

India's Number 1 Education App

BIOLOGY

BOOKS - NCERT BIOLOGY (ENGLISH)

MOLECULAR BASIS INHERITANCE

Multiple Questions

1. In a DNA strand the nucleotides are linked

together by

A. glycosidic bonds

B. phosphodiester bonds

C. peptide bonds

D. hydrogen bonds

Answer: B

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2. A nucleoside differs from a nucleotide. It

lacks the

A. base

B. suger

C. phophate group

D. hydroxyl group

Answer: C

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3. Both deoxyribose and ribose belong to a class of sugars called

A. trioses

B. hexoses

C. pentoses

D. polysaccharides

Answer: C

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4. The fact that a purine base always paired through hydrogen bonds with a pyrimidine base leads to, in the DNA double helix

A. the antiparallel nature

B. the semiconservative nature

C. uniform width throughout DNA

D. uniform length in all DNA

Answer: C

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5. The net electric charge on DNA and histones

A. both positive

B. both negative

C. Both (a) and (b)

D. zero

Answer: C

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6. The promoter site and the terminator site

for transcription are located at

A. 3' (downstream) end and 5' (upstream) end, respectively of the transcription unit

- B. 5' (upstream) end and 3' (Downstream) end, respectively of the transcription unit
- C. the 5' (uptream) end
- D. the 3' (downstream)end

Answer: C

7. Which of the following statements is the most appropriate for sickle cell anaemia

A. It connot be treated with iron

supplements

B. it is a molecular disease

C. It confers resistance to acquiring malaria

D. All of the above





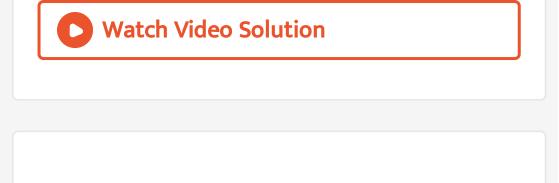


- **8.** One of the following is true with respect to AUG
 - A. It codes for methionine only
 - B. It is also an initation coden
 - C. It codes for methionine in both

prokaryotes and eukaryotes

D. All of the above

Answer: D



9. The first genetic material could be

A. Protein

B. carbohydrates

C. DNA

D. RNA

Answer: D

10. With regard to mature mRNA in eukaryotes

A. exons and introns do not appear in the

mature RNA

B. exons appear but introns do not apper

in the mature RNA

C. introns appear but exons do not apper

in the mature RNA

D. both exons. And introns appear in the

mature RNA

Answer: D



11. The human chromosome with the highest and least number of gens in them are respectively

A. chromosome 21 and Y

B. chromosome 1 and X

C. chromosome 1 and Y

D. chromosome X and Y

Answer: C



12. Who amongst the following scientists had no contribution in the development of the double helix model for the structure of DNA ?

A. Rosalind Franklin

- **B. Maurice Wilkins**
- C. Erwin Chargaff
- D. Meselson and Stahl

Answer: D



13. DNA is a polymer of nucleotides which are linked to each other by 3' - 5'phosphodiester bond . To prevent polymerisation of nucleotides, which of the following modifications would you choose ?

A. Replace purine with pyrimindines

B. Remove/ Replace 3' OH group in deoxy

ribose

C. Remove/Replace2' OH group with some

other group in deoxy ribose

D. Both (b) and (c)

Answer: B

14. Discontinuous synthesis of DNA occurs in

one strand, because

A. DNA molecule being synthesised is very

long

B. DNA dependent DNA polymerase

catalyes polymerisation only in one

direction (5' \rightarrow 3')

C. it is a more efficient process

D. DNA ligase has to have a role

Answer: B



15. Which of the following steps in transcription is catalysed by RNA polymerase?

A. Initiation

B. Elongation

C. Terminatioin

D. All of the above





16. Control of gene experssion takes place at the level of

A. DNA-replication

B. transcription

C. translation

D. None of these

Answer: B



17. Regulatory proteins are the accessory proteins that interact with RNA polymerase and affect its role in transcription. Which of the following statements is correct about regulatory protein ?

A. They only increase expression

B. They olny decrease expression

C. They interact with RNA polymerase but

do not affect the expression

D. They can act both as activators and as

repressors

Answer: D

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18. Which was the last human chromosome to

be completely sequenced ?

A. Chromosome 1

B. Chromosome 11

C. Chromosome 21

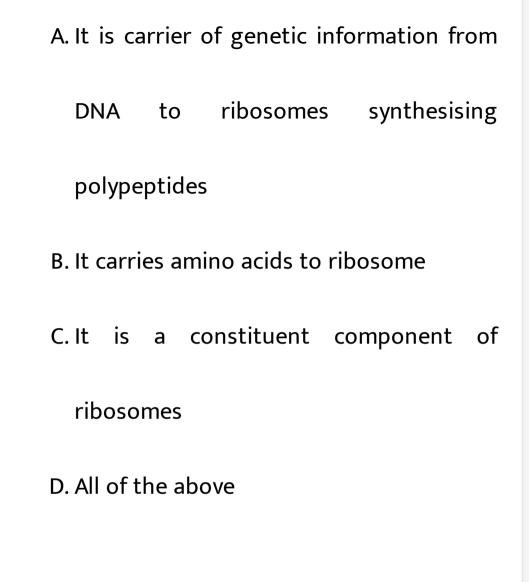
D. Chromosome-X

Answer: A

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19. Which of the following are the functions of

RNA



Answer: D

20. While analysing the DNA of an organism a total number of 5386 nucleotides were found out of which the proportion of different bases were: Adenine=29 %, Guanine= 17%, Cytosine=32%, Thymine=17 %, Considering the Chargaff's rule it can be concluded that

A. it is a double-stranded circular DNA

B. it is single-stranded DNA

C. it is a double-stranded linear DNA

D. NO conclusion can be drawn





21. In some viruses, DNA is synthesised by using RNA as template . Such a DNA is called

A. A-DNA

B. B-DNA

C. cDNA

D. rDNA

Answer: C



22. If Meselson and Stahl's experiment is continued for four generations in bacteria, the ratio of ${}^{15}_{N}/{}^{15}_{N} \cdot {}^{15}_{N}/{}^{14}_{-}/{}^{14}_{N}$ containing DNA in the fourth generation would be

A. 1:1:0

B.1:4:0

C. 0:1:3

D. 0:1:7

Answer: D

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23. If the sequence of nitrogen bases of the coding strand of DNA in a transcription unit is 5' - ATGAATG - 3', the sequence of bases in its RNA transcript would be

A. 5'- A U G A A U G - 3'

B. 5' - U A C U U A C - 3'

C. 5' - C A U U C A U - 3'

D. 5' - G U A A G U A - 3'

Answer: A

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24. The RNA polymerase holoenzyme

transcribes

A. the promoter, structural gene and the

terminator region

B. the structural gene and the terminator

regions

C. the structural gene and the terminator

regions

D. the structural gene only

Answer: C

25. If the base sequence of a codon in mRNA is				
5'-AUG-3',	the	sequence	of	tRNA
pairing with it must be				
A. 5'-UAC -3'				
B. 5'-CAU -3'				
C. 5'- AUG -3'				
D. 5'- GUA -3'				
Answer: A				
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26. The amino acid attaches to the tRNA at its

A. 5'-end

B. 3'-end

C. Anti codon site

D. DHU loop

Answer: B

27. To initiate translation, the mRNA first binds

to

A. the smallar ribosomal sub-unit

B. the larger ribosomal sub-unit

C. the whole ribosome

D. No such specificity exists

Answer: A

28. In E. coli, the lac operon gets switched on

when

A. lactose is present and it binds to the

repressor

B. repressor binds to operator

C. RNA polymerase binds to the operator

D. lactose is present and it binds to RNA

polymerase

Answer: A

Very Short Answer Type Questions

1. What is the function of histones in DNA packaging ?

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2. DIFFERENCE BETWEEN EUCHROMATIN &

HETEROCHROMATIN

3. The enzyme DNA polymerase in E. coli is a DNA dependent polymerase and also has the ability to proofread the DNA strand being synthesised Explain. Discuss the dual polymerase.

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4. What is the cause of discontinuous synthesis of DNA on one of the parental

strands of DNA? What happens ro these short

stretches of synthesised DNA?



5. Given below is the sequence of coding strand of DNA in a transcription unit 3' AATGCAGCTAT TAGG-5' Write the sequence of (a) its complementary strand

(b) the mRNA

6. What is DNA polymorphism? Why is it important to study it?
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7. Based on your understanding of genetic code, explain the formation of any abnormal heamoglobin molecule. What are the known consequences of such a change?

8. Sometimes cattle or even humen beings give birth to their young ones that are having extremely different sets of organs like limba/position of eye(s) etc. Comment .



9. In a nucleus, the number of ribonucleoside triphophates is 10 times the number of deoxy \times 10 ribonucleoside triphosphaes, but only deoxy ribonucleotides are added during the DNA replication. Suggest a mechanism.



10. Name a few enzymes involed in DNA replication other then DNA polymerase and ligase. Name the Key function for each of them.

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11. Name any three viruses which have RNA as

the genetic material.





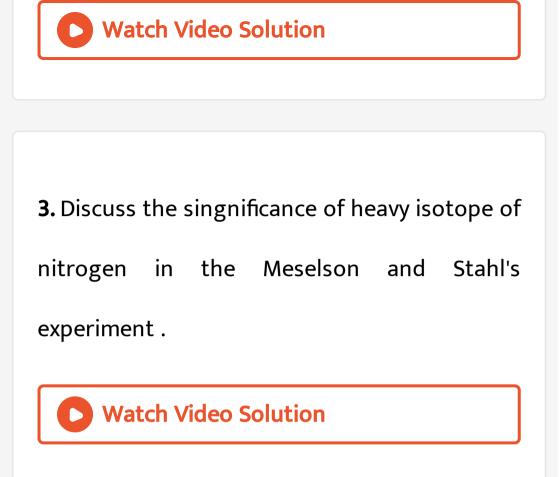
Short Type Answer Questions

1. Define transformation in Griffith's experiment. Discuss how it helps in the identification of DNA as the genetic material.

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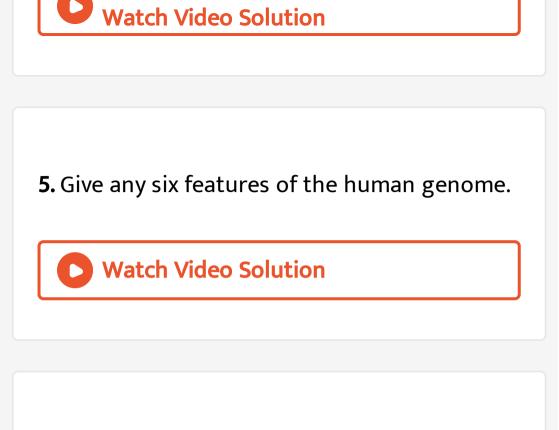
2. Who revealed biochemical nature of the

transforming principle?



4. Define a cistron. Giving examples differentiate between monocistronic and polycistronic unit.





6. During DNA replication, why is it that the entire molecule does not open in one go? Explain replication fork. What are the two functions that the monomers (dNTPs) play?



7. Retroviruses do not follow central dogma.

Comment.

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8. In an experiment, DNA is treated with the compound which tends to place itself amongst the stacks of nitrogenous base pairs. As a result of this, the distance between two consecutive base increases.From 0.34-0.44nm, calculate the length of DNA double helix

(Which has `2x10^(9)bp) in the presence of

saturating of this compound.



9. What would happen if histones were to be mutated and made rich in acidic amino acids such as aspertic acid and gultamic acid in place of basic amino acids such as lysine and arginine?



10. Recell the experiments done by frederick Griffith, Avery, MacLeod and McCarty, where DNA was speculated to be the genatic material. If RNA , instead of DNA was the genetic meterial, would the heat killed strain of pneumoccus have transformed the R-strain into virulent strani? Explain.

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11. You are repeating the Hershey-Chase experiment and are provided with two

isotopes $.^{32} P$ and $.^{15} N$ (in place of $.^{35} S$ in the original experiment). How does yoe expect your results to be differnet?

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12. There is only one possible sequence of amino acids when deduced from a given nucleotides. But multiple nucleotides sequence can be deduced from a single amino acid sequence. Explain this phenomena.



13. A single base mutation in a gene may not 'always' result in loss or gain of function. Do you think the statement is correct? Define your answer .

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14. A low level of expression of lac operon occurs at all the time. Can you explain the logic behind this phenomena.

15. How has the sequencing of humen genome opened new windows for treatment of verious genetic disorders. Discuss amongst your classmates.

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16. The total number of genes in humans is far

less(lt25000) the than the pravious estimate

(up to 140000 gene). Comment.

17. Now , sequencing of total genomes is getting less expensive day by day. Soon it may be affordable for a common men to get his genome sequenced. What in your opinion could be the advantage and disadvantage of this development?



18. Would it be appropriate to use DNA probes such as VNTR in DNA fingerprinting of a bacteriophage?



19. During in vitro synthesis of DNA, a researcher used 2', 3'-dideoxy cytidine triphosphate as raw nucelotide in place of 2' - deoxy cytidine. What would be the consequnce?



20. That background information did Watson and Crick have made available for developing a model of DNA ? What was their contribution ?

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- 21. What are the functions of
- (i) methylated guanine cap?
- (ii) poly-A 'tail' in a mature on RNA ?

22. Do you think that the alternate splicing of exons may enable a structural gene to code for several isoproteins from one and the same gene? If yes, how? If not, why so ?

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23. Comment on the utility of variability in number of tansem repeats during DNA fingerprinting .



Long Answer Type Questions

1. Give an account of Hershey and Chase experiment. What did it conclusively prove? If both DNA and proteins contained phosphors and Sulphur do you think the result would have been the same?

2. During the course f evolution why DNA was choosen over RNA as genetic material. Give reasons by first discussing the desired criteria in a molecule that can act as genetic meterial and in the light of biochemical differences between DNA and RNA.



3. Give an account of post transcriptional

modifications of a eukaryotic mRNA.



4. Discuss the process of translation in detail.



5. Define an operon, giving an example, explain

an inducible operon.

6. There is a paternity dispute for a child'. Which techique can solve the problem? Discuss the priciple involved.



7. Give an account of the methods used in

sequencing the human genome.



8. List the various markers that are used in

DNA fingerprinting

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9. Replication was allowed to take place in the presence of redioactive deoxynucleotides precursors in E. coli that was a mutant for DNA ligase. Nswly synthesised redioactive DNA was purified and strands were separated by denatureation. These were centrifuged using

density gradient centrifugation. Which of the

following would be a correct resulat ?

