BIOLOGY

BOOKS - KVPY PREVIOUS YEAR

KVPY

Biology

1. Ribonucleic Acids (RNA) that catalyze enzymatic reactions are called ribozymes. Which one of the following acts as a ribozyme ?

A. Ribosome

B. Amylase

C. tRNA

D. Riboflavin

Answer: A

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2. In 1670, Robert Boyle conducted an experiment where in he placed a viper (a poisonous snake) in a chamber and rapidly reduced the pressure in that chamber. Which of the following would be true ?

A. Gas bubbles developed in the tissues of the snake

B. The basal metabolic rate of the snake increased tremendously

C. The venom of the snake was found to decreased in potency

D. The venom of the snake was found to increase in potency

Answer: A

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3. Bacteria can survive by absorbing soluble nutrients via their outer body surface, but animals cannot, because

A. Bacteria cannot ingest particles but animals can

B. Bacteria have cell walls and animals do not

C. Animals have too small a surface area per unit volume as compared to bacteria

D. Animals cannot metabolize soluble nutrients

Answer: C

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4. A horse has 64 chromosomes and a donkey has 62. Mules result from crossing a horse and a donkey. State which of the following is INCORRECT ?

A. Mules can have either 64, 63 or 62 chromosomes

B. Mules are infertile

C. Mules have well defined gender (male/female)

D. Mules have 63 chromosomes

Answer: A

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5. If the total number of photons falling per unit area of a leaf per minute is kept constant, then which of the following will result in maximum photosynthesis ?

A. Shining green light

B. Shining sunlight

C. Shining blue light

D. Shining ultraviolet light

Answer: C

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6. Path-finding by ants is by means of -

A. Visually observing landmarks

B. Visually observing other ants

C. Chemical signals between ants

D. Using the earth's magnetic field

Answer: C

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7. Sometimes urea is fed to reminants to improve their health. It works by-

A. Helping growth of gut microbes that break down cellulose

B. Killing harmful microorganisms in their gut

C. Increasing salt content in the gut

D. Directly stimulating blood cell proliferation

Answer: A

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8. If you compare adults of two herbivore species of different sizes, but forms the same geographical area, the amount of faces produced per kg body weight would be -

A. More in the smaller one than the larger one

B. More in the larger one than the smaller one

C. Roughly the same amount in both

D. Not possible to predict which would be more

Answer: A

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9. Fruit wrapped in paper ripens faster than when kept in open air because -

A. Heat of respiration is retained better

B. A chemical in the paper helps fruit ripening

C. A volatile substance produced by the fruit is retained better and helps in ripening

D. The fruit is cut off from the ambient oxygen which is an inhibitor to fruit ripening

Answer: C

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10. When a person is suffering from high fever, it is someties observed that the skin has a reddish tinge. Why does this happen?

A. Red colour of the skin radiates more heat

B. Fever causes the release of a red pigment in the skin

C. There is more blood circulation to the skin to keep the body warm

D. There is more blood circulation to the skin to release heat from the body

Answer: D

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11. Bacteriochlorophylls are photosynthetic pigments found in phototrophic bacteria. Their function is distinct from the plant chlorophylls in that they-

A. do not produce oxygen

B. do not conduct photosynthesis

C. absorb only blue light

D. function without a light source

Answer: A

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12. Athletes often experience muscle cramps. Which of the following statements in true muscle cramps?

A. Muscle cramp is caused due to conversion of pyruvic acid into lactic acid in the cytoplasm

B. Muscle cramp is caused due to conversion of pyruvic acid into lactic acid in the mitochondria

C. Muscle cramp due to nonconversion of glucose to pyruvate in the cytoplasm

D. Muscle cramp is caused due to conversion of pyruvic acid into ethanol in the cytoplasm

Answer: A

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13. A couple went to a doctor and reported that both of them are "carriers" for a particular disorder, their first child is suffering from that disorder and that they are expecting their second child. What is the probability that the new child would be affected by the same disorder?

A. $100\ \%$

B. $50\ \%$

C. $25\ \%$

D. $75\ \%$

Answer: C

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14. Of the following combinations of cell biological processes which one is associated with embryogenesis ?

A. Mitosis and Meiosis

B. Mitosis and Differentiation

C. Meiosis and Differentiation

D. Differentiation and Reprogramming

Answer: B

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15. Conversion of the Bt protoxin produced by Bacillus thuringiensis to its active form in the gut of the insects is mediated by

A. acidic pH of the gut

B. alkaline pH of the gut

C. lipid modification of the protein

D. cleavage by chymotrypsin

Answer: B

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16. If you dip a sack full of paddy seeds in water overnight and then keep it out for a couple of days, it feels warm. What generates of heat ?

A. Imbibation

B. Exothermic reaction between water and seedcoats

C. Frication among seeds due to swelling

D. Respiration

Answer: D

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17. Restriction endonucleases are enzymes that cleave DNA molecules into smaller fragments. Which type of bond do they act on ?

A. N-glycosidic Bond

B. Hydrogen bond

C. Phosphodiester bond

D. Disulfide bond

Answer: C

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18. The fluid part of blood flows in and out of capillaries in tissue to exchange nutrients and waste materials. Under which of the following conditions will fluid flow out from the capillaries into the surrounding tissue ?

A. When arterial blood pressure exceeds blood osmotic pressure

B. When arterial blood pressure is less than blood osmotic pressure

C. When arterial blood pressure is equal to blood osmotic pressure

D. Arterial blood pressure and blood osmotic pressure have nothing to do with the outflow of fluid from capillaries

Answer: A

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19. The distance between two consecutive DNA base pairs is $0.34nm$. If the length of a chromosome is 1mm, the number of base pairs in the chromosome is approximately-

A. 3 million

B. 30 million

C. 1.5 million

D. 6 million

Answer: A

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20. Estimate the order of the speed of propagation of an potential or nerve impulse -

A. nm/s

B. micron/s

C. cm/s

D. m/s

Answer: D

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21. A bust cell has intracellular bacteria symbionts. If the growth rate of bacterial symbiont is always 10% higher than that of the host cell, after 10 generations of the host cell the density of bacteria in host cells will increase -

A. by 10%

B. two-fold

C. ten-fold

D. hundred-fold

Answer: B

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22. In a diploid organism, there are three different alleles for a particular gene. Of these alleles one is recessive and the other two alleles exhibit co-dominance. How many phenotypes are possible with this set of alleles ?

A. 3

B. 6

C. 4

D. 2

Answer: C

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23. Two students are given two different double stranded DNA molecules of equal length. They are asked to denature the DNA molecules by heating. The DNA given to student A has the following composition of bases $(A:G:T:C:35:15:35:15)$ while that given to student B is $(A:G:T:C::12:38:12:38)$. Which of the following statements os true?

A. Both the DNA molecules would denature at the same rate

B. The information given in insufficient to draw any conclusion

C. DNA molecule given to student B would denature faster than that of student A

D. DNA molecule given to student A would denature faster than that given to students B

Answer: D

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24. The amino acid sequences of a bacterial protein and a human protein carrying out similar function are found to be $60\,\%$ identical. However the DNA sequences of the genes coding for these proteins are only $45\,\%$ identical. This is possible because :-

A. Protein sequence does not depend on DNA sequence.

B. DNA codons having different nucleotides in the third position can code for the same amino are found

C. DNA codons having different nucleotides in the second position can code for the same amino acids

D. Same DNA codons can code for multiple amino acids

Answer: B

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25. The following DNA Sequence $(5' \rightarrow 3')$ specifies part of a protein coding sequence, starting from position I. Which of the following mutantions will give rise to a protein that is shorter tha the full-length protein ?

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	T	G	C	A	A	G	A	T	A	T	A	G	C	T

A. Deletion of nucleotide 13

B. Deletion of nucleotide 8

C. Insertion of a single nucleotide between 3 and 4

D. Inseration of a single nucleotide between 10 and 11

Answer: B

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26. Which of the following correctly represents the results of an enzymatic reaction? Enzyme is E, substrate is S and products are P_1 & $P2$.

A. $P1 + S \Leftrightarrow P2 + E$

B. $E + S \Leftrightarrow P1 + P2$

C. $P1 + P2 + E \Leftrightarrow S$

D. $E + S \Leftrightarrow P1 + P2 + E$

Answer: D

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27. Four species of birds have different egg colours: [1] white with no markings, [2] pale brown with no markings. [3] grey-brown with dark streaks and spots, [4] pale blue with dark blue-green spots. Based on egg colour, which species is most likely to nest in a deep tree hole ?

A. 1

B. 2

C. 3

D. 4

Answer: A

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28. Consider a locus with two alleles, A and a. If the frequency of AA is 0.25 , what is the frequency of under Hardy-Weinberg equilibrium ?

A. 1

B. 0.25

C. 0.5

D. 0

Answer: C

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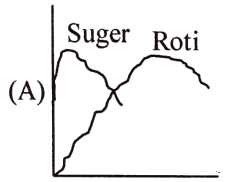
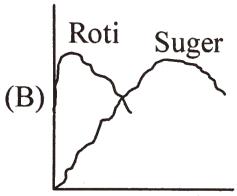
29. Which of the following graphs accurately represents the insulin levels (Y-axis) in the body as a function of time (X-axis) after eating sugar and

bread/roti?

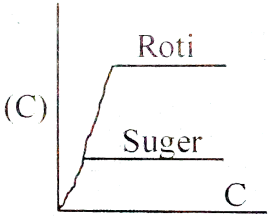
A.



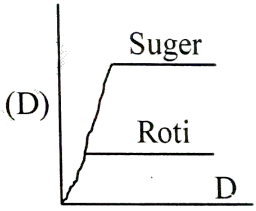
B.



C.



D.



Answer: A

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30. You marked two ink-spot along the height at the base of coconut three and also at the top of the three. When you examine the spots next year when the three has event taller, your will see-

A. the two spots at the top have grown more apart than the two spots at the bottom

B. the top two spots have grown less apart then the two spots at the bottom

C. both the sets of spots have grown aprt to the same extent

D. both sets of spots remain un-altered

Answer: A

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31. If parents have free ear lobes and the offspring has attached ear lobes, then parents must be

A. homozygous

B. heterozygous

C. co-dominant

D. nullizygous

Answer: B

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32. During meiosis there is

(A) one round of DNA replication and one division (B) two rounds of DNA replication and one division

(C)two rounds of DNA replication and two division (D) one round of DNA replication and two division

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33. Blood clotting involves the conversion of

A. prothrombin to thromboplastin

B. thromboplastin to prothrombin

C. fibrinogen to fibrin

D. fibrin to fibrinogen

Answer: C

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34. The gall bladder is involved in

A. synthesizing bile

B. storing and secreting bile

C. degrading bile

D. producing insulin

Answer: B

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35. Which one of the following colours is the LEAST useful for plant life?

A. red

B. blue

C. green

D. violet

Answer: C

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36. At rest the volume of air that moves in and out per breath is called

A. resting volume

B. vital capacity

C. lung capacity

D. tidal volume

Answer: D

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37. How many sex chromosomes does a normal human inherit from father?

A. 1

B. 2

C. 23

D. 46

Answer: A

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38. In the 16th century, sailors who travelled long distances had diseases related to malnutrition, because they were not able to eat fresh vegetables and fruits for months at a time. Scurvy is a result of deficiency of

A. carbohydrates

B. proteins

C. Vitamin C

D. Vitamin D

Answer: C

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39. The following structure is NOT found in plant cells

A. vacuole

B. nucleus

C. centriole

D. endoplasmic reticulum

Answer: C

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40. The cell that transfers information about pain to the brain is called a

A. neuron

B. blastocyst

C. histoblast

D. haemocyte

Answer: A

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41. The presence of nutrients in the food can be tested. Benedict's test is used to detect

A. sucrose

B. glucose

C. fatty acid

D. vitamin

Answer: B

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42. Several minerals such as iron, iodine, calcium and phosphorous are important nutrients. Iodine is found in

A. thyroxine

B. adrenaline

C. insulin

D. testosterone

Answer: A

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43. The principle upon which a lactometer works is

A. viscosity

B. density

C. surface tension

D. presence of protein

Answer: B

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44. Mammalian liver cells will swell when kept in

A. hypertonic solution

B. hypotonic solution

C. isotonic solution

D. isothermal solution

Answer: B

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45. The form of cancer called 'carcinoma' is associated with

A. lymph cells

B. mesodermal cells

C. blood cells

D. epithelial cells

Answer: D

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46. You remove four fresh tobacco leaves of similar size and age. Leave "leaf 1" as it is, smear "leaf 2" with vaseline on the upper surface, "leaf 3" on the lower surface and "leaf 4" on both the surfaces. Hang the leaves for a few hours and you observe that leaf 1 wilts the most, 2 has wilted, leaf 3 wilted less than leaf 2 and leaf 4 remains fresh. Which of the following conclusion is most logical?

A. tobacco leaf has more stomata on the upper surface

B. tobacco leaf has more stomata on the lower surface

C. stomata are equally distributed in upper and lower surfaces

D. no conclusion on stomatal distribution can be drawn from this experiment

Answer: B

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47. Vestigial organs such as the appendix exist because

A. they had an important function during development which is not needed in the adult

B. they have a redundant role to play if an organ with similar function fails

C. nature cannot get rid of structures that have already formed

D. they were inherited from an evolutionary ancestor in which they were functional

Answer: D

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48. Mendel showed that unit factors, now called alleles, exhibit a dominant/ recessive relationship. In a monohybrid cross, the .....trait disappears in the first filial generation

A. dominant

B. co-dominant

C. recessive

D. semi-dominant

Answer: C

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49. If man with an X-linked dominant disease has six sons with a woman having a normal complement of genes, then the sons will

A. not show any symptoms of the disease

B. show strong symptoms of the disease

C. three will show a disease symptom, while three will not

D. five will show a disease symptom, while one will not

Answer: A

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50. In evolutionary terms, an Indian school boys is more closely related to

A. an Indian frog

B. an American snake

C. a Chinese horse

D. an African shark

Answer: C

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51. The major constituents of neurofilaments are -

A. microtubules

B. intermediate filaments

C. actin filaments

D. protofilaments

Answer: D

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52. In which phase of the cell cycle are sister chromatids available as template for repair ?

A. G1 phase

B. G2 phase

C. S phase

D. M phase

Answer: D

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53. A person has difficulty in breathing at higher altitudes because-

A. oxygen is likely to from lungs to blood

B. oxygen is likely to diffuse from blood to lungs

C. partial pressure of O_2 is lower than partial pressure of CO_2

D. overall intake of O_2 by the blood becomes low

Answer: C

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54. In humans, the composition of a zygote that will develop into a female is -

A. $44A + XX$

B. $44A + XY$

C. $22 + X$

D. $23A$

Answer: A

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55. If you fractionate all the organelles from the cytoplasm of a plant cell, in which one of the following sets of fractions will you find nucleic acids ?

A. nucleus, mitochondria, chloroplast, cytoplasm

B. nucleus, mitochondria, chloroplast, glyoxysome

C. nucleus, chloroplast, cytoplasm and peroxisome

D. nucleus, mitochondria, chloroplast, Golgi bodies

Answer: A

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56. A protein with 100 amino acid residues has been translated based on triplet genetic code. Had the genetic code been quadruplet, the gene that

codes for the protein would have been-

A. same in size

B. longer in size by 25 %

C. longer in size by 100 %

D. shorter in size

Answer: B

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57. If the sequence of bases in DNA is 5'-ATGTATCTCAAT-3', then the sequence of bases in its transcript will be-

A. 5'-TACATAGAGTTA-3'

B. 5'-UACAUAGAGUUA-3'

C. 5'-AUGUAUCUCAAU-3'

D. 5'-AUUGAGAUACAU-3'

Answer: D

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58. The Na^+/K^+ pump is present in the plasma membrane of mammalian cells where it-

A. expels potassium from the cell

B. expels sodium and potassium from the cell

C. pumps sodium into the cell

D. expels sodium from the cell

Answer: D

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59. The CO_2 in the blood is mostly carried-

A. by hemoglobin in RBCs

B. in the cytoplasm of WBCs

C. in the plasma as bicarbonate ions

D. by plasma proteins

Answer: C

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60. Patients who have undergone organ transplants are given anti-rejection medication to -

A. minimize infection

B. stimulate B-macrophage cell interaction

C. prevent T-lymphocyte proliferation

D. adopt the HLA of donor

Answer: C

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61. Saline drip is given to a Cholera patient because-

A. NaCl kills Vibrio cholera

B. NaCl generates ATP

C. Na^+ ions stops nerve impulse and hence sensation of pain

D. Na^+ ions help in retention of water in body tissue

Answer: D

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62. A water molecule can from a maximum of ..... Hydrogen bonds.

A. 1

B. 2

C. 3

D. 4

Answer: D

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63. Circadian Rhythm is an endogenously driven cycle for biochemical, physiological and behavioral processes. In humans, the approximate duration of this 'biological clock' is -

A. 1 Hour

B. 6 Hour

C. 12 Hour

D. 24 Hour

Answer: D

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64. Modern evolutionary theory consists of the concepts of Darwin modified by knowledge concerning-

A. population statistics

B. Mendel's laws

C. the idea of the survival of the fittest

D. competition

Answer: C

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65. Soon after the three germ layers are formed in a developing embryo, the process of organogenesis starts. The human brain is form the -

A. ectoderm

B. endoderm

C. mesoderm

D. partly endoderm and partly mesoderm

Answer: A

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66. Puffs in the polytene chromosomes of Drosophilia melanogaster salivary glands represent-

A. transcriptionally active genes

B. transcriptionally inactive genes

C. heterochromatin

D. housekeeping genes

Answer: A

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67. The process of cell death involving DNA cleavage in cells is known as -

A. necrosis

B. apoptosis

C. cytokinesis

D. endocytosis

Answer: B

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68. According to the original model of DNA, as proposed by Watson & Crick in 1953, DNA is a-

A. left handed helix

B. helix that makes a full turn every 70 nm

C. helix where one turn of DNA contains 20 base-pairs

D. Two stranded helix where each stand has opposite polarity

Answer: D

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69. During meiosis crossing over occurs at :

A. leptotene

B. zygotene

C. pachytene

D. diplotene

Answer: C

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70. An electrode is placed in the axioplasm of a mammalian axon and another electrode is placed just outside the axon. The potential difference measured will be -

A. 0

B. -70 mV

C. $-70\mu V$

D. $+70\mu V$

Answer: B

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71. Which sequence of events gives rise to flaccid guard cells and stomatal closure at night ?

A. log [Glucose] $\Rightarrow$ low osmotic pressure $\Rightarrow$ low pH $\Rightarrow$ high pCO_2

B. low pH $\Rightarrow$ high pCO_2 $\Rightarrow$ low [Glucose] $\Rightarrow$ low osmotic pressure

C. low osmotic pressure $\Rightarrow$ high pCO_2 $\Rightarrow$ low pH $\Rightarrow$ low [Glucose]

D. high pCO_2 $\Rightarrow$ low pH $\Rightarrow$ low [Glucose] $\Rightarrow$ low osmotic pressure

Answer: D

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72. Rice has a diploid genome with $2n = 24$. If crossing-over is stopped in a rice plant anf then selfed seeds are collected, will all the offsprings be genetically identical to the parent plant ?

A. yes, because crossing -over is the only source of genetic variation

B. no, because stopping of crossing -over automatically increases rate of point mutation

C. yes, only if the parent plant was a completely inbreed line

D. yes, only if the parent plant was a hybrid between two pure-breed lines

Answer: C

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73. Rodents can distinguish between many different types of odours. The basis for odour discrimination is that-

A. they have a small number of odorant receptors that bind to many different odorant molecules

B. the mechanoreceptors in the nasal cavity are activated by different by odorant molecules found in the air passing through the nostrils

C. the part of the brain that processes the sense of smell has many different receptors for odorant molecules

D. a large number of different chemoreceptors are present in the nasal cavity that binds a variety of odorant molecules

Answer: D

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74. Although blood flows through large arteries at high pressure, when the blood reaches small capillaries the pressure decreases because-

A. the valves in the arteries regulate the rate of blood flow into the capillaries

B. the volume of blood in the capillaries is much lesser than that in the arteries

C. the total cross-sectional area of capillaries arising from an artery is much greater than that of the artery

D. elastin fibers in the capillaries help to reduce the arterial pressure

Answer: C

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75. E. coil about to replicate was pulsed with tritiated thymidine for 5 min and then tranferred to normal medium. After one cell division which one

of the following observations would be correct ?

A. both the strands of DNA will be radioactive

B. one strand of DNA will be radiactive

C. none of the strands will be radioactive

D. half of one strand of DNA will be radiactive

Answer: B

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76. Selection of lysine auxotroph (bacteria which requires lysine for growth) from a mixed population of bacteria can be done by growing the bacterial population in the presence of -

A. lysine

B. penicillin

C. lysine and penicillin

D. glucose

Answer: D

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77. Increasing the number of measurement of an experimental variable will -

A. increase the standard error of the sample

B. increase the mean of the sample

C. decrease the standard error of the sample

D. result in all of the above

Answer: C

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78. For a human male what is the probability that all the maternal chromosomes will end up in the same gamete ?

A. $1/23$

B. 2^{23}

C. 2^{46}

D. $(1/2)^{23}$

Answer: D

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79. Nocturnal animals have retinas that contain-

A. a high percentage of rods to increase sensitivity to low light conditions

B. a high percentage of cones so that nocturnal color vision can be improved in low light conditions

C. an equal number of rods and cones so that vision can be optimized

D. retinas with the photoreceptor layer present in the front of the eye to increase light sensitivity

Answer: A

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80. The length of one complete turn of a DNA double helix is -

A. $34Å$

B. $34nm$

C. $3.4Å$

D. $3.4\mu m$

Answer: A

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81. The disorders that arise when the immune system destroys self cells are called autoimmune disorders. Which of the following would be classified under this?

A. rheumatoid arthritis

B. asthma

C. rhinitis

D. eczema

Answer: A

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82. When of the following class of immunoglobulins can trigger the complement cascade?

A. IgA

B. IgM

C. IgD

D. IgE

Answer: B

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83. Diabetes insipidus is due to

A. hypersecretion of Vasopressin

B. hyposecretion of insulin

C. hypersecretion of insulin

D. hyposecretion of vasopressin

Answer: D

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84. Fossils are most often found in which kind of rocks ?

A. meteorites

B. sedimentary rocks

C. igneous rocks

D. metamorphic rocks

Answer: B

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85. Peptic ulcers are caused by -

A. a fungus, Candida albicans

B. a virus, cytomegalovirus

C. a parasite, Trypanosoma brucei

D. a bacterium, Helicobacter pylori

Answer: D

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86. Transfer RNA (tRNA) -

A. is present in the ribosomes and provides structural integrity

B. usually has clover leaf-like structure

C. carries genetic information from DNA to ribosomes

D. codes for proteins

Answer: B

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87. Some animals excrete uric acid in urine (uricotelic) as it requires very little water. This is an adaptation to conserve water loss. Which animals among the following are most likely to be uricotelic?

A. fishes

B. amphibians

C. birds

D. mammals

Answer: C

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88. A ripe mango, kept with unripe mangoes causes their ripening. This is due to the release of a gaseous plant hormone-

A. auxin

B. gibberlin

C. cytokinine

D. ethylene

Answer: D

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89. Human chromosomes undergo structural changes during the cell cycle. Chromosomal structure can be best visualized if a chromosome is isolated from a cell at-

A. G1 phase

B. S phase

C. G2 phase

D. M phase

Answer: D

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90. By which of the following mechanisms is glucose reabsorbed from the glomerular filrate by the kidney tubule?

A. osmosis

B. diffusion

C. active transport

D. passive transport

Answer: C

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91. In mammals, the hormones secreted by the pituitary, the master gland, is itself regulated by -

A. hypothalamus

B. median cortex

C. pineal gland

D. cerebrum

Answer: A

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92. Which of the following is true for TCA cycle in eukaryotes ?

A. takes place in mitochondrion

B. produces no ATP

C. takes place in golgi complex

D. independent of electron transport chain

Answer: A

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93. A hormone molecule binds to a specific protein on the plasma membrane inducing a signal. The protein it binds to is called-

A. ligand

B. antibody

C. receptor

D. histone

Answer: C

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94. DNA mutations that do not cause any functional change in the protein product are known as -

A. nonsense mutations

B. missense mutations

C. deletions mutations

D. silent mutations

Answer: D

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95. Plant roots are usually devoid of chlorophyll and cannot perform photosynthesis. However, there are exceptions. Which of the following plant root can perform photosynthesis ?

A. Arabidopsis

B. Tinospora

C. Rice

D. Hibiscus

Answer: B

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96. Vitamin A defeciency leads to night-blindness. Which of the following is the reason for the disease ?

A. rod cells are not converted to cone cells

B. rhodopsin pigment of rod cells is defective

C. melanin pigment is not synthesized in cone cells

D. cornea of eye gets dried

Answer: B

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97. In Dengue virus infection, patients often develop haemorrhagic fever due to internal bleeding. This happens due to the reduction of -

A. platelets

B. RBCs

C. WBCs

D. lymphocytes

Answer: A

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98. If the sequence of bases in sense strand of DNA is 5'-GTTCATCG-3', then the sequence of bases in its RNA transcript would be-

A. 5'-GTTCATCG-3'

B. 5'-GUUCAUCG-3'

C. 5'-CAAGTAGC-3'

D. 5'-CAAGUAGC-3'

Answer: B

Watch Video Solution

99. In a food chain such as grass $\rightarrow$ deer $\rightarrow$ lion, the energy cost of respiration as a proportion of total assimilated energy at each level would be -

A. $60\,\% - 30\,\% - 20\,\%$

B. $20\,\% - 30\,\% - 60\,\%$

C. $20\% - 60\% - 30\%$

D. $30\% - 30\% - 30\%$

Answer: A

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100. Excess salt inhibits bacterial growth in pickles by-

A. Endosmosis

B. exosmosis

C. oxidation

D. denaturation

Answer: B

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101. Restriction endonucleses are enzymes that are used by biotechnologists to -

A. cut DNA at specific base sequence

B. join fragments of DNA

C. digest DNA form the 3end

D. digest DNA form the 5 end

Answer: A

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102. Enzyme 'x' hydrolysis peptide bond so it is a proteolytic enzyme -

$\Rightarrow$ Amylase $\rightarrow$ starch digesting enzyme

$\Rightarrow$ Lipase $\rightarrow$ fact digesting enzyme

$\Rightarrow$ Trypsin $\rightarrow$ protein digesting enzyme

$\Rightarrow$ Maltase $\rightarrow$ Maltose digesting enzyme (Disaccharides)

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103. a person with blood group AB has

A. Antigen A and B RBC s and both anti-A and anti-b antibodies in plasma

B. antigen a and B on RBC s , but neither anti -A nor anti-B antibodies in plasma

C. no antigen on RBc s but both anti A and anti- B antibodies in plasma

D. Antigen A on RBCs and anti -B antibodies in plasma

Answer: B

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104. Glycolysis is the breakdown of glucose to pyruvic acid ,How many molecules of pyruiv acid are formed form one molecule of glucose ?

A. 1

B. 2

C. 3

D. 4

Answer: B

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105. the process of transfer of electrons from glucose to molecular oxygen in bacteria and mitochondria is known as-

A. TCA cycle

B. Oxidative phosphorylation

C. fermentation

D. Glycolysis

Answer: B

Watch Video Solution

106. which one of the following cell types is a part of innate immunity ?

A. skin epithelial cells

B. B cells

C. T lymphocytes

D. Liver cells

Answer: A

Watch Video Solution

107. Deficiency of which one of the following vitamins can cause impaired blood clotting ?

A. vitamin B

B. Vitamin C

C. Vitamin

D. Vitamin K

Answer: D

Watch Video Solution

108. which one of the following is deterimental to soil fertility ?

A. Saprophytic bacteria

B. Nitrosomonas

C. Nitrobacter

D. Pseudomnas

Answer: D

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109. In which phylum of the body is segmented

A. Porifera

B. Platyhelminthes

C. Annelida

D. Echinodermata

Answer: C

Watch Video Solution

110. Widal test is used for susceptibility of

A. Typhoid

B. Pneumonia

C. Malaria

D. Filaria

Answer: A

Watch Video Solution

111. which ,among grass , goat , tiger and vulture , in a food chain , will have the maximum concentration of harmful chemicals in its body due to contamination of pesticides in the soil ?

A. Grass since it grows in the contaminated soil

B. Goat since it eats the grass

C. Tiger since it feeds on the goat which in turn eats the goat , which feeds on the grass

D. Vulture since it eats the tiger , which in turn eats the goat , which eats the grass

Answer: D

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112. Considering the average molecular mass of a base to be 500 Da . What is the molecular mass of a double stranded DNA of 10 base pairs ?

A. 500Da

B. 5K Da

C. 10kDa

D. 1 kDa

Answer: C

Watch Video Solution

113. which of the following paris are both polysaccharides ?

A. Cellulose and glycogen

B. Starch and glucose

C. Cellulose and fructose

D. Ribose and sucrose

Answer: A

Watch Video Solution

114. which one of the following is a modified leaf ?

A. Sweet potato

B. Ginger

C. Onion

D. Carrot

Answer: C

Watch Video Solution

115. Genomic DNA is digested with Alu , I ,a restriction enzyme which is a four base pair cutter .what is the frequncy with which it will cut DNA assuming arandon distribution of bases in the genome ?

A. 43469

B. 43489

C. 1/256

D. 1/1296

Answer: C

View Text Solution

116. IF rice is cooked in a pressure cooker on the siachen glacirer , at sea beach , and on Deccan plain , which of the following Is correct about the time taken for cooking rice ?

A. Get cooked faster on the siachen glacier

B. Gets cooked faster at sea beach

C. Gets cooked faster on Deccon plain

D. Gets cooked at the same time at all three places

Answer: D

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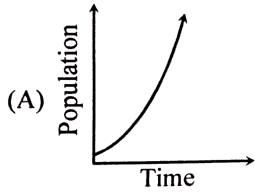
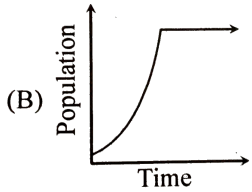
117. A few rabbits are introduced in an un- inhabited island with plenty of food , If these rabbits breed in the absence of any disease , natural calamity and predating, which one of the following graphs best represents their population growth ?

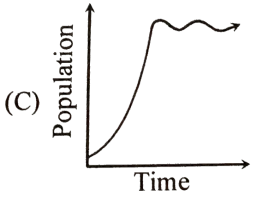
A.



B.



C.



(D)

D.

Answer: A

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118. what is the advantage of storing gluose as glycogen in animals instead of as monomeric glucose ?

A. Energy obtained from glycogen is more than that from the corresponding glucose monomers

B. Glucose present as monomers within the cell exerts more osmotic pressure than a single glycogen molecule , resulting in loss of water from the cells .

C. Glucose present as monomers within th cell exerts more osmotic pressure than a single glycogen molecule . Resulting in excess

water within the cells

D. Glycogen gives more rigidity to the cells .

Answer: C

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119. A line is drawn from the exterior of an animal cell to the centre of the nucleus , crossing through one mitochondrion . What is the minimum of membrane bilayers that the line will cross ?

A. 4

B. 3

C. 8

D. 6

Answer: Bonus

View Text Solution

120. Immunosuppressive drugs like cyclosporin delay the rejection of graft post organ transplantation by

A. inhibiting T cell infiltration

B. killing B cells

C. killing macrophages

D. killing dendrite cells

Answer: A

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121. Which one of these substances will repress the lac operon ?

A. Arabinose

B. Glucose

C. Lactose

D. Tryptophan

Answer: B

Watch Video Solution

122. Assume a spherical mammalian cell has a diameter of 27 microns. If a polypeptide chain with alpha helical conformation has to stretch across the cell, how many amino acids should it be comprised of ?

A. 180000

B. 1800

C. 27000

D. 12000

Answer: A

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123. Which one of the following has phosphoric acid anhydride bonds ?

A. Deoxy ribonucleic acid

B. Ribonucleic acid

C. dNTPs

D. Phospholipids

Answer: C

Watch Video Solution

124. The two components of autonomous nervous system have antagonistic actions. But in certain cases their effects are mutually helpful. Which of the following statement is correct ?

A. At rest, the control of heart beat is not by the vagus nerve

B. During exercise the sympathetic control decreases

C. During exercise the parasymphathetic control decreases

D. Stimulation of sympathetic system results in constriction of the pupil

Answer: C

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125. In a random DNA sequence, what is the lowest frequency of encountering a stop codon ?

A. 1 in 20

B. 1 in 3

C. 1 in 64

D. 1 in 10

Answer: A

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126. The two alletes that determine the blood group AB of an individual are located on

A. two different autosomes

B. the same autosome

C. two different sex chromosomes

D. one on sex chromosome and the other on an autosome

Answer: B

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127. In biotechnology applications, a selectable marker is incorporated in a plasmid

A. to increase its copy number

B. to increase the transformation efficiency

C. to eliminate the non-transformants

D. to increase the expression of the gene of interest

Answer: C

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128. Spermatids are formed after the second meiotic division from secondary spermatocytes. The ploidy of the secondary spermatocytes is

A. n

B. 2n

C. 3n

D. 4n

Answer: A

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129. Phosphlipids are formed by the esterification of

A. three ethanol molecules with three fatty acid molecules

B. one glycerol and two fatty acid molecules

C. one glycerol and three fatty acid molecules

D. one ethylene glycol and two fatty acids molecules

Answer: B

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130. Given the fact that histone birds DNA, it should be rich in

A. arginine, lysine

B. cysteine, methionine

C. glutamate, aspartate

D. isloeucine, leucine

Answer: A

Watch Video Solution

131. If molecular weight of a polypeptide is 15.3kDa, what would be the minimum number of nucleotides in the mRNA that codes for this polypeptide ? Assume that molecular weight of each amino acid is 90 Da.

A. 510

B. 663

C. 123

D. 170

Answer: A

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132. Melting temperature for double stranded DNA is the temperature at which $50\,\%$ of the double stranded molecules are converted into single stranded molecules. Which one of the following DNA will have the highest melting temperature ?

A. DNA with $15\,\%$ guanine

B. DNA with $30\,\%$ cytosine

C. DNA with $40\,\%$ thymine

D. DNA with $50\,\%$ adenine

Answer: B

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133. Following are the types of immunoglobulin and their functions. Which one of the following is INCORRECTLY paired ?

A. IgD : viral pathogen

B. IgG : phagocytosis

C. IgE : allergic reaction

D. IgM : complement fixation

Answer: A

Watch Video Solution

134. Which one of the following can be used to detect amino acids ?

A. Iodine vapour

B. Ninhydrin

C. Ethidium bromide

D. Bromophenol blue

Answer: B

Watch Video Solution

135. Mutation in a single gene can lead to changes in multiple traits. This is an example of

A. Heterotrophy

B. Co-dominance

C. Penetrance

D. Pleiotrophy

Answer: D

Watch Video Solution

136. Which one of the following is used to treat cancers ?

A. Albumin

B. Cyclosporin A

C. Antibodies

D. Growth hormone

Answer: C

Watch Video Solution

137. Which of the following processes leads to DNA ladder formation ?

A. Necrosis

B. Plasmolysis

C. Apoptosis

D. Mitosis

Answer: C

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138. Co-enzymes are components of an enzyme complex which are necessary for its function. Which of these is a known co-enzyme ?

A. Zinc

B. Vitamin B_{12}

C. Chlorophyll

D. Heme

Answer: B

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139. The peptidoglycans of bacteria consist of

A. sugars, D-amino acids and L-amino acids

B. sugars and only D-amino acids

C. sugars and only L-amino acids

D. sugars and glycine

Answer: A

Watch Video Solution

140. How many bands are seen when immunoglobulin G molecules are analysed on a sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) under reducing conditions ?

A. 6

B. 1

C. 2

D. 4

Answer: C

Watch Video Solution

141. In a mixed culture of slow and fast growing bacteria, penicillin will

A. kill the fast growing bacteria more than the slow growing

B. kill slow growing bacteria more than the fast growing

C. kill both the fast and slow growing bacteria equally

D. will not kill bacteria at all

Answer: A

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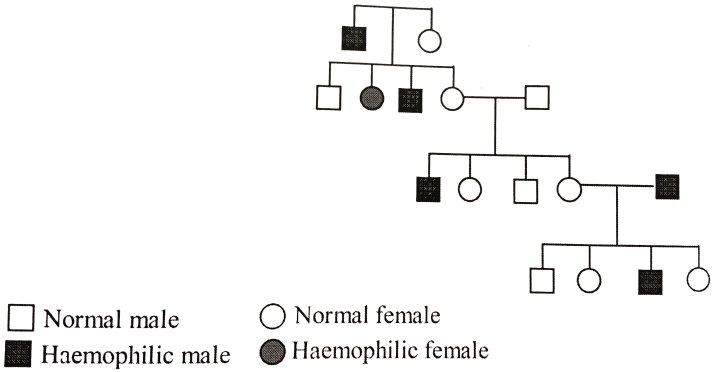
142. Consider the follwing pedigree over four generations and mark the correct answer below about the inheritance of haemophilia.



A. Haemophilia is X-linked dominant

B. Haemophilia is autosomal dominant

C. Haemophilia is X-linked recessive

D. Haemophilia is Y-linked dominant

Answer: C

View Text Solution

143. A person has 400 million alveoli per lung with an average radius of 0.1 mm for each alveolus. Considering the alveoli are spherical in shape, the total respiratory surface of that person is closest to

A. $500 \quad mm^2$

B. $200 \quad mm^2$

C. $100 \quad mm^2$

D. $1000 \quad mm^2$

Answer: D

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144. A mixture of equal numbers of fast and slow dividing cells is cultures in a medium containing a trace amount of radioactively labeled thymidine for one hour. The cells are then transferred to regular (unlabelled) medium. After 24 hrs of growth in regular media

A. fast dividing cells will have maximum radioactivity

B. slow dividing cells will have maximum radioactivity

C. both will have same amount of radioactivity

D. there will be no radioactivity in either type of cells

Answer: A

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145. If a double stranded DNA has 15% cytosine, what is the $\%$ of adenine in the DNA ?

A. 15%

B. 70%

C. 35 %

D. 30 %

Answer: C

Watch Video Solution

146. The mitochondrial inner membrane consists of a number of infoldings called cristae. The increased surface area due to cristae helps in :

A. Increasing the volume of mitochondria

B. Incorporating more of the protein complexes essential for electron transport chain

C. Changing the pH

D. Increasing diffusion of ions

Answer: B

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147. The activity of a certain protein is dependent on its phosphorylation. A mutation in its gene changed a single amino acid which affected the function of the molecule. Which amino acid change is most likely to account for this observation ?

A. Tyrosine to Tryptophan

B. Lysine to valine

C. Leucine to isoleucine

D. Valine to alanine

Answer: A

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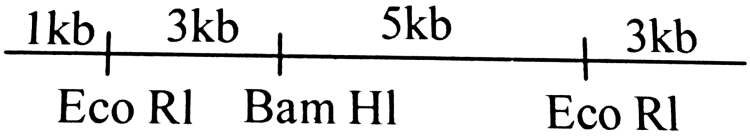
148. Consider the linear double stranded DNA is shown below. The restriction enzyme sites and the lengths demarcated are. This DNA is

completely digested with both Eco RI and Bam HI restriction enzymes. If the product is analyzed by gel electrophoresis, how many distinct bands would be observed ?



A. 5

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

149. Enzyme X catalyzes hydrolysis of GTP into GDP. The GTP-bound form of X transmits a signal that leads to cell proliferation. The GDP-bound form does transmit any such signal. Mutations in X are found in many

cancers. Which of the following alterations of X are most likely to contribute to cancer ?

A. Mutations that increase the of X for GDP

B. Mutations that decrease the affinity of X for GTP

C. Mutations that decrease the rate of GTP hydrolysis

D. Mutations that prevent expression of enzyme X.

Answer: C

Watch Video Solution

150. What is the length of human DNA containing 6.6×10^9 bp ?

A. 22 nm

B. 0.22 mm

C. 2.2 m

D. 22 m

Answer: c

Watch Video Solution

151. The Diptheria, Pertussis and Tetanus (DPT) consist of .

A. live attenuated strains of Diptheria , pertussis , Tetanus

B. toxoid of Diptheria , Tetanus , and heat killed whole cells of Pertussis

C. Whole cell lysate of Diptheria, Pertussis, Tetanus

D. Heat Killed strains of Diptheria , Pertussis, Tetanus

Answer: b

Watch Video Solution

152. Which of the following is NOT an enzyme ?

A. Lipase

B. Amylase

C. Trypsin

D. Bilirubin

Answer: d

Watch Video Solution

153. The pH of the avian blood is maintained by

A. HCO_3^-

B. $H_2PO_4^-$

C. CH_3COO^-

D. Cl^-

Answer: a

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154. Podocyte layer that provies outer lining to the surface of glomerular capillaries are found in

A. bowman's capsule

B. loop of Henle

C. renal artery

D. ureter

Answer: a

Watch Video Solution

155. If a dsDNA has 20% adenine, what would be its cytosine content ?

A. 0.2

B. 0.3

C. 0.4

D. 0.8

Answer: b

Watch Video Solution

156. whichone of the following is incapable of curing pellagra ?

A. Niacine

B. Nicotine

C. Nicotinamide

D. Tryptophan

Answer: b

Watch Video Solution

157. In Escherichia coil, how many codons code for the standard amino-acids ?

A. 64

B. 60

C. 61

D. 20

Answer: c

Watch Video Solution

158. Bombyx mori (silk worm) belongs to the order

A. Lepidoptera

B. Diptera

C. Hymenotera

D. Coleoptera

Answer: a

Watch Video Solution

159. The source of mammalian hormone " Relaxin" is

A. ovary

B. stomach

C. intestine

D. pancreas

Answer: a

Watch Video Solution

160. Which one of the following animals is a connecting link between reptiles and mammals ?

A. Platypus

B. Bat

C. Armadillo

D. Frog

Answer: a

Watch Video Solution

161. The number of chromosomes in Turner's syndrome is

A. 44

B. 45

C. 46

D. 47

Answer: b

Watch Video Solution

162. Chipko movement in the year 1974 in Garhwal Himalayas involved

A. Protecting tigers

B. Preventing soil erosion by planting trees

C. Preventing pollution by closing down industries

D. Hugging trees to prevent the contractors from felling them

Answer: d

Watch Video Solution

163. Which of the following amino acids is NOT involved in gluconeogenesis ?

A. Alanine

B. Lysine

C. Glutamate

D. Arginine

Answer: b

Watch Video Solution

164. Which of the following entities causes syphillis ?

A. Treponema pallidum

B. Neisseria gonorrhoea

C. HIV

D. Hepatits B

Answer: a

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165. The atmospheric pressure is 760 mm Hg at the sea level. Which of the following ranges in nearest to the partial pressure of CO_2 in mm Hg ?

A. 0.30.0.31

B. 0.60 - 0.61

C. 3.0 -3.1

D. 6.0 -6.1

Answer: a

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166. A breeder crossed a pure breed tall plant having white flowers tall pure short plant having blue flowers. He obtained 202 F_1 progeny and found and found that they are all tall having white flowers. Upon selfing these these F_1 Plants, he obtained a progeny of 2160 plants. Approximately, how many of these are likely to be short and having blue flower?

A. 1215

B. 405

C. 540

D. 135

Answer: d

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167. Match the different types of heart given in Column A with organisms given in the column B. Choose the corrent combination.

Column A	Column B
P. Neurogenic Heart	i. Human
Q.Bronchial heart	ii. King crab
R. pulmonary heart	iii. Shark

A. P-ii,Q-iii,R-i

B. P-iii,Q-ii,R-i

C. P-I,Q-iii,R-ii

D. P-ii,Q-I,R-iii

Answer: a

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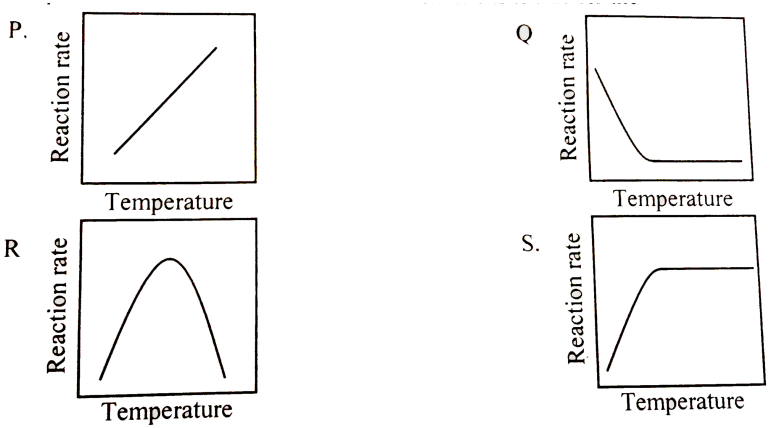
168. Given below are the four schematic that describe the dependence of the rate of an enzymatic reaction on temperature which of the following combinations is true for thermophilic and psychrophilic organisms ?



A. P and P

B. P and S

C. P and R

D. R and R

Answer: d

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169. Match the enzymes in Group I with the reactions in Group II. Select the correct combination.

	Column A		Column B
P	Hydrolase	i	Inter-conversion of optical isomers
Q	Lyase	ii	Oxidation reduction of two substrates
R	Isomerase	iii	Joining of two compounds
S	Ligase	iv	Removal of a chemical group from one substrate to an
		v	transfer of a chemical group from one substrate to an

A. P-iv,Q-ii,R-iii,S-i

B. P-v,Q-iv,R-I,S-iii

C. P-iv,Q-I,R-iii, S-v

D. P-I,Q-iv,R-v,S-ii

Answer: b

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170. Which is a water-borne disease

A. Tuberculosis

B. Chickenpox

C. Malaria

D. Cholera

Answer: D

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171. In his seminal work on genetics, Gregor Mendel described the physical traits in the pea plant as being controlled by two 'factors'. What term is used to define these factors today?

A. Chromosomes

B. Alleles

C. Genes

D. Hybrids

Answer: C

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172. A majority of the tree species of penensular Indian origin fruit in the months of

A. April - May

B. December - January

C. August - September

D. All month of the year

Answer: A

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173. In frogs, body proportions do not change with their growth. A frog that is twice as long as another will be heavier by approximately

A. Two-fold

B. Six-fold

C. Four-fold

D. Eight-fold

Answer: A

Watch Video Solution

174. Which of the following has the widest angle of binocular vision ?

A. Rat

B. Duck

C. Eagle

D. Owl

Answer: C

View Text Solution

175. The two alleles of a locus which an offspring receives from the male and female gametes are situated on

A. Two different homologs of the same chromosome

B. Two different chromosomes

C. Sex chromosome

D. A single chromosome

Answer: A

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176. Ants locate sucrose by

A. Using a strong sense of smell

B. Using a keen sense of vision

C. Physical contact with sucrose

D. Sensing the particular wave length of light emitted reflected by sucrose

Answer: C

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177. The interior of a cow-dung piece kept for a few days is quite warm.This is mostly because

A. Cellulose present in the dung is a good insulator

B. Bacterial metabolism inside the dung releases heat

C. Undigested material releases heat due to oxidation by air

D. Dung is dark and absorbs a lot of heat

Answer: B

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178. Which one of these is the correct path for a reflex action ?

A. Receptor-Motor Neuron-Spinal Cord-Sensory Neuron-Effector

B. Effector-Sensory Neuron-Spinal Cord-Motor Neuron-Receptor

C. Receptor-Sensory Neuron-Spinal Cord-Motor Neuron-Effector

D. Sensory Neuron-Receptor-Motor-Neuron-Spinal Cord-Effector

Answer: C

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179. Insectivorous plants digest insects to get an essential nutrient. Other plants generally get this nutrient from the soil. What is this nutrient ?

A. Oxygen

B. Carbon dioxide

C. Nitrogen

D. Phosphates

Answer: B

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180. Mohini, a resident of Chandigarh went to Shimla with her parents. There she same plant that they have in their backyard, at home. However, she observed that while the plants in their backyard bore white flowers, those in Shimla had pink flowers. She brought home some seeds of the plant from Shimla and planted them in Chandigarh. Upon performing self breeding for several generation she found that the plant from Shimla

produced only white flowers.

(a) According to you what might be the reason for his observation- genetic or eavironmental factors ?

(b) Suggest a simple experiment to determine whether this variation is genetic in nature

(c) Suggest another experiment to check whether this variation in flower color is due to environmental factors

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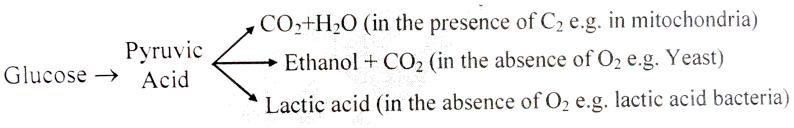
181. The break-down of glucose in a cell occurs in any of the following pathways :



Three experiments (A, B, C) have been set up. In each experiment, a flask contains the organism in growth medium, glucose and a brown dye that changes its colour to yellow when the pH decreases. The mouth of the flask is attached to a test tube containing lime water (Calcium hydroxide , as shown in the figure) . In C, but not in A and B , air is removed from the

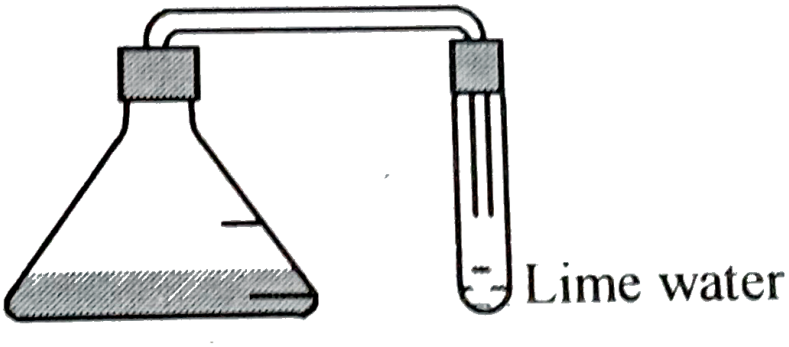
flask before beginning the experiment.

After a period of growth, the following observation were made :

A : Lime water turns milky , the dye colour remains the same

B : The dye colour changes , lime water does not turn milky

C : Lime water turns milky , the dye colour remains the same



(a) Question : Identify which of the reactions is the pathways depicted above is taking place in each experiment . Give reasons for your answer .

(b) Question : Identify which of the reactions in the pathways depicted above is expected to occur in Red Blood Cells (RBCs)

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182. A scientist has a house just beside a busy highway. He collects leaves from some plants growing in his garden to do radio-carbon dating (to

estimate the age of the plant by estimating the amount of a radioisotope of carbon in its tissues). Surprisingly the radio-carbon dating shows that the plant is a few thousand years old.

(a) Was the result of the radio-carbon dating wrong or can you propose a reason for such an observation ?

(b) What simple experiment can be done to test the reason that you have proposed ?

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Part I Biology

1. A smear of blood from a healthy individual is stained with a nuclear stain called hematoxylin and then observed under a light microscope. Which of the following cell type would be highest in number ?

A. neutrophils

B. lymphocytes

C. eosinophils

D. monocytes

Answer: A

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2. Which of the following biological involves a bacteriophge ?

A. transformation

B. conjugation

C. translocation

D. transduction

Answer: D

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3. In which compartment of a cell does the process of glycolysis takes place ?

A. golgi complex

B. cytoplasm

C. mitochondria

D. ribosomes

Answer: B

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4. Huntington's disease is a disease of the-

A. nervous system

B. circulatory system

C. respiratory system

D. excretory system

Answer: A

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5. A cell will experience the highest level of endosmosis when it is kept in-

A. distilled water

B. sugar solution

C. salt solution

D. protein solution

Answer: A

Watch Video Solution

6. When the leaf of the `tocuh-me-not' (chui-mui,Mimosa pudica) plant is touched, the leaf droops because-

A. a nerve signal passes through the plant

B. the temperature of the plant increases

C. water is lost from the cells at the base of the leaf

D. the plant dies

Answer: C

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7. If you are seeing mangroves around you, which part India are you visiting ?

A. Western Ghats

B. Thar desert

C. Sunderbans

D. Himalayas

Answer: C

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8. Myeloid tissue is a type of-

A. haematopoietic tissue

B. cartilage tissue

C. muscular tissue

D. areolar tissue

Answer: A

Watch Video Solution

9. Amphibian heart is

A. two chambered

B. three chambered

C. four chambered

D. three and half chambered

Answer: B

Watch Video Solution

10. Gigantism and acromegaly are due to defects in the function of the following gland-

A. adrenals

B. thyroid

C. pancreas

D. pituitary

Answer: D

Watch Video Solution

11. Which one of the following organelles can synthersize some of its own proteins ?

A. lysozome

B. golgi apparatus

C. vacuole

D. mitochondrion

Answer: D

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12. Maltose is a polymer of -

A. one glucose and one fructose molecule

B. one glucose and one galactose molecule

C. two glucose molecules

D. two fructose molecules

Answer: C

Watch Video Solution

13. The roots of some higher plants get associated with a fungal partner. The roots provide food to the fungus while the fungus supplies water to the roots. The structure so formed is known -

A. lichen

B. anabaena

C. mycorrhiza

D. rhizobium

Answer: C

Watch Video Solution

14. Prehistoric forms of life are found in fossils. The probability of finding fossils of more comples organisms-

A. increases from lower to upper strata

B. decreases from lower to upper strata

C. remains constant in each stratum

D. uncertain

Answer: A

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Part 2 Chemistry

1. A body is born with the normal number and distribution of rods, but no cones in his eyes. We would expect that the body would be-

A. coloure blind

B. night blind

C. blind in both eyes

D. blind in one eye

Answer: A

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2. In mammals, pleural membranes cover the lunge as well as insides of the rib cage. The pleural fluid in between the two membranes-

A. dissolves oxygen for transfer to the alveoli

B. dissolves CO_2 for tranfer to the blood

C. provides partial pressure

D. reduces the friction between the ribs and the lungs

Answer: D

Watch Video Solution

3. At which phase of the cell cycle, DNA polymerase activity is an its highest?

A. Gap 1 (G1)

B. Mitotic (M)

C. Synthetic (S)

D. Gap 2 (G2)

Answer: C

Watch Video Solution

4. Using Bolt, an Olympic runner, at the end of a 100 meter sprint, will have more of which of the following in his muscles ?

A. ATP

B. Pyruvic acid

C. Lactic acid

D. Carbon dioxide

Answer: C

Watch Video Solution

5. Desert temperature often varies between 0 to $50^{\circ}C$. The DNA polymerase isolated from a camel living in the desert will be able to synthesize DNA most efficiently at-

A. $0^{\circ}C$

B. $37^{\circ}C$

C. $50^{\circ}C$

D. $25^{\circ}C$

Answer: B

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Part 2 Biology

1. Why hydrogen peroxide is applied on the wound as a disinfectant, there is frothing at the site of injury, which is due to the presence of an enzyme in the skin that used hydrogen peroxide as a substrate to produce-

A. Hydrogen

B. Carbon Dioxide

C. Water

D. Oxygen

Answer: D

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2. Persons suffereing from hypertension (high blood pressure) are advised a low-salt diet because-

A. More salt is absorbed in the body of a patient with hypertension

B. High salt leads to water retention in the blood that further increases the blood pressure

C. High salt increases nerve conduction and increases blood pressure

D. High salt causes adrenaline release that increases blood pressure

Answer: B

Watch Video Solution

3. Insectivorous plants that mostly grow on swampy soil use insects as a source of -

A. Carbon

B. Nitrogen

C. Phosporous

D. Magnesium

Answer: B

Watch Video Solution

4. In cattle, the coat colour red and white are two dominant traits, which express equally F_1 to produce roan (red and white colour in equal proportion). If F_1 progeny are self breed, the resulting progeny in F_2 will have phenotypic ration (red : roan : white) is -

A. $1:1:1$

B. $3:9:3$

C. $1:2:1$

D. $3:9:4$

Answer: C

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5. The restriction endonuclease EcoR-I recognizes and cleaves DNA sequence as shown below

5' -G A A T T C-3'

3' -C T T A A G'5'

What is the probable number of cleavage sites that can occur in a 10 kb long random DNA sequence?

A. 10

B. 2

C. 100

D. 50

Answer: B

Watch Video Solution

6. Which one of the following is true about enzyme catalysis ?

A. The enzyme changes at the end of reaction

B. The activation barrier of the process is lower in the presence of enzyme

C. The rate of the reaction is retarded in the presence of an enzyme

D. The rate of the reaction is independent of substrate concentration

Answer: B

View Text Solution

7. Vibrio cholera causes cholera in humans. Ganga water was once used successfully to combat the infection. The possible reason could be-

A. High salt content of Ganga water

B. Low salt content of Ganga water

C. Presence of bacterophages in Ganga water

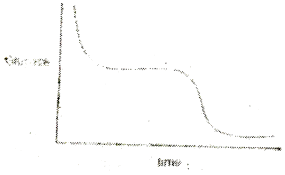
D. Presence of antibiotics in Ganga Water

Answer: D

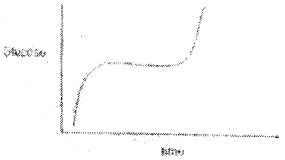
Watch Video Solution

8. Which of the following graphs accurately represents the insulin levels (Y-axis) in the body as a function of time (X-axis) after eating sugar and bread/roti?

A.

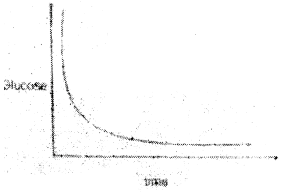


B.



C.

D.



Answer: A

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9. The following sequence contains the open reading frame of a polypeptide. How many amino acids will the polypeptide consists of ?

5' AGCATATGATCGTTTCTCTGCTTTGAACT-3'

A. 4

B. 2

C. 10

D. 7

Answer: B

Watch Video Solution

10. Insects constitute the largest animal group on earth. About $25 - 30\,\%$ of the insect species are known to be herbivores. In spite of such huge herbivore pressure, globally, green plants have persisted. One possible reason for this persistence is -

A. Food preference of insects has tended to change with time

B. Herbiovors insects have become inefficient feeders of green plants

C. Herbivore population has been kept in control by predators

D. Decline in reproduction of herbivores with time

Answer: C

Watch Video Solution

Part I Biology

1. In which of the following types of glands is the secretion collected inside the cell and discharged by disintegration of the entire gland?

A. Apocrine

B. Merocrine

C. Holocrine

D. Epicrine

Answer: C

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2. Which one of the following interactions doest NOT promote coevolution?

A. commensalism

B. Mutualism

C. Parasitism

D. Interspecific competition

Answer: D

Watch Video Solution

3. Startification is more common is which of the following ?

A. Deciduous forest

B. Tropical rain forest

C. Temperate forest

D. Tropical savannah

Answer: B

Watch Video Solution

4. Where is the third ventricle of the brain located?

A. Cerebrum

B. Cerebellum

C. Pons varoli

D. Diencephalon

Answer: D

Watch Video Solution

5. Which of the following is the final product of a gene?

A. a polypeptide only

B. an RNA only

C. either polypeptide or RNA

D. a nucleotide only

Answer: C

Watch Video Solution

6. Forelimbs if whales, bats, humans and cheetah are examples of which of the following processes?

A. Divergent evolution

B. Convergent evolution

C. Adaptation

D. Saltation

Answer: A

Watch Video Solution

7. Which of the following results from conjugation in Paramecium ?

A. Cell death

B. Cell division

C. Budding

D. Recombination

Answer: D

Watch Video Solution

8. In an experiment investigating photoperiodic response, the leaves of a plant are removed. What is the most likely outcome?

A. Photoperiodism is not affected

B. Photoperiodic response does not occur

C. The plant starts flowering

D. The plant starts to grow taller

Answer: B

View Text Solution

9. Testoterone is secreted by which endocrine part of testis?

A. Leydig cells

B. Seminiferous tubules

C. Tunica albugenia

D. Sertoli cells

Answer: A

Watch Video Solution

10. The mutation of a purine to a pyrimidine is known as

A. Transition

B. fram shift

C. nonsense

D. transversion

Answer: D

Watch Video Solution

11. Which fo the following is secreted at the ends of an axon?

A. Ascorbic acid

B. Acetic acid

C. Acetyl choline

D. Acetyl CoA

Answer: C

Watch Video Solution

12. A bacterial colony is produced from

A. a single bacterium by its repetitive division

B. multiple bacterium without replication

C. clumping of two to three bacteria

D. a single bactgerium whithout cell division

Answer: A

Watch Video Solution

13. Rhinoviruses are the causative agents of

A. Diarrhoea

B. AIDS

C. Dengue

D. Common cold

Answer: D

Watch Video Solution

14. What is the genetic material of Ebola virus ?

A. Single-stranded DNA

B. Double-stranded RNA

C. Single-stranded RNA

D. Double-stranded DNA

Answer: C

Watch Video Solution

15. Name the terminal acceptor of electrons in the mitochondrial electron transport chain

A. Nitrate

B. Fumarate

C. Succinate

D. Oxygen

Answer: D

Watch Video Solution

16. Two tubes labelled 'P' and 'Q' contain food stuff. Tube 'P' gave positive test with Benedict's solution while tube 'Q' gave positive test with Nitric acid. Which of the following is correct ?

A. Tube 'P' contains suger, tube 'Q' contains protein

B. Tube 'P' contains protein , tube 'Q' contains sugar

C. Both tube 'P' and tube 'Q' contain sugar

D. Both, tube 'P' and tube 'Q' contain protein

Answer: A

Watch Video Solution

17. How many linear DNA fragments will be produced when a circular plasmid is digested with a restriction enzyme having 3 sites?

A. 4

B. 5

C. 3

D. 2

Answer: C

View Text Solution

18. If the humidity of the atmosphere suddenly increaes substantially, the water flow in the xylem will-

A. increase

B. decrease

C. remain unaltered

D. increase sharply and then reduce slowly to the preexisting level

Answer: B

Watch Video Solution

19. Which one of the following is the complementary sequence for the DNA with 5'CGTACTA-3'

A. 5' TAGTACG-3'

B. 5'-ATCATGC-3'

C. 5'-UTCUTGC-3'

D. 5'-GCUAGCA-3'

Answer: A

Watch Video Solution

Part Ii Mathematics

1. A diploid plant has 14 chromosomes, but its egg cell has 6 chromosomes. Which one of the following is the most likely explanation

of this?

A. Non-disjunction in meiosis I and II

B. Non-disjunction in meiosis II

C. Non-disjunction is mitosis

D. Normal meiosis

Answer: B

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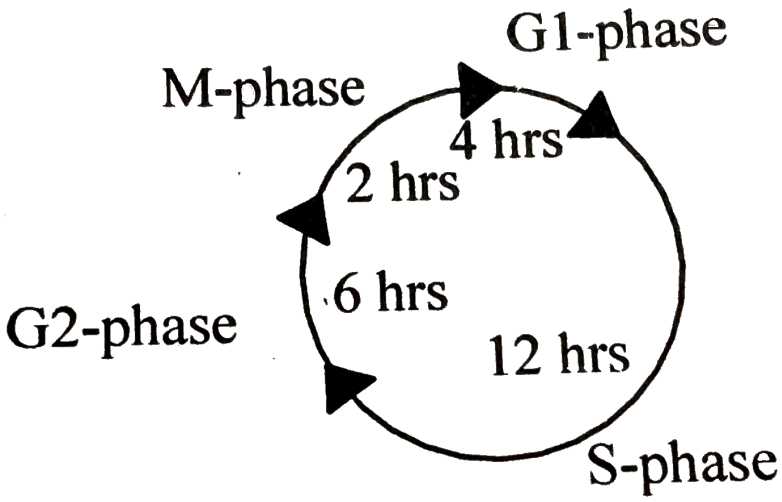
Part Ii Biology

1. Following the cell cycle scheme given below, what is the probaility that a cell would be in M-phase at any given time ?



A. $1/2$

B. $1/12$

C. $1/6$

D. $1/2$

Answer: B

Watch Video Solution

2. A flower with Tt genotype is cros-pollinated by TT pollens. What will the genotypes of the resulting endosperm and embryo, respectively, be?

A. TTT,(TT+Tt)

B. (TTT+TTt)

C. TTt,Tt

D. TTt,(TT+Tt)

Answer: A

Watch Video Solution

3. A new life from discovered on a distant planet has a genetic code consisting of five unique nucleotides and only one stop codon. If each has four bases, what is the maximum number of unique amino acids this life from can use?

A. 624

B. 20

C. 124

D. 3124

Answer: A

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4. A spontaneous mutation results in a couple having only female progeny. When the doughter marries and has childeren, non of them are males. However , in the third generation there are few male offspring . What is the most likely ex planation of this observation-

A. The mutation reverse spontaneously in the third generation

B. The mutation occurs on the X chromosome and is both recessive and lethal

C. The mutation occurs on the X chromosome and is both recessive and dominant

D. The mutation occurs on an autosome and is dominant

Answer: B

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5. A circular plasmid of 10,000 base pairs (bp) is digested with two restriction enzymes, A and B , to produce a 3000 bp and a 2000 bp bands when visualized on an agarose gel. When digested with one enzyme at a time only one band is visible at 5000 bp. If the first site for enzyme a(A1) is present at the 100^{th} base, the order in which the remaining sites (A2,B1 and B2) are present is-

A. 310051008100

B. 810031005100

C. 510031008100

D. 810051003100

Answer: C

Watch Video Solution

6. After meiosis-II daughter cells differ from the parent cells and each other in their genotypes. This can occur because of which one of the following mechanism(s) ?

A. Only synaptic crossing over

B. Only crossing over had independent assortment of chromosomes

C. Only crossing, over hand chromosonal segregation

D. Crossing, over, independent assortment and segregation of chromosomes

Answer: D

Watch Video Solution

7. A desert lizard (an ectotherm) and a mouse (an endotherm) are placed inside a chamber at $15^{\circ}C$ and their body temperature [T(L) for the lizard and T(M) for the mouse] and metabolic rates [ML(L) for the lizard nad

M(M) for the mouses] are monitored. Which one of the following is correct-

A. T(L) and M(L) will fall while T(M) will increase

B. T(L) and M(L) will increase while T(M) and M(M) will fall

C. T(L) and M(L) will fall, T(M) will remain same and M(M) will increase

D. T(L) and M(L) will remain same and T(M) and M(M) will decrease

Answer: C

Watch Video Solution

8. In Griffith's experiments mice died when injected with-

A. heat killed S-strain

B. heat killed S-strain combined with R- strain

C. heat killed R- strian

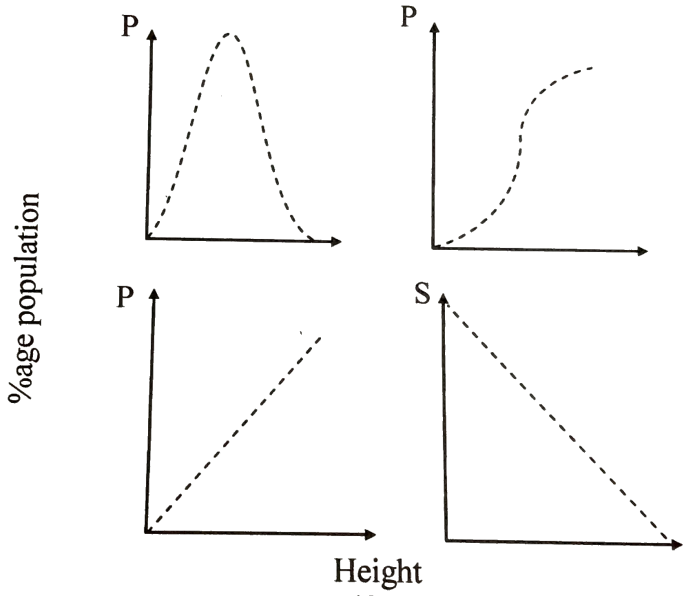
D. live R-strain

Answer: B

View Text Solution

9. Human height is a multigenic character. If the heights of all the individuals in a metropolis are measured and the percentage of the population belonging to a specific height are plotted as shown below,

Which of the plots would represent the mot realistic distribution-



A. P

B. Q

C. R

D. S

Answer: A

Watch Video Solution

10. Mitochondria synthesizes ATP based on chemiosmosis when mitochondria is transferred from a buffer pH 8.0 to buffer pH 4.0

A. an increase in intra-mitochondrial acidity

B. a decrease in intra-mitochondrial acidity

C. blockage of ATP synthesis

D. synthesis of ATP

Answer: D

View Text Solution

11. Anthropocene refers to the geological age during which

A. the earliest hominids radiated from their ancestral forms.

B. human activity significantly influenced climate the environment

C. arthropod radiation was highest

D. arthropod radiation significantly influenced climate and environment .

Answer:

Watch Video Solution

12. Match the vitamins listed in Column I with the diseases caused due to their deficiency in Column II.

Column I	Column II
P. Vitamin A	i. Pellegra
Q. Vitamin B_2	ii. Rickets
R. Vitamin D	iii. Ariboflavinosis
S. Vitamin B_{12}	iv. Night blindness
	v. Pernicious anaemia

Choose the CORRECT combination

A. P-iv, Q-ii , R-iii , S-iv

B. P-I , Q-ii , R-iv , S-iii

C. P-iv , Q-iii, R-ii , S-v

D. P-iii , Q-iv , R-v, S-i

Answer:

Watch Video Solution

13. An adult mammal with 50 kg body weight has the following functional paramenters of its lungs.

Inspiratory reserve volume = 40 ml/kg body weight

Expiratory reserve volume = 15 ml/kg body weight

Vital capacity = 60 ml/kg body weight

Breathing rate = 209/min

The volume (in litre) of air that its lungs displaces in 24 hours is

A. 72000

B. 7200

C. 3600

D. 1200

Answer:

Watch Video Solution

14. In a breed of dog, long-haired phenotype is recessive to short-hair. In a litter , one pup is short-haired and its sibling is long-haired. Consider the following possible phenotypes of the parents.

i. both parents are short-haired

ii. Both parents are long-haired

iii. One parent is short-haired , and one is long -haired

Choose the CORRECT combination of the possible parental phenotype.

A. I only

B. ii only

C. iii only

D. I or iii

Answer:

Watch Video Solution

15. Which ONE of the following is the most likely ratio of blood groups (A: B: AB) among the progeny from heterozygous parents with B and AB blood groups?

A. $0.5 : 0.25 : 0.25$

B. $0.25 : 0.25 : 0.5$

C. $0.25 : 0.5 : 0.25$

D. $0:0.25:0.75$

Answer:

Watch Video Solution

16. Match the plants in Column I with their features listed in Column II ,III & IV

Column I	Column II	Column III	Column IV
Types of plants	Types of photosynthesis	Site of Calvin cycle	Time of stomata opening
Rice	CAM	Mesophyll	Day
Pineapple	C4	Bundle sheath	Night
Sugarcane	C3		

Choose the CORRECT combination .

A. Rice -C3- Mesophyll -Day, Pineapple - CAM-Mesophyll-Night , Sugarcane-C4-Bundle sheath-Day

B. Rice-C3-Mesophyll-Day, Pineapple-CAM-Mesophyll-Night, Sugarcane-C4-Mesophyll-Day

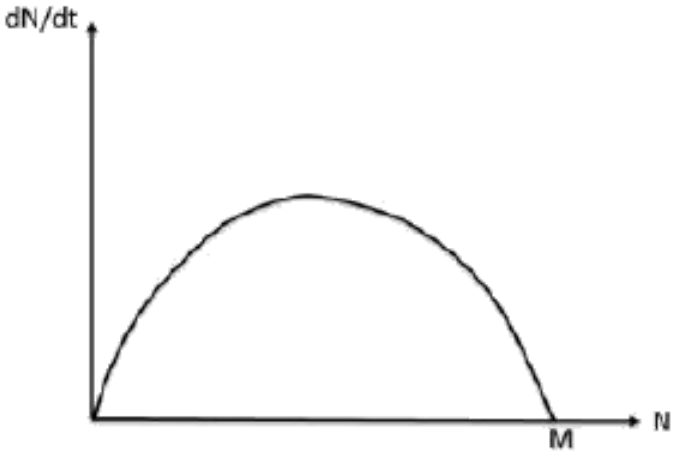
C. Rice-C4-Mesophyll-Day, Pineapple-C3-Bundlle sheath-Night, Sugarcane-CAM-Bundle sheath-Day

D. Rice-CAM-Mesophyll-Day, Pineapple-CAM-Mesophyll-Day, Sugarcane-C4-Bundle sheath Day

Answer:

Watch Video Solution

17. In the graph below. where N is population size and tis time. M represents



A. specific growth rate.

B. median population size.

C. carrying capacity.

D. minimum population size without going extinct.

Answer:

Watch Video Solution

18. Match the metabolic pathways in Column I with their corresponding intermediate molecules listed in Column II

Column I	Column II
P. Krebs cycle	i. Dihydroxy acetone phosphate
Q. Glycolysis	ii. Succinate
R. Electron transport chain	iii. Cytochrome c
S. Nitrogen fixation	iv. Glutamate
	v. Glyoxylate

Choose the CORRECT combination.

A. P-ii, Q-i, R-iii, S-iv

B. P-i,Q-v, R-iv,S-ii

C. P-v,Q-i, R-iii, S-iv

D. P-ii, Q-i, R-iii, S-v

Answer:

Watch Video Solution

19. By comparing mitosis and meiosis occurring in the same organism, which ONE of the following options is CORRECT regarding the DNA content per cell?

A. Mitotic anaphase $>$ Meiotic anaphase I = Meiotic anaphase II

B. Mitotic anaphase = Meiotic anaphase I $>$ Meiotic anaphase II

C. Mitotic anaphase $<$ Meiotic anaphase I = Meiotic anaphase II

D. Mitotic anaphase = Meiotic anaphase I $<$ Meiotic anaphase II

Answer:

Watch Video Solution

20. Which ONE of the following is likely to occur upon heating a solution of eukaryotic protein from $20^{\circ}C$ to $95^{\circ}C$

A. Breakage of disulphide bonds

B. Change in primary structure

C. Hydrolysis of peptide bonds

D. Change in tertiary structure

Answer:

Watch Video Solution

21. Which ONE of the following statements is INCORRECT about the hexokinase-catalysed reaction given below?

Glucose + ATP $\rightarrow$ Glucose-6-phosphate + ADP

A. This reaction takes place in the cytoplasm

B. This is an endergonic reaction

C. Folding of hexokinase to fit around the glucose molecule excludes water from the active site

D. This reaction involves an induced fit mechanisin in hexokinase

Answer:

Watch Video Solution

22. An ecologist samples trees in multiple forest plots to determine species richness. Which ONE of the following can help determine the adequacy of sampling effort?

A. Graph the number of new tree species in each successive sampling plot.

B. Graph the total number of tree species per total area for all plots combined

C. Graph the number of individuals per tree species in each successive sampling plot.

D. 30 sampling plots are sufficient, irrespective of the forest area.

Answer:

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Part A Biology

1. Interferon combat viral infection by

A. inhibiting viral packaging directly

B. increasing the binding of antiboides to viruses.

C. binding to the virus and agglutinating them.

D. restricting viral spread to the neighbouring cells

Answer: D

Watch Video Solution

2. Leydig cells synthesize

A. insulin

B. growth hormone

C. testosterone

D. estrogen

Answer: C

Watch Video Solution

3. Glucagon increases the blood glucose concentration by

A. promoting glycogenolysis

B. increasing the concentration of fructose 2,-6-bisphosphate

C. increasing the concentration of pyruvate kinase

D. inhibiting gluconeogenesis

Answer: A

Watch Video Solution

4. Which ONE of the following is NOT essential for Polymerase Chain Reaction (PCR) ?

A. Restriction enzymes

B. Denaturation of DNA

C. Primers

D. DNA polymerase

Answer: A

Watch Video Solution

5. CO_2 acts as greenhouse gas because

A. it is transparent to heat but traps sunlight

B. it is transparent to sunlight but traps heat.

C. it is transparent to both sunlight and heat.

D. it traps both sunlight and heat.

Answer: B

Watch Video Solution

6. A graph of species richness vs area on log-log axes is

A. linear

B. sigmoidal

C. oscillatory

D. parabolic

Answer: A

Watch Video Solution

7. Concentration of Na^+ ions outside a nerve cell is ~100 times more than inside. The concentration of K^+ ions is more inside the cells. The levels of Na^+ ions and K^+ ions are maintained by

A. free diffusion of Na^+ ions and pumping of K^+ ions across the membrane.

B. Na^+ and K^+ pumps in the membrane.

C. free diffusion of K^+ ions and pumping of Na^+ ions across the membrane

D. water channels fomed by lipids in the membrane.

Answer: B

Watch Video Solution

8. In a chemical reaction, enzymes catalyze the reaction by

A. lowering the activation energy

B. increasing the activation energy.

C. decreasing the free energy change between reactants and products.

D. increasing the free energy chain between reactants and product.

Answer: A

Watch Video Solution

9. The rigidity of cellulose is due to

A. coiled structure of glucose polymer

B. $\beta(1 \rightarrow 4)$ glycosidic linkage

C. hydrogen bonding with adjacent glucose polymer

D. cross-linking between glucose and peptides

Answer: C

Watch Video Solution

10. Antigen-antibody reaction

A. always result in precipitation of the complex

B. depend only on covalent interactions.

C. are irreversible

D. depend on ionic and hydrophobic interactions.

Answer: D

Watch Video Solution

11. Which one of the following combination of molecular masses of polypeptides are obtained from purified human IgM when analysed on sodium dedecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) under reducing conditions

A. 55kDa,15kDa

B. 70kDa,25 kDa, 15 kDa

C. 55 kDa,25 kDa

D. 155kDa

Answer: B

View Text Solution

12. For a particular gene that determines the coat color in a diploid organism, there are three different alleles that are codominant. How may different skin colors are possible in such an organism.

A. 9

B. 6

C. 4

D. 3

Answer: B

Watch Video Solution

13. Two genetic loci controlling two different traits are linked. During the inheritance of these traits, the Mendelian laws that would be affected is/are

A. Law of dominance, law of segregation and law of independent assortment

B. Law of segregation and Law of independent assortment

C. Only law of independent assortment

D. Only Law of segregation

Answer: C

Watch Video Solution

14. Which ONE of the following statement is INCORRECT ?

A. Alleles are different form of the same gene.

B. Alleles are present at the same locus.

C. Alleles code for different isoforms of a protein.

D. Alleles are non-heritable.

Answer: D

Watch Video Solution

15. Which ONE of the following statement is INCORRECT about restriction endonucleases ?

A. They serve as primitive form of immune system in bacteria

B. They digest the DNA non-randomly.

C. They digest the DNA at specific location.

D. They digest the DNA from free ends.

Answer: D

Watch Video Solution

16. The number of net ATP molecules produced from I glucose molecule during glycolysis is

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

17. Which ONE of the following coenzymes is required for the conversion of L-alanine to a racemic mixture of D-and L-alanine ?

A. Pyridoxal-6-phosphate

B. Thiamine pyrophosphate

C. Coenzyme A

D. Flavin adenine dinucleotide

Answer: A

Watch Video Solution

18. Cyclic electron flow during photosynthesis generates

A. NADPH alone.

B. ATP and NADPH.

C. ATP alone.

D. ATP,NADPH and O_2

Answer: C

Watch Video Solution

19. Match the type of cells given in Column I with organism given in Column II. Choose the appropriate combination from the options below .

Column I	Column II
(P) Flame cells	(i) Sponges
(Q) Collar cells	(ii) Hydra
(R) Stinging cells	(iii) Planaria
(A) P-iii, Q-i, R-ii	(B) P-iii, Q-ii, R-i
(C) P-i, Q-ii, R-iii	(D) P-ii, Q-iii, R-i

A. P-iii,Q-i,R-ii

B. P-iii,Q-ii,R-i

C. P-i,Q-ii,R-iii

D. P-i,Q-iii,R-ii

Answer: A

Watch Video Solution

20. Compared to the atmospheric air, the alveolar air has

A. more pO_2 and less pCO_2

B. less pO_2 and pCO_2

C. more pO_2 and more pCO_2

D. less pO_2 and less pCO_2

Answer: B

Watch Video Solution

Part B Biology

1. The genetic distance between genes A and B is 10 cm. An organism with Ab combination of the alleles is crossed with the organism with aB combination of alleles. What will be the percentage of the gametes with AB alleles combinatory by an F1 individual ?

A. 1

B. 5

C. 10

D. 50

Answer: B

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2. Proteins P,Q, and R are associated with intact organellar membrane in a cell. If the intact organelles is treated with a high ionic strength buffer, only protein R remained associated with the membrane fraction. Based on this, one could conclude that

A. P and Q are per peripheral membrane protein

B. R is a peripheral membrane protein

C. P and Q are integral membrane bound proteins.

D. P is peripheral and Q is integral membrane protein.

Answer: A

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3. In photosynthesis, oxygen is produced by

A. photosystem I from carbon dioxide.

B. photosystem II from carbon dioxide

C. photosystem I from water

D. photosystem II from water

Answer: B

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4. How many different protein consisting of 100 amino acids can be formed from 20 different amino acids ?

A. 20^{100}

B. 100^{20}

C. 2^{20}

D. 20×100

Answer: A

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5. Molecular weight of E. Coli DNA is 3.1×10^9 g/mol. Average molecular weight of nucleotide pair is 660 g/mol and each nucleotide pair contirbutes ot 0.34 nm to the length of DNA. The length of E. coli DNA molecule will be approximately

A. 0.8 nm

B. 1.6 nm

C. $1.6\mu m$

D. $1.6mm$

Answer: C

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6. Which ONE of the following option is TRUE with respect to Emigration ?

A. It is the difference between the births and deaths in a population.

B. It is the difference between individuals who have come to a habitat and who have left the habitat

C. It involved individuals of different species coming to a habitat from elsewhere during the period under consideration

D. It involves individuals of a population leaving a habitat during the time period under consideration.

Answer: D

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7. Choose the CORRECT combination of statements given below related to cysteine residue in proteins.

i. Cysteine can be linked to tyrosine by S-O bond.

ii. Cysteine can be linked to another cysteine by S-S bond

iii. Cysteine can complex with Zn^{2+}

iv. Cysteine can be linked to methionine by S-S bond

A. i and ii

B. ii and iii

C. iii and iv

D. i and iv

Answer: B

Watch Video Solution

8. The minimum number of plant to be screened to obtain a plant of the genotype AabbCcDd from a cross between plants of genotypes AaBbCcDd and AABnCCDd is

A. 8

B. 16

C. 32

D. 64

Answer: C

View Text Solution

9. When a pure breed, red flower-producing plant of genotype RR is crossed with a pure bred, white flower-producing plant of genotype rr, all the F_1 plants produced pink flowers If all the plants in each generation form $F_1 \rightarrow F_6$ are selfed, what will be the percentage of plant with red and white flowers in the final population consisting of a large number of individuals ? (Consider that flower colour has no effect on reproduction and survival.)

A. $3 - 4$

B. $12 - 13$

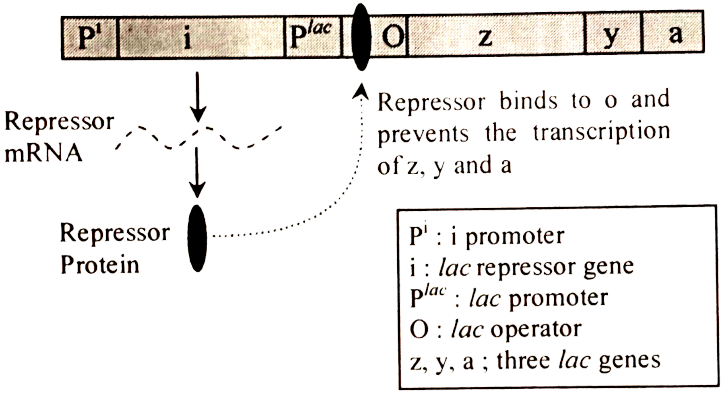
C. $49 - 51$

D. $97 - 100$

Answer: D

View Text Solution

10. The schematic below describes the status of lac operon in the absence of lactose. Which ONE of the following happens lactose is present in the cell ?



A. Lactose binds to p^1 and stops the transcription of i.

B. Lactose is converted to allolactose, which binds to P^{lac} and results in the displacements of the repressor from O.

C. Lactose is converted to allolactose, which bind to the repressor protein and prevents its interaction with O.

D. Lactose has no effect on the status of the lac operon.

Answer: C

View Text Solution

Part 1 Biology

1. Which ONE of the following molecules is a secondary metabolite ?

A. Ethanol

B. Lactate

C. Penicillin

D. Citric Acid

Answer: C

Watch Video Solution

2. Lecithin is a ?

A. Carbohydrate

B. Phpspholipid

C. Nucleoside

D. Protein

Answer: B

Watch Video Solution

3. The water potential $\left(\Psi^{P}\right)$ of pure water at standard temperature and atmospheric pressure is ?

A. 0

B. 0.5

C. 1.0

D. 2.0

Answer: A

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4. Action potential in neurons is generated by a rapid influx of ?

A. Chloride ions

B. Potassium ions

C. calcium ions

D. sodium ions

Answer: D

Watch Video Solution

5. Erythropoietin is produced by ?

A. Heat

B. Kidney

C. Bone marrow

D. Adrenal gland

Answer: B

Watch Video Solution

6. Thendrills are modifications of ?

A. Stem or leaf

B. Stem only

C. Leaf only

D. Aerial roots only

Answer: A

Watch Video Solution

7. Which one of the following combinations of biomolecules is present in the ribosomes ?

A. RNA, DNA and protein

B. RNA lipids and DNA

C. RNA and protein

D. RNA and DNA

Answer: C

Watch Video Solution

8. Which one of the following proteins does not play a role in skeletal muscle contraction?

A. Actin

B. Myosin

C. Troponin

D. Microtuble

Answer: D

Watch Video Solution

9. Which one of the following reaction is catalyzed by high-energy ultraviolet radiation in the stratosphere ?

A. $O_2 + O \rightarrow O_3$

B. $O_2 \rightarrow O + O$

C. $O_3 + O_3 \rightarrow 3O_2$

D. $O + O \rightarrow O_2$

Answer: B

Watch Video Solution

10. Which ONE of the following statements is True about trypsinogen ?

A. it is activated by enterokinase

B. It is activated by renin

C. It is activated by pepsin

D. It does not need activation

Answer: A

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11. Which ONE of the following organisms respire through the skin ?

A. Blue whale

B. Salamander

C. platypus

D. Peacock

Answer: B

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12. Which ONE of the following human cells lacks a nucleus ?

A. Neutrophil

B. Neuron

C. Mature erythrocyte

D. Karatinocyte

Answer: C

Watch Video Solution

13. The first enzyme that the food encounters in human digestive system is ?

A. Pepsin

B. Trypsin

C. Chymotrypsin

D. Amylase

Answer: D

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14. Glycoproteins are formed in which ONE of the following organelles ?

A. Peroxisome

B. Lysosome

C. Golgi apparatus

D. Mitchondria

Answer: C

Watch Video Solution

15. An example of nastic movement ?

A. Folding up of the leaces of mimosa pudica

B. Climbing of tendrils

C. Growth of roots from seeds

D. Growth of pollen tube towards the ovule

Answer: A

Watch Video Solution

16. The first ionization enthalpies for three elements are 1214, 1680 and $2080 kjmol^{-1}$,respectively, The correct sequence of the element is :

A. O, F and Ne

B. F, O and Ne

C. Ne, F and O

D. F, Ne and O

Answer: A

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17. Individuals of one kind occupying a particular geographic area at given time are called

A. community

B. population

C. species

D. biome

Answer: B

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18. What fraction of assimilated energy is used in respiration by the herbivore ?

A. ~10 percent

B. ~60 percent

C. ~30 percent

D. ~80 percent

Answer: C

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19. Athetes are often trained at high altitude because

A. training at high altitude increases muscle mass

B. training at high altitude increases the number of red blood cells

C. there is less chance of arm injury at high altitude

D. athletes sweat less at high altitude

Answer: B

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20. In human brain two cerebral hemispheres are form by a bundle of fibers which is known as

A. Medulla oblongata

B. cerebrum

C. cerebellum

D. corpus cellosum

Answer: D

Watch Video Solution

21. Which one of the following hormones is produced by the pancreas ?

A. prolactin

B. Glucagon

C. Leutinizing hormone

D. Epinephrine

Answer: B

Watch Video Solution

22. The stalk of a plant leaf is derived from which one of the following types of plant tissue? Â

A. Sclerenchyma

B. Parenchyma

C. Chlorenchyma

D. Collenchyma

Answer: D

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23. Which of the following muscle types CANNOT be used voluntarily ?

A. Both striated and smooth

B. Both cardiac and struated

C. Both smooth and cardiac

D. Cardiac, striated and smooth

Answer: C

Watch Video Solution

24. The pulmonary artery carries

A. deoxygented blood to the lungs

B. oxygented blood to the brain

C. oxygenated blood to the lungs

D. deoxygented blood to the kidney

Answer: A

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25. Both gout and kidney stone formation is caused by

A. calcium oxalate

B. uric acid

C. creatinine

D. potassium chloride

Answer: B

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26. The auditory nerve gets its input from which of the following ?

A. The sense cells of the cochlea

B. Vibration of the last ossicle

C. Eustachian tube

D. Vibration of the tympanic membrane

Answer: A

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27. Which of the following organelles contain circular DNA ?

A. Peroxisomes and Mitochondria

B. Mitochondria and Golgi complex

C. Chloroplsts and L-ysosomes

D. Mitochondria and chloroplast

Answer: D

Watch Video Solution

28. A reflex action does NOT involve

A. neurons

B. brain

C. spinal cord

D. muscle fiber

Answer: B

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29. Which one of the following options is true in photosynthesis ?

A. CO_2 is oxidized and H_2O is reduced

B. H_2O is oxidized and CO_2 is reduced

C. Both CO_2 and H_2O are reduced

D. Both CO_2 and H_2O are oxidized

Answer: B

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30. Â Human mature red blood cells (RBCs) do NOT containÂ

A. Iron

B. Cytoplasm

C. Mitochondria

D. Haemoglobin

Answer: C

Watch Video Solution

31. Â A person was saved tidm poisonous snake bite by antivenom injection. Which of the following immunity explains this form of protection?

A. Â Naturally acquired active immunity

B. Artificially acquired active immunity .

C. Â Naturally acquired passive immunity

D. Artificially acquired passive immunity

Answer: D

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32. According to Watson-Crick model, hydrogen bonding in a double-stranded DNA occures between

A. Adenine and guanine

B. Adenine and thymine

C. Cytosine and adenine

D. guanine and thymine

Answer: B

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33. Which ONE of the following statements about mitosis is CORRECT ?

A. One nucleus gives rise to 4 nuclei

B. Homologous chromosomes synapse during anaphase

C. The centromeres separate at the onset of anaphase

D. Non-sister chromatids recombine

Answer: C

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34. Gaseous exchange of oxygen and carbon dioxide between alveolar air and capillaries takes place by

A. Active transport

B. Diffusion

C. Carrier-mediated transport

D. Imbibition

Answer: B

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35. Of the periods listed below, which ONE is the earliest period when Ostracoderms, the jawless and finless fishes, appeared?

A. Devonian period

B. Cambrian period

C. Carboniferous period

D. Silurian period

Answer: D

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36. Scurvy is caused by the deficiency of

A. Nicotinic acid

B. Ascorbic acid

C. Pantothenic acid

D. Retinoic acid

Answer: B

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37. Optical activity of DNA is due to its

A. Bases

B. Sugars

C. Phosphate

D. Hydrogen bonds

Answer: B

Watch Video Solution

38. The monarch butterfly avoids predators such as birds by

A. Changing color frequently

B. Flying away from the predator swiftly

C. Producing a chemical obnoxious to the predator

D. Producing ultrasonic waves

Answer: C

Watch Video Solution

39. Elephantiasis (Filariasis) in man is caused by

A. Entamoeba histolytica

B. Plasmodium falciparum

C. Trypanosoma brucei

D. Wuchereria bancrofti

Answer: D

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40. Which ONE of the following conversions does NOT happen under anaerobic conditions ?

A. Glucose to ethanol by Saccharomyces.

B. Lactose to lactic acid by Lactobacillus.

C. Glucose to CO_2 and H_2O by Saccharomyces.

D. Cellulose to glucose by Cellulomonas.

Answer: C

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41. An amont of 18 g glucose corresponds to

A. 1.8 mole

B. 1 mole

C. 0.18 mole

D. 0.1 mole

Answer: D

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42. The number of electrons required to reduce one molecule of oxygen to water during mitochondrial oxidation is

A. 4

B. 3

C. 2

D. 1

Answer: A

Watch Video Solution

43. Which ONE of the following molecules is dervied from pantothenic acid ?

A. Thiamine pyrophosphate

B. Nicotinamide adenine dinucleotide phosphate

C. Flavin adenine dinucleotide phosphate

D. Acetyl-CoA

Answer: D

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44. Match the disease given in Column I with the principal causal organism in Column II and choose the correct combination.

Colum I	Column II
(P) AIDS	(i) HBV
(Q) Syphilis	(ii) *Neisseria sp.*
(R) Viral hepatitis	(iii) *Treponema sp.*
(S) Gonorrhoea	(iv) HIV

A. P-iv, Q-iii, R-i, S-ii

B. P-iv, Q-ii, R-i, S-iii

C. P-i, Q-ii, R-iv, S-iii

D. P-i, Q-iv, R-ii, S-ii

Answer: A

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45. Chromosomes are classified based on the position of centromere. A chromosome having a terminal centromere is called

A. metacentric

B. telocentric

C. sub-metacentric

D. acrocentric

Answer: B

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46. Which ONE of the following options lists the primary energy source (s) for all forms of life on earth ?

A. Light, Inorganic substances

B. Inorganic substances, Organic substances

C. Light, Organic substances

D. N_2, CO_2

Answer: A

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Part 2 Biology

1. if the genotypes determining the blood groups of a couple are $l^A L^B$ and $L^A L^B$, then the probability of their first child having type O blood is

A. 0

B. 0.25

C. 0.5

D. 0.75

Answer: A

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2. A Cross was carried out between two individuals heterozygous for two pairs genes was carried out. Assuming segregation and independent

assortment the number of different genotype and phenotype obtained respectively would be ?

A. 4 and 9

B. 6 and 3

C. 9 and 4

D. 11 and 4

Answer: C

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3. In which of the following cellular compartment(s) do respiratory reactions occur ?

A. Cytoplasm and endolasmic reticulum

B. Mitochondria and Golgi complex

C. Mitochondria and cytoplasm

D. Mitochondria only

Answer: C

Watch Video Solution

4. A women heterozygous for color blindness marries a color blind man. What would be the ratios of carrier daughters, color blind daughters, normal sons and color blind sons in the F1 generation?

A. $1:2:2:1$

B. $2:1:1:2$

C. $1:1:1:1$

D. $1:1:2:2$

Answer: C

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5. Two semi-permeable bags containing 2% sucrose are placed in two beakers, 'P' containing water and 'Q' containing 10% sucrose. Which one of the following outcomes is true?

A. Bag in 'P' becomes flaccid due to exosmosis

B. Bag in 'P' becomes turgid due to endosmosis

C. Bag in 'Q' becomes flaccid due to endodmosis

D. Concentration of sucrose remains unchanged in both

Answer: B

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6. Children suffering from phenylketonuria are given food low in phenylalanine and supplemented with tyrosine. This is because they

A. are unable to utilize phenylalanine

B. do not require phenylalanine

C. have increased tyrosine anabolism

D. have increased tyrosine catabolism

Answer: A

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7. Two bottles were half filled with water from Ganga ('P") and kaveri ('Q') and kept under identical airtight conditions for 5 days. The oxygen was determined to be 2% in bottle ('P') and 10% in bottle ('Q'). What could be the cause of this difference ?

A. Ganga is more polluted than Kaveri

B. Both the rivers are equally polluted

C. Kaveri is more polluted than Ganga

D. Kaveri has more minerals than Ganga

Answer: A

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8. Considering ABO blood grouping system in humans, during blood transfusion some combinations of blood groups are compatible $(\surd)$ whereas the others are incompatible (X). Which ONE of the following options is COR- RECT ?

A.

(A)

Donor \ Recipient	O	A	B	AB
O	X	X	X	√
A	√	X	√	X
B	√	√	X	X
AB	√	√	√	√

B.

(B)

Donor \ Recipient	O	A	B	AB
O	X	X	X	X
A	√	X	√	X
B	√	√	X	X
AB	√	√	√	X

C.

(C)

Donor \ Recipient	O	A	B	AB
O	√	X	X	X
A	√	√	X	X
B	√	X	√	X
AB	√	√	√	√

D.

(D)

Donor \ Recipient	O	A	B	AB
O	√	√	√	√
A	X	√	X	√
B	X	X	√	√
AB	X	X	X	√

Answer: D

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9. A 25,000 Da protein contains a single binding site for a molecule (ligand), whose molecular weight is 2,500 Da. Assuming high affinity and phsiologically irreversible blinding, the amount of the ligand required to occupy all the binding sites in 10 mg protein will be

A. 0.1 mg

B. 1 mg

C. 10 mg

D. 100 mg

Answer: B

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10. In an in vitro translation experiment, poly (UC) RNA template produced poly (Ser-Leu), while poly (AG) RNA template produced poly

(Arg-Glu) polypeptide. Which ONE of the following options represents correct interpretations of the codons assignments for Ser, Leu, Arg, and Glu.

A. Ser $\rightarrow$ UCU, Leu $\rightarrow$ CUC, Arg $\rightarrow$ AGA, Glu $\rightarrow$ GAG

B. Ser $\rightarrow$ CUC, Leu $\rightarrow$ GAG, Arg $\rightarrow$ UCU, Glu $\rightarrow$ AGA

C. Ser $\rightarrow$ AGA, Leu $\rightarrow$ UCU, Arg $\rightarrow$ GAG, Glu $\rightarrow$ CUC

D. Ser $\rightarrow$ GAG, Leu $\rightarrow$ AGA, Arg $\rightarrow$ CUC, Glu $\rightarrow$ UCU

Answer: A

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11. A single bacterium is actively growing in a medium that supports its growth to a number of 100 million. Assuming the division time of the bacterium as 3 hours and the life span of non-dividing bacteria as 5 hours, which ONE of the following represents the maximum number of bacteria that would be present at the end of 15 hour ?

A. 10

B. 64

C. 24

D. 32

Answer: D

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12. A couple has two sons and two daughters. Only one son is colour blind and the rest of the siblings are normal. Assuming colour blindness is sex-linked, which ONE of the following would be the phenotype of the parents ?

A. Mother would be colour blind, father would be normal.

B. Father would be colour blind, mother would be normal.

C. Both the parents would be normal.

D. Both the parents would be colour blind.

Answer: C

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Part 1 Biology

1. What is the maximum number of oxygen atoms that a molecule of haemoglobin can bind ?

A. 2

B. 4

C. 8

D. 16

Answer: C

Watch Video Solution

2. Bt toxin produced by Bacillus thuringiensis does not kill the producer because the toxin is

A. In an inactive protoxin form

B. Rapidly secreted outside

C. Inactivated by an antitoxin

D. In unfolded form

Answer: A

Watch Video Solution

3. An angiosperm was identified with its endosperm of 6n. Assuming that is a self-pollinating species, which ONE of the following is the correct ploidy of the parent ?

A. 3n

B. 4n

C. 6n

D. 8n

Answer: B

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4. Which ONE of the following statements is TRUE about viruses?

A. All viruses posses a protein coat around its genetic material at all stages of their life cylce

B. All viruses contain RNA as genetic material

C. All viruses contian DNA as gentic material

D. All viruses replicate only within the host cell

Answer: D

Watch Video Solution

5. Mitochondrial cristae are infoldings of the

A. Outer membrane and they increase the surface are

B. Outer membrane and they decrease the surface area

C. Inner membrane and they increase the surface area

D. Inner membrane and they decrease the surface area

Answer: C

Watch Video Solution

6. In biological nitrogen fixation the enzyme nitrogenase converts

A. Nitrate to nitrite

B. Atmospheric nitrogen to nitrite

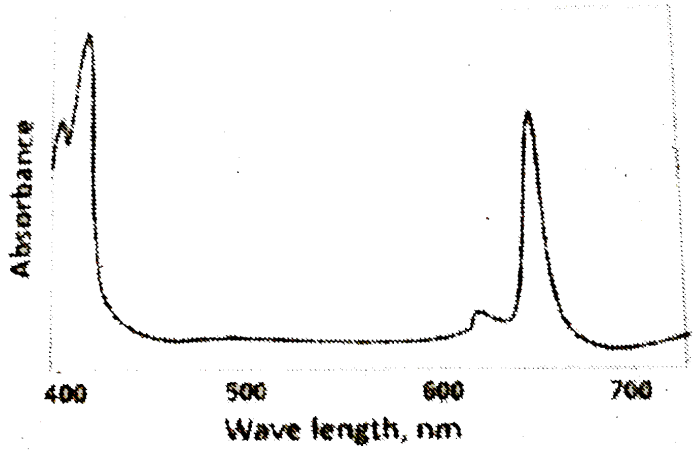
C. Nitrite to ammonia

D. Atmospheric nitrogen to ammonia

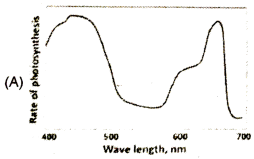
Answer: D

Watch Video Solution

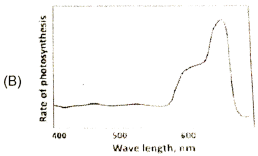
7. The graph below represents the absorption spectrum of major pigment contributing to photosynthesis ?



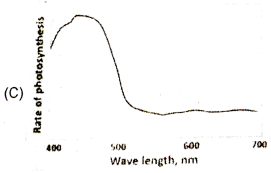
A.



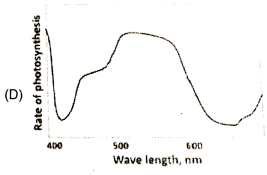
B.



C.



D.



Answer: A

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8. ONE of the following properties of normal cell is lost during its transition to cancerous cell ?

A. Glutamine utilization

B. Contact inhibition

C. Glucose utilization

D. Membrane fluidity

Answer: B

Watch Video Solution

9. Which ONE of the following gases is produced during fermentation by yeast ?

A. CO_2

B. O_2

C. H_2

D. N_2

Answer: A

Watch Video Solution

10. Serine proteases are called so because they ?

A. Require free serine for their activity

B. Cleave after serine residues in the substrate

C. Are inhibited by the presence of free serine

D. Have a serine residue at their active site

Answer: D

Watch Video Solution

11. The maximum number of genotypes of the pollens produced by a tall pea plant with round, yellow seeds of the genotype TtRrYY, if the three loci are unlinked, would be :

A. 1

B. 2

C. 4

D. 8

Answer: C

Watch Video Solution

12. ONE of the following statements is TRUE with respect to human ovary ?

A. Estrogen is secreted by Graafian follicles and progesterone by corpus lutem

B. Estrogen is secreted by corpus luteum and progesterone by Graafian follicles

C. Both estrogen and progesterone are secrted by Graafian follicles

D. Both estrogen and progesterone are secreted by corpus luteum

Answer: A

Watch Video Solution

13. Which ONE of the following statements is INCORRECT with respect to human antibodies ?

A. They can neutralize microbes

B. They are synthesised by T cells

C. They are made up of four polypeptide chains

D. Milk contains antibodies

Answer: B

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14. Concentration (%) of NaCl isotonic to human blood is

A. 0.085-0.09%

B. 1.7-1.8%

C. 3.4-3.6%

D. 0.85-0.9%

Answer: D

Watch Video Solution

15. Which ONE of the following statement is TRUE about the Golgi apparatus ?

A. It is found only in animals

B. It is found only in prokaryotes

C. It modifies and targets proteins to the plasma membrane

D. It is a site for ATP production

Answer:

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16. Creutzfeldt Jakob Disease (CJD) is a transmissible disease caused by a

A. Virus

B. Bacterium

C. Fungus

D. misfolded protein

Answer: D

Watch Video Solution

17. A researcher found petridied disnosaur faeces. Which ONE of the following is unlikely to be found in this fossil ?

A. Decayed conifer wood

B. Bamboo

C. Cycad

D. Giant fern

Answer: B

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18. Which ONE of the pair of amino-acids contains two chiral centres ?

A. Isoleucine and threonine

B. Leucine and valine

C. Valine and isoleucine

D. Theronine and leucine

Answer: A

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19. In photosynthetic carbon fixation, which ONE of the following reacts with CO_2?

A. Phosphoglycolate

B. 3-Phosphoglycerate

C. Ribulose-1,5-bisphosphate

D. Ribulose-5-phosphate

Answer: C

View Text Solution

20. Match the disease in Column-I with the routes of infection in Column-II. Choose the CORRECT combination :

	Column-I	Column-II
P.	Tuberculosis	i. Contaminated food and water
Q.	Dysentry	ii. inhalation of aerosol
R.	Filariasis	iii. Contact via skin
S.	Syphilis	iv. Sexual intercourse
		v. Mosquito bite

A. P-ii,Q-i,R-v,S-iv

B. P-ii,Q-i,R-iii,S-v

C. P-i,Q-iii,R-v,S-iv

D. P-ii,Q-ii,R-iv,S-v

Answer: A

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Part 2 Biology

1. What is the probability that a human individual would receive the entire haploid set of chromsomes from his her grandfather ?

A. $1/2$

B. $(1/2)^{23}$

C. $(1/2)^{2}$

D. $(1/2)^{46}$

Answer: B

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2. Which ONE of the following primer pairs would amplify the fragment of DNA given below ?

A. 5'-CTAGTCGTCGAT-3' and vkSj 5'- GACTGAGCTGAGCTGACTG-3'

B. 5'-CTGACTCGACTCGAC-3' and vkSj-5'- CTAGTCGTCGAT-3'

C. 5'-CTAGTCGTCGAT-3' and vkSj- CAGCTCAGCTCAGTC-3'

D. 5'-CTAGTCGTCGAT - 3' and vkSj- GTCGAGTCGAGTCAG-3'

Answer: C

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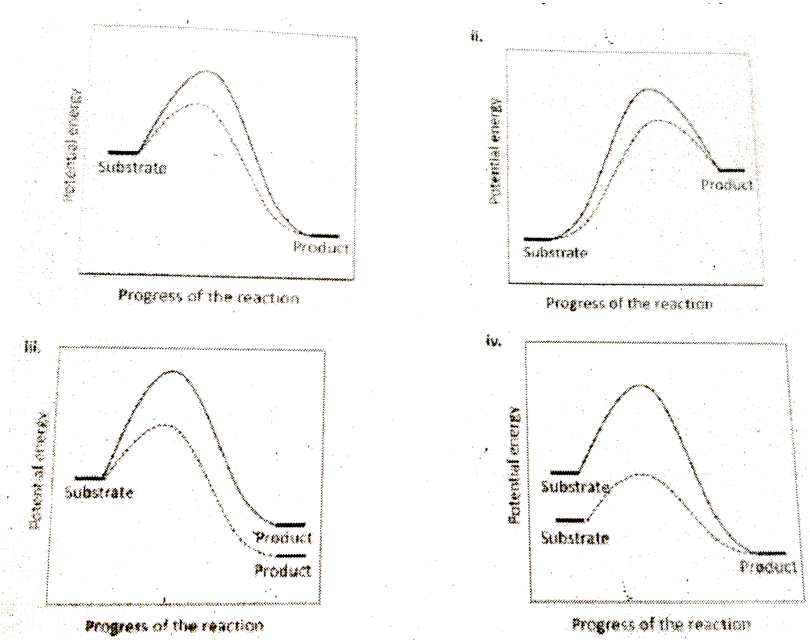
3. The following graphs with the solid and dotted lines correspond to the reactions without and with enzyme , respectively . Which of the following

graph(s) correctly represent the concept of activation energy ?



A. (i) only

B. (iii) and (iv)

C. (ii) only

D. (i) and (ii)

Answer: D

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4. A novel species with double stranded genetic material consists of 5 bases namely P, Q, R, S& T with percentages given below

	P	Q	R	S	T
Percentage	22	28	22	12	16

Based on the above information which , ONE of the following inferences is NOT supported by the observations ?

A. S base pairs with T , and Q base Pairs with R

B. S base pairs with Q , and T base pairs with Q

C. P base pairs with R , and S base pairs with Q

D. P base pairs with R , and T base pairs with Q

Answer: A

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5. How many different blood groups are possible in a diploid species with ABCD blood grouping system involving I^A, I^B, I^C and I^O alleles (I^O is recessive and others are co-dominant)

A. 4

B. 6

C. 7

D. 8

Answer: C

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6. Within the exponential phase of growth , if the initial surface area and the growth rate of a leaf are $10mm^2$ and $0.015mm^2$/hour respectively , the area of the leaf after 4 days would range from :

A. 10 to 12 mm^2

B. 20 to 24 mm^2

C. 30 to 36 mm^2

D. 40 to 48 mm^2

Answer: D

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7. If the acidic , basic and hydrophobic residues of proteins are considered to be red , green and blue in color respectively then a globular protein in aqueous solution would have

A. Red and blue on the surface and green at the core

B. Red and green on the surface and blue at the core

C. Blue on the surface and red and green at the core

D. Blue and green on the surface and red at the core

Answer: B

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8. A lysosome vesicle of 1 μ m diameter has an internal pH of 5.0 . The total number of H^+ ions inside this vesicle would range from

A. 10^3 to 10^4

B. 10^4 to 10^5

C. 10^5 to 10^{10}

D. 10^{10} to 6.023×10^{23}

Answer: A

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9. Match the vitamins listed in Column - I with their respective coenzyme form in Column - II . Choose the correct combination .

Column-I	Column-II
P. Vitamin B_1	i. Thiamine pyrophosphate
Q. Vitamin B_2	ii. Flavine adenine dinucleotide
R. Vitamin B_6	iii. Methylcobalamin
S. Vitamin B_{12}	iv. Coenzyme A
	v. Pyridoxal phosphate

A. P-v , Q - iii , R-i , S-iv

B. P-iii , Q - iv , R - ii , S- i

C. P-i , Q - ii , R - v, S - iii

D. P-i , Q - iv , R - ii , S - iii

Answer: C

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10. Two independent experiments related to photosynthesis were conducted-one with $\hat{}(18)O$- labelled water (experiment P) and the other with $\hat{}(14)C$- labelled CO_2 (experiment Q) . Which ONE of the following options lists the first labelled products in experiments P and Q respectively ?

A. $P: O_2$ $Q: 3-$ phosphoglycerate

B. $P: 3-$ Phosphoglycerate Q : NADPH

C. $P: O_2$ $Q: ATP$

D. $P:3-$ Phosphoglycerate Q : 3- phosphoglycerate

Answer: A

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Part I Chemistry

1. Which ONE of the following is NOT a function of the small intestine ?

A. Absorption of end products of digestion

B. Digestion of proteins

C. Digestion of lipids

D. Acidification of ingested food

Answer:

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2. Insulin stimulates the conversion of glucose to

A. fructose

B. glycogen

C. sucrose

D. starch

Answer:

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3. Which ONE of the following statements about ecosystem energetics is INCORRECT ?

A. The metabolic requirements of poikilotherms are higher than that of homeotherms.

B. Autotrophs form the base of the food chain in natural ecosystems.

C. In terrestrial ecosystems, most of the primary production is consumed by detritivores and not herbivores.

D. Approximately 10% energy of one trophic level is transferred to the next level.

Answer:

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4. Proton motive force is created by pumping protons across the

A. trans - Golgi network

B. endoplasmic reticulum

C. mitochondrial membrane

D. early endosomal membrane

Answer:

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5. Which ONE of the following Mendelian diseases is an example of X-linked recessive disorder ?

A. Haemophilia

B. Phenylketonuria

C. Sickle cell anaemia

D. Beta - thalassemia

Answer:

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6. Which ONE of the following pairs gives rise to fruit and seed, respectively, in a typical angiosperm plant ?

A. Ovule and ovary

B. Ovary and pollen

C. Pollen and anther

D. Ovary and ovule

Answer:

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7. The concept of vaccination arose from Edward Jenner's observation that

A. injecting inactivated anthrax spores in sheep protected them from anthrax.

B. injecting humans with tuberculosis - infected lung extracts protected them from tuberculosis.

C. milk - maids previously infected with cowpox did not contract small pox.

D. injecting inactivated rabies virus in humans protected them from rabies.

Answer:

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8. A plant with genotype AABBCC is crossed with another plant aabbcc genotype. How many different genotypes of pollens is possible in an F1 plant if these three loci follow independent assortment ?

A. 8

B. 4

C. 2

D. 1

Answer:

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9. Which ONE of the following sequences of evenets CORRECTLY represents mitosis ?

A. Metaphase, telophase, prophase, anaphase

B. Anaphase, prophase, metaphase, telophase

C. Prophase, anaphase, metaphase, telophase

D. Prophase, metaphase, anaphase, telophase

Answer:

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10. The amount of air that is left behind in lungs after expiratory reserve volume has been exhaled is

A. inspiratory reserve volume.

B. tidal volume.

C. residual volume.

D. vital capacity.

Answer:

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11. Match the species in Column I with their respective feature of body organisation in Column II

Column I	Column II
P. Mollusca	i. Pseudocoelom
Q. Annelida	ii. Radula
R. Nematoda	iii. Radial symmetry
S. Echinodermata	iv. Segmentation

Choose the CORRECT combination.

A. P-ii, Q-i, R-iv, S-iii

B. P-ii, Q-iv, R-i, S-iii

C. P-iii, Q-iv, R-i, S-ii

D. P-iv, Q-iii, R-ii, S-i

Answer:

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12. Who among the following scientists proposed the theory natural selection independently of Charles Drawin ?

A. Alfred Russel Wallace

B. Carl Linnaeus

C. Georges Cuvier

D. Jeans - Baptist Lamarck

Answer:

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13. The maximum concentration of harmuful chemicals is expected to be found in organisms

A. at the bottom of a food chain.

B. at the middle of a food chain.

C. at the top of a food chain.

D. at any level in a food chain

Answer:

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14. The genome of SARS - Co V2 is composed of

A. double stranded DNA.

B. double stranded RNA.

C. single stranded DNA.

D. single stranded RNA.

Answer:

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Part I Biology

1. Species with high fecundity, high growth rates, and small body sizes are typically

A. endangered species

B. keystone species

C. K-selected species

D. r-selected species

Answer:

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2. When RNase enzyme is denatured by adding urea, which ONE of the following combinations of bonds would be disrupted?

A. Ionic and disulphide bonds

B. Ionic and hydrogen bonds

C. Hydrogen and peptide bonds

D. Peptide and disulphide bonds

Answer:

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3. The function of aposematic colouration is to

A. attract mates

B. camouflage

C. scare off competitors

D. warn predators

Answer:

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4. The exponent z of the species-area measured at continental scales is

A. smaller than the value of z at regional scales

B. equal to the value of z at regional scales

C. greater than the value of z at regional scales

D. unrelated to the vallue of z at regional scales.

Answer:

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5. The pH of an aqueous solution of $10^{-8} MHCl$ is

A. 6.0

B. between 6.9 - 7.0

C. between 7.0 - 7.1

D. 8.0

Answer:

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6. Which ONE of the following can NOT cause eutrophication of lakes?

A. Introduction of invasive floating plants

B. Discharge of fertilizer-rich agricultural waste

C. Natural ageing of lakes

D. Discharge of industrial waste

Answer:

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7. Which ONE of the following polymerases transcribes 5S rRNA?

A. RNA Pol I

B. RNA Pol III

C. RNA Pol II

D. RNA Pol IV

Answer:

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8. Which ONE of the following statements about renning is CORRET?

A. It is secreted by adrenal glands

B. It converts angiotensinogen to angiotensin

C. It is secreted by peptic cells of gastric glands into the stomach

D. It is a hormone

Answer:

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9. When one goes from a brightly lit area to a dimly lit room our eyes adjusts slowly, thereby regaining the clarity of vision. Which ONE of the following explains this process?

A. Regeneration of rhodopsin in the rod cells

B. Bleaching of rhodopsin

C. Constriction of the pupil

D. Increase in the number of rod cells

Answer:

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10. In a diploid population at Hardy-Weinberg equilibrium, consider a locus with two alleles. The frequencies of these two alleles are denoted by p and q, respectively. Heterozygosity in this population is maximum at

A. $p = 0.25, q = 0.75$

B. $p = 0.4, q = 0.6$

C. $p = 0.6, q = 0.4$

D. $p = 0.5, q = 0.5$

Answer:

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11. An enzyme with optimal activity at pH 2.0 and $37^\circ C$ is most likely to be

A. lysozyme from hen egg white

B. trypsin from cattle

C. DNA polymerase from Thermus aquaticus

D. pepsin from humans

Answer:

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12. While adjusting to varying environmental temperature, plants incorporate in their plasma membrane

A. more saturated fatty acids in cold and more unsaturated fatty acids in hot environment

B. more unsaturated fatty acids in cold and more saturated fatty acid in hot environment

C. more saturated fatty acids in both cold and hot environment

D. more unsaturated fatty acids in both cold and hot environment

Answer:

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13. Which ONE of the following terms is NOT used while describing human vertebra?

A. Lumbar

B. Sacral

C. Thoracic

D. Tarsal

Answer:

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14. Assume a population that has reached herd immunity for an infectious disease. If an infected individual is introduced to this population. Which of the following is most likely to occur?

A. The infection will spread exponentially across population

B. The infection will spread linearly across the population

C. A few individuals may get infected, but the infection will not spread across the population

D. No other individual will be infected by the disease

Answer:

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15. Match the type of cells in Column I with the organs they are part of, listed in

Column I	Column II
P. Chondroblast	i. Bone
Q. Osteoclast	ii. Brain
R. Microglia	iii. Cartilage
S. Pneumocyte	iv. Lung

Choose the CORRECT combination.

A. p-iii, Q-I, R-ii, S-iv

B. P-ii, Q-I, R-iii, S-iv

C. P-iv, Q-iii, R-ii,

D. P-iii, Q-ii, R-iv, S-i

Answer:

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16. A bacterial culture was started with an inoculum of 10 cells. What will be the number of cells at the end of 10 cycles of division, assuming that every progeny cell undergoes division in each cycle?

A. 100

B. 1024

C. 2048

D. 10240

Answer:

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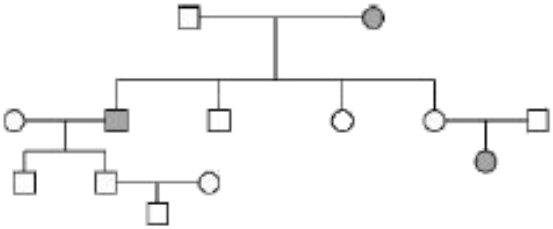
17. The following family tree traces the occurrence of a rate genetic disease. The filled symbols signify the individuals with the disease, whereas the open symbols signify healthy individuals.



Based on this information, the disease is most likely to be

A. autosomal, dominant

B. autosomal, recessive

C. X-linked, recessive

D. X-inked, dominant

Answer:

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18. Which ONE of the following statements is CORRECT about the mechanism of action of penicillin?

A. It inhibits transcription

B. It hydrolyses cell wall

C. It inhibits cell wall biosynthesis

D. It inhibits translation

Answer:

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19. Leaf extract from an infected plant was passed through a filter with a pore size of $0.05\mu m$ diameter. The infectious agent was detected in the filtrate. Which ONE of the following is the likely infectious agent?

A. Bacteria

B. Virus

C. Nematode

D. Fungus

Answer:

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