

1. Answer the following short questions

i. What is a gene?

Ans: A gene is the basic physical and functional unit of heredity. Genes are made up of DNA. Some genes act as instructions to make molecules called proteins.

ii. What substances do genes tell our bodies to make?

Ans: Genes contain instructions that tell our cells to make molecules called proteins. Proteins perform various functions in our body to keep us healthy.

iii. What is heredity and its unit?

Heredity means the transmission of characters from one generation to another. A gene is the basic physical and functional unit of heredity.

iv. What are the three main components of DNA?

DNA is made up of three major components.

Pentose sugar	Phosphate group	Nitrogenous bases
Pentose sugar molecule called deoxyribose.	Phosphate group helps to bind 2 deoxyribose molecules	Nitrogenous bases form the base of double helix.

v. What is difference between a nucleotide and nucleocide?

Deoxyribose sugar, nitrogenous bases and phosphate molecule are collectively called a nucleotide. When phosphate group is removed from nucleotide unit It is called a nucleocide.

vi. Name the four nitrogenous bases of DNA.

- Adenine
- Guanine
- Cytosine
- Thymine

vii. Why DNA is called “Blue Print” for life?

DNA stands for Deoxyribonucleic acid, and it is a molecule that carries genetic instructions that determine all characteristics of living things including, growth, development, functioning and reproduction. That is the reason DNA is called “**Blue Print**” for life.

viii. What are autosomes and sex chromosomes?

In humans, there are 46 chromosomes in each cell, arranged in 23 pairs. The 22 pairs of chromosomes are called autosomes. The 23rd pair is the sex chromosomes.

1. Long answer questions:

i. State four characteristics of humans which are totally unaffected by the environment.

1) Eye color

The color of a person's eyes is determined by their genes, and does not change because of the environment.

2) Blood type

Blood type is also decided by our genes and does not change by the environment.

3) Fingerprint patterns

Everyone has unique fingerprints, and these patterns are formed before birth. They stay the same throughout a person's life, no matter where they are or what they do.

4) Innate talents

Some people are naturally good at things like singing, drawing or sports. These talents are part of who they are and aren't effected by their surroundings.

ii. Describe the importance of DNA.

Ans: DNA is crucial because it contains the genetic instructions that determine the characteristics and traits of all living organisms, including humans. It serves as a blueprint for the development, functioning, and reproduction of cells and is essential for the inheritance of genetic information from one generation to the next. It is the code of life that stores all the information related to living organisms.

iii. How DNA functions?

- DNA is like a biological instruction manual.
- It carries all the information needed to build and maintain living things.
- When a cell needs to make something, like a protein, it reads the DNA's instructions and copies them into a molecule called RNA.

- This RNA then guides the cell in creating the desired protein, which plays a role in the organism’s traits and functions.
- DNA ensures that organisms can grow, reproduce and function properly by passing on their genetic code to the next generation.

iv. Describe the structure of DNA?

- The structure of DNA is like a double helix, which is twisted ladder-like. It consists of two long strands.
- It has four nitrogenous bases.
- These molecules are bind with each other with the help of hydrogen bonds.
- Adenine binds with Thymine with two hydrogen bonds.
- Guanine binds with Cytosine with 3 hydrogen bonds.
- The diameter of DNA molecule is 2 nm.
- The double helical strand has one major and one minor groove that makes that makes up one turn.

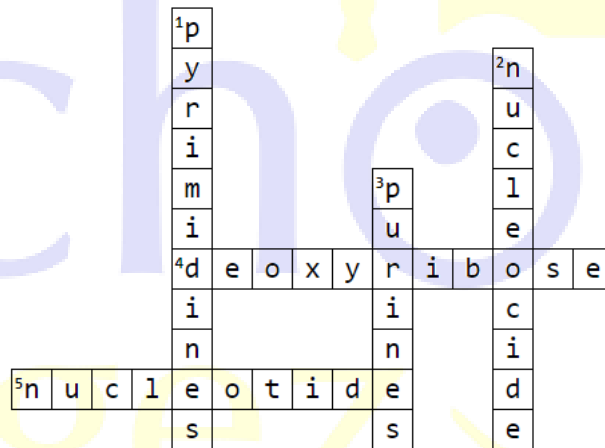
2. Tick the right option.

1. The basic physical and functional unit of heredity is;			
I. Gene	II. Chromosome	III. DNA	IV. Ribosome
2. The thread-like structures that are found in the nucleus of a cell.			
I. Genes	II. Mitochondria	III. Chromosomes	IV. Ribosomes
3. Females have two chromosomes;			
I. XY	II. YY	III. YX	IV. XX
4. Males have chromosomes;			
I. XY	II. YY	III. YZ	IV. XX
5. DNA is made up of major components;			
I. 2	II. 3	III. 4	IV. 5

3. Fill ups

- i. **Heredity** means the transmission of characters from one generation to another.
- ii. A gene is a sequence of **DNA** that codes for a particular protein.
- iii. The 22 pairs of chromosomes are called **autosomes**.
- iv. DNA is called the **blue print** for life.
- v. DNA has four **nitrogenous** bases.

4. Crosswords



Across	Down
4.Pentose sugar	1.Cytosine,thymine
5.Three components of DNA	2.Removal of phosphate group
	3.Guanine, adenine

5. Words Search

Find the following word in the words search.

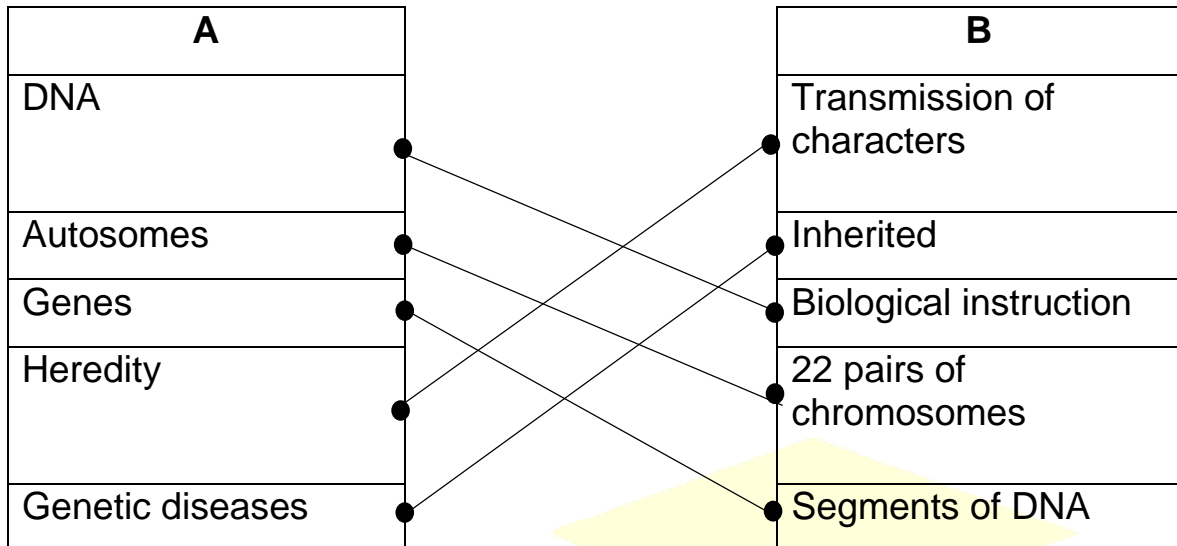
Deoxyribose	Nitrogenous	Phosphate	Helix	Molecule
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S	C	A	T	S	A	L	T	D	R	N
K	M	O	L	E	C	U	L	E	R	I
B	T	E	A	T	H	I	N	O	X	T
G	O	O	U	R	C	E	L	X	B	R
P	P	N	K	H	E	A	E	R	U	O
O	L	I	U	E	H	E	L	I	X	G
V	A	R	I	A	T	I	O	B	E	E
E	S	P	I	N	D	L	E	O	R	N
C	M	B	T	U	I	M	B	S	A	O
D	B	N	P	O	U	Y	N	E	N	U
P	H	O	S	P	H	A	T	E	M	S

6. Jumbled Words

- | | |
|-----------------------------|-----------------------------------|
| i. Ninegua <u>Guanine</u> | ii. tideleonuc <u>Nucleotide</u> |
| iii. nineade <u>Adenine</u> | iv. cideleonuc <u>Nucleocide</u> |
| v. sinecyto <u>Cytosine</u> | vi. osepent <u>Pentose</u> |
| vii. minethy <u>Thymine</u> | viii. adderl <u>Ladder</u> |
| ix. raucil <u>Uracil</u> | x. nousgenitro <u>Nitrogenous</u> |

7. Columns



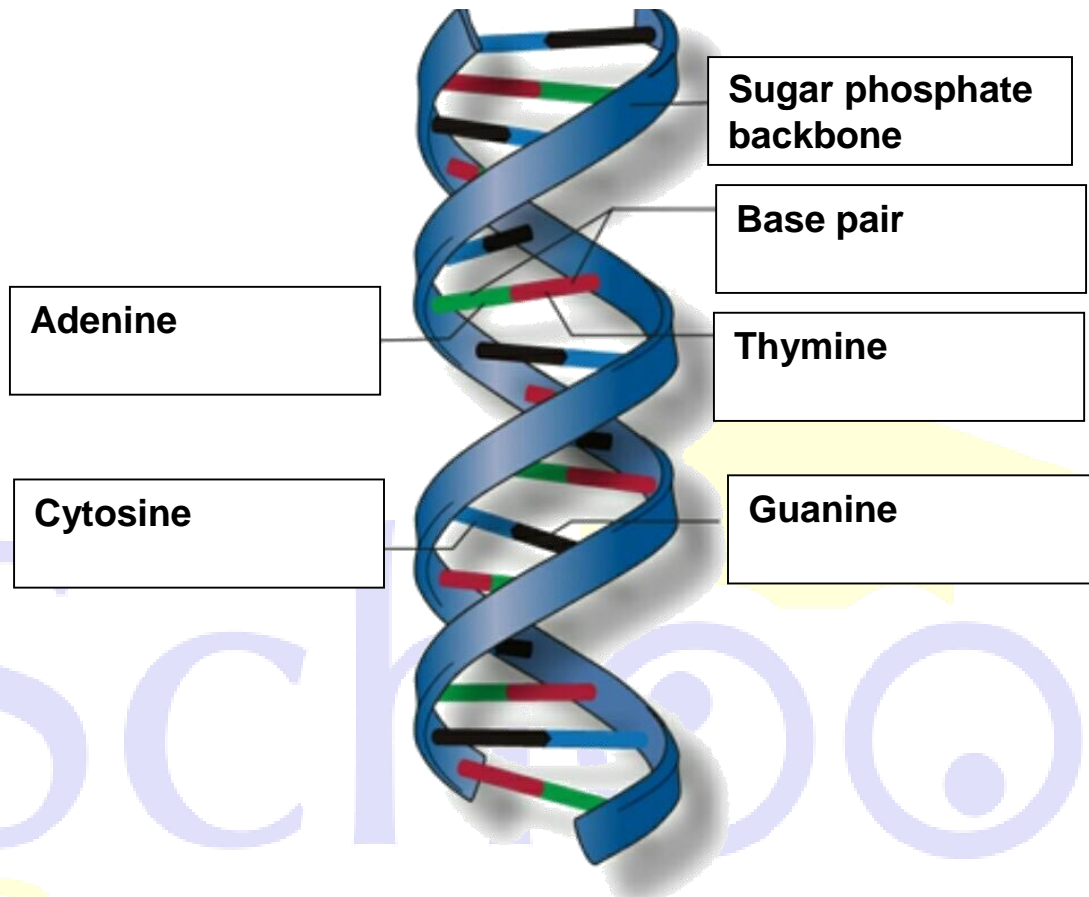
8. Write “T” for the true and “F” for the false statement.

- i. Adenine binds with Thymine with two hydrogen bonds.
- ii. Guanine binds with Cytosine with 4 hydrogen bonds.
- iii. The structure of DNA was discovered by Francis Crick and James Watson.
- iv. The structure of DNA is like a double helix, which is twisted ladder-like
- v. The diameter of DNA molecule is 4 nm.

T
F
T
T
F

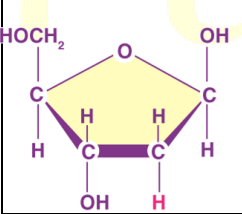
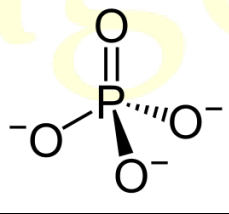
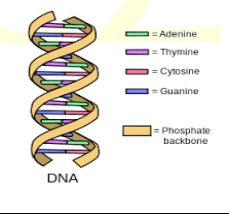
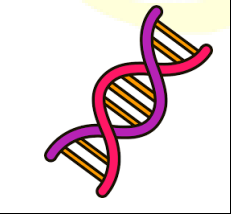
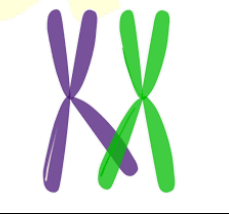
9. Label the diagram.

Structure of DNA



10. Drag and Drop

Look at the pictures and write their names in the relevant column.

				
Pentose sugar	Phosphate group	Nitrogenous bases	DNA	Chromosomes

Structure	Function
Pentose sugar	Forms the backbone of DNA
Phosphate group	Provide structural support to DNA
Nitrogenous bases	Encode genetic information
DNA	Transmits genetic information
Chromosomes	Carry genetic instructions

11. Comprehension

Answer the following questions after reading the paragraph and observe the picture carefully.

DNA, or deoxyribonucleic acid, is like a tiny instruction manual inside each cell, telling it how to function and grow. It's made up of two twisting strands, forming a structure called a double helix. Every living thing has its unique DNA code, inherited from parents. During cell division, DNA is copied so that each new cell gets its set of instructions. Understanding DNA helps scientists unlock the secrets of life and discover how traits pass from one generation to the next.



I. What is double helix?

Ans: DNA is made up of two twisting strands, forming a structure called a double helix

II. How a new cell gets its set of instructions?

Ans: During cell division, DNA is copied so that each new cell gets its set of instructions.

III. How the knowledge about DNA is helpful for scientists?

Ans: Understanding DNA helps scientists unlock the secrets of life and discover how traits pass from one generation to the next.