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Topic:- DU_J19_MSC_GENETICS

1) Two siblings who inherit 50% of the genome from the mother and 50% from the father show lot of phenotypic differences. Which one of the following events during gametogenesis of the parents will maximally contribute to this difference? [Question ID = 2609]

1. Independent assortment [Option ID = 10435]
2. Recombination [Option ID = 10434]
3. Mutation [Option ID = 10433]
4. Environment [Option ID = 10436]

Correct Answer :-

- Mutation [Option ID = 10433]

2) Which anti-cancerous drug is obtained from *Catharanthus roseus* ?

[Question ID = 2665]

1. Serpentine [Option ID = 10659]
2. Colchicine [Option ID = 10660]
3. Taxol [Option ID = 10657]
4. Vincristine [Option ID = 10658]

Correct Answer :-

- Taxol [Option ID = 10657]

3) Which of the following statements about C3 and C4 cycle is INCORRECT:

[Question ID = 2667]

1. Both C3 and C4 cycle uses Rubisco for final CO_2 incorporation into sugar [Option ID = 10666]
2. Both are pathways of dark reaction of photosynthesis [Option ID = 10665]
3. C4 plants have stomata closed during the day and open only at night [Option ID = 10668]
4. C4 plants use PEP carboxylase for uptake of CO_2 and C3 plants use Rubisco [Option ID = 10667]

Correct Answer :-

- Both are pathways of dark reaction of photosynthesis [Option ID = 10665]

4) Which of the following proteins is NOT involved in the process of translation?

[Question ID = 2670]

1. Ribosomal RNA [Option ID = 10677]
2. Elongation factors [Option ID = 10680]
3. Aminoacyl tRNA synthetase [Option ID = 10678]
4. Initiation factors [Option ID = 10679]

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Correct Answer :-

- Ribosomal RNA [Option ID = 10677]

5) Which one of the following statements about nitrogen fixation is correct?

[Question ID = 2668]

1. Plants convert atmospheric nitrogen to ammonia [Option ID = 10669]
2. Mutant strains of rhizobium are able to secrete excess protein into the soil [Option ID = 10670]
3. The enzyme nitrogenase reduces N_2 to form ammonia [Option ID = 10671]
4. Ammonia is converted to N_2, which is the form of nitrogen most easily absorbed by plants [Option ID = 10672]

Correct Answer :-

- Plants convert atmospheric nitrogen to ammonia [Option ID = 10669]

6) Which one of the following genetic disorders manifests due to defects in nucleotide excision repair?

[Question ID = 2661]

1. Lynch syndrome [Option ID = 10643]
2. Hereditary nonpolyposis colorectal cancer (HNPCC) [Option ID = 10641]
3. Xeroderma pigmentosum (XP) [Option ID = 10642]
4. Diabetes [Option ID = 10644]

Correct Answer :-

- Hereditary nonpolyposis colorectal cancer (HNPCC) [Option ID = 10641]

7) A circular DNA of 4.7 Mb (Mb=million base pairs) length is cut with a restriction enzyme whose precise recognition sequence is not known. The digest shows ~75 fragments on a pulsed-field gel. What is the most likely conclusion from this data? [Question ID = 2696]

1. The enzyme is an 8-base cutter [Option ID = 10783]
2. The enzyme is a 6-base cutter [Option ID = 10782]
3. The enzyme is a 4-base cutter [Option ID = 10781]
4. This was a partial digest [Option ID = 10784]

Correct Answer :-

- The enzyme is a 4-base cutter [Option ID = 10781]

8) An individual has the genotype *Aa Bb cc dd Ee*. What frequency of gametes will have the genotype abcde?

[Question ID = 2617]

1. 1/16 [Option ID = 10467]
2. 1/8 [Option ID = 10466]
3. 1/4 [Option ID = 10465]
4. 1/32 [Option ID = 10468]

Correct Answer :-

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- 1/4 [Option ID = 10465]

9) An individual has the genotype *Aa Bb*. The two genes are linked in cis and are 5cM apart. What percentage of gametes will have the genotype *ab*?

[Question ID = 2618]

1. 5 [Option ID = 10470]
2. 47.5 [Option ID = 10471]
3. 95 [Option ID = 10472]
4. 2.5 [Option ID = 10469]

Correct Answer :-

- 2.5 [Option ID = 10469]

10) A group of blastomeres of the amphibian blastula that can induce gastrulation when placed at an ectopic site is called as: [Question ID = 2657]

1. Spemann's organizer [Option ID = 10627]
2. Hensen's node [Option ID = 10625]
3. Henle's loop [Option ID = 10626]
4. Zone of polarizing activity [Option ID = 10628]

Correct Answer :-

- Hensen's node [Option ID = 10625]

11) A group that includes a common ancestor and some descendants is called: [Question ID = 2672]

1. allopatric [Option ID = 10688]
2. monophyletic [Option ID = 10685]
3. polyphyletic [Option ID = 10687]
4. paraphyletic [Option ID = 10686]

Correct Answer :-

- monophyletic [Option ID = 10685]

12) If half-life of a radioactive material is 15 minutes, how much of a 1mCi sample would be left after 45 minutes? [Question ID = 2647]

1. 0.50mCi [Option ID = 10585]
2. 0.0625 mCi [Option ID = 10588]
3. 0.125mCi [Option ID = 10587]
4. 0.250 mCi [Option ID = 10586]

Correct Answer :-

- 0.50mCi [Option ID = 10585]

13) Regarding protein structure, which, if any, of the following statements is INCORRECT?

[Question ID = 2662]

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1. The structure of an alpha-helix is determined by hydrogen bonding between chemical groups on the side chains. [Option ID = 10648]
2. The primary structure is the linear sequence of amino acids. [Option ID = 10645]
3. The secondary structure is the path followed by the polypeptide backbone over its length. [Option ID = 10646]
4. The secondary structure of every protein contains an alpha-helix. [Option ID = 10647]

Correct Answer :-

- The primary structure is the linear sequence of amino acids. [Option ID = 10645]

14) The gene which is suppressed by another non-allelic gene through interaction is known as [Question ID = 2624]

1. Homologs [Option ID = 10495]
2. Epistatic [Option ID = 10493]
3. Pleotropic [Option ID = 10496]
4. Hypostatic [Option ID = 10494]

Correct Answer :-

- Epistatic [Option ID = 10493]

15) The genetic map for three genes A, B and C is as follows: A-B = 10 map units, B-C = 5 map units and A-C = 15 map units. In an individual of genotype *AbC/aBc*, the percentage of gametes expected to be *ABC* is (assume no interference) [Question ID = 2610]

1. 0.25 [Option ID = 10437]
2. 0.5 [Option ID = 10438]
3. 2.5 [Option ID = 10439]
4. 5 [Option ID = 10440]

Correct Answer :-

- 0.25 [Option ID = 10437]

16) A grasshopper population is being assessed by capture-mark-recapture method. On the first day, 100 grasshoppers were captured from a given area in 1 hour time, marked and released. On the next day during recapture 10 marked and 90 unmarked grasshoppers could be found in the same time period and same area. What is the estimated population of grasshopper in this area?

[Question ID = 2630]

1. 80 [Option ID = 10517]
2. 100 [Option ID = 10518]
3. 10000 [Option ID = 10520]
4. 1000 [Option ID = 10519]

Correct Answer :-

- 80 [Option ID = 10517]

17) A group of plants is kept under 12hr light /12 hr dark regimen and it flowers. Another group of plants is kept under similar conditions but given a flash of light during the night period. The plants fail to flower. From these observations we can conclude that the plant is

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[Question ID = 2695]

1. Long day plants [Option ID = 10777]
2. Day neutral plants [Option ID = 10779]
3. Short day plants [Option ID = 10778]
4. Medium day plants [Option ID = 10780]

Correct Answer :-

- Long day plants [Option ID = 10777]

18) During splicing the spliceosome complex does not recognize which of the following sites?

[Question ID = 2683]

1. Branch point [Option ID = 10730]
2. Acceptor [Option ID = 10731]
3. G-rich site [Option ID = 10732]
4. Donor [Option ID = 10729]

Correct Answer :-

- Donor [Option ID = 10729]

19) During meiosisI, formation of a ring involving four chromosomes is often an indication of

[Question ID = 2635]

1. pericentric inversion [Option ID = 10538]
2. paracentric inversion [Option ID = 10537]
3. tetraploidy [Option ID = 10539]
4. reciprocal translocation [Option ID = 10540]

Correct Answer :-

- paracentric inversion [Option ID = 10537]

20) The lactose operon in *E. coli* is an example of: [Question ID = 2699]

1. repressible operon with negative regulation only [Option ID = 10793]
2. repressible operon with both negative and positive regulation [Option ID = 10795]
3. inducible operon with negative regulation only [Option ID = 10794]
4. inducible operon with both negative and positive regulation [Option ID = 10796]

Correct Answer :-

- repressible operon with negative regulation only [Option ID = 10793]

21) The most widely accepted theory for the transport of carbohydrates in higher plants is [Question ID = 2674]

1. Mass flow theory [Option ID = 10694]
2. Osmotic theory [Option ID = 10693]
3. Root pressure theory [Option ID = 10695]
4. Imbibition theory [Option ID = 10696]

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Correct Answer :-

- Osmotic theory [Option ID = 10693]

22) Plants dissipate excess excitation energy as heat so as to protect from photo-oxidative damage. The mechanisms known as: [Question ID = 2688]

1. Photo-inhibition [Option ID = 10750]
2. Non- photochemical quenching [Option ID = 10752]
3. Photo chemical quenching [Option ID = 10751]
4. Warburg effect [Option ID = 10749]

Correct Answer :-

- Warburg effect [Option ID = 10749]

23) With reference to *lac* operon which of the following merodiploids will show a constitutive expression of β-galactosidase?

[Question ID = 2620]

1. $I^-O^CZ^+Y^-$ / F' $I^+O^+Z^-Y^+$ [Option ID = 10478]
2. $I^-O^CZ^-Y^-$/ F' $I^+O^+Z^+Y^+$ [Option ID = 10480]
3. $I^-O^+Z^+Y^-$ / F' $I^+O^CZ^-Y^+$ [Option ID = 10479]
4. $I^-O^+Z^+Y^-$ / F' I^+ $O^+Z^-Y^+$ [Option ID = 10477]

Correct Answer :-

- $I^-O^+Z^+Y^-$ / F' I^+ $O^+Z^-Y^+$ [Option ID = 10477]

24) How many consensus sequences for splicing are found in an exon? [Question ID = 2686]

1. 2 [Option ID = 10743]
2. 0 [Option ID = 10741]
3. 1 [Option ID = 10742]
4. 3 [Option ID = 10744]

Correct Answer :-

- 0 [Option ID = 10741]

25) How many copies of an allele is likely to be found in a bacterial genome? [Question ID = 2616]

1. 2 or more [Option ID = 10463]
2. 2 [Option ID = 10462]
3. Cannot be predicted as it will depend upon the size of the gene [Option ID = 10464]
4. 1 [Option ID = 10461]

Correct Answer :-

- 1 [Option ID = 10461]

26) How many membranes will a small molecule diffusing from the cytosol of one mammalian cell to the mitochondrial matrix of the adjoining cell transverse? [Question ID = 2701]

1. Two [Option ID = 10801]

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2. Three [Option ID = 10802]
3. Four [Option ID = 10803]
4. Five [Option ID = 10804]

Correct Answer :-

- Two [Option ID = 10801]

27) The process of replication is: [Question ID = 2606]

1. Discontinuous only [Option ID = 10422]
2. Semi-conservative and discontinuous [Option ID = 10424]
3. Semi-conservative and continuous [Option ID = 10423]
4. Semi conservative only [Option ID = 10421]

Correct Answer :-

- Semi conservative only [Option ID = 10421]

28) Digestion of a 5kb linear DNA fragment with *Eco* RI generates two fragments of 2 kb and 3 kb, while digestion of the same molecule with *Hind* III yields three fragments of 0.7 kb, 3.5 kb and 0.8 kb. When the same DNA is digested with both the enzymes, it yields fragments of 0.7 kb, 1.3 kb, 2.2 kb and 0.8 kb. The right sequence of restriction sites in the DNA fragment is [Question ID = 2648]

1. Two *Hind* III sites followed by only one *Eco* RI site [Option ID = 10591]
2. One *Eco* RI site in between two *Hind* III sites [Option ID = 10589]
3. One *Eco* RI site followed by two *Hind* III sites. [Option ID = 10592]
4. One *Hind* III site in between two *Eco* RI sites [Option ID = 10590]

Correct Answer :-

- One *Eco*RI site in between two *Hind*III sites [Option ID = 10589]

29) Zygotic meiosis is a characteristic feature of [Question ID = 2638]

1. Gymnosperms [Option ID = 10552]
2. Bryophytes [Option ID = 10550]
3. Algae [Option ID = 10549]
4. Pteridophytes [Option ID = 10551]

Correct Answer :-

- Algae [Option ID = 10549]

30) An unknown bacteriophage has a base composition of 23 % G, 36 % C, 21 % A, and 20 % T. Its genome is likely to be: [Question ID = 2605]

1. Double stranded RNA [Option ID = 10418]
2. Double stranded DNA [Option ID = 10417]
3. Single stranded DNA [Option ID = 10419]
4. Single stranded RNA [Option ID = 10420]

Correct Answer :-

- Double stranded DNA [Option ID = 10417]

31) Amensalism is a kind of interaction between two species in which [Question ID = 2604]

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1. both species have detrimental effect [Option ID = 10415]
2. both species have beneficial effect [Option ID = 10416]
3. one has the beneficial effect while the other is not affected [Option ID = 10413]
4. one has the detrimental effect and the other is not affected [Option ID = 10414]

Correct Answer :-

- one has the beneficial effect while the other is not affected [Option ID = 10413]

32) Targeted suppression of gene expression can be achieved through:

[Question ID = 2679]

1. T-DNA mutagenesis [Option ID = 10714]
2. RNA interference [Option ID = 10713]
3. Transposon mutagenesis [Option ID = 10715]
4. Ethyl methanesulphonate [Option ID = 10716]

Correct Answer :-

- RNA interference [Option ID = 10713]

33) Deviation in Hardy-Weinberg equilibrium in a population would be caused by:

[Question ID = 2697]

1. Random mating [Option ID = 10788]
2. Founder effect [Option ID = 10787]
3. Lack of selection [Option ID = 10785]
4. Large population size [Option ID = 10786]

Correct Answer :-

- Lack of selection [Option ID = 10785]

34) Übisch bodies are:

[Question ID = 2639]

1. callose rich vesicles which get impregnated in the cavities of exine. [Option ID = 10556]
2. membrane bound lipoidal bodies that contribute to exine formation. [Option ID = 10553]
3. membrane bound proteinaceous bodies that confer recognition reaction. [Option ID = 10555]
4. polysaccharidic granules that give species specific exine pattern. [Option ID = 10554]

Correct Answer :-

- membrane bound lipoidal bodies that contribute to exine formation. [Option ID = 10553]

35) A chromosomal aberration leads to a change in the order of genes in a genetic map but does not alter its linkage group. This could be due to [Question ID = 2629]

1. Translocation [Option ID = 10513]
2. Recombination [Option ID = 10514]
3. Transposition [Option ID = 10515]
4. Inversion [Option ID = 10516]

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Correct Answer :-

- Translocation [Option ID = 10513]

36) Contact dermatitis is an example of [Question ID = 2641]

1. Cell- mediated hypersensitivity [Option ID = 10563]
2. Anaphylaxis hypersensitivity [Option ID = 10562]
3. Immune complex hypersensitivity [Option ID = 10564]
4. Cytotoxic hypersensitivity [Option ID = 10561]

Correct Answer :-

- Cytotoxic hypersensitivity [Option ID = 10561]

37) To make a 1L solution of 0.1N $MgCl_2$ from a 10N stock solution of $MgCl_2$, the volume of H_2O and 10N $MgCl_2$ that is needed to be mixed will be: [Question ID = 2700]

1. 800ml H_2O + 200ml $MgCl_2$ [Option ID = 10799]
2. 999ml H_2O + 1ml $MgCl_2$ [Option ID = 10798]
3. 900ml H_2O + 100ml $MgCl_2$ [Option ID = 10797]
4. 990ml H_2O + 10ml $MgCl_2$ [Option ID = 10800]

Correct Answer :-

- 900ml H_2O + 100ml $MgCl_2$ [Option ID = 10797]

38) Value of which of the following parameter is ZERO when the cell is fully turgid? [Question ID = 2660]

1. Turgor pressure [Option ID = 10637]
2. Wall pressure [Option ID = 10638]
3. Osmotic pressure [Option ID = 10639]
4. Diffusion pressure deficit [Option ID = 10640]

Correct Answer :-

- Turgor pressure [Option ID = 10637]

39) In order to purify a protein from a given cell extract, which of the following techniques would give maximum purity? [Question ID = 2646]

1. Affinity chromatography [Option ID = 10582]
2. Anion exchange [Option ID = 10584]
3. Cation exchange [Option ID = 10583]
4. Gel filtration [Option ID = 10581]

Correct Answer :-

- Gel filtration [Option ID = 10581]

40) In order to produce a karyotype, dividing cells are treated with colchicine to: [Question ID = 2632]

1. osmotically weaken the nuclear membrane [Option ID = 10527]
2. halt cell division at metaphase [Option ID = 10528]

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3. produce characteristic banding patterns [Option ID = 10526]
4. increase condensation of chromosomes [Option ID = 10525]

Correct Answer :-

- increase condensation of chromosomes [Option ID = 10525]

41) Transcription is said to proceed in 5′ to 3′ direction because: [Question ID = 2637]

1. The RNA polymerase attaches itself to the 5′ end of the DNA and moves towards the 3′ end [Option ID = 10547]
2. the incoming rNTP is added onto the free phosphate group at the 3′ position of the sugar in the nascent transcript [Option ID = 10548]
3. the incoming rNTP is added onto the free OH group at the 5′ position of the sugar in the nascent transcript [Option ID = 10545]
4. the incoming rNTP is added onto the free OH group at the 3′ position of the sugar in the nascent transcript [Option ID = 10546]

Correct Answer :-

- the incoming rNTP is added onto the free OH group at the 5′ position of the sugar in the nascent transcript [Option ID = 10545]

42) Which type of chemical mutagen are incorporated into the genome by DNA polymerase during replication? [Question ID = 2621]

1. Deaminating agents [Option ID = 10483]
2. Alkylating agents [Option ID = 10481]
3. Intercalating agents [Option ID = 10484]
4. Base analogs [Option ID = 10482]

Correct Answer :-

- Alkylating agents [Option ID = 10481]

43) Which type of restriction enzymes does not require ATP? [Question ID = 2677]

1. Type II [Option ID = 10706]
2. Type III [Option ID = 10707]
3. Type IV [Option ID = 10708]
4. Type I [Option ID = 10705]

Correct Answer :-

- Type I [Option ID = 10705]

44) Antigen recognition by an antibody depends on: [Question ID = 2640]

1. N-terminal of both heavy and light chain [Option ID = 10560]
2. N-terminus of light chain [Option ID = 10559]
3. C-terminal of both heavy and light chain [Option ID = 10558]
4. C-terminal of heavy chain [Option ID = 10557]

Correct Answer :-

- C-terminal of heavy chain [Option ID = 10557]

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45) If inheritance of a disease to the next generation is only possible through females, the probable mode of inheritance is:

[Question ID = 2627]

1. Autosomal [Option ID = 10508]
2. Cytoplasmic [Option ID = 10507]
3. Mendelian [Option ID = 10505]
4. Sex-linked [Option ID = 10506]

Correct Answer :-

- Mendelian [Option ID = 10505]

46) A mutational event inserts bases at the start of the coding sequence of a gene. The highest chance of the altered protein being functional when the number of base(s) inserted is:

[Question ID = 2682]

1. 1 [Option ID = 10725]
2. 4 [Option ID = 10728]
3. 2 [Option ID = 10726]
4. 3 [Option ID = 10727]

Correct Answer :-

- 1 [Option ID = 10725]

47) In which of the following cases a heterozygote can be easily distinguished from a homozygote? [Question ID = 2615]

1. Recessive epistasis as well as in case of complementary genes [Option ID = 10460]
2. Recessive epistasis only [Option ID = 10459]
3. Incomplete dominance only [Option ID = 10457]
4. Incomplete dominance as well as co-dominance [Option ID = 10458]

Correct Answer :-

- Incomplete dominance only [Option ID = 10457]

48) Migration of individual cells from the surface into the embryo's interior is termed as [Question ID = 2644]

1. Ingression. [Option ID = 10573]
2. Delamination. [Option ID = 10576]
3. Involution. [Option ID = 10574]
4. Invagination. [Option ID = 10575]

Correct Answer :-

- Ingression. [Option ID = 10573]

49) A cross is made between a pure breeding plant with red coloured flowers and a pure breeding plant with white coloured flowers. Such a cross is called as a:

[Question ID = 2631]

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1. dihybrid cross [Option ID = 10523]
2. back cross [Option ID = 10524]
3. test cross [Option ID = 10521]
4. monohybrid cross [Option ID = 10522]

Correct Answer :-

- test cross [Option ID = 10521]

50) If an mRNA has AUGACCUAACAU sequence, what will be the sequence of the template? [Question ID = 2693]

1. ATGTTAGGTCAT [Option ID = 10770]
2. TACAATCCAGTA [Option ID = 10772]
3. TACTGGATTGTA [Option ID = 10771]
4. ATGACCTAACAT [Option ID = 10769]

Correct Answer :-

- ATGACCTAACAT [Option ID = 10769]

51) You have a protein which has the same conformation independent of acidic or basic pH. You separate it on a 10cm long Native PAGE which has been made in buffer with pH 4.5 and you find the protein band to have migrated to 8cm after applying 20mA current for 3hrs. You then separate the protein on a 10cm Native PAGE made with buffer of pH 11 for 3hrs by applying a current of 20mA. How far would the protein band run? [Question ID = 2651]

1. 9 cm [Option ID = 10603]
2. 4 cm [Option ID = 10601]
3. 10 cm [Option ID = 10604]
4. 8cm [Option ID = 10602]

Correct Answer :-

- 4 cm [Option ID = 10601]

52) Peter Mitchell's chemiosmotic hypothesis used inside out submitochondrial vesicles. In an effort to replicate his experiments, you prepare similar vesicles and assay for ATP production. However, you observe that very little ATP is produced in the presence of ADP, O_2 and physiological buffer at pH 7. You have already checked for presence of Pi in the buffer. Which of the following will you do next to increase your ATP production? [Question ID = 2669]

1. Decrease the pH of the external buffer compared to the inside of vesicles [Option ID = 10673]
2. Increase the pH of the external buffer compared to the inside of vesicles [Option ID = 10675]
3. Add more ADP into the vesicles [Option ID = 10676]
4. Add more ADP to the external buffer [Option ID = 10674]

Correct Answer :-

- Decrease the pH of the external buffer compared to the inside of vesicles [Option ID = 10673]

53) Eukaryotic cells and their organelles are disrupted by sonication. Soluble and insoluble components are separated by centirifugation. Protein X is found in the insoluble fraction following centrifugation. The insoluble fraction is treated with 0.5 M NaCl and centrifugation is repeated. Protein X is now found in the soluble fraction. Protein X would be best described as [Question ID = 2666]

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1. a soluble cytoplasmic protein [Option ID = 10663]
2. a soluble nuclear protein [Option ID = 10664]
3. an integral membrane protein in an organelle [Option ID = 10661]
4. a peripheral membrane protein [Option ID = 10662]

Correct Answer :-

- an integral membrane protein in an organelle [Option ID = 10661]

54) Given that an autosomal gene has 5 alleles, how many heterozygous genotypes can be formed? [Question ID = 2613]

1. 18 [Option ID = 10451]
2. 24 [Option ID = 10452]
3. 12 [Option ID = 10450]
4. 10 [Option ID = 10449]

Correct Answer :-

- 10 [Option ID = 10449]

55) A carbon fixation pathway that evolved in some plants as an adaptation to arid conditions is for increased efficiency in the use of water:

[Question ID = 2675]

1. Crassulacean Acid Metabolism [Option ID = 10699]
2. Calvin cycle [Option ID = 10697]
3. Krebs cycle [Option ID = 10700]
4. Hatch and Slack pathway [Option ID = 10698]

Correct Answer :-

- Calvin cycle [Option ID = 10697]

56) Electrophoresis of a purified protein by SDS-PAGE in presence of 2-mercaptaethanol yields two bands of 35kDa and 45kDa. However, in gelfiltration chromatography, the same protein elutes as a 80kDa. What conclusion will you draw from your results?

[Question ID = 2649]

1. Two bands generated in SDS-PAGE due to degradation [Option ID = 10594]
2. The protein is a heterodimer [Option ID = 10596]
3. The protein is not purified to homogeneity [Option ID = 10593]
4. The protein is a homodimer [Option ID = 10595]

Correct Answer :-

- The protein is not purified to homogeneity [Option ID = 10593]

57) A nucleoside molecule is made of a base linked to: [Question ID = 2698]

1. position 2 of the ribose sugar [Option ID = 10790]
2. position 1 of the ribose sugar [Option ID = 10789]
3. position 3 of the ribose sugar [Option ID = 10791]
4. position 5 of the ribose sugar [Option ID = 10792]

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Correct Answer :-

- position 1 of the ribose sugar [Option ID = 10789]

58) When several steps occur in a reaction, the overall rate is: [Question ID = 2656]

1. independent of activation energy [Option ID = 10623]
2. determined by the step with the highest activation energy [Option ID = 10622]
3. determined by the step with the lowest activation energy [Option ID = 10621]
4. determined by the fastest step [Option ID = 10624]

Correct Answer :-

- determined by the step with the lowest activation energy [Option ID = 10621]

59) In the classical example of a dihybrid cross with a F_2 phenotypic ratio of 9:7, which of the following statements is FALSE for the two genes involved?

[Question ID = 2614]

1. Alleles of each gene exhibit segregation. [Option ID = 10456]
2. The genes exhibit epistasis [Option ID = 10455]
3. The genes are linked [Option ID = 10454]
4. The genes assort independently [Option ID = 10453]

Correct Answer :-

- The genes assort independently [Option ID = 10453]

60) In the tomato, cut leaf, C, is dominant to potato leaf, c; and, purple stem, A, is dominant to green stem, a. Potato purple plants are crossed with cut, green plants and the progeny ratios were: 70 cut, purple; 91 potato, purple; 86 cut, green; 77 potato, green. What are the probable genotypes of the parents?

[Question ID = 2611]

1. *cc Aa x Cc aa* [Option ID = 10441]
2. *cc Aa x Cc aa* [Option ID = 10442]
3. *cc Aa x CC aa* [Option ID = 10444]
4. *cc AA x CC aa* [Option ID = 10443]

Correct Answer :-

- *cc Aa x Cc aa* [Option ID = 10441]

61) In temperature sensitive mutant bacterial strain there is large accumulation of Okazaki fragments when grown at non-permissive temperature in comparison to those grown at permissive temperature. The bacterial strain is likely to carry a mutation in a gene encoding for which of the following?

[Question ID = 2684]

1. DNA topoisomerase I [Option ID = 10734]
2. DNA ligase [Option ID = 10735]
3. DNA gyrase [Option ID = 10736]

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4. DNA polymeraseI [Option ID = 10733]

Correct Answer :-

- DNA polymeraseI [Option ID = 10733]

62) pH of an aqueous solution is 4. What is its [OH^-] ? [Question ID = 2703]

1. 12 [Option ID = 10812]
2. 10 [Option ID = 10811]
3. 3 [Option ID = 10809]
4. 4 [Option ID = 10810]

Correct Answer :-

- 3 [Option ID = 10809]

63) The counts of bacteria per mL in samples drawn at two points separated by one hour in the exponential phase are approx. 1.5 X10^8 and 6 X 10^8 , respectively. The generation time of the bacterium is [Question ID = 2650]

1. ¾ hr [Option ID = 10598]
2. ¼ hr [Option ID = 10600]
3. 1 hr [Option ID = 10597]
4. ½ hr [Option ID = 10599]

Correct Answer :-

- 1 hr [Option ID = 10597]

64) Gap junctions are NOT essential for which of the following function(s): [Question ID = 2689]

1. Skeletal muscle contraction [Option ID = 10756]
2. Smooth muscle contraction [Option ID = 10754]
3. Transfer of electric impulses [Option ID = 10753]
4. Transfer of second messengers [Option ID = 10755]

Correct Answer :-

- Transfer of electric impulses [Option ID = 10753]

65) An artificial membrane is created with a ratio of 60:40 unsaturated versus saturated fatty acids on their lipid tail. What would be the consequence on the membrane fluidity upon shift from warm temp to cold temp [Question ID = 2664]

1. Membrane fluidity remains constant [Option ID = 10653]
2. Membrane fluidity will initially decrease followed by an increase [Option ID = 10656]
3. Membrane fluidity will decrease [Option ID = 10655]
4. Membrane fluidity will increase [Option ID = 10654]

Correct Answer :-

- Membrane fluidity remains constant [Option ID = 10653]

66) A kind of covalent modification which occurs *in vivo* on both histones and DNA is:

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[Question ID = 2642]

1. Phosphorylation [Option ID = 10565]
2. Acetylation [Option ID = 10567]
3. Methylation [Option ID = 10566]
4. Succinylation [Option ID = 10568]

Correct Answer :-

- Phosphorylation [Option ID = 10565]

67) Wheat is an essential crop as it is one of the most significant food sources for people worldwide. However, this crop species has one of the most challenging genomes. Common bread wheat is hexaploid, meaning each nucleus contains how many individual genomes? [Question ID = 2608]

1. 6 [Option ID = 10431]
2. 12 [Option ID = 10432]
3. 3 [Option ID = 10429]
4. 4 [Option ID = 10430]

Correct Answer :-

- 3 [Option ID = 10429]

68) Mutation in gene 'x' leads to lethality in a haploid organism. Which one of the following is best suited to analyse the function of gene 'x'? [Question ID = 2633]

1. Recessive mutants [Option ID = 10531]
2. Dominant mutants [Option ID = 10532]
3. Pleiotropic mutants [Option ID = 10529]
4. Temperature-sensitive mutants [Option ID = 10530]

Correct Answer :-

- Pleiotropic mutants [Option ID = 10529]

69) The DNA content of a diploid cell at G_1 phase of the cell cycle is 'C'. What will be the DNA content in its gametes? [Question ID = 2622]

1. C [Option ID = 10487]
2. 1/4C [Option ID = 10485]
3. 1/2C [Option ID = 10486]
4. 2C [Option ID = 10488]

Correct Answer :-

- 1/4C [Option ID = 10485]

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The following table represents the F_2 progeny obtained following selfing of F_1 progeny derived from a cross between parents with pure dominant and recessive phenotypes. Further, the table shows the results for four different phenotypes. The phenotypes are governed by single or multiple gene(s).

Phenotype	Dominant Phenotype	Recessive Phenotype
Plant height	95	7
Flower colour	72	25
Seed shape	98	2
Seed colour	118	2

Identify the phenotype which is governed by two genes.

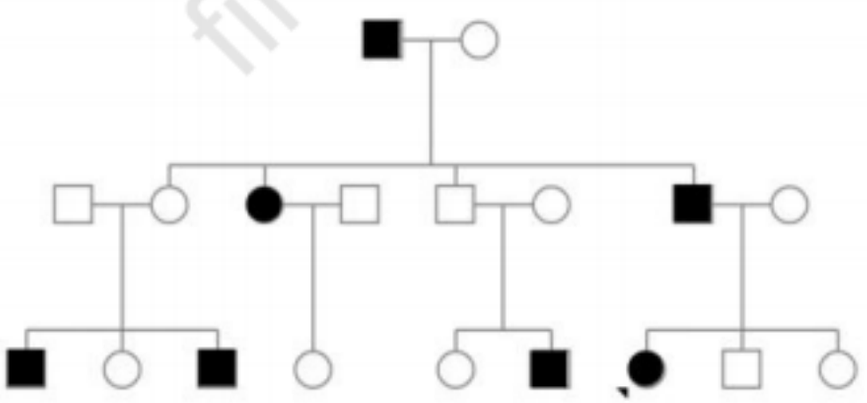
[Question ID = 2612]

1. Seed color [Option ID = 10448]
2. Seed shape [Option ID = 10447]
3. Flower color [Option ID = 10446]
4. Plant height [Option ID = 10445]

Correct Answer :-

- Plant height [Option ID = 10445]

71) What is the most likely mode of inheritance in the following pedigree?



[Question ID = 2626]

1. X-linked dominant with non-random X-inactivation [Option ID = 10503]
2. X-linked recessive [Option ID = 10504]
3. Autosomal recessive [Option ID = 10502]
4. Autosomal dominant with reduced penetrance [Option ID = 10501]

Correct Answer :-

- Autosomal dominant with reduced penetrance [Option ID = 10501]

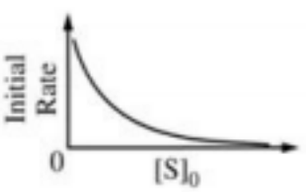
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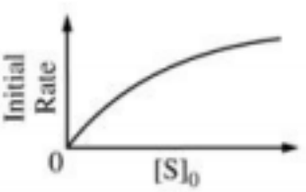
72) The mechanism shown below has been proposed for the enzyme-catalyzed hydrolysis of certain biochemical compounds (substrates), where ES is an enzyme-substrate complex. Given a fixed amount of enzyme, E, which of the following could be the plot of the initial rate of the production of product, P, when using varying initial concentrations of substrate, $[S]_0$?

$$E+S \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} ES \xrightarrow{k_2} E+P$$

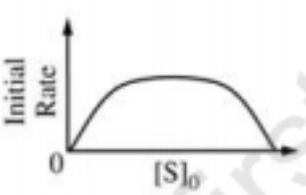
[Question ID = 2655]

1. 

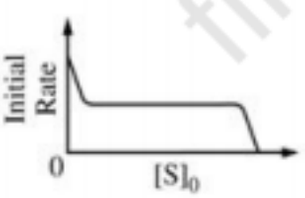
[Option ID = 10619]

2. 

[Option ID = 10617]

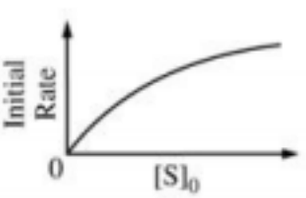
3. 

[Option ID = 10618]

4. 

[Option ID = 10620]

Correct Answer :-

• 

[Option ID = 10617]

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The rate constant of a bimolecular enzyme reaction is found to follow the Arrhenius equation shown below.

$$k=Ae^{-Ea/RT}$$

Which of the following will result in a smaller rate constant?

[Question ID = 2658]

1. Reducing activation energy [Option ID = 10629]
2. Reducing temperature [Option ID = 10630]
3. Reducing pressure [Option ID = 10631]
4. Reducing concentrations of reactants [Option ID = 10632]

Correct Answer :-

- Reducing activation energy [Option ID = 10629]

74) A buffer is made from equal concentrations of a weak acid and its conjugate base. What is the effect on its pH upon doubling the volume of buffer solution by adding water to it? [Question ID = 2654]

1. It has little effect [Option ID = 10613]
2. It changes the pH dependent on the pKa of the acid [Option ID = 10616]
3. It significantly increases the pH [Option ID = 10614]
4. It significantly decreases the pH [Option ID = 10615]

Correct Answer :-

- It has little effect [Option ID = 10613]

75) The following statements were made about genes and their products:
i. One gene can code for only one polypeptide
ii. The sequence of an mRNA can be changed post-transcriptionally
iii. All eukaryotic mRNA have a polyA tail
iv. Codons are universal
Which of the above statement(s) is/are TRUE? [Question ID = 2623]

1. Only (i) [Option ID = 10489]
2. Only (ii) [Option ID = 10490]
3. Both (i) and (iv) [Option ID = 10491]
4. Both (ii) and (iii) [Option ID = 10492]

Correct Answer :-

- Only (i) [Option ID = 10489]

76) Which of the following is(are) characteristic of mass spectrometry?
I. Analyte molecules are converted to gaseous ions.
II. The ions are separated according to their mass-to-charge ratio.
III. In addition to compound identification, mass spectra can be utilized to determine precise isotopic masses and isotopic ratios. [Question ID = 2652]

1. I and II only [Option ID = 10605]
2. I and III only [Option ID = 10606]

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3. II and III only [Option ID = 10607]
4. I, II, and III [Option ID = 10608]

Correct Answer :-

- I and II only [Option ID = 10605]

77) Which of the following residues have the lowest propensity to occur in an alpha- helix? [Question ID = 2687]

1. Proline [Option ID = 10747]
2. Alanine [Option ID = 10745]
3. Methionine [Option ID = 10748]
4. Arginine [Option ID = 10746]

Correct Answer :-

- Alanine [Option ID = 10745]

78) Which of the following statements about telomerase is TRUE? [Question ID = 2671]

1. Telomerase is an DNA dependent DNA polymerase [Option ID = 10683]
2. Telomerase is an DNA dependent RNA polymerase [Option ID = 10684]
3. Telomerase is an RNA dependent DNA polymerase [Option ID = 10681]
4. Telomerase is an RNA dependent RNA polymerase [Option ID = 10682]

Correct Answer :-

- Telomerase is an RNA dependent DNA polymerase [Option ID = 10681]

79) Which of the following is changing the fastest over evolutionary time? [Question ID = 2678]

1. Exon DNA sequences [Option ID = 10712]
2. Microsatellites [Option ID = 10711]
3. Amount of Intergenic DNA [Option ID = 10709]
4. The order of genes on the chromosomes [Option ID = 10710]

Correct Answer :-

- Amount of Intergenic DNA [Option ID = 10709]

80) Which one of the following statements is FALSE about TATA binding protein (TBP)? [Question ID = 2694]

1. It is not important for rRNA and tRNA transcription [Option ID = 10774]
2. It is a component of general transcription factor, TFIID [Option ID = 10775]
3. It binds to TATA box and bends the DNA [Option ID = 10773]
4. It binds DNA on minor groove [Option ID = 10776]

Correct Answer :-

- It binds to TATA box and bends the DNA [Option ID = 10773]

81) Which one of the following organisms show meroblastic cleavage? [Question ID = 2625]

1. Frog [Option ID = 10498]
2. Chicken [Option ID = 10499]

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3. Sea urchin [Option ID = 10497]
4. Humans [Option ID = 10500]

Correct Answer :-

- Sea urchin [Option ID = 10497]

82) Which one of the following transgenic crop(s) have been approved for commercial cultivation in India? [Question ID = 2634]

1. Cotton and Brinjal [Option ID = 10535]
2. Cotton and mustard [Option ID = 10536]
3. Cotton [Option ID = 10533]
4. Brinjal [Option ID = 10534]

Correct Answer :-

- Cotton [Option ID = 10533]

83) Which one of the following cellular processes is NOT carried out in the mitochondria? [Question ID = 2643]

1. Ketone body biosynthesis [Option ID = 10571]
2. Tricarboxylic acid cycle [Option ID = 10569]
3. Gluconeogenesis [Option ID = 10572]
4. β-oxidation of fatty acids [Option ID = 10570]

Correct Answer :-

- Tricarboxylic acid cycle [Option ID = 10569]

84) Which one of the following would contribute to intrinsic fluorescence to a protein? [Question ID = 2659]

1. Charged amino acids [Option ID = 10635]
2. Branched chain amino acids [Option ID = 10636]
3. Aromatic amino acids [Option ID = 10633]
4. Aliphatic amino acids [Option ID = 10634]

Correct Answer :-

- Aromatic amino acids [Option ID = 10633]

85) Which one of the following antibiotics inhibits translation but does not bind with free 30S or 50S ribosome subunit? [Question ID = 2603]

1. Streptomycin [Option ID = 10409]
2. Hygromycin B [Option ID = 10411]
3. Erythromycin [Option ID = 10412]
4. Puromycin [Option ID = 10410]

Correct Answer :-

- Streptomycin [Option ID = 10409]

86) Which one of the following mutant types can be associated with exon skipping? [Question ID = 2690]

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1. Nonsense mutations [Option ID = 10757]
2. Regulatory mutations [Option ID = 10758]
3. Silent mutations [Option ID = 10760]
4. RNA processing mutations [Option ID = 10759]

Correct Answer :-

- Nonsense mutations [Option ID = 10757]

87) Which one of the following techniques CANNOT be utilized to examine Protein-Protein interaction? [Question ID = 2645]

1. Fluorescence Resonance Energy Transfer (FRET) [Option ID = 10578]
2. Phage display [Option ID = 10580]
3. Yeast two hybrid system [Option ID = 10577]
4. Yeast three hybrid system [Option ID = 10579]

Correct Answer :-

- Yeast two hybrid system [Option ID = 10577]

88) Which one of the following is the best indicator of SO_2 pollution? [Question ID = 2607]

1. Bryophytes [Option ID = 10425]
2. Lichens [Option ID = 10427]
3. Algae [Option ID = 10428]
4. Pteridophytes [Option ID = 10426]

Correct Answer :-

- Bryophytes [Option ID = 10425]

89) If a woman with blood group AB marries a man of blood group O what is the probability that their first child will have the blood group A? [Question ID = 2636]

1. 0.25 [Option ID = 10544]
2. 0.5 [Option ID = 10543]
3. 1 [Option ID = 10541]
4. 0.75 [Option ID = 10542]

Correct Answer :-

- 1 [Option ID = 10541]

90) Which metabolite required for nucleotide synthesis is provided by the Pentose phosphate pathway? [Question ID = 2663]

1. Ribulose 5-phosphate [Option ID = 10650]
2. Deoxy-ribose 5-phosphate [Option ID = 10649]
3. Xylulose 5-phosphate [Option ID = 10652]
4. Ribose 5-phosphate [Option ID = 10651]

Correct Answer :-

- Deoxy-ribose 5-phosphate [Option ID = 10649]

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Select the correct events leading to the opening of the stomata.
i. Decline in guard cell solutes
ii. Lowering of osmotic potential of guard cells
iii. Rise in potassium levels in guard cells
iv. Movement of water from neighbouring cells into guard cells
v. Guard cells becoming flaccid [Question ID = 2685]

1. i, ii &iii only [Option ID = 10737]
2. ii, iv, and v only [Option ID = 10738]
3. ii, iii, and iv only [Option ID = 10740]
4. i and v only [Option ID = 10739]

Correct Answer :-
- i, ii &iii only [Option ID = 10737]

92) While studying functional conservation of a gene across species, a comparison of protein sequences is more informative than nucleic acid sequences due to:

[Question ID = 2681]

1. Proteins being the functional units [Option ID = 10721]
2. Proteins being made from degenerate codons [Option ID = 10724]
3. Protein being made of 20 aa while nucleic acidis made of 4 bases [Option ID = 10723]
4. Proteins having a three-dimensional structure [Option ID = 10722]

Correct Answer :-
- Proteins being the functional units [Option ID = 10721]

93) Which is the primary electron donor in photosynthesis? [Question ID = 2676]

1. NADPH [Option ID = 10703]
2. Water [Option ID = 10701]
3. Oxygen [Option ID = 10702]
4. ATP [Option ID = 10704]

Correct Answer :-
- Water [Option ID = 10701]

94) A plant heterozygous for three unlinked genes *(Aa Bb Dd)* is selfed. What proportion of the progeny would have the genotype *A_ B_ dd* ? [Question ID = 2619]

1. 9/16 [Option ID = 10473]
2. 9/64 [Option ID = 10475]
3. 10/16 [Option ID = 10474]
4. 10/64 [Option ID = 10476]

Correct Answer :-
- 9/16 [Option ID = 10473]

95) Similarity resulting from common ancestry is called [Question ID = 2673]

1. convergence [Option ID = 10692]

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2. homology [Option ID = 10690]
3. homonym [Option ID = 10691]
4. homoplasy [Option ID = 10689]

Correct Answer :-

- homoplasy [Option ID = 10689]

96) The enzyme used in synthesizing RNA template *in vitro* in the experiments leading to deciphering the genetic code was:

[Question ID = 2692]

1. Polynucleotide phosphorylase [Option ID = 10767]
2. RNA polymerase II [Option ID = 10765]
3. RNA polymerase III [Option ID = 10766]
4. T7 RNA polymerase [Option ID = 10768]

Correct Answer :-

- RNA polymerase II [Option ID = 10765]

97) The 2018 Nobel prize for medicine or physiology was given to Drs. James P. Allison and Tasuku Honjo for their work on

[Question ID = 2602]

1. identifying new chemotherapy targets for effective control of cancer [Option ID = 10407]
2. cancer therapy by inhibition of negative immune regulation [Option ID = 10405]
3. cancer therapy by positively activating the immune regulation [Option ID = 10406]
4. advances in bone marrow transplantation for leukaemia [Option ID = 10408]

Correct Answer :-

- cancer therapy by inhibition of negative immune regulation [Option ID = 10405]

98) The concept of recon (which is the smallest unit of recombination i.e. 1bp) was proposed by Seymour Benzer by studying recombination between:

[Question ID = 2628]

1. biochemical mutants of *Neurospora crassa* [Option ID = 10511]
2. white eye mutants of *Drosophila melanogaster* [Option ID = 10510]
3. lysis mutants of bacteriophage T4 [Option ID = 10509]
4. auxotrophic mutants of *Escherichia coli* [Option ID = 10512]

Correct Answer :-

- lysis mutants of bacteriophage T4 [Option ID = 10509]

99) Addition of salt to culture medium only allows the salt- tolerant bacteria to grow. This is an example of a: [Question ID = 2680]

1. Enrichment medium [Option ID = 10717]
2. Differential medium [Option ID = 10720]

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3. Resuscitation medium [Option ID = 10718]
4. Selective medium [Option ID = 10719]

Correct Answer :-

- Enrichment medium [Option ID = 10717]

100) The correct order of post-transcriptional modifications involved in eukaryotic mRNA is: [Question ID = 2691]

1. Splicing-Capping- Polyadenylation [Option ID = 10761]
2. Capping- Splicing-Polyadenylation [Option ID = 10763]
3. Capping-Polyadenylation-Splicing [Option ID = 10762]
4. Polyadenylation- Capping-Splicing [Option ID = 10764]

Correct Answer :-

- Splicing-Capping- Polyadenylation [Option ID = 10761]

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