Grade 10 Biology Kerala 2023

Time: $1^{1/2}$ Hours **Total Score: 40**

Instruction:

- The first 15 minutes is cool-off time.
- You may use the time to read the questions and plan your answers.
- Answer only based on instructions and questions given.
- Consider score and time while answering.

Answer any 5 questions from Q. No. 1 to 6. Each carries 1 score. **5x1=5**

Q1. Identify the word pair relation and fill in the blank.

Planaria : Eye spot

House fly : _____

Solution:

Housefly: **Ommatidium** (Photoreceptors within the compound eyes for vision.)

Q2. Choose the correct pair from the following options.

ENT - Treatment of Eye

Cardiology - Treatment of Heart

Ophthalmology - Treatment of Cancer

Solution:

Cardiology - Treatment of Heart

Q3. Correct mistake if any in the underlined part of the given statements.

(a) Gibberellin stimulates breakdown of stored food to facilitate germination.

(b) Ethylene promotes the growth of terminal buds.

(c) Cytokinin maintains the dormancy of the embryo.

Solution:

The corrected statements are:

(b) **Auxin** promotes the growth of terminal buds.

(c) **Abscisic acid** maintains cell growth, cell division and cell differentiation.

Q4. The genetic makeup of human females is 44 + XX and that of male is 44 + XY. What do the XX and XY indicate?

Solution:

XX and XY indicate the sex chromosomes. In organisms, the sex chromosomes determines the sex of an individual.

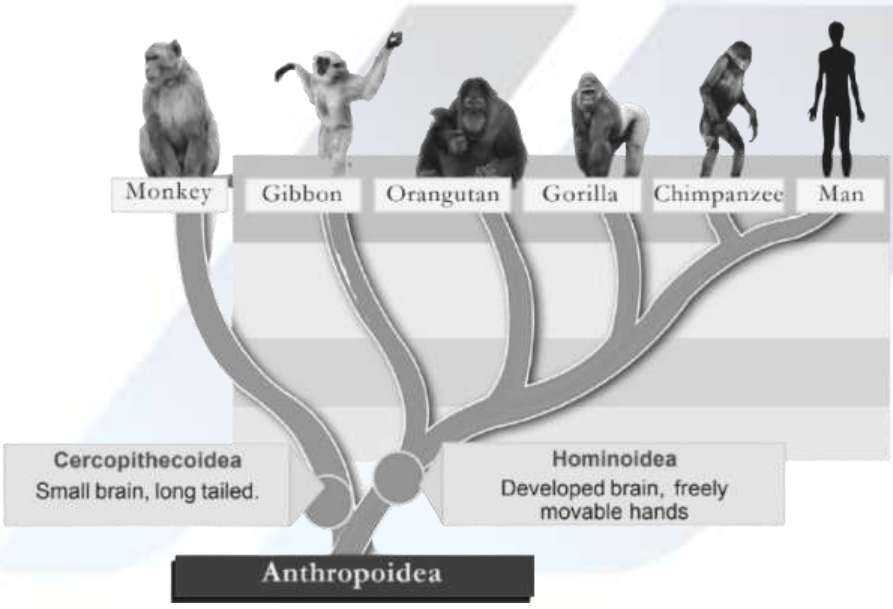
Q5. Find out the odd one and write the common features of others.

Chimpanzee, Gorilla, Monkey, Orangutan.

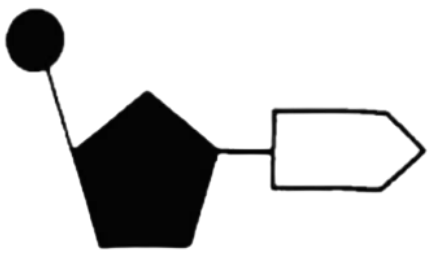
Solution:

Monkey is an odd one out here.

Humans, chimpanzees, gorillas, orangutans, gibbons, and monkeys belong to a group called **Anthropoidea**. This group is divided into two categories: **Cercopithecoidea** and **Hominoidea**. Monkeys belong to the **Cercopithecoidea** group, while humans and the other apes fall under **Hominoidea**. Cercopithecoidea are characterized by having a smaller brain and long tails, whereas Hominoidea have more developed brains and hands that can move freely.



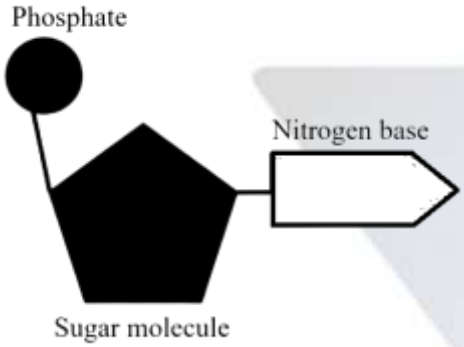
Q6. What does the illustration indicate?



Solution:

The illustration indicates a **nucleotide.**

DNA is made up of small building blocks called nucleotides. Each nucleotide consists of a sugar, a phosphate, and a nitrogen-containing base.



Answer any 6 questions from Q. No. 7 to 13. Each carries 2 scores. **6x2=12**

Q7. Write the name and functions of A and B in the given figure.

Solution:

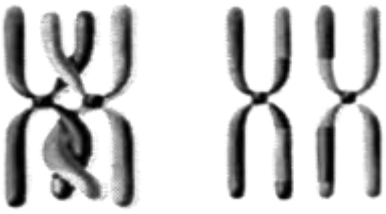
A – Axon

Function: Transmits electrical impulses from the neuron to other neurons or target tissues.

B – Synaptic knob

Function: Facilitates communication between neurons and other cells by releasing neurotransmitters.

Q8. Analyse the given illustration and answer the questions.



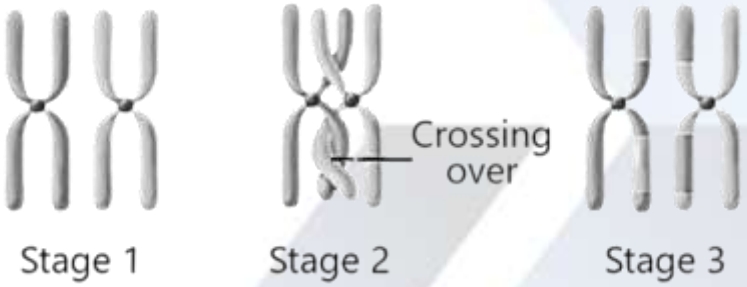
(a) Which process does this illustration indicate?

(b) How does this process cause variation?

Solution:

(a) The given illustration indicates **crossing over**.

(b) Genetic Variations Due to Crossing Over: During early meiosis, chromosomes pair up and exchange DNA segments, a process called crossing over. This reshuffles genes, creating altered chromosomes. When passed to the next generation, these changes result in new traits, promoting genetic variation in the population.



Q9. Symptoms of a viral disease are given. Analyse them and answer the questions.

- Inflammation of the liver.
- White portions of the eyes and nails become yellow coloured.

(a) Identify the disease.

(b) Why do the white portions of the eyes and nails become yellow coloured?

Solution:

(a) The disease is **Jaundice.**

(b) Jaundice is a condition where the skin, the whites of the eyes, and mucous membranes appear yellow due to an elevated level of bilirubin, a yellow-orange pigment found in bile.

Q10. The details of blood groups of two persons are given in the table. Analyse them and answer the questions.

Person	Antigen	Antibody	Rh factor
X	B	a	Present
Y	A	b	Absent

(a) Identify the blood groups of persons X and Y.

(b) Can Y receive blood from X? Why?

Solution:

(a) The blood group of person X is B^+ and Y is A^-.

(b) No, person Y cannot receive blood from person X because person Y, with Rh- blood, does not naturally have Rh antibodies in their blood plasma. However, if a person with Rh- blood receives blood from someone with Rh+ blood, their immune system can develop anti-Rh antibodies. The Rh antigens in Rh+ blood can trigger the production of these antibodies, leading to the agglutination (clumping) of red blood cells.

Q11. Choose suitable hints from the box and complete the table.

- Culex mosquito
- Plasmodium
- Bacteria
- Bat
- Filarial worm
- Rat
- Anopheles mosquito
- Virus

Disease	Vector	Pathogen
Malaria		
Filariasis		

Solution:

Disease	Vector	Pathogen
Malaria	*Anopheles* mosquito	*Plasmodium*
Filariasis	*Culex* mosquito	Filarial worm

Q12. Analyse the given statements and answer the questions.

(i) Sudden withdrawal of the hand while touching on a hot object unknowingly.

(ii) Blinking of eyes when light suddenly falls on them.

(a) Name the reflex actions that take place in (i) and (ii).

(b) What is reflex action?

Solution:

(a) The reflex actions that take place are: (i) Spinal reflex action and (ii) Cerebral reflex action

(b) Reflex actions are automatic and involuntary responses to stimuli that occur without conscious thought.

Q13. The main concept on Origin of life is given below. Analyse it and answer the questions.

Life originated on some other planet in the universe and accidentally reached the earth.

(a) Which theory is mentioned here?

(b) Which evidence supports this?

Solution:

(a) The theory of Panspermia is mentioned here.

(b) The theory of Panspermia suggests that life originated on another planet in the universe and was accidentally brought to Earth. The organic compounds found in meteors that fell to Earth provide support for this idea.

Answer any 5 questions from Q. No. 14 to 20. Each carries 3 scores. 5x3=15

Q14. Arrange columns B and C according to column A.

A. Parts	B. Peculiarity	C. Functions
Cerebrum	Rod shaped part	Maintenance of homeostasis
Cerebellum	Situated just below the thalamus	Controls involuntary actions like heart beat, breathing, etc.
Medulla Oblongata	The second largest part of the brain	Evokes sensations
	The largest part of the brain	Maintains equilibrium of the body

Solution:

A. Parts	B. Peculiarity	C. Functions
Cerebrum	The largest part of the brain	Evokes sensations
Cerebellum	The second largest part of the brain	Maintains equilibrium of the body
Medulla Oblongata	Rod shaped part	Controls involuntary actions like heartbeat, breathing, etc.

Q15. Hints related to a disease are given. Analyse them and answer the questions.

- It is a genetic disease.
- Excess blood is lost even through minor wounds.

(a) Identify the disease.

(b) Why excess blood is lost even through minor wounds in such patients?

(c) How temporary relief is brought in, for such patients?

Solution:

(a) The genetic disease indicated in the hints is **Haemophilia.** It is a condition in which excess blood is lost even through minor wounds.

(b) Haemophilia is caused by a mutation or change, in one of the genes, that provides instructions for making the proteins needed to form a blood clot. When blood can't clot properly, excessive bleeding occurs after any injury or blood vessel damage.

(c) Temporary relief for haemophilic patients is provided by injecting the missing or deficient clotting factor protein into their bloodstream. This helps the blood clot properly, reducing the risk of excessive bleeding after an injury or trauma.

Q16. Table showing the blood glucose level of three persons before breakfast is given below. Analyse it and answer the questions.

Individual	Blood glucose level
A	82mg/100ml
B	178mg/100ml
C	104mg/100ml

(a) Which person is Diabetic?

(b) What is the cause of this disease?

(c) What are the symptoms of this disease?

Solution:

(a) The **B** individual is diabetic.

(b) The cause of diabetes is the low production of **insulin**, a hormone that helps regulate blood sugar levels.

(c) Increased appetite, excessive thirst, and frequent urination are the main symptoms of diabetes.

Q17. Stages in the process of protein synthesis are given below. Arrange them in sequential order.

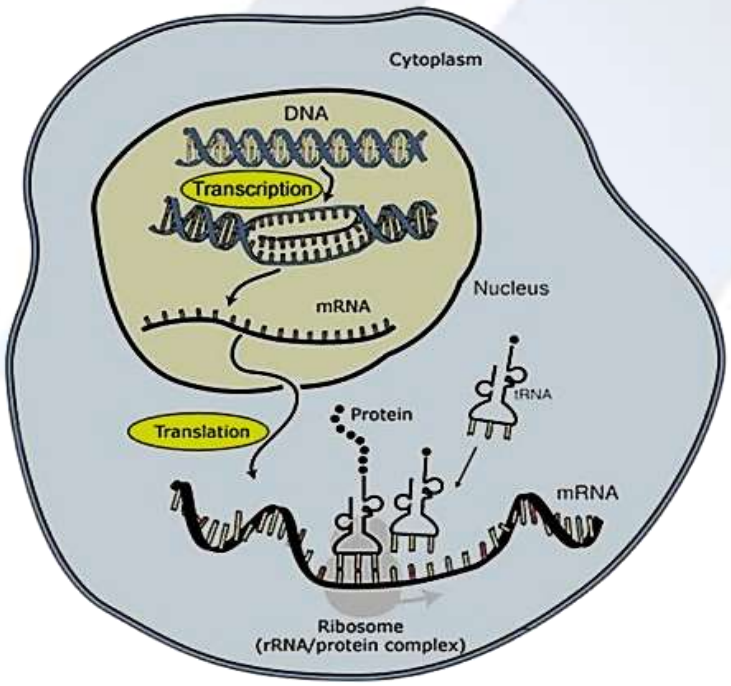
- Protein is synthesized.
- mRNA reaches the ribosome.
- mRNA reaches outside the nucleus.
- Amino acids are added based on the information in mRNA.
- tRNA brings different kinds of amino acids to the ribosome
- mRNA forms from DNA.

Solution:

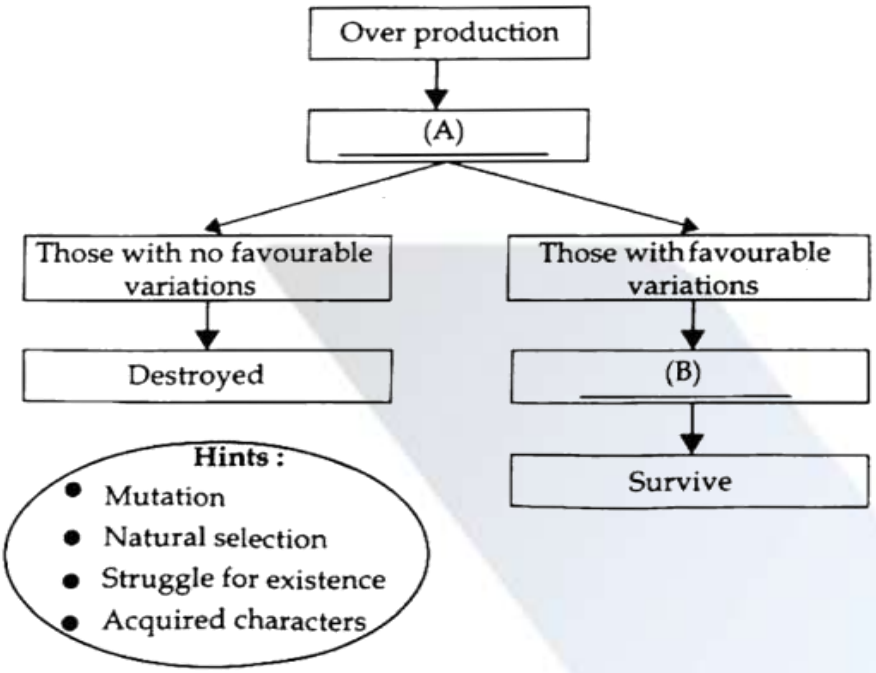
Protein Synthesis is the process where cells make proteins by transcribing DNA into mRNA and translating it into amino acid chains using ribosomes.

The sequential order of stages in the process of protein synthesis is given as follows:

1. mRNA forms from DNA.
2. mRNA reaches outside the nucleus.
3. mRNA reaches the ribosome.
4. tRNA brings different kinds of amino acids to the ribosome
5. Amino acids are added based on the information in mRNA.
6. Protein is synthesized.



Q18. The flow chart and hints related to a theory of evolution are given below. Analyse them and answer the questions.



(a) Choose suitable hints from the box and fill in A and B.

(b) Which theory is indicated in the flow chart?

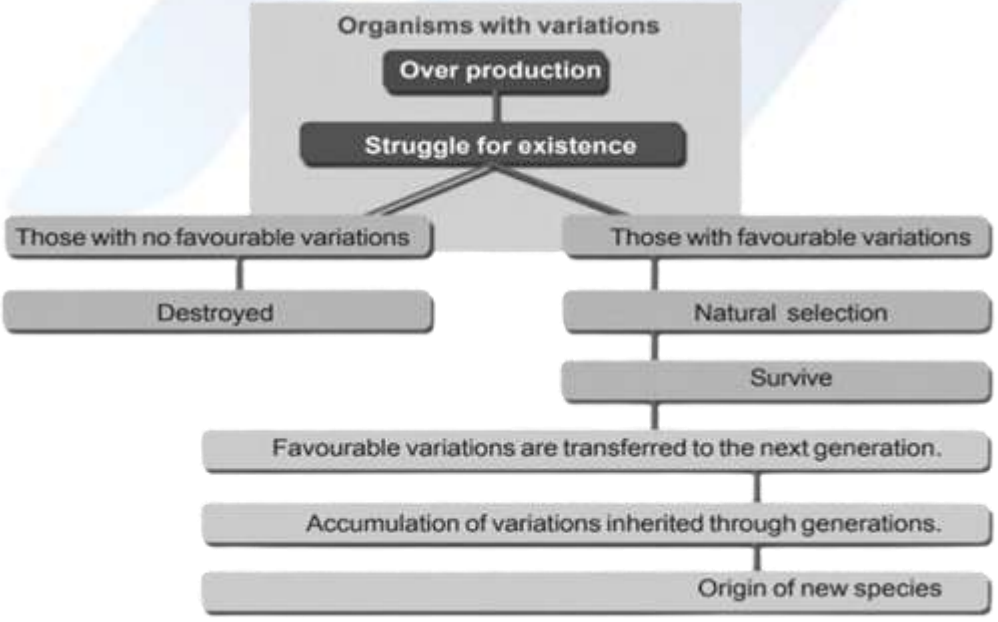
(c) What is the limitation of this theory?

Solution:

(a) A - **Struggle for existence**; B - **Natural selection**

(b) Theory of Natural Selection

(c) Darwin identified that continuous variations occurred in organisms, but he could not explain the reasons for these variations.



Q19. Give reason for the following.

(a) There is no vision in the Blind spot.

(b) Persons with colour blindness are not selected for jobs like that of a driver, pilot etc.

(c) The deficiency of Vitamin A results in Night blindness.

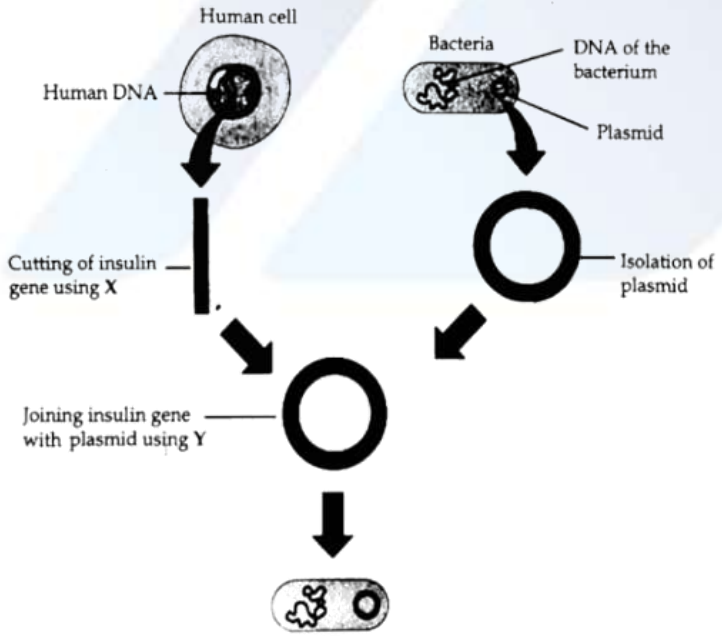
Solution:

(a) The blind spot is a small area on the retina where the optic nerve begins. This area lacks **photoreceptor cells** (rods and cones) responsible for detecting light and forming images. Since no signals are sent to the brain from this region, vision is absent in the blind spot.

(b) Cone cells in the human eye detect **RGB** colours. A defect in these cells causes colour blindness, a genetic disorder impairing the ability to distinguish colours like red and green. Accurate colour perception is crucial for interpreting traffic signals and warning lights, making individuals with colour blindness unsuitable for jobs like drivers or pilots.

(c) Vitamin A is essential for the production of **rhodopsin**, a pigment in the rod cells of the retina that helps us see in dim light. Its deficiency reduces rhodopsin levels, leading to poor vision in low-light conditions, a condition known as night blindness.

Q20. Observe the illustration showing the production of insulin through Genetic engineering and answer the questions.



(a) Name enzymes X, Y.

(b) What is the role of plasmid in this process?

(c) Does the succeeding generations of bacteria produced in this way have the ability to produce insulin? Why?

Solution:

(a) X - **Restriction Endonuclease**; Y - **Ligase**

(b) Bacterial plasmids are generally used as **vectors**. Suitable vectors are used to transfer a gene from one cell to another cell. Vectors containing ligated genes enter the target cells.

(c) Yes, the succeeding generations of bacteria produced in this way have the ability to produce insulin because the succeeding generations will have the new genes as a part of the genetic constitution.

Answer any 2 Questions from 21 to 23. Each carries 4 score. **2x4=8**

Q21. Observe the illustration and answer the questions.

(a) Which is the process indicated in this illustration?

(b) Name the white blood cells involved in this process.

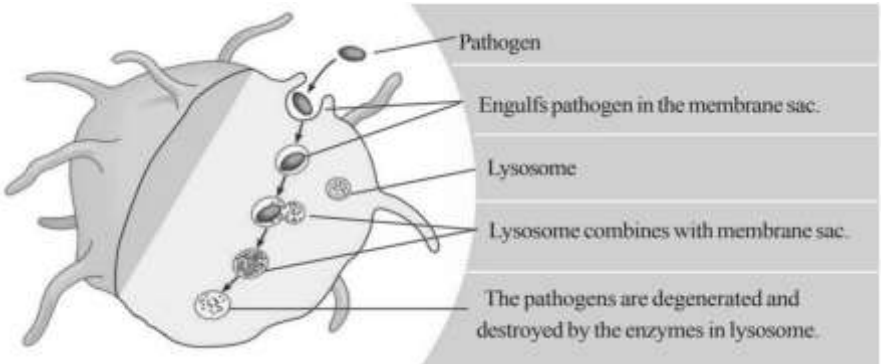
(c) Write the steps involved in this process in sequential order.

Solution:

(a) The process indicated in the illustration is **phagocytosis**.

(b) The white blood cells involved in this process are - **monocytes** and **neutrophils**.

(c) The sequential order of steps involved in this process are:



Q22. Redraw the diagram. Name and label the parts indicated below.

(For drawing 1 score)

(a) The transparent anterior part of the sclera.

(b) The point of maximum visual clarity.

(c) Transmits impulses to visual centre of the brain.

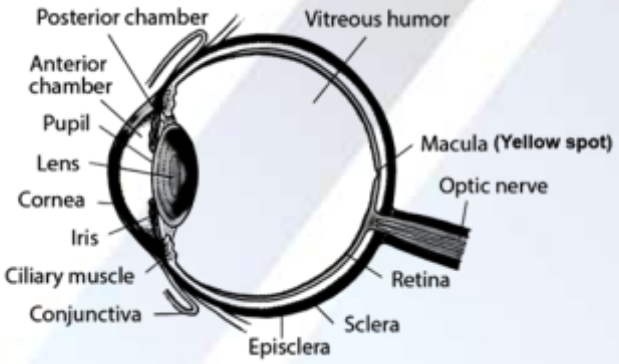
Solution:

The parts indicated in the question:

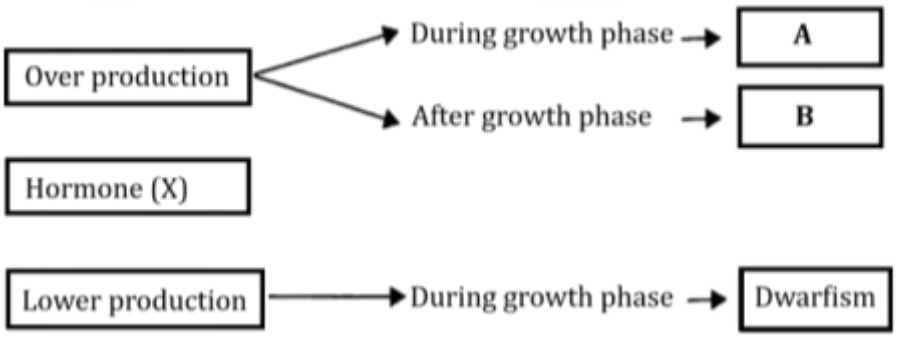
(a) The transparent anterior part of the sclera: This is the **cornea.**

(b) The point of maximum visual clarity: This is the **yellow spot.**

(c) Transmits impulses to the visual centre of the brain: This is the **optic nerve.**



Q23. Analyse the illustration of hormonal disorders and answer the questions.



(a) Name the hormone indicated as X.

(b) Identify the disorders A and B.

(c) What are the symptoms of A and B?

Solution:

(a) The hormone indicated as X is **Growth hormone** (Somatotropin)

(b) Disorder A – **Gigantism**; Disorder B - **Acromegaly**

(c) Symptoms:

- Gigantism - There is excessive growth of the body.
- Acromegaly - There is growth of the bones on the face, jaws and fingers.