR



16. a. If fertilization does not occur, the endometrium, coupled with blood and mucus from the vagina and cervix (the lower, narrow part of the uterus located between the bladder and the rectum) make up the menstrual flow (also called menses) that leaves the body through the vagina.
    b. Sperms contain either X or Y chromosome whereas an egg will always have X chromosome only.
    c. Three methods of contraception include;
    Barrier method: prevents the fusion of sperm and egg or implantation
    Example, Condom, IUD etc
    Surgical method: Performed either in male (vasectomy)or female (tubectomy). This method prevents fertilization.
    Hormonal pills/chemical methods: Use of contraceptive pills or spermicidal gels.

OR

a. Iodised salt is advisable because Iodine present in iodised salt is essential for functioning of thyroid and formation of thyroxine hormone. The disease caused due to deficiency of iodine is Goitre. The symptom due to goitre is Swollen neck.
b. Nerve impulses travels from dendrite to cell body, then along the axon to its end. At the end, some chemicals are released which fill the gap of synapse, and starts a similar electrical impulse to another neuron and the impulse further travel in the body.

Section B

17.

(d) Statement (A)
Explanation:
The human stomach produces gastric juices which contain hydrochloric acid in them resulting in a pH of 1.4.

18.

(b) Both the statements A and B are true.
Explanation:

- **The oxyacetylene flame** is used for welding purposes. The oxyacetylene welding process uses a combination of oxygen and acetylene (C_2H_2) gas to provide a high-temperature flame. It is commonly used to join mild steel permanently.
- Ethyne (C_2H_2) reacts with HCl in the presence of $HgCl_2$ to from vinyl chloride or chloroethane H_2C=CHCl. This colourless compound is an important industrial chemical. It is chiefly used to produce polyvinyl chloride (PVC).

19.

(b) Has low melting point
Explanation:
Given that the compound X and Y form compound Z.
Here, X loses electron and Y gains electron meaning that an ionic or an electrovalent bond is formed.
Thus, the compound Z is a crystalline solid, has high melting and boiling point. It conducts electricity in the molten state.
The compound Z cannot have a low melting point.

20.

(b) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)

Explanation:

- Carbon forms a large number of compounds due to the property of catenation. Catenation is the linkage of atoms of the same element into longer chains. Catenation occurs most readily in carbon.
- Ethane is an alkane (saturated hydrocarbon with single bonds between the two carbon atoms).
- Butene is an alkene (unsaturated hydrocarbon with double bonds between two carbon atoms).
- Ethyne is an alkyne (unsaturated hydrocarbon with triple bonds between the two carbon atoms).

21. **(a)** Turns green and a coating will be formed on the nail

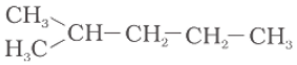
Explanation:

The solution will turn green due to the formation of iron sulphate. A coating of copper is formed on the nail. Iron is more reactive than copper and displaces it from its solution.

$CuSO_4(aq) + Fe(s) \rightarrow FeSO_4(aq) + Cu(s)$

22.

(c)



Explanation:

In this option, three carbon atoms are sharing electrons with univalent atoms. In other options, only two carbon atoms are sharing electrons with univalent atoms.

23.

(c) Hydrogen chloride gas and water

Explanation:

Hydrogen chloride gas and water

24. **(a)** Both A and R are true and R is the correct explanation of A.

Explanation:

Water is never added to concentrated sulphuric acid as it is an exothermic reaction and releases a large amount of heat energy. It also results in the spurting of the acid, which can burn your skin. Concentrated sulphuric acid is added to water in small amounts and that too with constant stirring and cooling.

25. i. When Ammonium Hydroxide is added to the Ferrous Sulphate solution then a dirty green ppt. of Ferrous Hydroxide is formed with Ammonium Sulphate by Double Displacement reaction.
$2NH_4OH\ (aq) + FeSO_4\ (aq) \rightarrow Fe(OH)_2\ (ppt) + (NH_4)_2\ SO_4\ (aq)$

ii. When Ammonium Hydroxide is added to Aluminium Cholride then a white ppt. of Aluminium Hydroxide is formed with Ammonium Choride by Double Displacement Reaction.
$3NH_4OH\ (aq) + AlCl_3\ (aq) \rightarrow Al(OH)_3\ (ppt.) + 3NH_4Cl\ (aq)$

26. The substance X is copper. On heating in air, it forms copper oxide, Y.

$$\underset{\text{Copper powder (Brown) (X)}}{2Cu} + \underset{\text{(From air)}}{O_2} \longrightarrow \underset{\text{Copper oxide (Black) (Y)}}{2CuO}$$

When hydrogen gas is passed over black copper oxide, hydrogen acts as a reducing agent and it turns copper oxide back into copper.

$$\underset{\text{Copper (II) oxide (Black) (Y)}}{CuO(s)} + H_2(g) \longrightarrow \underset{\text{Copper (Brown) (X)}}{Cu(s)} + H_2O(l)$$

OR

i. The metal (M) is silver (Ag) and gas (X_2) is chlorine (Cl_2).

ii. $2AgCl(s) \xrightarrow{Light} 2Ag(s) + Cl_2(g)$ [When salt MX is exposed to sunlight it undergoes photodecompostion reaction]
Silver chloride

27. A: Metal M will get corroded partly
The part of metal M outside oil will get corroded whereas the part of the metal M inside the oil will not corrode, as it cannot react with moist air.
B: Metal M will not undergo corrosion.
It is inside the oil and not exposed to moist air.
C: Metal M will not undergo corrosion as moisture is absent in test tube C.

28. i. The process is known as the reduction of metal oxide.
ii. In the given reaction, H_2 is oxidized.
iii. In the given reaction, O_2 is reduced.

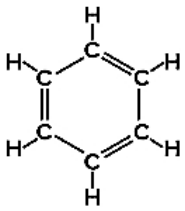
OR

If four molecules of Hydrogen are combined with oxygen then four molecules of water are formed.

29. a.
- Carbon cannot form C^{4+} ions as very high energy is required to remove 4 electrons.
- Carbon cannot gain 4 electrons to form C^{4-} ions as 6 protons cannot hold 10 electrons.

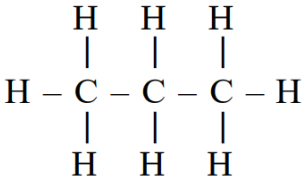
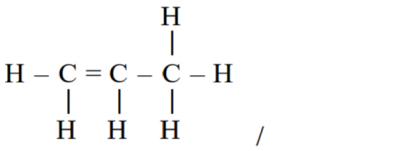
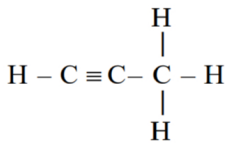
i. Covalent compounds are bad conductor of electricity as they do not have free electrons.
ii. Due to weak forces of attraction between the molecules, thus less energy is required for breaking the bonds which results in low melting and boiling points.

b. Structure of Benzene

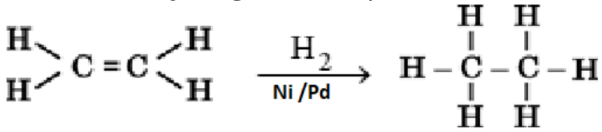


OR

i.

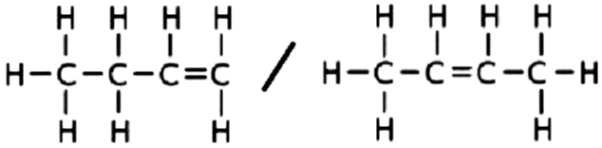
Saturated hydrocarbons	Unsaturated hydrocarbons
Compounds which have single covalent bond between all carbon atoms./Compounds with general formula C_nH_{2n+2}	Compounds which have at least one double or triple bond between carbon and carbon atom. / Compounds with general formula C_nH_{2n} and C_nH_{2n-2}
Example: Propane  / $CH_3CH_2CH_3$	Example: Propene- CH_2=CH-CH_3/  / Propyne 

ii.
- Addition of hydrogen in the presence of Ni or Pd/Hydrogenation/



- It is used in the hydrogenation of vegetable oil.

iii. Butene



Section C

30.

(b) B and C

Explanation:

A ray of light passing from an optically denser medium to an optically rarer medium bends away from the normal, and a ray of light passing from an optically rarer medium to an optically denser medium bends toward the normal.

31.

(d) ∠A and ∠e

Explanation:

∠A and ∠e

32.

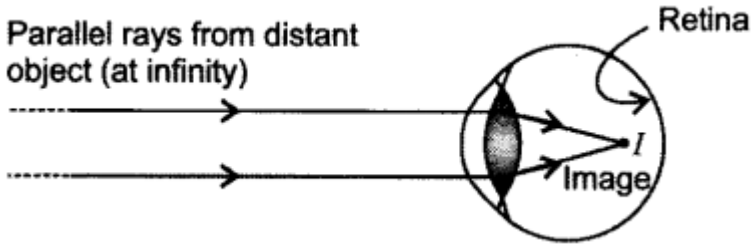
(b) Both A and R are true but R is not the correct explanation of A.

Explanation:

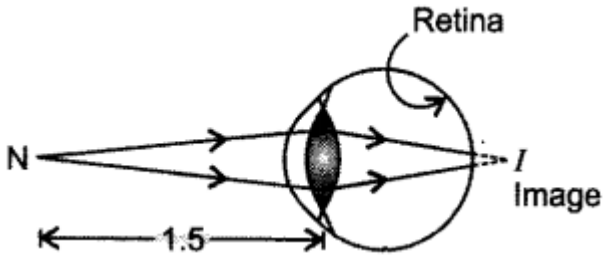
When a current-carrying conductor is placed in a magnetic field, it experiences a force except when it is placed parallel to the magnetic field. The force acting on a current-carrying conductor in a magnetic field is due to interaction between magnetic field produced by the current-carrying conductor and external magnetic field in which the conductor is placed.

33. i. **When student is seated at the back seat:** Since a student at the back bench in a class is not able to see what is written on blackboard , Therefore, student is suffering from myopia eye defect. Myopia or Short-sightedness is caused due to

1. excessive curvature in cornea.
2. elongation of eyeball. Ray diagram is shown below.



ii. **When student is seated at front seat**: The ray diagram is shown below:



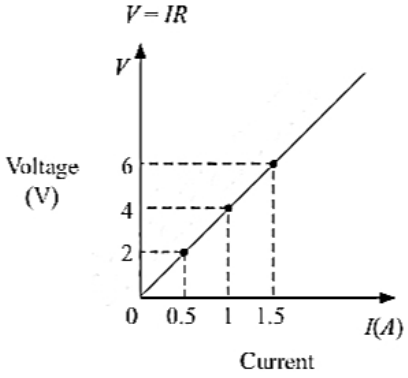
34. The correct values of current and voltage the student should use in his calculations are 38 mA, 3.2 V

OR

a. V is directly proportional to I

V = IR This is called as Ohm's law.

Graph:



b. Given:
Potential Difference (V) = 1.4 V
Current (I) = 0.35 A
Now,
V = IR
so, R = $\frac{V}{1} = \frac{1.4}{0.35}$ = 4 ohm
Hence, the resistance of a conductor will be 4 ohm.

35. a. According to this rule, stretch the thumb, forefinger and middle finger of your left hand such that they are mutually perpendicular. If the first finger points in the direction of magnetic field and the second finger in the direction of current, then the thumb will point in the direction of motion or the force acting on the conductor.
    b. i. Rod is displaced towards left.
    ii. Rod is displaced towards right.
    iii.
    - No displacement is observed in rod.
    - This is because current and magnetic field are parallel, so there will be no force experienced by the conductor.
36. a. Myopia/Near Sightedness/Short sightedness
    b. Two causes:
    - Excessive curvature of eye lens
    - Eye ball is elongated

    c. $f(m) = 1/P = 1/-0.5 = -2m$
37. i. 1. The force acting on a current-carrying conductor placed perpendicular to a magnetic field increases with the increase in the current flowing through a conductor.
    2. When a horseshoe magnet is replaced by a stronger magnet, then the magnetic field increases. Thus, the force acting on the conductor increases.
    3. If the length of the conductor increases then the force acting on the conductor also increases.

    ii. Fleming's left hand rule: Stretch the forefinger, middle finger and the thumb of your left hand mutually perpendicular to each other. If the forefinger indicates the direction of magnetic field and the middle finger indicates the direction of current, then the thumb will indicate the direction of motion of conductor.
38. i. Low resistance, high melting point.
    ii. High resistance, low melting point
    Electric Fuse is based on the principle of the heating effect of Electric current.
    iii. Given: H = I^2Rt
    So, H' = $(2I)^2 \cdot \frac{R}{2}t$ = 2 H

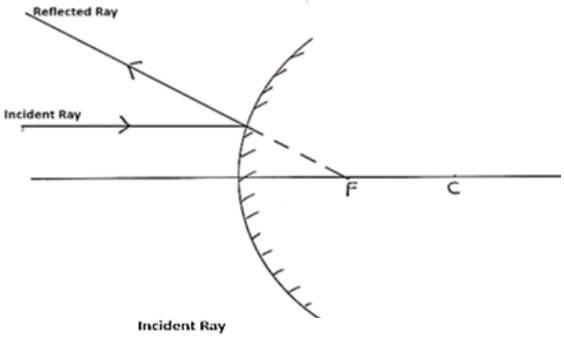
    OR

    Given: I = 5 A, resistance = R. Let r be the new radius.
    Now, H = i^2Rt ...(a)
    Also H' = $I^2R't$ ...(b)

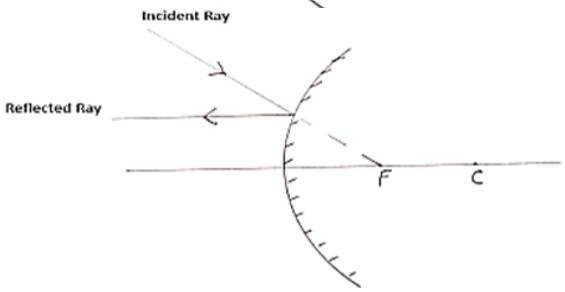
From (a) and (b), $5^2 \times \rho\frac{L}{\pi r^2}t = 10^2 \times \rho\frac{L}{\pi r'^2} \cdot t$

$\frac{25}{r^2} = \frac{100}{r'^2} \Rightarrow \frac{r'}{r} = 2 \Rightarrow$ r' = 2r

39. i. 1.



2.



ii. Here f = -12 cm, u = -18 cm, v = ?, h = 1.5 cm, h' = ?

Mirror formula $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$

$\therefore \frac{1}{v} = \frac{1}{f} - \frac{1}{u}$

$= \frac{1}{-12}\ \text{cm} - \frac{1}{-18}\ \text{cm}$

$= \frac{-1}{36}$

$\therefore$ v = -36 cm

$m = \frac{h'}{h} = -\frac{v}{u}$

$\frac{h'}{1.5} = -\frac{(-36)}{(-18)}$

h' = -3.0 cm

OR

Concave lens-

focal length $(f) = -60\ cm$

Object length $(h) = 9\ cm$

Object distance $(u) = -30\ cm$

Lens formula, $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

$\frac{1}{v} = \frac{1}{f} + \frac{1}{u}$

$v = \frac{-1}{60} + \left(\frac{-1}{30}\right)$

$m = \frac{v}{u} = \frac{-20}{-30} = \frac{2}{3}$

$m = \frac{h'}{h} \Rightarrow h' = m \times h$

$h' = \frac{2}{3} \times 9$

$h' = 6\ cm$

Image is virtual, erect and smaller than object.