NEW STANDARD ACADEMY

SEMRI KOTHI SUPER MARKET, RAEBARELI

CLASS 12 (PHYSICS) DPP (Academy) 25/11 /2024

1. . Find the radius of curvature of the convex surface of a plane convex lens, whose focal length is 0.3 m and the refractive index of the material of the lens is 1.5.
2. Show that the limiting value of the angle of prism is twice its critical angle. Hence define critical angle.
3. Draw a labelled diagram of telescope when the image is formed at the least distance of distinct vision? Hence derive the expression for its magnifying power.
4. Drive the expression for the angle of deviation for a ray of light passing through an equilateral prism of refracting angle A
5. Draw a ray diagram to illustrate image formation by a Newtonian type reflecting telescope. Hence state two advantages of it over refracting type telescopes.
6. The magnifying power of an astronomical telescope in the normal adjustment position is 100 . The distance between the objective and the eye piece is 101 cm . Calculate the focal length of the objective and the eye piece.
7. A convex lens made up of refractive index n_1 is kept in a medium of refractive index n_2 . Parallel rays of light are incident on the lens. Complete the path of rays of light emerging from the convex lens if
   a) $n_1 > n_2$
8. Derive the relation $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$, where f_1 and f_2 are focal lengths of two thin lenses and F is the focal length of the combination in contact.
9. A convex lens has a focal length 0.2 m and made of glass (μ=1.50) is immersed in water (μ =1.33) . Find the change in focal length of the lens.
10. A reflecting type telescope has a concave reflector of radius of curvature 120 cm . Calculate the focal length of eye piece to achieve a magnification of 20 .
11. Show that a convex lens produces an N time magnified image, when the object distances from the lens have magnitude $\left(f \pm \frac{f}{n}\right)$. Here f is the magnitude of the focal length of the lens. Hence find two values of object distance u, for which convex lens of power 2.5 D will produce an image that is four times as large as the object?
12. Define total internal reflection of light. Hence write two advantages of total reflecting prisms over a plane mirror.
13. An equiconvex lens of radius of curvature R is cut into two equal parts by a vertical plane, so it becomes a plano-convex lens. If f is the focal length of equiconvex lens, then what will be focal length of the planoconvex lens?
14. A converging lens of focal length 6.25 cm is used as a magnifying glass if near point of the observer is 25 cm from the eye and the lens is held close to the eye. Calculate
    a) distance of object from the lens.
    b) angular magnification
    c) angular magnification when final image is formed at infinity.
15. Draw a graph to show that variation of angle of deviation δ_m with that of angle of incidence i for a monochromatic ray of light passing through a glass prism of refracting angle A. Hence deduce the relation.
    $\mu = \frac{sin\left(\frac{A+\delta_m}{2}\right)}{sin\left(\frac{A}{2}\right)}$
16. An object of size 3.0 cm is placed 14 cm in front of a concave lens of focal length 21 cm . Describe the image produced by the lens. What happens if the object is moved further away from the lens?
17. A beam of light converges at a point P. Now a lens is placed in the path of the convergent beam 12 cm from P. At what point does the beam converge if the lens is
    a) a convex lens of focal length 20 cm
    b)a concave lens of focal length 16 cm.
18. Double-convex lenses are to be manufactured from a glass of refractive index 1.55, with both faces of the same radius of curvature. What is the radius of curvature required if the focal length is to be 20cm ?
19. A small telescope has an objective lens of focal length 144 cm and an eyepiece of focal length 6.0 cm . What is the magnifying power of the telescope? What is the separation between the objective and the eyepiece?
20. A giant refracting telescope at an observatory has an objective lens of focal length 15 m. If an eyepiece of focal length 1.0 cm is used, what is the angular magnification of the telescope?

NEW STANDARD ACADEMY

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CLASS 12 (CHEMISTRY) DPP (Academy) 25/11/2024

1. What are amines ? How are they classified ? Give their preparations and properties.
2. How many isomers are possible for the amines of the formula C_3H_9N How do these amines react with:
   (a) HNO_2
   (b) CH_3 COCl (c) G.R.?
3. How are PST amines distinguished from each other?
4. Describe the laboratory and industrial preparation of aniline.
5. How is sulphanilic acid prepared from aniline ?
6. What is diazotisation ? Describe the coupling reactions of benzene diazonium chloride with:
   (a) phenol (b) aniline. Show its industrial application by taking a suitable example.
7. How is benzene diazonium chloride prepared? How does it react with ?
   (a) CuCl/HCI
   (b) CuCN/KCN
   (c) aq. Kl
   (d) H3PO2
   (e) ice cold alk. phenol
   (f) aniline.
8. How will you convert aniline into ?
   (a) p-hydroxyazobenzene
   (b) benzonitrile
   (c) acetanilide
   (d) phenyl isothiocyanate
   (e) benzoic acid
   (f) lodobenzene
9. 9. Write short note on the following:
   (a) Coupling reactions
   (b) Hofmann bromamide reaction
   (c) Diazotisation reaction
   (d) Gabriel phthalimide reaction
   (e) Carbylamine reaction
10. Write short note on the following:
    (a) Zwitter ion
    (b) Acylation
    (c) Ammonolysis
    (d) Electrophilic substitution in aromatic primary amines
    (e) Hinsberg test
    How are following prepared? Write the equations.
    (a) Ethyl carbylamine from ethylamine
    (b) Phenyl carbylamine from aniline
    (c) Bromobenzene from aniline
    (d) Ethane from ethylamine
    (e) Diethylamine from ethylamine
11. What happens when:
    (a) Aniline is treat with $NaNO_2$/HCl at 273-278 K?
    (b) Ethylamine reacts with HNO_2?
    (c) Benzene diazoncim fluoroborate is heated ?
12. How will you prepare ?
    (a) Fluorobenzene from aniline
    (b) Monobromo aniline from aniline
13. How will you convert the following:
    (i) Nitrobenzene into aniline ?
    (ii) Ethanoic acid into methanamine ?
    (iii) Aniline into N-phenylethanamide ?
14. Arrange the following in increasing order of basic strength:
    $C_6H_5NH_2$, C_6H_5 $NHCH_3$, $C_6H_5CH_2NH_2$
15. Account for the following:
    (i) Primary amines (R - NH_2) have higher boiling point than tertiary amines (R_3N)
    (ii) Aniline does not undergo Friedel - Crafts reaction
    (iii) $(CH_3)_2$ NH is more basic than mathcal $(CH_3)_3$ N in an aqueous solution

NEW STANDARD ACADEMY

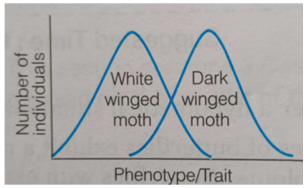
SEMRI KOTHI SUPER MARKET, RAEBARELI
CLASS 12 (BIOLOGY) DPP (Academy) / /2024

1. Explain the significance of the experiment carried out by SL Miller. Name the scientists whose hypothesis prompted him to carry out this experiment.
2. How does meteorite analysis favour this hypothesis?
3. Bees and flowering plants are known to have co-evolved and incorporated each whereas a part of their lifestyle.
   (i) How do they mutually benefit from each other?
   (ii) Describe any two adaptations of bees that help them benefit from flowering plants.
   (iii) Describe any two adaptations of flowering plants that help them benefit from
4. 4. Consider a hypothetical situation
   A species of butterflies exhibit a range of wing colours. Butterflies with extremely bright wing colours attract predators easily as compared to the ones with very dull wing colours. Butterflies with very dull wing colours fail to attract mates as compared to the ones with bright wing colours. Butterflies with intermediate wing colours have the best chance of both avoiding predators and finding mates.
   (i) Which type of natural selection does this phenomenon exemplify? Justify your answer.
   (ii) A few years later, the rise in industries and pollution, causes the habitat to become darker. How would it affect the survival of the different kinds of butterflies belonging to this species? Which type of natural selection does this phenomenon exemplify?
   (iii) In a specific region where this species is prevalent, a mutation in its population leads to butterflies with a shade of wing colours brighter than the existing shades. How would the long-term survivability of this variant be?
5. A group of palaeontologists aim to characterise fossil samples based on their age amongst other parameters. They collected the samples from different depths in the ground. They have recorded the values of these samples from the ground level and compiled them in the following table.

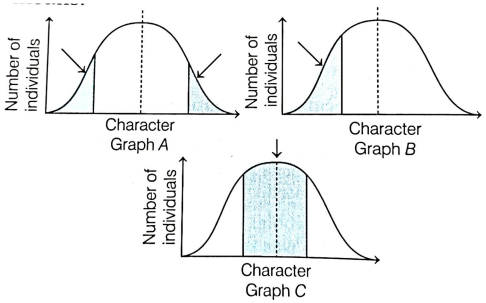
Samples Name	Depth from the ground level (m)
A	4000
B	6000
C	1500

   Arrange the sample names with respect to their age (oldest to youngest). Justify your answer
6.

   Natural selection operates in different ways in nature.
   (i) Identify the type of natural selection depicted in the graph above.
   (ii) In England after industrialisation, the population of dark winged moths



   were more favoured than white winged moth. Explain.
   (iii) Anthropogenic action can enhance the rate of evolution. Explain with the help of an example.
7. According to Darwinian theory, the rate of appearance of new forms is linked to their life cycles. Explain.
8. Arrange the following evolutionary phenomenon with respect to their contribution to evolution (from most significant to least significant). Justify your answer with respect to each phenomenon.
   (i) Vegetative propagation
   (ii) Natural selection
   (iii) Hybridisation
   (iv) Genetic drift
9. Natural selection operates when nature selects for fitness.' Comment on the statement mentioned above.
10. Among 1000 rabbits of a population, 360 have long ears (LL), 150 have medium ears (LI), and 490 have short ears (II).
    Calculate the following in detail
    (i) frequency of individuals per each genotype
    (ii) allele frequencies of L and I
    (iii) Based on (i) and (ii), determine if the population is in Hardy-Weinberg equilibrium. Justify your answer.
11. What is the frequency of heterozygous genotype (Aa) in a randomly mating population in which the frequency of all dominant phenotypes is 0.36?
12. The graphs below show three types of natural selection. The shaded areas marked with arrows show the individuals in the population which are not selected. The dotted vertical lines show the statistical means.



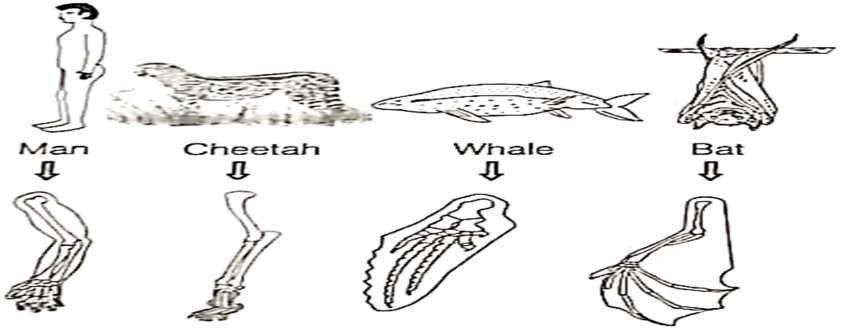
(i)What names are given to the types of selection shown in graphs A, B and C?

(ii) After the selection has operated for several generations in the above populatiom indicated as graph A, B and C, graphically illustrate the probable results.

13. 13. Lake Tanganyika harbours a wide variety of cichlid fish. These fish have minor modifications in the jaw shape, number of teeth, and intestine length amongst various other features, and have evolved to feed on algae, plankton, plants, insects, and other fish of various sizes also residing in the lake.
    (i) Which of the following evolutionary phenomenon does the above scenario describe?
    (ii) Based on (i), mention any four advantages of this phenomenon.
14. Over the course of human evolution, the size of the brain has consistently grown larger.
    (i) Mention any two factors that could be responsible for this continual expansion.
    (ii) Which category of evolution does this pattern align with-stabilising, directional. or disruptive?

Directions: This section contains 3 Cases each having 3/4 Questions. You have to write the answer of each question based on the context of the related case.

15. Case 1 The forelimbs of four vertebrates are shown in the diagram given below. Observe the diagram and answer the questions that follows.



(i) What does the given organs represents?

(ii) 'Homology in organ indicates common ancestry'. Justify the statement.

(iii) Give example showing similar evolution in plants.

16. While watching a science-fiction movie, Rohit came to know that dinosaurs skeleton have been found in Germany. He got astonished and asked her teacher about the significance of these fossils. Teacher told him that these fossils provide evidences of evolution.
    Now based on the above situation answer the questions that follows.
    (i) What are fossils and where are they found? 4
    (ii) During evolutionary studies, scientists found that forelimb of man is similar to that of whale. Explain the reason.
    (iii) Name the present day counterpart organisms of dinosaurs.
17. Case 3 A population at Hardy-Weinberg
    equilibrium has two allelles for fur colour, red and black. Assume black is dominant to red fur colour of the animal in the population, 16 percent of the animals have red fur.
    Based on the following situation answer the questions that follows.
    (i) State the Hardy-Weinberg principle.
    (ii) What percentage of the alleles in the population code for black fur?
    (iii) What are the factors affecting the Hardy-Weinberg equilibrium in a population?

Or

(iii) How does all the factors of Hardy- Weinberg equilibrium actually contributes to the process of evolution

18. Write the hypothetical proposals put forth by Oparin and Haldane.
19. Comment on the statement, "Migration may increase or decrease the effects of selection".
20. Comment on the statement, "Migration may increase or decrease the effects of selection".

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CLASS 12 (Maths) DPP (Academy) 25/11 /2024

1. Show that the relation R on the set R of real numbers defined as R = {(a,b) :a≤ b^2}, is neither reflexive nor symmetric nor transitive.
2. Let A= {1,2,3,…,9} and R be the relation defined on A× A by (a,b) R (c,d) iff a+d = b+c. Prove that R is an equivalence relation .Also find the3 equivalence class [(2,5)].
3. Let N be the set of natural numbers and R be the relation on N× N defined by (a,b) R(c,d) iff ad= bc for all a,b,c,d ∈ N. Show that R is an equivalence relation.
4. Let f : N →N be defined by f(n) = $\begin{cases} \frac{n+1}{2}, if\ n\ is\ odd \\ \frac{n}{2}, if\ n\ is\ even \end{cases}$ for all n∈N. Examine whether tha function f is onto one –one or bijective.
5. Check whether a function $f: R \to \left[-\frac{1}{2},\frac{1}{2}\right]$ defined as f(x) = $\frac{1}{1+x^2}$ is one- one and onto or not.
6. Prove that a function f :$[0,\infty) \to [-5,\infty)$ defined as f(x) = $4x^2$+4x-5 is both ono-one and on to .
7. Show that the function f : R→R defined by f(x) =|x|+x is neither one –one nor onto . Also find the range of f.
8. Let R be the set of all real numbers. Show that the function f :R→ $R\ defined\ f(x) = ax + b\ for\ all\ x \in R$ where a,b ∈ $R\ a \neq 0$ is a one –one correspondence.
9. Show that the function f :N→N defined by f(x) = x^3 is injective but not surjective.
10. Show that the funtion f :R→ $R\ defined\ by$ f(x) = $2x^3$-7 for all x∈ R is bijective.
11. If f : R→ $R$is defined by f(x) = 3x+2 find (fof) (x)
12. Find gof and fog when f : R→ $R$and g : R→ $R\ are\ definedby\ f(x) = 8x^3$ and g(x)= $x^{1/3}$
13. Find gof and fog if f : R→ $R$and g : R→ R are given by f(x) = |x| and g(x) = |2x-5|. Show that gof ≠ fog.
14. Show that the function f : R →{x :x∈ $R, -1 < x < 1$} given by f(x) = $\frac{x}{1+|x|}$ is one –one and onto . Hence find the inverse function of f.
15. Using principal nalues evaluate : $\cos^{-1}\left(cos\frac{2\pi}{3}\right) + sin^{-1}\left(sin\frac{2\pi}{3}\right)$.
16. Evaluate the following :- $\sin\left(2sin^{-1}\frac{3}{5}\right)$
17. Evaluate the following :- $\sin\left(2cot^{-1}\left(\frac{5}{12}\right)\right)$
18. $Draw\ the$ graph of f(x) = $\sin^{-1}$ x,x∈ $\left[-\frac{1}{\sqrt{2}},\frac{1}{\sqrt{2}}\right]$. Also , write range of f(x).
19. $Find$ the values of : $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{3}$
20. $If\ tan^{-1}x - tan^{-1}y = \frac{\pi}{4}$, xy >-1 then find the value of x-y-xy