Solution
MOCK EXAM - PAPER 1
Class 10 - Science
Section A

1.

(d) Remains the same
Explanation:
Remains the same because boiled gram seeds do not produce CO_2 gas.

2. **(a)** two individuals of a species
Explanation:
species is the lowest level of classification and shows the high level of similarities among the organisms. so two individuals of a species have the maximum common characteristics.

3.

(d) DDT, Polyester, Glass
Explanation:
DDT, Polyester, Glass

4.

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

- In the nervous system, a synapse is a structure which serves as Junction between neuron that permits a neuron to pass an electrical or chemical signal to another neuron.
- A neuron is an electrically excitable cell that processes and transmits information through electrical and chemical signals that is why it is the largest cell in the human body.
- Olfactory receptors are responsible for the detection of odorants which give rise to the sense of smell.
- Thermoreceptors are able to detect heat and cold and are found throughout the skin in order to allow sensory reception throughout the body.

5.

(b) The tigers will die
Explanation:
The tigers will die

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.

(c) Growth hormone
Explanation:
Growth hormone (GH) deficiency cause dwarfism. This hormone is produced in the pituitary gland, which is located at the base of the brain.

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

Human testes are located outside the abdominal cavity in a pouch called the scrotum. The goal is to keep the scrotal temperature lower than the internal body temperature.

9. **(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.
10. The sex chromosome of human male is XY. A sperm of human male marries either an X chromosome or one Y chromosome.
    The sex chromosome of human is XX and hence, the egg always carries the X chromosome.
    If a sperm carrying X chromosome fertilises an egg which carries X chromosome, then the child born will be a girl. If a sperm carrying Y chromosome fertilises an egg which carries X chromosome, then the child born will be a boy.
11. i. aquatic
    ii. abiotic
    iii. non living organisms
    iv. living organisms
    v. Ecosystem is a system, or a group of interconnected elements, formed by the interaction of a community of organisms with their environment.

    OR

    Pesticides are poisonous chemical substances, which are sprayed over crop plants to protect them from pests and diseases by either killing them or stopping their growth. These chemical pesticides mix up with soil and water from where they are absorbed by the growing plants along with water and other minerals and get deposited in plant tissues. When herbivorous animals eat plants then these poisonous chemical pesticides go into their bodies through the food chain and further when they are consumed by carnivores, then the pesticides get transferred to their bodies. In this process of transfer of food through food chains these harmful chemicals get concentrated at each subsequent trophic level and their concentration keep on increasing (Biomagnification) with increasing trophic level.
12. Forebrain (cerebrum) is the main thinking part of the human brain.
    Other important functions of forebrain are:
    i. It helps in hearing, smell, sight etc.
    ii. Storing information.
    iii. Movement of voluntary muscles is controlled by forebrain..
    iv. Sensation of feeling hunger or satiety is also controlled by forebrain.
13.

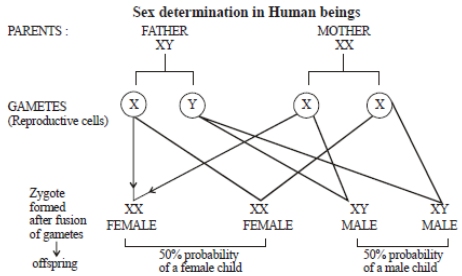
Parents	RRYY	x	rryy
	Round, yellow		wrinkled, green
F_1 —	Rr Yy	x	Rr Yy
	Round, yellow		**Round, yellow**

    The given cross is a dihybrid cross that shows the inheritance of two different traits simultaneously. In the given question, when pure breeding dominant parent plant (RRYY) crossed with pure breeding recessive parent plant (rryy), it gives heterozygous dominant progeny in the F_1 generation. All progeny in this cross will have genotype RrYy and exhibit round yellow. Self-cross of F1 progeny will give F_2 generation.
14. i. **Salivary amylase -** converts Starch to sugar
    ii. **Bile salts -** changing the acidic food alkaline/emulsifies fats.
    iii. **Trypsin -** Helps in digestion of proteins/Lipase - Breaking down emulsified fats
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. Female have a perfect pair of chromosomes XX. In perfect pair the gametes produced are of same type i.e. X and X chromosome.

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 $30^{o}C$, 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. i. Unisexual flowers have either stamens or carpels but not both.
Eg - Papaya and watermelon
Bisexual flowers have both stamens and carpels. Here are some examples of each: eg - Hibiscus and mustard

ii. A - Pollen grain
B - Stigma
C - Pollen tube
D - Female germ cell

iii. Pollination may occur without fertilization but fertilization will not take place without pollination because pollination does not depend on fertilization but fertilization cannot take place without pollination because for fertilization to occur, it requires both male and female gametes.

OR

The sudden involuntary movement in a voluntary organ; in response to a stimulus; is called reflex action.

Examples of reflex action:

i. Moving your hand away from a hot iron plate
ii. Blinking of eyes

Reflex Arc: The path of electrical impulse during a reflex action is called the reflex arc. A reflex arc is composed of a sensory neuron, spinal cord, motor neuron, and muscle. It involves the following steps:

i. The sensory neuron picks signals from the stimulus and carries the signals to the spinal cord.
ii. Spinal cord process the signals and sends a message through the motor neuron.
iii. A motor neuron transmits the signals to the effector's muscle so that the muscle can take immediate action.

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. **(a)** Both the statements A and B are true.
Explanation:
All soaps are biodegradable i.e. they can be decomposed by micro-organisms like the bacteria. Branched-chain synthetic detergents are far less degradable than unbranched detergents.

19.

(c) Lithium
Explanation:

Lithium has lowest density.

20. **(a)** (i) - (c), (ii) - (b), (iii) - (d), (iv) - (a)
Explanation:
- The general formula of an alcohol is R-OH.
- The general formula of an aldehyde is R-CHO.
- The general formula of a ketone is R-CO-R'.
- The general formula of a halo-alkane is R-X.

21. **(c)** Student C
Explanation:
Fe + ZnSO4 → No reaction
It is because iron is less reactive than Zinc.
Zn + $FeSO_4$ → $ZnSO_4$ + Fe
The solution becomes colourless and black iron gets deposited.

22. **(c)** Ethyl alcohol
Explanation:
Ethyl alcohol

23. **(c)** Tomato
Explanation:
Tomato

24. **(c)** A is true but R is false.
Explanation:
Bleaching powder is produced by the action of chlorine on slaked lime.

25.
- Solution A is basic in nature as phenolphthalein turns into pink colour from colourless solution.
- When Solution B was added drop wise it made the solution colourless, it indicates Solution B is an acid.

26.
- In combination reaction single product (substance) is formed from two or more reactants (substances) whereas in decomposition reaction a single reactant (substance) breaks down to give two or more products (substances). So, the two are opposite.
- Example of combination reaction

$$\underset{\text{Carbon}}{C(s)} + \underset{\text{Oxygen}}{O_2\,(g)} \longrightarrow \underset{\text{Carbon dioxide}}{CO_2(g)} + \text{Heat}$$

- Example of decomposition reaction

$$\underset{\text{Calcium carbonate}}{CaCO_3\,(s)} \xrightarrow{\text{Heat}} \underset{\text{Calcium Oxide}}{CaO(s)} + \underset{\text{Carbon dioxide}}{CO_2(g)}$$

OR

In a decomposition reaction, a single substance breaks down into two or more substances while in a combination reaction, two or more substances react to produce one substance. Therefore, decomposition reactions are called opposite of combination reactions.
Example of decomposition reaction: $NH_4Cl(s) \rightarrow HCl(g) + NH_3(g)$
Example of combination reaction: HCl (g) + NH_3(g) → NH_4Cl (s)

27. (i) (a) Aluminium, (b) Copper
(ii) In both cases, the gas evolved is H_2. When calcium reacts with water the heat evolved is not sufficient for hydrogen to catch fire. On the other hand, sodium metal reacts with water violently and in this case a lot of heat is evolved which is sufficient for hydrogen to catch fire.

28. i. Double displacement reaction
$CuSO_4 + H_2S \longrightarrow 4CuS + H_2SO_4$
Both $CuSO_4$ and H_2S exchange their ions to give new compounds-CuS and H_2SO_4. Hence, this is a double displacement reaction.
ii. $Zn_{(s)} + H_2SO_{4(aq)} \longrightarrow ZnSO_{4(aq)} + H_{2(g)}$
It is an example of single displacement reaction.
iii. $BaCl_2 + (NH_4)_2SO_4 \rightarrow \underset{(ppt.)}{BaSO_4 \downarrow} + 2NH_4Cl$
It is a precipitation reaction as well as double displacement reaction.
OR
$AlCl_3 + 3NH_4OH \longrightarrow Al(OH)_3 + 3NH_4Cl$

29. Compound 'C' is ethanoic acid. It reacts with sodium to form sodium ethanoate. Therefore, compound 'R' is sodium ethanoate or sodium acetate. We know that hydrogen gas burns with a pop sound. This reaction can be represented as-
$2CH_3COOH + 2Na \longrightarrow 2CH_3COONa + H_2$
When ethanoic acid reacts with methanol in the presence of an acid, we get (methyl ethanoate) ester which is a sweet-smelling substance. Hence, compound S is methyl ethanoate and A is methanol. This reaction can be represented as-
$CH_3COOH + CH_3OH \xrightarrow{Acid} CH_3COOH - CH_3$
When sodium hydroxide is added to ethanoic acid, it gives sodium ethanoate and water as given below-
$CH_3COOH + NaOH \longrightarrow CH_3COONa + H_2O$
When methyl ethanoate is treated with NaOH solution, it gives back methanol and sodium ethanoate as shown below-
$CH_3COO - CH_3 + NaOH \longrightarrow CH_3OH + CH_3COONa$

OR

a. property of carbon atom to combine with itself to form long chains is called catenation.
small size of carbon atom
i. It has 4 electrons in its outermost shell and needs to gain or lose 4 electrons to attain stable noble gas configuration. It would require a large amount of energy to gain or lose 4 electrons. So carbon atom shares 4 electrons with other atoms of carbon or with atoms of other elements to form covalent bonds.
ii. Due to weak intermolecular forces carbon compounds have low melting and boiling points.

b. $2Na + 2CH_3CH_2OH \longrightarrow 2CH_3CH_2ONa + H_2$
$CH_3CH_2OH + 3O_2 \longrightarrow 2CO_2 + 3H_2O$

Section C

30.
(c) (A)
Explanation:
Concave mirrors are used by the dentist to see the large images of teeth of patients since concave mirrors form enlarged images. Concave mirrors are also used for shaving purpose. Convex mirrors form diminished images. They are used as rear-view mirrors in cars, motorcycles, scooters, etc since they give a wide field of view.

31. **(a)** Violet and Red
Explanation:

The splitting of white light into its constituent colours is known as light dispersion. The spectrum is the band of seven colours produced by splitting white light. All of the constituent colours of white light have the same velocity in vacuum, but their velocity changes when they pass through a transparent 'medium' like a glass prism. Different colours are diverted by different angles on the prism's initial face. Violet's minimum speed is deviated by the maximum angle, whereas red's maximum speed is distorted by the minimum angle. As a result, the letters 'P' and 'Q' are violet and crimson, respectively.

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. a. An object is seen only when the light illuminating it is reflected and reach our eye. According to Rayleigh's scattering Law, the intensity of scattered light $\propto \frac{1}{\lambda^4}$. Since yellow colour has small wavelength than red colour, so scattering of yellow colour is more than the red colour. It means signal is illuminated more brightly by the red colour than the yellow colour. Hence, the signals can be seen easily from a longer distance. Therefore, red colour is used for danger signals than yellow colour.
b. In the visible spectrum, violet light have the shortest wavelength.Therefore, it has the highest refractive index. Therefore, when white light is passed through the prism, it split into its seven colours to give visible spectrum and violet colour having the shortest wavelength deviated the most.

34. i. P = $\frac{V \times V}{R}$
R = $\frac{V \times V}{P}$
R = $\frac{220 \times 220}{1100}$
R = $\frac{48400}{1100}$
R = 44 ohm
ii. $\frac{V}{I}$ = R
I = $\frac{V}{R}$
I = $\frac{220}{44}$
I = 5 A

OR

Resistance of wire $A(R_1) = \frac{\rho l}{A} = \frac{\rho l}{\pi r^2}$
Resistance of wire $B(R_2) = \frac{\rho l^{/}}{A^{/}} = \frac{\rho 2l}{\pi(2r)^2} = \frac{\rho 2l}{4\pi r^2}$
Total resistance in series
R=$R_1 + R_2$
R = $\frac{\rho l}{\pi r^2} + \frac{\rho 2l}{4\pi r^2}$
R = $\frac{\rho l}{\pi r^2}(1 + \frac{1}{2}) = \frac{3\rho l}{2\pi r^2}$
Ratio of the total resistance in series to the resistance of A =
$\frac{R}{R_1} = \frac{3\rho l}{2\pi r^2} / \frac{\rho l}{\pi r^2}$
$\frac{R}{R_1} = \frac{3\rho l}{2\pi r^2} \times \frac{\pi r^2}{\rho l}$
$\frac{R}{R_1} = \frac{3}{2}$
So, the required answer =3:2

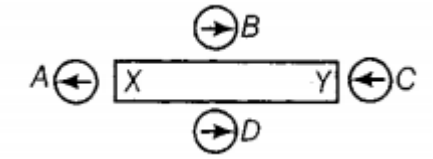
35. i. When the coil is kept vertically in North-South plane and the current is flowing in the anti-clockwise direction through the loop, then the magnetic field is in the East-West direction.
ii. When the coil is kept vertically in East-West plane and current through the coil is in the anti-clockwise direction, then the magnetic field is in the South-North direction.
iii. In this case, the direction of the field for the observer positioned below the coil is in the downward direction.

36. 1. Functions of following parts of human eye are given below :

1. Cornea - It is a thin membrane which provides 67% of the eye's focussing power.
2. Iris - It controls amount of light entering the eye by controlling the size of pupil similar to the aperture of a camera which has capacity to decrease or increase the amount of light entering eye.
3. Crystalline lens - It helps to focus light on retina for image formation.
4. Ciliary muscles - It contracts and relax in order to change the lens shape for focussing image at retina. when it contracts the lens become thicker and when it relaxes the lens become flat.

2. 1. The objective of organising such compaigns is to guide, educate and help those people who are suffering from corneal blindness that they can be cured by corneal replacement surgery.
   2. 1. Come to participate in this campaign because, if someone get his vision through your eyes, it is an incredible help.
      2. As eye is one of the most valuable sense organs through which an individual can achieve so many things in his/her life, so try to realise the situation that these people are sufferinng from.
   3. The persons who actively participate and contribute in such programme are strong hearted and very much helpful for the people living in such situations.

37. i.



ii. The North Pole is **X.**

38. a. $\mathrm{R_s} = 4\Omega + 6\Omega + 16\Omega = 26\Omega$

b. $\frac{1}{R_P} = \frac{1}{8\Omega} + \frac{1}{8\Omega} = \frac{1}{4}\Omega$

$\mathrm{R_P} = 4\Omega$

c. Total resistance = $26\Omega + 4\Omega = 30\Omega$

Potential difference = V = 6V

Current $I = \frac{V}{R}$

$\frac{6}{30} = \frac{1}{5}$ A or 0.2 A.

OR

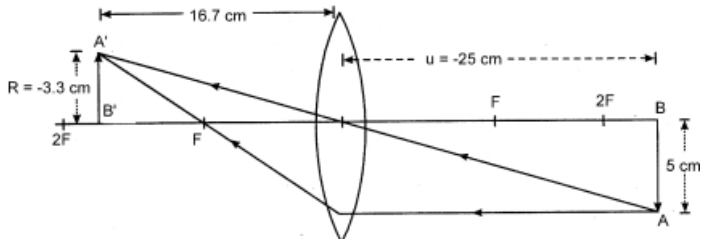
16Ω

Justification: According to Ohm's law when same current flows, the potential difference across a higher resistance is always higher.

Potential difference across $16\Omega = \mathrm{V} = \mathrm{IR} = 0.2 \times 16 = 3.2\ \mathrm{V}$

Potential difference across $8\Omega = \mathrm{V} = \mathrm{IR}_{\text{(total)}} = 0.2 \times 4 = 0.8\ \mathrm{V}$

39.



h = 5 cm; h' = ?, u = -25 cm [Object distance is always negative]

v = ?; f = +10 cm [convex lens]

Using $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}\ or\ \frac{1}{v} = \frac{1}{f} + \frac{1}{u}$

$\frac{1}{v} = \frac{1}{-25} + \frac{1}{10} = \frac{-2+5}{50} = \frac{3}{50}$

v = 16.7 cm

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

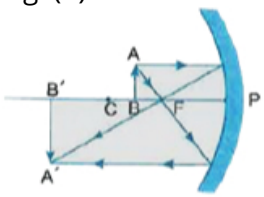
$h' = 5\frac{\frac{50}{3}}{-25} = \frac{-250}{75} = -3.3\ cm$

h' = -3.3 cm

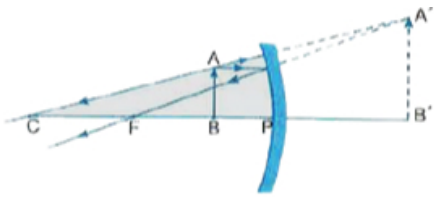
Negative sign shows image is inverted, real, diminished (3.3 cm) and at 16.7 cm on the right side of lens.

OR

a. A concave mirror of focal length f = 10 cm can produce a magnified real image if an object is placed between F and C (i.e., when 20 cm > u > 10 cm) as shown in Fig. (a). However, the same mirror may form a magnified virtual image when object is placed between P and F (i.e., u < 10 cm) as shown in Fig. (b).



(a)



(b)

b. Here focal length of convex mirror f= + 10 cm, distance of the object from the pole u = -10 cm

As per formula,

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

$\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{+10} - \frac{1}{-10}$

$= \frac{1}{10} + \frac{1}{10} = \frac{1}{5}$

$\Rightarrow$ v = +5 cm

Thus, image is formed behind the mirror at 5 cm from the pole of mirror.