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Topic:- GENETICS MSC S2

1) In March 2013, German researchers published the DNA sequence of the genome of a cell line, which were derived from cervical cancer cells taken unknowingly from a female patient in 1951. What was this woman's name and what is the name of the immortal cell line derived from her?
[Question ID = 4375]
1. Henrietta Lacks; HeLa cells [Option ID = 17494]
2. Charlotte O`Hara; CHO cells [Option ID = 17495]
3. Henrietta Kelvin; HEK cells [Option ID = 17496]
4. Simone Hayes; SiHa cells [Option ID = 17497]

Correct Answer :-
- Henrietta Lacks; HeLa cells [Option ID = 17494]

2) Which one of the following geometries do the atoms in a molecule of water adopt?
[Question ID = 4376]
1. Linear [Option ID = 17498]
2. Tetrahedral [Option ID = 17499]
3. Octahedral [Option ID = 17500]
4. Trigonal planar [Option ID = 17501]

Correct Answer :-
- Tetrahedral [Option ID = 17499]

3) Which one of the following constitutes the chemical form of the bulk of stored energy in the human body?
[Question ID = 4377]
1. Glucose [Option ID = 17502]
2. Glycogen [Option ID = 17503]
3. Fatty acids [Option ID = 17504]
4. Triglycerides [Option ID = 17505]

Correct Answer :-
- Triglycerides [Option ID = 17505]

4) Tetracycline blocks protein synthesis by
[Question ID = 4378]
1. Inhibiting translocase enzyme [Option ID = 17506]
2. Inhibiting peptidyl transferase [Option ID = 17507]
3. Inhibiting binding of aminoacyl tRNA to ribosomes [Option ID = 17508]
4. Inhibiting initiation of translation [Option ID = 17509]

Correct Answer :-
- Inhibiting binding of aminoacyl tRNA to ribosomes [Option ID = 17508]

5) What sort of experiment is done to determine whether two mutations are in the same or in different genes?
[Question ID = 4379]
1. Complementation test [Option ID = 17510]
2. Chi-square test [Option ID = 17511]
3. Co-dominance test [Option ID = 17512]
4. Epistasis test [Option ID = 17513]

Correct Answer :-
- Complementation test [Option ID = 17510]

6) 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 = 4380]
1. 0.25

   [Option ID = 17514]
2. 0.5

   [Option ID = 17515]
3. 2.5

   [Option ID = 17516]
4. 5.0

   [Option ID = 17517]

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Answer :-

[Option ID = 17516]

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7) 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 genes.

Phenotype	Dominant Phenotype	Recessive Phenotype
Plant height	95	7
Flower color	72	25
Pod size	98	2
Pod shape	118	2

Identify the phenotype which is governed by a single gene

[Question ID = 4381]

1. Plant Height

   [Option ID = 17518]
2. Flower color

   [Option ID = 17519]
3. Pod size

   [Option ID = 17520]
4. Pod shape

   [Option ID = 17521]

Correct Answer :-

- Flower color

  [Option ID = 17519]

8) The early genetic maps that were developed used phenotypes as markers because:

[Question ID = 4382]

1. A phenotype governed by a gene could be visually identified and its inheritance pattern followed [Option ID = 17522]
2. The location of the gene on the chromosome could be easily identified by banding patterns like in the polytene chromosomes [Option ID = 17523]
3. The gene specifying a given phenotype could be easily cloned [Option ID = 17524]
4. Genes spanned larger regions than the current day DNA markers like SNPs [Option ID = 17525]

Correct Answer :-

- A phenotype governed by a gene could be visually identified and its inheritance pattern followed [Option ID = 17522]

9) Duplication, deletion, inversion and translocation are examples of chromosomal rearrangements. Which of these can lead to changes in the genetic map?

[Question ID = 4383]

1. Translocation and duplication [Option ID = 17526]
2. Deletion and inversion [Option ID = 17527]
3. Translocation, duplication, and deletion [Option ID = 17528]
4. Duplication, deletion, inversion and translocation [Option ID = 17529]

Correct Answer :-

- Duplication, deletion, inversion and translocation [Option ID = 17529]

10) With reference to spontaneous mutations, one of the questions asked by geneticists was whether spontaneous mutations are induced in response to external stimuli or whether variants are present at a low frequency in most populations. In order to answer this, "fluctuation test" was carried out by:

[Question ID = 4384]

1. Salvador Luria and Max Delbrück [Option ID = 17530]
2. Francois Jacob and Jacques Monod [Option ID = 17531]
3. Thomas Hunt Morgan [Option ID = 17532]
4. Seymour Benzer [Option ID = 17533]

Correct Answer :-

- Salvador Luria and Max Delbrück [Option ID = 17530]

11) In *E. coli* four Hfr strains donate the following genetic markers, shown in the order donated:

Strain 1: A D C E Q

Strain 2: A K M T Y

Strain 3: C E Q W X

Strain 4: M T Y X W

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All these HFr strains are derived from the same F^+ strain. What is the order of these markers on the circular chromosome of the original F^+?

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[Option ID = 17534]

2. Y T M K A D C E Q W X Y

[Option ID = 17535]

3. D C E Q A K M T Y X W D

[Option ID = 17536]

4. C E Q W X Y T M A K D C

[Option ID = 17537]

Correct Answer :-

- Y T M K A D C E Q W X Y

[Option ID = 17535]

12) Given that an autosomal gene has 6 alleles, how many heterozygous genotypes can be formed?
[Question ID = 4386]

1. 12 [Option ID = 17538]
2. 15 [Option ID = 17539]
3. 18 [Option ID = 17540]
4. 24 [Option ID = 17541]

Correct Answer :-

- 15 [Option ID = 17539]

13) Mendel's law of segregation, as applied to the behaviour of chromosomes during cell division means that:
[Question ID = 4387]

1. Alleles of a gene separate from each other when homologous chromosomes separate at meiosis II [Option ID = 17542]
2. Alleles of a gene separate from each other when chromatids separate at meiosis II [Option ID = 17543]
3. Alleles of a gene separate from each other when homologous chromosomes separate at meiosis I, or when chromatids separate at meiosis II if there is a cross over between the gene and the centromere [Option ID = 17544]
4. Alleles of a gene separate from each other when chromatids separate at meiosis I, or when homologous chromosomes separate at meiosis II if there is a cross over between the gene and the centromere [Option ID = 17545]

Correct Answer :-

- Alleles of a gene separate from each other when homologous chromosomes separate at meiosis I, or when chromatids separate at meiosis II if there is a cross over between the gene and the centromere [Option ID = 17544]

14) Interference is a common phenomenon during crossing over in meiosis. As the frequency of observed Double Cross Over (DCO) becomes close to the expected frequency of DCO, the coefficient of coincidence will:

[Question ID = 4388]

1. Increase

[Option ID = 17546]

2. Decrease

[Option ID = 17547]

3. Remain same

[Option ID = 17548]

4. No relationship between the two

[Option ID = 17549]

Correct Answer :-

- Increase

[Option ID = 17546]

15) When two plants with pink flowers are crossed, the progeny obtained has pink flowers. When the F_1 pink-flowered progeny is selfed, the F_2 progeny have pink-flowered and white-flowered plants in a 15:1 ratio. This is a case of
[Question ID = 4389]

1. Incomplete dominance [Option ID = 17550]
2. Duplicate gene [Option ID = 17551]
3. Recessive epistasis [Option ID = 17552]
4. Dominant epistasis [Option ID = 17553]

Correct Answer :-

- Duplicate gene [Option ID = 17551]

16) In humans, the haploid number of chromosomes is 23. Assuming that no recombination occurs, how many different types of gametes can arise by independent assortment?
[Question ID = 4390]

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1. [Option ID = 17554]
2. [Option ID = 17555]
3. = 46 [Option ID = 17556]
4. 46^2 [Option ID = 17557]

Correct Answer :-

- 2^{23} [Option ID = 17555]

17) Colour blindness is an X-linked recessive character. A colour-blind man and his wife with normal vision have a colour-blind daughter. What is the probability that their new born son would be colour-blind?
[Question ID = 4391]

1. 0 [Option ID = 17558]
2. 1/4 [Option ID = 17559]
3. 1/2 [Option ID = 17560]
4. 1 [Option ID = 17561]

Correct Answer :-

- 1/2 [Option ID = 17560]

18) In Drosophila (fruit flies), eye colour is sex-linked and red eye colour is dominant to white eye colour. Which of the following are not possible in a cross between a red-eyed male and a heterozygous female?
[Question ID = 4392]

1. Red-eyed male [Option ID = 17562]
2. White-eyed male [Option ID = 17563]
3. Carrier female [Option ID = 17564]
4. Homozygous white-eyed female [Option ID = 17565]

Correct Answer :-

- Homozygous white-eyed female [Option ID = 17565]

19) The frequency of a disorder controlled by an autosomal recessive allele is 1 in 10000. What is the frequency of the recessive allele?
[Question ID = 4393]

1. 1/100 [Option ID = 17566]
2. 1/200 [Option ID = 17567]
3. 1/1000 [Option ID = 17568]
4. 1/2000 [Option ID = 17569]

Correct Answer :-

- 1/100 [Option ID = 17566]

20) Balanced polymorphism describes the preservation of genetic variability through the selection of heterozygotes. Which one of the following is an example of balanced polymorphism?
[Question ID = 4394]

1. Blood groups [Option ID = 17570]
2. Sickle cell trait [Option ID = 17571]
3. Skin colour [Option ID = 17572]
4. Industrial melanism [Option ID = 17573]

Correct Answer :-

- Sickle cell trait [Option ID = 17571]

21) What genotype is present most often among the progeny (F2) of a dihybrid cross (*AaBb X AaBb*)?

[Question ID = 4395]

1. AaBb

   [Option ID = 17574]
2. AABb

   [Option ID = 17575]
3. AABB

   [Option ID = 17576]
4. AAbb

   [Option ID = 17577]

Correct Answer :-

- AaBb

  [Option ID = 17574]

22) A man and a woman, who do not show any apparent signs of a certain inherited disease, have seven children (5 daughters and 5 sons). Three of the sons suffer from the given disease but none of the daughters are affected. Which of the following mode of inheritance can explain these results ?

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[Option ID = 4396]
1. [illegible]inked recessive [Option ID = 17578]
2. [illegible]inked dominant [Option ID = 17579]
3. Autosomal dominant [Option ID = 17580]
4. Sex limited dominant [Option ID = 17581]

Correct Answer :-
- Sex linked recessive [Option ID = 17578]

23) What are the assumptions of Hardy Weinberg equilibrium?
[Question ID = 4397]
1. Small population size, random mating, no selection, no migration, no mutation [Option ID = 17582]
2. Large population size, random mating, no selection, no migration, no mutation [Option ID = 17583]
3. Large population size, random mating, heterozygotes survive the best, no migration, no mutation [Option ID = 17584]
4. Large population size, like individuals mate, no selection, no migration, no mutation [Option ID = 17585]

Correct Answer :-
- Large population size, random mating, no selection, no migration, no mutation [Option ID = 17583]

24) In the Himalayan rabbits, the ears, feet, and muzzle are pigmented while the rest of the body is white. This is because of they express an enzyme variant that is ineffective at body temperature but function at lower temperature experienced by cells of extremities . This is an example of:
[Question ID = 4398]
1. Incomplete dominance [Option ID = 17586]
2. Conditional mutation [Option ID = 17587]
3. Suppressor mutation [Option ID = 17588]
4. Epistasis [Option ID = 17589]

Correct Answer :-
- Conditional mutation [Option ID = 17587]

25) Which of the following is an autosomal dominant disorder?
[Question ID = 4399]
1. Huntington's disease [Option ID = 17590]
2. Tay-Sach's disease [Option ID = 17591]
3. Cystic Fibrosis [Option ID = 17592]
4. Sickle Cell Anaemia [Option ID = 17593]

Correct Answer :-
- Huntington's disease [Option ID = 17590]

26) In a cloning experiment, the 'gene of interest' is to be inserted into the *lacZ* gene present on a vector which also carries the gene for tetracycline resistance. The transformed cells are plated on three (3) different media containing
i) tetracycline + X-gal,
ii) only tetracycline, and
iii) only X-gal;
which one of the following results would indicate successful cloning of the gene of interest?

[Question ID = 4400]
1. White colony on the tetracycline + X-gal plates

   [Option ID = 17594]
2. Blue colony on the tetracycline + X-gal plates

   [Option ID = 17595]
3. Any colony on the tetracycline + X-gal plates irrespective of color

   [Option ID = 17596]
4. Blue colony on X-gal plate which does not grow on tetracycline plates

   [Option ID = 17597]

Correct Answer :-
- White colony on the tetracycline + X-gal plates

  [Option ID = 17594]

27) In a typical Polymerase Chain Reaction (PCR), the reaction is cycled between 95°C → 55°C → 72°C. If the composition/length of the primer pair is altered, which one of the above mentioned temperatures should be adjusted accordingly?
[Question ID = 4401]
1. 95°C [Option ID = 17598]
2. 55°C [Option ID = 17599]
3. 72°C [Option ID = 17600]
4. 55°C and 72°C [Option ID = 17601]

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Answer :-
[Option ID = 17599]

28) Which one of the following statements about the reporter gene in yeast two-hybrid system is CORRECT?

[Question ID = 4402]

1. It is fused with the activation domain of a transcription factor

   [Option ID = 17602]
2. It is fused with the DNA binding domain of a transcription factor

   [Option ID = 17603]
3. It is expressed only if the proteins being tested interact

   [Option ID = 17604]
4. It always requires the presence of histidine in the growth medium for its expression

   [Option ID = 17605]

Correct Answer :-

- It is expressed only if the proteins being tested interact

  [Option ID = 17604]

29) Which of the following techniques will one use to identify the spatial pattern of expression of a gene in a developing embryo?

[Question ID = 4403]

1. Microarray

   [Option ID = 17606]
2. *In situ* hybridization

   [Option ID = 17607]
3. Northern hybridization

   [Option ID = 17608]
4. qPCR

   [Option ID = 17609]

Correct Answer :-

- *In situ* hybridization

  [Option ID = 17607]

30) Colchicine treatment of root tip meristem cells results in all of the following EXCEPT:

[Question ID = 4404]

1. Induction of polyploidy

   [Option ID = 17610]
2. Prevention of cytokinesis

   [Option ID = 17611]
3. Inhibition of meiotic spindle assembly

   [Option ID = 17612]
4. Prevention of chromosome segregation

   [Option ID = 17613]

Correct Answer :-

- Inhibition of meiotic spindle assembly

  [Option ID = 17612]

31) Which one of the following techniques can be utilized to investigate DNA-Protein interaction?

[Question ID = 4405]

1. DNA foot printing [Option ID = 17614]
2. Comparative Genomic Hybridization (CGH) [Option ID = 17615]
3. Yeast three hybrid system [Option ID = 17616]
4. Single-strand conformation polymorphism (SSCP) [Option ID = 17617]

Correct Answer :-

- DNA foot printing [Option ID = 17614]

32) Which one of the following microscopy techniques is based on the specimen's interference with the wavelength of light to produce a high contrast image without staining?

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[Question ID = 4406]

1. Bright field light microscopy [Option ID = 17618]

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2. field microscopy [Option ID = 17619]
3. e contrast microscopy [Option ID = 17620]
4. escence microscopy [Option ID = 17621]

Correct Answer :-

- Phase contrast microscopy [Option ID = 17620]

33) SDS is used in gel electrophoresis for the separation of a mixture of proteins based on their molecular size. SDS is used to

[Question ID = 4407]

1. Disrupt protein dimers [Option ID = 17622]
2. Stabilize the proteins [Option ID = 17623]
3. Decrease the surface tension of the buffers [Option ID = 17624]
4. Have a uniform charge density on the proteins [Option ID = 17625]

Correct Answer :-

- Have a uniform charge density on the proteins [Option ID = 17625]

34) A breeder identified a variegation mutant in the leaf colour in a normal green population of maize. To study the genetics of this mutant he made a cross between variegated and green plants using variegated as the female parent. All the F_1 and the selfed F_2 progeny were variegated. The leaf variegation in maize could be due to:

[Question ID = 4408]

1. Maternal effect [Option ID = 17626]
2. Mendelian inheritance [Option ID = 17627]
3. Maternal inheritance [Option ID = 17628]
4. Mendelian inheritance, with variegated being dominant over green [Option ID = 17629]

Correct Answer :-

- Maternal inheritance [Option ID = 17628]

35) You have a protein which has a different three-dimensional conformation based on whether the buffer has 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 same 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 = 4409]

1. Greater than 8 cm but less than 9cm [Option ID = 17630]
2. Equal to 8cm [Option ID = 17631]
3. Less than 8cm but further than 6cm [Option ID = 17632]
4. Either greater or less than 8cm [Option ID = 17633]

Correct Answer :-

- Either greater or less than 8cm [Option ID = 17633]

36) Which one of the following processes is used by some bacteria to regulate expression of an amino acid biosynthetic operon in accordance to the levels of aminoacetylated tRNA in the cell?

[Question ID = 4410]

1. Antitermination [Option ID = 17634]
2. Attenuation [Option ID = 17635]
3. Aminoacylation [Option ID = 17636]
4. Activation of transcription [Option ID = 17637]

Correct Answer :-

- Attenuation [Option ID = 17635]

37) The DNA content a gamete of a diploid organism is 'C'. What will be the DNA content of its somatic cell in G_1 phase of cell cycle?

[Question ID = 4411]

1. 1/2C [Option ID = 17638]
2. C [Option ID = 17639]
3. 2C [Option ID = 17640]
4. 4C [Option ID = 17641]

Correct Answer :-

- 2C [Option ID = 17640]

38) Variation in which types of repeat sequence commonly arise by replication slippage?

[Question ID = 4412]

1. Microsatellites [Option ID = 17642]
2. Minisatellites [Option ID = 17643]
3. Retrotransposons [Option ID = 17644]
4. DNA transposon [Option ID = 17645]

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Correct Answer :-

- Microsatellites [Option ID = 17642]

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Which is the correct hierarchy of gene activity in early *Drosophila* development?

[Question ID = 4413]

1. Maternal, gap, pair-rule, segment polarity

   [Option ID = 17646]
2. Gap, maternal, segment polarity, pair-rule

   [Option ID = 17647]
3. Maternal, pair-rule, gap, segment polarity

   [Option ID = 17648]
4. Gap, segment polarity, pair-rule, homeotic gene

   [Option ID = 17649]

Correct Answer :-

- Maternal, gap, pair-rule, segment polarity

  [Option ID = 17646]

40) The process of non-reciprocal recombination by which one allele in a heterozygote is converted into the corresponding allele is called:

[Question ID = 4414]

1. Gene targeting [Option ID = 17650]
2. Gene knockout [Option ID = 17651]
3. Gene replacement [Option ID = 17652]
4. Gene conversion [Option ID = 17653]

Correct Answer :-

- Gene conversion [Option ID = 17653]

41) Which of the following can be taken as evidence for 'Genomic Equivalence': the theory that all cells of an organism contain an equivalent complement of genetic information ?

[Question ID = 4415]

1. Sequencing of the human genome

   [Option ID = 17654]
2. Cloning of Dolly

   [Option ID = 17655]
3. Analysis of transcriptome of different stages of development in *Drosophila*

   [Option ID = 17656]
4. Development of a detailed genetic map in *Neurospora*

   [Option ID = 17657]

Correct Answer :-

- Cloning of Dolly

  [Option ID = 17655]

42) In meiosis, an inversion in one member of a pair of homologous chromosomes will most likely lead to which of the following?

[Question ID = 4416]

1. Nondisjunction of the affected chromosome [Option ID = 17658]
2. Chromosomes with duplications and deficiencies [Option ID = 17659]
3. Increased recombination frequency in the inverted region [Option ID = 17660]
4. Mispairing of the affected chromosome with a non-homologous chromosome [Option ID = 17661]

Correct Answer :-

- Chromosomes with duplications and deficiencies [Option ID = 17659]

43) Bacterial core RNA polymerase (RNAP) can bind to DNA. However, in order to initiate transcription from specific promoter sequences, it needs to associate with a sigma factor to form the holo-enzyme. The following table gives information on the binding of core and holo- RNAP to DNA.

	Association constant (Arbitrary Units)		Half life of complex (AU)	
	With non-specific DNA sequence	With promoter DNA sequence	With non specific DNA sequence	With promoter DNA sequence
Core RNAP	1	1	0.1	1
Holo RNAP	0.001	100	0.1	1000

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on the above which one of the following statements is a correct explanation for the observation?

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[Question ID = 4417]

1. The holo RNAP can bind to longer stretches of DNA sequence thus increasing the probability of its binding to the promoter

   [Option ID = 17662]
2. Binding of sigma factor increases the catalytic activity of the core RNAP

   [Option ID = 17663]
3. Sigma factor reduces the non-specific binding of the core RNAP and increases the binding to promoter DNA

   [Option ID = 17664]
4. Sigma factor provides catalytic site essential for transcription

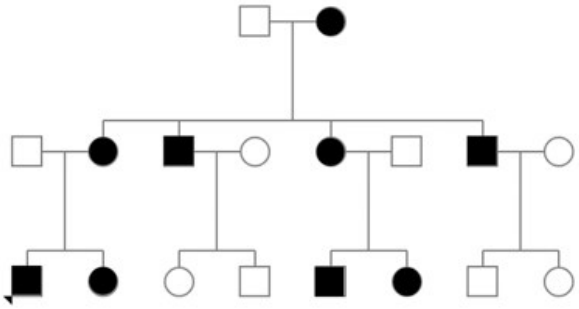
   [Option ID = 17665]

Correct Answer :-

- Sigma factor reduces the non-specific binding of the core RNAP and increases the binding to promoter DNA

  [Option ID = 17664]

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



[Question ID = 4418]

1. Autosomal dominant [Option ID = 17666]
2. Autosomal recessive [Option ID = 17667]
3. X-linked dominant [Option ID = 17668]
4. Mitochondrial inheritance [Option ID = 17669]

Correct Answer :-

- Mitochondrial inheritance [Option ID = 17669]

45) If a geneticist were to closely examine the make-up of a single autosomal chromosome from one of your cells, that chromosome would be found to be

[Question ID = 4419]

1. Derived entirely from genes from just one of your grandparents [Option ID = 17670]
2. A mosaic of genes derived from your mother and father [Option ID = 17671]
3. A mosaic of genes derived from all four of your grandparents (maternal and paternal) [Option ID = 17672]
4. A mosaic of genes derived from either your maternal grandparents or your paternal grandparents [Option ID = 17673]

Correct Answer :-

- A mosaic of genes derived from either your maternal grandparents or your paternal grandparents [Option ID = 17673]

46) In a hospital three babies were mixed up. The blood group of the babies were A, B and AB. In order to identify the parents, their blood groups were determined. The results obtained were:

Parent set 1 - A and AB

Parent set 2 - AB and O

Parent set 3 - B and AB

Which one of the following conclusions can be definitely made?

[Question ID = 4420]

1. The baby with blood group A is the child of the parent set 2

   [Option ID = 17674]
2. The baby with blood group AB is the child of parent set 1

   [Option ID = 17675]
3. The baby with blood group B is the child of parent set 3

   [Option ID = 17676]
4. Parentage of none of the babies can be determined from the given information

   [Option ID = 17677]

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Answer :-

ntage of none of the babies can be determined from the given information

[Option ID = 17677]

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47) The concept of one gene one enzyme hypothesis was proposed by Beadle and Tatum by studying:

[Question ID = 4421]

1. Auxotrophic mutants of *Escherichia coli*

   [Option ID = 17678]
2. Biochemical mutants of *Neurospora crassa*

   [Option ID = 17679]
3. White eye mutants of *Drosophila melanogaster*

   [Option ID = 17680]
4. Temperature sensitive mutants in *Saccharomyces cerevisiae*

   [Option ID = 17681]

Correct Answer :-

- Biochemical mutants of *Neurospora crassa*

  [Option ID = 17679]

48) The most common pathway from a gene to a protein in eukaryotic cells involves:

[Question ID = 4422]

1. First, transcription of RNA and its processing, then its transport, then translation [Option ID = 17682]
2. First transcription of the RNA and its transport, then processing, then translation [Option ID = 17683]
3. First, processing of the RNA and its transport, then transcription, then translation [Option ID = 17684]
4. First, transport of mRNA followed by its processing, then transcription, then translation [Option ID = 17685]

Correct Answer :-

- First, transcription of RNA and its processing, then its transport, then translation [Option ID = 17682]

49) Which one of the following DNA sequences is likely to form a left-handed Z-DNA? [sequence of one strand is represented]

[Question ID = 4423]

1. $(AAAAAAATAAAAA)_{10}$ [Option ID = 17686]
2. $(CGCGCGCGCGCGCG)_{10}$ [Option ID = 17687]
3. $(AAAAAAAAAAAAA)_{10}$ [Option ID = 17688]
4. $(AGAGAGAGAGAGAG)_{10}$ [Option ID = 17689]

Correct Answer :-

- $(CGCGCGCGCGCGCG)_{10}$ [Option ID = 17687]

50) Speciation that occurs when two groups of the same species shares the same ecological niche, but evolve differently so that they can no longer interbreed is called as:

[Question ID = 4424]

1. Allopatric speciation [Option ID = 17690]
2. Sympatric speciation [Option ID = 17691]
3. Parapatric speciation [Option ID = 17692]
4. Peripatric speciation [Option ID = 17693]

Correct Answer :-

- Sympatric speciation [Option ID = 17691]

51) Homologous genes that are in direct line of evolutionary descent from the ancestral genes but have ended up in different gene pools because of speciation are called :

[Question ID = 4425]

1. Homologous [Option ID = 17694]
2. Homeologous [Option ID = 17695]
3. Orthologous [Option ID = 17696]
4. Paralogous [Option ID = 17697]

Correct Answer :-

- Orthologous [Option ID = 17696]

52) Choose the correct order of the following events in meiosis.

(1) Homologous chromosomes separate

(2) Chromosomes split at the centromere and sister chromatids separate

(3) Homologous chromosomes pair

(4) Homologous chromosomes recombine

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[Question ID = 4426]

1. (4), (3), (1), (2) [Option ID = 17698]

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2. (3), (4), (1) [Option ID = 17699]
3. (4), (1), (2) [Option ID = 17702]
4. (4), (2), (1) [Option ID = 17701]

Correct Answer :-

- (3), (4), (1), (2) [Option ID = 17700]

53) The allele associated with sickle cell anaemia apparently reached a high frequency in some human populations due to:
[Question ID = 4427]

1. Random mating [Option ID = 17702]
2. Migration of individuals with the allele into other populations [Option ID = 17703]
3. Superior fitness of heterozygotes in areas where malaria was present [Option ID = 17704]
4. A high mutation rate at that specific gene [Option ID = 17705]

Correct Answer :-

- Superior fitness of heterozygotes in areas where malaria was present [Option ID = 17704]

54) The phenomenon in which the severity of symptoms in genetic disorders increases from generation to generation is called:
[Question ID = 4428]

1. Genetic drift [Option ID = 17706]
2. Genetic anticipation [Option ID = 17707]
3. Genetic polymorphism [Option ID = 17708]
4. Genetic erosion [Option ID = 17709]

Correct Answer :-

- Genetic anticipation [Option ID = 17707]

55) The -10 region of E. coli promoter recognised by sigma ^{70} is rich in _____ bases.
[Question ID = 4429]

1. A, G [Option ID = 17710]
2. C, T [Option ID = 17711]
3. A, T [Option ID = 17712]
4. C, G [Option ID = 17713]

Correct Answer :-

- A, T [Option ID = 17712]

56) Homeotic genes are responsible for:
[Question ID = 4430]

1. Homeostasis [Option ID = 17714]
2. Development [Option ID = 17715]
3. Cell cycle [Option ID = 17716]
4. Stemness [Option ID = 17717]

Correct Answer :-

- Development [Option ID = 17715]

57) Which one of the following plays a key role in cartilage regeneration?
[Question ID = 4431]

1. Perichondrium [Option ID = 17718]
2. Chondroblast [Option ID = 17719]
3. Osteoblast [Option ID = 17720]
4. Periosteum [Option ID = 17721]

Correct Answer :-

- Perichondrium [Option ID = 17718]

58) Which one of the following can slow-down the contraction rate of the heart muscle?
[Question ID = 4432]

1. Adrenalin [Option ID = 17722]
2. Epinephrine [Option ID = 17723]
3. Testosterone [Option ID = 17724]
4. Acetylcholine [Option ID = 17725]

Correct Answer :-

- Acetylcholine [Option ID = 17725]

59) The H1N1 strain of Influenza A virus emerged in Mexico and spread very quickly across the world killing more than 20,000 people. The viral genome when sequenced had components of swine flu virus, avian virus and human influenza virus. The process by which this pandemic strain H1N1 emerged is an example of :
[Question ID = 4433]

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1. Antigenic shift [Option ID = 17726]
2. Antigenic drift [Option ID = 17727]
3. Genetic reassortment [Option ID = 17728]

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4. mutation [Option ID = 17729]

Answer :-
- Genetic reassortment [Option ID = 17728]

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60) Which one of the following mammalian cells generally CANNOT metabolize glucose to carbon dioxide aerobically?
[Question ID = 4434]
1. White blood cells [Option ID = 17730]
2. Red blood cells [Option ID = 17731]
3. Liver cells [Option ID = 17732]
4. Unstriated muscle cells [Option ID = 17733]

Correct Answer :-
- Red blood cells [Option ID = 17731]

61) Which one of the following gene is responsible for the establishment of the anterior-posterior body axis?
[Question ID = 4435]
1. Biccoid [Option ID = 17734]
2. Fushi tarazu [Option ID = 17735]
3. Bithroax [Option ID = 17736]
4. Even skipped [Option ID = 17737]

Correct Answer :-
- Biccoid [Option ID = 17734]

62) In the presence of drug X, protein synthesis is initiated but only dipeptides are formed that remain bound to the ribosomes thus suggesting that the drug X affects protein synthesis by blocking
[Question ID = 4436]
1. Activation of elongation factors [Option ID = 17738]
2. Activation of amino acids [Option ID = 17739]
3. The recognition of stop signals [Option ID = 17740]
4. The formation of peptide bonds [Option ID = 17741]

Correct Answer :-
- Activation of elongation factors [Option ID = 17738]

63) The germ layer that gives rise to nerve cells is
[Question ID = 4437]
1. Endoderm [Option ID = 17742]
2. Ectoderm [Option ID = 17743]
3. Mesoderm [Option ID = 17744]
4. Endo and mesoderm [Option ID = 17745]

Correct Answer :-
- Ectoderm [Option ID = 17743]

64) Proteins destined to be secreted to the cell surface move through the secretory pathway in which of the following order:
[Question ID = 4438]
1. Smooth ER, Golgi transport vesicle, Golgi cisternae, secretory vesicle, cell surface [Option ID = 17746]
2. Rough ER, Golgi cisternae, Golgi transport vesicle, secretory vesicle, cell surface [Option ID = 17747]
3. Rough ER, Golgi transport vesicle, Golgi cisternae, secretory vesicle, cell surface [Option ID = 17748]
4. Golgi transport vesicle, secretory vesicle, Golgi cisternae, Rough ER, cell surface [Option ID = 17749]

Correct Answer :-
- Rough ER, Golgi transport vesicle, Golgi cisternae, secretory vesicle, cell surface [Option ID = 17748]

65) Which of the following is a primary standard is used in in standardizing bases?
[Question ID = 4439]
1. Ammonium hydroxide [Option ID = 17750]
2. Sulfuric acid [Option ID = 17751]
3. Acetic acid [Option ID = 17752]
4. Potassium acid phthalate [Option ID = 17753]

Correct Answer :-
- Potassium acid phthalate [Option ID = 17753]

66) Intrinsic fluorescence of protein is due to
[Question ID = 4440]
1. Aromatic amino acids [Option ID = 17754]
2. Sulphur containing amino acids [Option ID = 17755]
3. Histidine [Option ID = 17756]
4. Proline [Option ID = 17757]

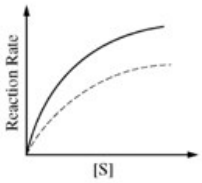
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Correct Answer :-

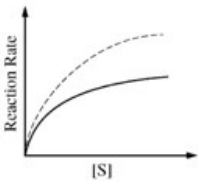
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...atic amino acids [Option ID = 17754]

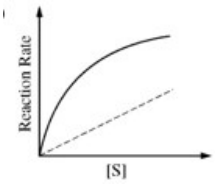
...hich of the following graphs best shows the results of reaction rate versus substrate concentration for cooperative enzyme in the absence (solid line) and presence (dashed lines) of an allosteric inhibitor?
[Question ID = 4441]

1. 

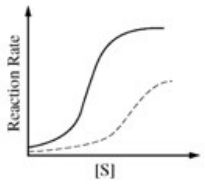
[Option ID = 17758]

2. 

[Option ID = 17759]

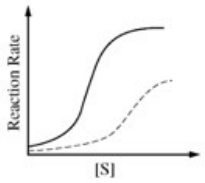
3. 

[Option ID = 17760]

4. 

[Option ID = 17761]

Correct Answer :-

- 

[Option ID = 17761]

68) Enzymes that catalyse removal of groups from the substrates without addition or removal of water are classified as
[Question ID = 4442]

1. Oxidoreductases [Option ID = 17762]
2. Lyases [Option ID = 17763]
3. Transferases [Option ID = 17764]
4. Hydrolases [Option ID = 17765]

Correct Answer :-

- Lyases [Option ID = 17763]

69) You have a mixture of three proteins in a Tris-Cl, pH7.5 solution with the following molecular weight (mw) and isoelectric point (pI): P1 (mw 40 kDa, pI 7.4), P2 (mw150kDa, pI 7.2) and P3 (mw 250kDa, pI 7.3) respectively. What would be the most appropriate technique to separate them in an active form?
[Question ID = 4443]

1. Affinity chromatography [Option ID = 17766]
2. Size exclusion chromatography [Option ID = 17767]
3. Anion exchange chromatography [Option ID = 17768]
4. Immunoprecipitation [Option ID = 17769]

Correct Answer :-

- Size exclusion chromatography [Option ID = 17767]

70) Statins decrease the cholesterol level in blood by:
[Question ID = 4444]

1. Inhibiting the uptake of cholesterol from the gut [Option ID = 17770]
2. Inhibiting the activity of HMG-CoA reductase in the liver [Option ID = 17771]
3. Inhibiting the activity of HMG-CoA synthase in the liver [Option ID = 17772]

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4. ...asing activity of lecithin/cholesterol acyl transferase (LCAT) in the lipoproteins [Option ID = 17773]

Answer :-

- Inhibiting the activity of HMG-CoA reductase in the liver [Option ID = 17774]

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71) The E value in a BLAST search measures

[Question ID = 4445]

1. The probability that the search result is non- random [Option ID = 17774]
2. The probability that the search result obtained is random [Option ID = 17775]
3. The reliability of the search [Option ID = 17776]
4. Significance of the search result [Option ID = 17777]

Correct Answer :-

- The probability that the search result obtained is random [Option ID = 17775]

72) To make a 1L solution of 0.2N $MgCl_2$ 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 = 4446]

1. 800ml H_2O + 200ml $MgCl_2$ [Option ID = 17778]
2. 995ml H_2O + 5ml $MgCl_2$ [Option ID = 17779]
3. 950ml H_2O + 50ml $MgCl_2$ [Option ID = 17780]
4. 980ml H_2O + 20ml $MgCl_2$ [Option ID = 17781]

Correct Answer :-

- 980ml H_2O + 20ml $MgCl_2$ [Option ID = 17781]

73) Immune response in *Drosophila melanogaster* is primarily mediated by

[Question ID = 4447]

1. T cell receptors

   [Option ID = 17782]
2. B cell receptors

   [Option ID = 17783]
3. Antibodies

   [Option ID = 17784]
4. Anti-microbial peptides

   [Option ID = 17785]

Correct Answer :-

- Anti-microbial peptides

  [Option ID = 17785]

74) How many membranes will a diffusible extracellular molecule destined for mitochondrial matrix transverse?

[Question ID = 4448]

1. Two [Option ID = 17786]
2. Three [Option ID = 17787]
3. Four [Option ID = 17788]
4. Five [Option ID = 17789]

Correct Answer :-

- Three [Option ID = 17787]

75) Which one of the following is NOT present in the primary structure of a protein?

[Question ID = 4449]

1. Covalent bonds in the side chains

   [Option ID = 17790]
2. Covalent bonds involving hydrogen atoms

   [Option ID = 17791]
3. Covalent bonds between sulphur atoms

   [Option ID = 17792]
4. Covalent bonds at the carboxy and amino terminal of the polypeptide

   [Option ID = 17793]

Correct Answer :-

- Covalent bonds between sulphur atoms

  [Option ID = 17792]

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76) A novel enzyme with sugar isomerase activity was purified from a species of Bacillus. The steady state parameters were

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red for several different sugars

	K_M (in M)	K_{cat} (in Sec^{-1})
Arabinose	**$5X10^{-3}$**	**20**
Glucose	**$1X10^{-5}$**	**10**
Fructose	**$5X10^{-4}$**	**100**
Xylose	**$5X10^{-6}$**	**50**

Which sugar is used up fast (most rapidly when present in in micromolar concentration in the cell:

[Question ID = 4450]

1. Arabinose

   [Option ID = 17794]
2. Glucose

   [Option ID = 17795]
3. Fructose

   [Option ID = 17796]
4. Xylose

   [Option ID = 17797]

Correct Answer :-

- Xylose

  [Option ID = 17797]

77) Bacterial cell culture with Optical Density of 1 means:

[Question ID = 4451]

1. 1% of incident light is absorbed [Option ID = 17798]
2. 10% of the incident light is transmitted [Option ID = 17799]
3. 10% of the incident light is absorbed [Option ID = 17800]
4. 90% of the incident light is transmitted [Option ID = 17801]

Correct Answer :-

- 10% of the incident light is transmitted [Option ID = 17799]

78) Which one of the following techniques will allow you to visualize chromosomal translocation in a cell?

[Question ID = 4452]

1. Southern hybridization

   [Option ID = 17802]
2. Polymerase chain reaction

   [Option ID = 17803]
3. Fluorescence *in-situ* hybridization

   [Option ID = 17804]
4. Next generation sequencing

   [Option ID = 17805]

Correct Answer :-

- Fluorescence *in-situ* hybridization

  [Option ID = 17804]

79) Separation of proteins in a gel containing chemicals to establish pH gradient when the electric charge is applied is generally known as

[Question ID = 4453]

1. Isoelectric focusing [Option ID = 17806]
2. Native gel electrophoresis [Option ID = 17807]
3. Immuno-electrophoresis [Option ID = 17808]
4. Denaturing gel electrophoresis [Option ID = 17809]

Correct Answer :-

- Isoelectric focusing [Option ID = 17806]

80) Fluorescence recovery after photobleaching in live cells is used to determine

[Question ID = 4454]

1. Co-localization of proteins [Option ID = 17810]
2. Distance between two organelles [Option ID = 17811]
3. Diffusion of proteins [Option ID = 17812]
4. Nucleic acid compactness [Option ID = 17813]

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Correct Answer :-
sion of proteins [Option ID = 17827]

81) DNA and RNA molecules are composed of a series of molecules, called nucleobases, joined together in long chains. How many naturally occurring nucleobases are there?
[Question ID = 4455]
1. 3 [Option ID = 17814]
2. 4 [Option ID = 17815]
3. 5 [Option ID = 17816]
4. 6 [Option ID = 17817]

Correct Answer :-
- 5 [Option ID = 17816]

82) Which of the following statements is TRUE regarding Golgi Apparatus (GA)
[Question ID = 4456]
1. GA has polarity [Option ID = 17818]
2. Is often associated with mitochondria [Option ID = 17819]
3. Trans- face is located near nuclear membrane [Option ID = 17820]
4. GA is the primary site for secretory protein synthesis [Option ID = 17821]

Correct Answer :-
- GA has polarity [Option ID = 17818]

83) Assembly of two subunits 40S and 60S of the ribosome results in:
[Question ID = 4457]
1. 100 S monosome [Option ID = 17822]
2. 80 S monosome [Option ID = 17823]
3. 70 S monosome [Option ID = 17824]
4. 90 S monosome [Option ID = 17825]

Correct Answer :-
- 80 S monosome [Option ID = 17823]

84) C-value paradox is about:
[Question ID = 4458]
1. Linearity of the relationship between genome size and complexity of organism [Option ID = 17826]
2. Non-linear relationship between genome size and complexity of organism [Option ID = 17827]
3. Dosage compensation being associated with higher eukaryotes [Option ID = 17828]
4. Relation between number of chromosomes and complexity of organism [Option ID = 17829]

Correct Answer :-
- Non-linear relationship between genome size and complexity of organism [Option ID = 17827]

85) When a fragment of genomic DNA was hybridized to its corresponding cDNA and observed under an electron microscope the following structure was observed.



The loops marked by arrows represent
[Question ID = 4459]
1. UTRs [Option ID = 17830]
2. Exons [Option ID = 17831]
3. Introns [Option ID = 17832]
4. Insertion loops [Option ID = 17833]

Correct Answer :-
- Introns [Option ID = 17832]

86) 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 = 4460]
1. Decrease the pH of the external buffer [Option ID = 17834]
2. Add more ADP to the external buffer [Option ID = 17835]
3. Increase the pH of the external buffer [Option ID = 17836]
4. Conclude that no more ATP can be produced from inside out vesicles anyway [Option ID = 17837]

Correct Answer :-
- Increase the pH of the external buffer [Option ID = 17836]

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87) The chromosome of a certain bacterium is circular, double stranded DNA of 3.6 X 10^6 base pairs. If the rate of

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tion fork movement is 1000 nucleotides per second, what will be the time required to replicate the chromosome?
ion ID = 4464]
inutes [Option ID = 17838]
2. 60 minutes [Option ID = 17839]
3. 72 minutes [Option ID = 17840]
4. 120 minutes [Option ID = 17841]

Correct Answer :-

- 30 minutes [Option ID = 17838]

88) Leucine rich repeats (LRR) are an integral part of which immunological receptor?
[Question ID = 4462]

1. Dendritic cell receptor [Option ID = 17842]
2. Toll-like receptor (TLR) [Option ID = 17843]
3. T cell receptor (TCR) [Option ID = 17844]
4. NK cell receptor [Option ID = 17845]

Correct Answer :-

- Toll-like receptor (TLR) [Option ID = 17843]

89) Alpha amanitin is a fungal toxin which inhibit the eukaryotic RNA polymerase. The three eukaryotic RNA polymerases show differential sensitivity to this toxin. Which of the following order is correct with respect to sensitivity towards the toxin
[Question ID = 4463]

1. RNA POL III > RNA POL II > RNA POL I [Option ID = 17846]
2. RNA POL II > RNA POL III > RNA POL I [Option ID = 17847]
3. RNA POL I > RNA POL III > RNA POL II [Option ID = 17848]
4. RNA POL II > RNA POL I > RNA POL III [Option ID = 17849]

Correct Answer :-

- RNA POL II > RNA POL III > RNA POL I [Option ID = 17847]

90) A eukaryotic gene encoding a 50 kDa protein was cloned in an *E. coli* expression vector under the *lac* promoter and operator. Upon addition of IPTG, the expression of 50 kDa protein was not detected. Which one of the following is the likely explanation for the above observation?

[Question ID = 4464]

1. The cloned sequence lacked the Kozak sequence

   [Option ID = 17850]
2. *E. coli* does not make proteins larger than 40 kDa

   [Option ID = 17851]
3. Differences in codon preference

   [Option ID = 17852]
4. 50 kDa protein contains a nuclear localization signal

   [Option ID = 17853]

Correct Answer :-

- Differences in codon preference

  [Option ID = 17852]

91) A scientist is comparing characteristics of a C3 plant -wheat and C4 plant - sugarcane. Which of the following is true regarding these two plants:
[Question ID = 4465]

1. Wheat plant makes glucose in its bundle sheath cells [Option ID = 17854]
2. Sugarcane plant has stomata open only at night while in wheat the stomata is open only during the day [Option ID = 17855]
3. Sugarcane plant physically separates its phases of CO_2 fixation and Calvin cycle while the wheat does not [Option ID = 17856]
4. Sugarcane plant uses Rubisco for CO_2 fixation [Option ID = 17857]

Correct Answer :-

- Sugarcane plant physically separates its phases of CO_2 fixation and Calvin cycle while the wheat does not [Option ID = 17856]

92) Which of the following regulate the opening and closing of the stomata?
[Question ID = 4466]

1. HCO_3^- channel [Option ID = 17858]
2. Na^+channel [Option ID = 17859]
3. K^+channel [Option ID = 17860]
4. Ca^+channel [Option ID = 17861]

Correct Answer :-

- K^+channel [Option ID = 17860]

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93) If the sequence of coding strand in a transcription unit is as follows: 5′- GAGTTGCCAATTGCAGTC-3′, the sequence of

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transcribed from the transcription unit would be
ion ID = 4467]
1. 5′-AGUUGCCAAUUGCAGUC-5′ [Option ID = 17862]
2. 5′-CUUAACGGUUAACGUCAG-3′ [Option ID = 17863]
3. 5′-GAGUUGCCAAUUGCAGUC-3′ [Option ID = 17864]
4. 5′-GACUGCAAUUGGCAACUC-3′ [Option ID = 17865]

Correct Answer :-

- 5′-GAGUUGCCAAUUGCAGUC-3′ [Option ID = 17864]

94) A mutation in gene X gives a mutant phenotype. A second mutation in another gene Y restores the wild type phenotype. The mutation in gene Y is a :

[Question ID = 4468]

1. Suppressor mutation

   [Option ID = 17866]
2. Revertant

   [Option ID = 17867]
3. Intragenic mutation

   [Option ID = 17868]
4. Recessive mutation

   [Option ID = 17869]

Correct Answer :-

- Suppressor mutation

  [Option ID = 17866]

95) A cross is made between two homozygous plants with phenotypes of Kanamycin resistance and sensitivity. All F_1 progeny show resistance to Kanamycin. Selfing of the F_1 gives rise to F_2 progeny segregating for resistant and sensitive phenotypes in a 63:1 ratio. How many genes govern this trait?
[Question ID = 4469]

1. Two [Option ID = 17870]
2. Three [Option ID = 17871]
3. Four [Option ID = 17872]
4. Eight [Option ID = 17873]

Correct Answer :-

- Three [Option ID = 17871]

96) The ratio between the energy transferred at different points through an ecosystem is called
[Question ID = 4470]

1. Ecological capacity [Option ID = 17874]
2. Ecological efficiency [Option ID = 17875]
3. Ecological assimilation [Option ID = 17876]
4. Ecological potential [Option ID = 17877]

Correct Answer :-

- Ecological efficiency [Option ID = 17875]

97) Peptide bond of a growing polypeptide chain is generated between:

[Question ID = 4471]

1. COOH attached to Cα of 1st amino acid and NH_2 attached to Cα of the next

   [Option ID = 17878]
2. NH_2 attached to Cα of 1st and COOH attached to Cα of the next

   [Option ID = 17879]
3. COOH attached to C_γ of 1st and NH_2 attached to Cα of the next

   [Option ID = 17880]
4. COOH attached to C_β of 1st and NH_2 attached to Cα of the next

   [Option ID = 17881]

Correct Answer :-

- COOH attached to Cα of 1st amino acid and NH_2 attached to Cα of the next

  [Option ID = 17878]

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98) In plants, the pressure flow model used to explain the direction of movement of phloem content, and photosynthate movement from source to sink is driven by

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1. ...ion ID = 4472]
1. ...TP dependent pressure flow pump [Option ID = 17882]
2. ...ter pressure potential gradient [Option ID = 17883]
3. Transpiration [Option ID = 17884]
4. Apoplastic diffusion [Option ID = 17885]

Correct Answer :-

- An ATP dependent pressure flow pump [Option ID = 17882]

99) Insulin enhances glucose transport primarily by:
[Question ID = 4473]

1. Converting glucose to glucose-6-phosphate [Option ID = 17886]
2. Increasing the number of glucose transporters on the membrane [Option ID = 17887]
3. Changing the level of UDP glucose in the cell [Option ID = 17888]
4. Changing the affinity of glucose transporters [Option ID = 17889]

Correct Answer :-

- Increasing the number of glucose transporters on the membrane [Option ID = 17887]

100) A pair of alleles, govern the synthesis of membrane proteins which are recognized by two different antibodies 'X' and 'Y'. When an individual whose cells cross-reacts to antibody 'X' and not to antibody 'Y' is mated to an individual whose cells cross-reacts to antibody 'Y' and not to antibody 'X', cells of all the progeny cross react to both the antibodies. Based on this observation, which one of the following best explains the relationship between the pair of alleles?
[Question ID = 4474]

1. Epistasis [Option ID = 17890]
2. Incomplete dominance [Option ID = 17891]
3. Co-dominance [Option ID = 17892]
4. Over-dominance [Option ID = 17893]

Correct Answer :-

- Co-dominance [Option ID = 17892]

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