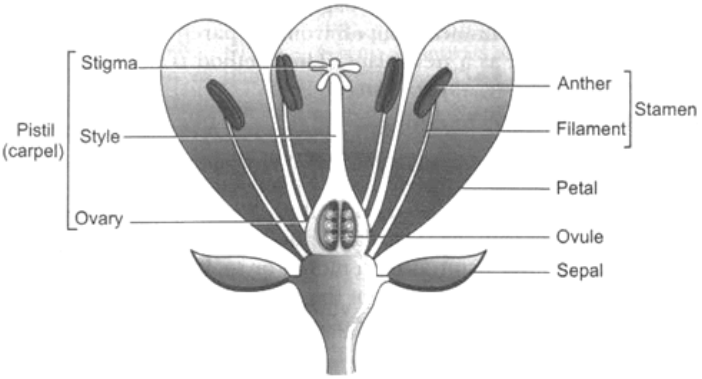
Solution
PRELIMINARY EXAM - I - SET 1
Class 10 - Science
Section A

1. **(a)** Pisces only
   Explanation:
   This is because of the single circulation where deoxygenated blood from all parts of the body is pumped into the heart. From the heart, it is pumped to gills where it gets oxygenated and gets transferred to all parts of the body. Hence, it proves Pisces will not receive oxygenated blood.
2. **(b)** copies of the same chromosome
   Explanation:
   The two versions of a trait that are brought in by the male and female gametes are situated on copies of the same chromosome. Each parent contributes one copy of the gene for a particular trait.
3. **(a)** can synthesize food by photosynthesis.
   Explanation:
   Can synthesize food by photosynthesis
4. **(d)** (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)
   Explanation:
   - The cerebrum is the largest part of the brain, located superiorly and anteriorly in relation to the brainstem.
   - The primary function of Cranial meninges is to protect the nervous system. It is a three-layer protective tissue that surrounds the neuraxis.
   - Olfactory lobe Either member of a pair of lobes in the forebrain.
   - At the anterior end of the cerebrum; the part of the brain at the back of the skull in vertebrates, which coordinates and regulates muscular activity.
5. **(a)** A and C
   Explanation:
   Excessive exposure of humans to UV (ultraviolet) rays results in damage to the immune system. Exposure to UV radiation is also a risk factor for most skin cancers.
6. **(b)** (ii) and (iv)
   Explanation:
   Oxygenated blood circulates through the left part of the heart whereas deoxygenated blood circulates through the right part of the heart. Atrium receives blood and the ventricle pumps the blood out of the heart.
7. **(b)** Auxin
   Explanation:
   Auxins are a powerful growth hormone produced naturally by plants. They are found in shoot and root tips and promote cell division, stem, and root growth.
8. **(a)** Both A and R are true and R is the correct explanation of A.
   Explanation:
   Both A and R are true and R is the correct explanation of A.

9. **(d)** A is false but R is true.

Explanation:

A food chain can have a maximum of five to six trophic levels, this is because a lot of energy is lost as heat at each trophic level on account of metabolism. So, a small amount of energy becomes available to the next trophic level. This limits the number of trophic level in a food chain.

10. 

11. i. Polythene is made from a polymer which is a chemical and it is non-biodegradable which needs proper disposal techniques. It can accumulate in soil causing loss of fertility or might block drains leading to water logging. If animals like cow would eat them it might block their alimentary canal, if not properly disposed. So Meera stopped her friend Reema to carry polythene bags for shopping.

ii. We can replace polythene bags with jute bags or paper bags for shopping.

OR

Phytoplanktons are microscopic aquatic plants which float on the surface of water in a pond, lake, river, etc.

For example : Algae

12. a. Brain is protected in bony box/skull/cranium/fluid filled balloon.

b. Region of brain: Hind brain and its part is cerebellum.

13. i. In first generation progeny (F_1 progeny) all plants with round seeds.

ii. In second generation progeny (F_2 progeny) all plants with round and wrinkled seeds.

iii. (i) Tall and drawrf plants.
(ii) Yellow and green seeds.
(iii) White and purple flowers.

14.

	Xylem	Phloem
Direction of transportation	Unidirectional/upwards only	Bidirectional/ both upwards and downwards
Major driving force	Transpiration pull or (Root pressure)	Osmotic pressure
Nature of the substances transported	Water and dissolved minerals	Products of photosynthesis/amino acid, sucrose

15. i. i. Flower color (purple or white)
ii. Plant size (tall or dwarf)

ii. In F_1 generation round and Yellow seeds were observed that mean round and Yellow are dominant traits.

iii. The traits which were not show in $_{F1}$ generation were recessive traits that do not show their presence in front of dominant genes.
Ratio of types if seeds in F_2 generation is 9 : 3 : 3 : 1

OR

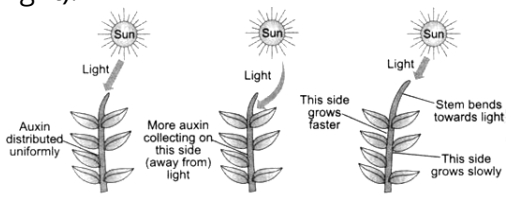
I. The trait that first appears or is visibly expressed in the organism is called the dominant trait.

II. The trait that is present at the gene level but is masked and does not show itself in the organism is called the recessive trait.

16. i. AIDS is a sexually transmitted disease. Its causative organism is the Human Immuno Virus (HIV).
ii. No, it was not the right decision by the head of the company because HIV is not spread by shaking hands, eating together or mixing with HIV-infected individuals. Instead he should be given equal rights and freedom so that he should feel happy and should not get depressed.
iii. The society should show a positive attitude towards HIV-positive persons. They should be given proper care and treatment. Everybody should support them so that they can lead a healthy life without getting mental depression. We should provide proper education and create awareness among people about HIV and AIDS.

OR

The directional movement of a plant part/plant in response to light is called phototropism. The shoot responds by bending towards light while roots respond by bending away from the light. We know that the plant stem responds to light and bends towards it due to the action of auxin hormone. When sunlight comes from above, then the auxin hormone present at the tip of the stem spreads uniformly down the stem. Due to the equal presence of auxin, both the sides of the stem grow straight and with same rapidity.This is because auxin hormone moves away from the light.
Thus, more auxin hormone is present in the left side of stem as compared to the right. The left side of stem, grows faster than its right side and therefore, the stem bends towards the right side (direction of light).



Experiment to show the effect of auxin on the growth of a plant in response to light (Phototropism)

The effect of auxin on the growth of a root is exactly opposite to that on a stem. Auxin hormone increases the rate of growth in stem but it decreases the rate of growth in a root. The side of root away from light will have all the auxin concentrated in it. Due to this, the side of root which is away from light will grow slower than the other side and make the root bends away from light.

Section B

17.

(d) (ii) and (iv)
Explanation:
Any acid produces hydrogen ion (H^+) which is present as hydronium ion (H_3O^+) because of combination with a water molecule.

18. **(a)** (A)
Explanation:
Soap is basic in nature. Acid dyes are used to dye protein fibres such as silk, wool, angora, mohair, feathers, etc. Hence, soap doesn't work well with woolen garments. The soap gets neutralized by the acidic dyes.

19.

(c) (ii) and (iv)
Explanation:
(ii) and (iv)

20. **(a)** (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)
Explanation:
- Copper is a good conductor of electricity and is used in electrical appliances.
- Sodium is very reactive and is stored under kerosene.
- Silver is tarnished by hydrogen sulphide. Tarnish is a thin layer of corrosion that forms over it.

- Graphite is an allotrope of carbon and a good conductor of electricity. It is used for making carbon electrodes and graphite electrodes in dry cells and electric arcs.

21. **(a)** lighter, insoluble
Explanation:
1. Since the gas is collected over water so it is insoluble.
2. The gas evolved is lighter than air.

22.
(c)
Ethanol + Methanol (5%)

Explanation:
Alcohol meant for industrial purposes is made unfit for human consumption by adding small amounts (about 5%) of methanol to ethanol. The mixture is known as **denatured spirit** or **denatured alcohol**. The addition of a small amount of copper sulphate is added to impart a blue colour to denatured spirit so that it can be identified easily.

23. **(a)** a gas evolves
Explanation:
Sodium bicarbonate reacts with acetic acid to form water, carbon dioxide and sodium acetate. Carbon dioxide gas is evolved.
$CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O + CO_2 \uparrow$

24.
(b) Both A and R are true but R is not the correct explanation of A.
Explanation:
Acids dissociate in aqueous solutions to form ions. These ions are responsible for conduction of electricity. Thus both assertion and reason are true, but reason is not the correct explanation of the assertion.

25. a. Compound **X** is Carbon Dioxide (CO_2); Compound **Y** is Calcium Carbonate ($CaCO_3$); Compound **Z** is Calcium Hydrogen Carbonate [$Ca(HCO_3)_2$].

b. i. $CaCO_3(s) + 2\ HCl\ (l) \rightarrow CaCl_2\ (aq) + H_2O\ (l) + CO_2(g)$
ii. $Ca(OH)_2\ (aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l)$

26. Calcium oxide reacts with water to form calcium hydroxide, also called slaked lime. It is an exothermic reaction.
Here are the equations for this reaction: calcium oxide + water → calcium hydroxide
$CaO\ (s) + H_2O \rightarrow Ca(OH)_2$

OR

- A reaction in which a more reactive element displaces a less reactive element from its compound.
- Thermit reaction
- Reaction of Iron (III) oxide with aluminium is a highly exothermic reaction, producing iron in molten form which is used to join railway tracks:
$Fe_2O_3(s) + 2Al(s) \rightarrow 2Fe(l) + Al_2O_3(s) +$ Heat

27. i. Metal D
ii. Blue colour of copper sulphate will disappear.
iii. $B > C > A > D$

28. i. $CuSO_4$ gets reduced.
ii. The oxidising agent generally gains the electron.
iii. Oxidizing agent - Copper,
Reducing agent - Zinc

OR

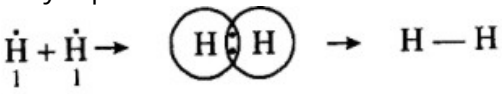
Displacement reaction

29. Covalent bond: The bond formed by equal contribution and mutual sharing of electrons between two atoms so that both the atoms acquire the stable nearest noble gas configuration i.e. get their octet complete is called covalent bond.
The mutually shared electrons become the common property of both the bonded atoms.
The number of electrons contributed by an atom of the element for mutual sharing during the formation of a covalent bond is called its covalency.
Each pair of shared electrons is represented by putting a single line (—) between two atoms.
In the example given below :

Element	At no.	Electronic configuration
H	1	1
C	6	2,4
O	8	2, 6
N	7	2, 5

Examples,

i. Formation of a hydrogen molecule(H_2): At no. of hydrogen = 1. It has one electron is the first orbit.
When two hydrogen atoms approach each other they share their single electron present in their first orbits. Each hydrogen atom can now be thought of as having noble gas configuration of helium. It may represented as:



Formation of H_2 molecule

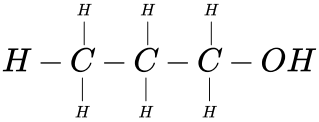
ii. Formation of chlorine molecule. Two chlorine atoms combine with each other to form a molecule of chlorine. In this case, both the atoms have seven electrons in their outermost shell and they contribute one electron each to form a covalent bond. Thus, both the chlorine atoms acquire noble gas configuration of argon. This may be depicted as:

Formation of Cl_2 molecule

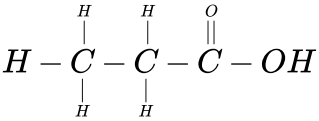
iii. Formation of HCl molecule. A covalent bond is formed not only between similar atoms but it may be formed between dissimilar atoms also. For example, hydrogen and chlorine form a covalent bond between their atoms. Hydrogen atom has only one electron and chlorine atom has seven electrons in its valence shell. Therefore, by mutual sharing of electron pair between a hydrogen and a chlorine atom both the atoms acquire nearest noble gas configuration. Hydrogen atom acquires electronic configuration of helium whereas chlorine atom gets electronic configuration of argon.

OR

According to the question, Given compounds are

i. 

Propan-1-ol

ii. 

propanic acid

iii. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-Cl$

1-Chloropropane

iv. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-OH$

Propanol

v. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-C\equiv CH$

Propyne

vi. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{}{\underset{\underset{O}{||}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-H$

Butanone

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.

(b) ∠2+ ∠3= ∠1+ ∠4

Explanation:

Only this option is correct

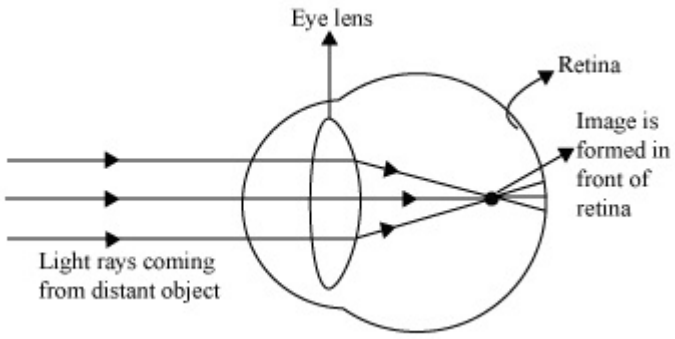
32. **(a)** Both A and R are true and R is the correct explanation of A.

Explanation:

If the wires are twisted together, they can be modelled as a single wire carrying current in the opposite directions. In this model, no magnetic field is induced in the wires which does not affect adjacent circuits.

33. a. Myopia or Short-sightedness is the inability of an eye in viewing long distance objects. The image in this case falls before the retina.

b. A myopic eye has its far point nearer than infinity. It forms the image of a distant object in front of its retina as shown in figure.



c. For every myopic eye, there exists a far point beyond which clear image cannot be seen. Short-sightedness is caused due to

i. excessive curvature in cornea.

ii. elongation of eyeball.

34. a. The mathematical expression of the Joules Law of heating is: $H = I^2 Rt$
Here, H is a heating effect, I is the current flowing through the device and t is the time taken.

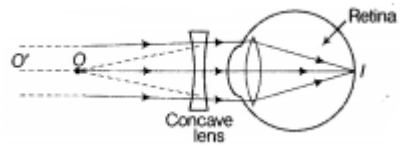
b. Given:
Amount of charge transferred = 96000 C
Time taken = 2hrs = $2 \times 60 \times 60$ sec = 7200 sec
Potential difference = 40 V
Heat generated = $V \times I \times t$
and we know that; $I = \frac{Q}{t}$
So, H = VQ
$= 40 \times 96000$
$= 3.84 \times 10^6$ J

OR

$R_S = R_3 + R_4 = 10 + 10 = 20\ \Omega$
$\frac{1}{R_P} = \frac{1}{R_2} + \frac{1}{R_S}$
$= \frac{1}{20} + \frac{1}{20} = \frac{1}{10}\Omega$
$R_p = 10\ \Omega$
Total equivalent resistance = $R = R_1 + R_P + R_5$
$= R = 20 + 10 + 10 = 40\ \Omega$

35. i. The direction of the magnetic field at a point can be found by placing a small magnetic compass at that point. The north end of the needle of a compass indicates the direction of magnetic field at a point where it is placed.
ii. The direction of magnetic field at the centre of a current-carrying circular loop is perpendicular to the plane of the loop.

36. i. Near sightedness (myopia) defect arises either because of :
(a) decrease in focal length of eye lens.(b) elongation of the eye ball
ii. To correct this defect of vision, he must use a concave lens of suitable focal length. The concave lens of suitable focal length will bring the image back to the retina as shown in the given figure.



iii. Given, v = -100 cm , $u = \infty$
Using lens formula,
$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \Rightarrow \frac{1}{-100} - \frac{1}{\infty} = \frac{1}{f}$
f = -100 cm = -1 m.
∴ Power of lens,
P = $\frac{1}{f(m)} = \frac{1}{-1}$ = -1D.

37. a. The third wire (earth wire) is a safety measure to ensure that in case of any leakage of current to the metallic body of the appliance, it keeps its potential to that of the Earth and the user may not get a severe shock.

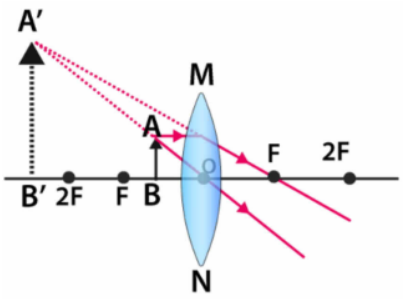
b. i. Use of electric fuse of proper rating.
ii. Not connecting too many appliances to a single socket.

38. i. Ohm is the unit of electrical resistance.
ii. According to Ohm's law, there is a relation between the current flowing through a conductor and the potential difference across it. It is given by,
$V \propto I$ V = IR
iii. R_3 resistance has high resistance.

OR

The slope of V-I graph at any point represents resistance.

39. Position of the candle flame = 12.0 cm
    Position of the lens = 50.0 cm
    Position of the screen = 88.0 cm
    i. u = 50 - 12 = 38 cm
    Image distance v = 88 - 50 = 38 cm
    Focal length = $\frac{1}{v} - \frac{1}{u} = \frac{1}{t}$
    f = 19 cm
    ii. Object distance u = 50 - 31 = 19 cm
    Here
    Object distance = focal length
    Hence the image is formed at infinity.
    iii. If he further shifts the candle towards the lens. The object comes between F and O. In this case. The image is virtual, enlarged and erect and is formed on the same side of the lens.
    iv.



OR

    a. Four characteristics:
        i. Image is formed on the same side of the lens as the object.
        ii. The image is enlarged / magnified, virtual and erect.
    b. $h' = \frac{h}{3}$
    Focal length = -20cm
    As per the lens formula
    $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$
    u = -40cm
    Hence, the distance of the object from the lens is 40cm.