Solution
PRELIMINARY EXAM - 4
Class 10 - Science
Section A

1. **(a)** old xylem
   Explanation:
   old xylem
2. **(c)** $100\%; 75\%$
   Explanation:
   100%; 75%
3. **(c)** the amount of harmful chemicals in the successive trophic levels of a food chain.
   Explanation:
   the amount of harmful chemicals in the successive trophic levels of a food chain.
4. **(c)** (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)
   Explanation:
   - The ductless gland secretes substances known as hormones directly into the bloodstream rather than through ducts.
   - Exocrine glands such as salivary glands discharge their products through ducts.
   - The milk-producing gland of women or other female mammals.
   - Insulin and glucagon are hormones that help regulate the levels of blood glucose, or sugar, in your body.
5. **(c)** DDT
   Explanation:
   DDT
6. **(d)** Mucus and Pepsin
   Explanation:
   Mucus and Pepsin
7. **(b)** They reproduce asexually.
   Explanation:
   They reproduce asexually.
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. **(b)** Both A and R are true but R is not the correct explanation of A.
   Explanation:
   Both A and R are true but R is not the correct explanation of A.

10. a. Provides a lower temperature than the normal body temperature for sperm formation.
    b. The secretion of the glands helps in the transport of sperms and provides nutrition.
11. a. High energy UV radiations split apart some molecular oxygen into free (O) atoms, these atoms combine with molecular oxygen to form ozone.
    b. The reaction involved.:

$$O_2 \xrightarrow{UV} O + O$$
$$O + O_2 \rightarrow \underset{\text{(Ozone)}}{O_3}$$

    c. Depletion of the ozone layer.
    If these UV radiations reach the earth they may cause skin cancer in human beings.

OR

Human beings occupies the top place of most trophic level and we know that concentration of harmful chemicals increase as we go above the trophic level. Therefore human beings are most adversely affected by biological magnification.
Ordinary washing of foods do not reduce the effect of biological magnification because there are concentration of harmful chemicals (say pesticides) in it when we sprayed this harmful chemicals over the plants to protect them from pests and insects.

12. Control and coordination of functioning of various organ and organ system of the body is under the direct control of nervous system in close coordination with endocrine(hormonal) system. This control is achieved by a complex network of neurons which carry signals in the form of electric impulses; to and from the brain and controls the body function directly whereas, the endocrine system are the ductless glands which release chemical substances directly into the blood and reaching the target site for action. Nervous and hormonal systems are complementary to each other. Thus, it can be said that nervous and hormonal system together perform the function of control and coordination in human beings.
13. a. All the plants in F_1 progeny will be of green coloured stem.

	♂		♀
Parents	GG (Green)	×	gg (Purple)
Gametes	G		g
F_1 generation	Gg (All green stem)		

    b. Cross for F_2 progeny is:

	♂		♀
Parents (selfing F_1)	Gg (Green)	×	Gg (Purple)
Gametes	G g		G g

    F_2progeny-

♂	G	g
♀		
G	Gf (Green)	Gf (Green)
g	Gf (Green)	gg (Purple)

    Phenotypic ratio = Green : Purple = 3 : 1
    c. According to the finding above, purple stems are subordinate to green stems. Thus, according to the rule of dominance, only the dominant characteristic was present in F_1. Purple stem in F_2 indicates that the alleles for purple stem were inherited but were not expressed in F_1, nevertheless. Only in F_2 under homozygous circumstances did they get expressed.
14. i. 'Rings of cartilage' ensures that the air passage does not collapse in absence of air.
    ii. Ribs are lifted → Diaphragm flattens → Chest cavity become larger → Air is sucked into the lungs (Alveoli) and we breathe in

iii. Due to lack of oxygen in our muscle cells (anaerobic respiration), pyruvate is converted into lactic acid, build-up of lactic acid in our muscles causes cramps.

15. i. Gametes produced by YyRr parent would be 25% YR, 25% yR, 25% Yr and 25% yr.

ii. 1 gamete can be produced by YYrr.
All sexually reproducing organisms have sex cells called gametes.

iii. Ttyy, TTyy, ttyy

OR

Round yellow heterozygous pea plant may be represented by genotype RrYy. On selfing, such plants following results will be obtained.

Parents: ♂ RrYy (Round Yellow) × ♀ RrYy (Round Yellow)

Gametes: (RY) (Ry) (rY) (ry) (RY) (Ry) (rY) (ry)

Offsprings:

♀ \ ♂	(RY)	(Ry)	(rY)	(ry)
(RY)	RRYY	RRYy	RrYY	RrYy
(Ry)	RRYy	RRyy	RrYy	Rryy
(rY)	RrYY	RrYy	rrYY	rrYy
(ry)	RrYy	Rryy	rrYy	rryy

Hence, total 16 genotypes will be obtained in the next generation out of which the frequency of occurrence of RrYY genotype is 2, as illustrated by the given Punnett square chart.

16. a. The role of the following organs of human male reproductive system

i. Testis: to produce male gametes.
ii. Scrotum: to provide optimal temperature to testis for the formation of sperm.
iii. Vas deferens: to deliver the sperms to the urinary bladder.
iv. Prostrate glands: to secrete the fluid which provides nutrition and medium for transport of sperms.

b. The placenta is a temporary disk-shaped organ that is found in human female during pregnancy. The placenta contains blood vessels. The placenta is attached to the foetus by an umbilical cord.
Functions of the placenta in human female:
The placenta helps in the removal of waste materials and carbon dioxide from the fetus's body.
It also provides the gaseous exchange, hormones, and nutrients to the baby.

OR

i.

Hormonal coordination in Plants	Hormonal coordination in Animals
1) By simple diffusion	Transported through blood to the target organ.
2) No specialised glands involved.	Hormone released by Endocrine glands.

ii. 1. Cerebrum/forebrain
2. Cerebellum/hindbrain
3. Medulla/hindbrain
4. Hypothalamus/forebrain.

iii. Brain is protected I - Bony box/skull/cranium/fluid filled balloon in skull,
Spinal cord is protected in - Backbone/Vertebral column.

Section B

17.

(c) All metal oxides react with water to give salt and acid.
Explanation:
Metal oxides are basic in nature. They give alkaline solution when dissolved in water.

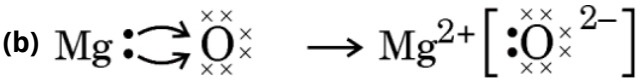
18.

(c) Both the statements A and B are false

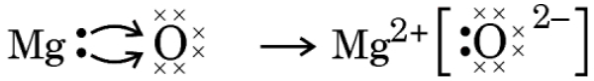
Explanation:

Valeric acid is another name for pentanoic acid. **Soaps** are sodium or potassium salts of long-chain fatty acids. When triglycerides in fat/oil react with aqueous NaOH or KOH, they are converted into **soap** and glycerol.

19.

(b) 

Explanation:



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

Explanation:

- Soaps are sodium or potassium salts of long-chain fatty acids.
- Detergents are sodium salts of a long chain of sulphonic acids.
- The reaction of acetic acid with metal hydroxides is a neutralization reaction.
  $CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$
- The reaction in which a carboxylic acid combines with an alcohol to form an ester is called esterification. When acetic acid CH_3COOH reacts with alcohol, an ester is formed along with water.
  $CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$

21. **(a)** Tube A

Explanation:

Iron nails get rusted in test tube A because both air and water are present in it. Iron nails do not get rusted in B because there is water but no air. In C, rusting will not take place because there is neither air nor water.

22. **(a)** (ii) and (iii)

Explanation:

(ii) and (iii)

23. **(a)** 7

Explanation:

7

24.

(c) A is true but R is false.

Explanation:

HCl produces H^+ ions in an aqueous solution because in presence of water, acids give H^+ ions. As H^+ ions cannot exist alone so it combines with water molecules and form H_3O^+.

25. i. No change in colour will be seen as dry HCl will not liberate H^+ ions.
ii. It will turn red litmus paper to blue because moistened NH_3 gas will form Ammonium Hydroxide (NH_4OH).
iii. Curd will turn blue litmus paper into the red as it contains lactic acid.
iv. Soap solution will turn red litmus paper to blue as it is basic in nature.

26. i. A single reactant (substance) breaks down to give two or more products.

- $CaCO_3(s) \xrightarrow{\text{Heat}} CaO(s) + CO_2(g)$

- $2AgCl(s) \xrightarrow{\text{Sunlight}} 2Ag(s) + Cl_2(\ g)$
- $2H_2O(l) \xrightarrow[\text{Current}]{\text{Electric}} 2H_2(\ g) + O_2(\ g)$

ii. because energy (heat) is released.

OR

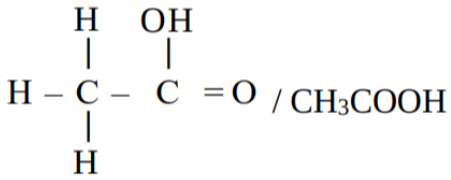
Barium chloride reacts with aluminium sulphate to give aluminium and separates Barium sulfate($BaSO_4$).

$3BaCl_2(aq) + Al_2(SO_4)_3\ (aq) \rightarrow 2AlCl_3(aq) + 3BaSO_4(s)\downarrow$

27. i. Magnesium (Mg) is the most reactive of all the metals.
ii. Copper (Cu) is the least reactive of all the metals.
iii. Decreasing order of reactivity : Mg>Cr>Co>Cu.

28. i. The process in which the addition of Oxygen and removal of hydrogen to a substance take place is called oxidation.
ii. Food becomes rancid when fat and oils present in the food are oxidised.
iii. Rancidity can be prevented by packaging fat and oil-containing food in Nitrogen gas.
OR
Rancidity spoils those food materials that are prepared in the fats and oils which have been kept for a considerable time and make them unfit for eating.

29. i. A - Ethanoic acid;



ii. $\underset{'A'}{CH_3COOH} + C_2H_5OH \xrightarrow{\text{aCld}} \underset{'B'}{CH_3COOC_2H_5}$
Role of acid - As a catalyst

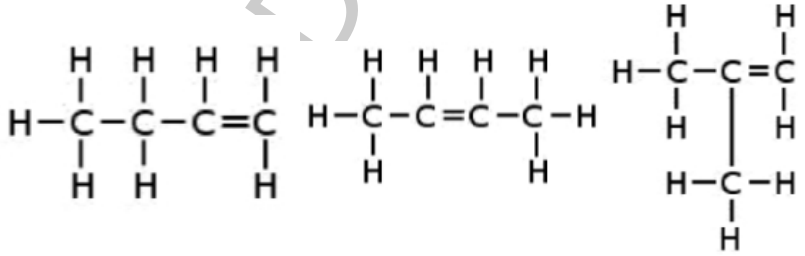
iii. By adding dil. NaOH to B (ester)/saponification/by adding water with acid or base/ on addition of NaOH , sodium salt of acid is produced which is further hydrolysed to form 'A'.

iv. By adding solution of alkaline potassium permanganate or acidified potassium dichromate in warm ethanol./

$$CH_3 - CH_2OH \xrightarrow[\text{Or acidified } K_2Cr_2O_7+\text{Heat}]{\text{Alkaline } KMnO_4+\text{Heat}} \underset{(A)}{CH_3COOH}$$

v. Carbon dioxide/CO_2

OR

i. 

(any two)

ii. I. Chloropropane
II. Butanone/Butan-2-one

iii. I. $CH_3 - CH_2OH \xrightarrow[\text{Or acidified } K_2Cr_2O_7+\text{ Heat}]{\text{Alkaline } KMnO_4+\text{ Heat}} CH_3COOH$

II. $CH_3CH = CH_2 + H_2 \xrightarrow[]{Ni/Pd} CH_3CH_2CH_3$

III. $CH_3COOH + C_2H_5OH \xrightarrow{\text{Acid}} CH_3COOC_2H_5 + H_2O$

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.

(c) 1 and 6

Explanation:

1 and 6

32. **(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.

33. Here, distance of far point, x = 1.2m

For viewing distant objects, focal length of corrective lens, F = -x = -1.2 m

We know that, Power of lens (P) is inversely proportional to the focal length (f).

Therefore, P = $\frac{1}{f} = \frac{1}{-1.2}$ = -0.83D.

Therefore, the person should use the diverging concave lens of power -0.83D.

34. i. V $\propto$ I i.e current is directly proportional to applied voltage.

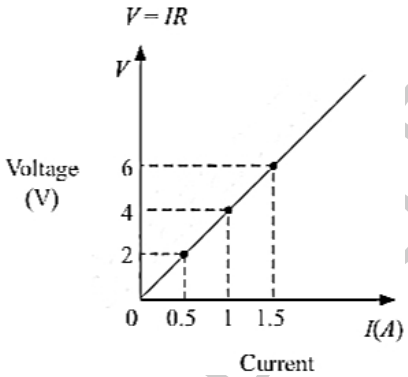
ii. at 2.5 V current will be 0.25 A

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

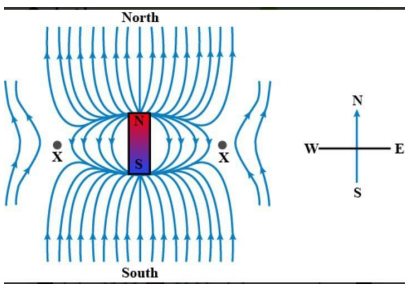
Current (I) = 0.35 A

Now,

V = IR

so, R = $\frac{V}{I} = \frac{1.4}{0.35}$ = 4 ohm

Hence, the resistance of a conductor will be 4 ohm.

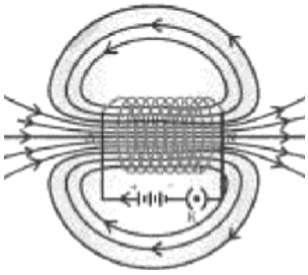
35. a. 

the poles are mentioned in the given figure and the magnetic field will be stronger at the end of the pole.

b. If magnetic field lines intersect each other, then at the intersection point there will be two directions of the same field which is not possible. Hence the field lines do not cross or intersect each other.

36. Different wavelengths deviate differently in the prism because the angle of refraction for different colours having different wavelengths is different while passing through the glass prism (medium). A light ray is refracted when it passes from one medium to another at an angle and its speed changes. At the interface, it is bent in one direction if the material it enters is denser (when light slows down) and in the other direction if the material is less dense (when light speeds up). Because different wavelengths (colours) of light travel through a medium at different speeds, the amount of bending is different for different wavelengths. Violet is bent the most and red the least because violet light has a shorter wavelength, and short wavelengths travel more slowly through a medium than longer ones do.

37. A coil of insulated copper wire wound in the form of a cylinder is a solenoid. When current is passed through a solenoid, it produces magnetic field lines like a bar magnet. The pattern of magnetic field lines of a solenoid is shown in the figure. Inside the solenoid, field lines are parallel to each other This indicates that the magnetic field is uniform .



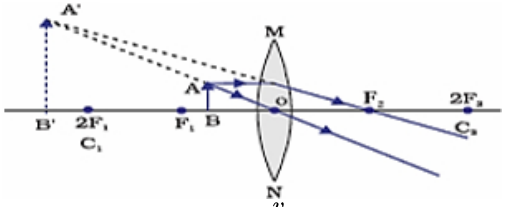
38. i. The equivalent resistance in the parallel combination is lesser than the least value of the individual resistance.
The equivalent resistance of parallel combinations
$\frac{1}{Rp} = \frac{1}{2} + \frac{1}{4} + \frac{1}{8}$
$\Rightarrow$ Rp = $\frac{8}{7}\Omega$
Thus equivalent resistance is less than 2Ω.

ii. Resistance of each piece $= \frac{12}{3} = 4\Omega$
$\frac{1}{R_p} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4} \Rightarrow R_p = \frac{4}{3}\Omega$

iii. All the three resistors are in paralle.
$\therefore \frac{1}{R_p} = \frac{1}{6} + \frac{1}{3} + \frac{1}{1} = \frac{1+2+6}{6} = \frac{9}{6}\ R_P = \frac{6}{9} = \frac{2}{3}\Omega$
OR
All are in parallel.
$\frac{1}{R_p} = \frac{1}{12} \times 4 = \frac{1}{3} \Rightarrow R_p = 3\Omega$
$I = \frac{3}{3} = 1\ \text{A}$
So, current in each resistor $I' = \frac{3}{12} = \frac{1}{4}\ \text{A}$

39. i. S. No. 3, 2f is 50 cm. ∴ 2f = 50 cm, or f = 25 cm.
Justification: Object distance(u) and image distance (v) are same so it implies that object is placed at 2F.

ii. S. No. 6, is not correct.
Reason: For u = −15 cm, sign of v must be - ve (as the image is formed on the same side of the lens as the object)

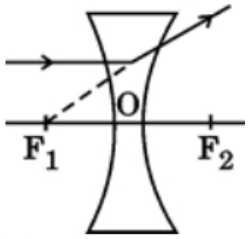


iii. Magnification: $m = \frac{v}{u}$

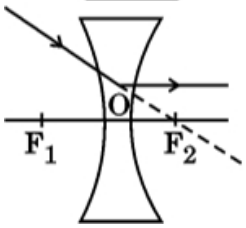
$= \frac{+150 \text{ cm}}{-30 \text{ cm}} = -5 \text{ cm}$

OR

i. 1.



2.



ii. Given u = -16 cm, f = +24 cm, h = 4 cm
Formula used $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$
$\therefore \frac{1}{v} - \frac{1}{(-16)} = \frac{1}{+24}$
$\frac{1}{v} = \frac{-1}{48}$
v = -48 cm
Image is formed on the same side as the object
$m = \frac{h'}{h} = \frac{v}{u}$
$\frac{h'}{4} = \frac{-48}{-16}$
h' = 12 cm