BIOLOGY – Code No. 044
SAMPLE QUESTION PAPER*
CLASS – XII (2025-26)

Maximum Marks: 70 **Time: 3 hours**

General Instructions:

(i) All questions are compulsory.
(ii) The question paper has five sections and 33 questions.
(iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
(iv) There is no overall choice. Answer all 33 questions. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
(v) Wherever necessary, neat and properly labeled diagrams should be drawn.

Section – A

Q. No. 1 to 12 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

Q. No	Question	Marks
1	The male gametes are formed by: A. Mitotic division of nucleus of vegetative cell B. Meiotic division of nucleus of vegetative cell C. Mitotic division of nucleus of generative cell D. Meiotic division of nucleus of generative cell	1
2	The primary endosperm nucleus is formed by fusion of which of the following? A. A male gamete and a female gamete B. A male gamete and two polar nuclei C. A female gamete and two synergids D. Two male gametes and an egg cell	1
3	During the menstrual cycle of a human female, formation of graafian follicle is stimulated by secretion of which of the following gonadotropin hormones? A. Estrogen and progesterone B. FSH and Estrogen C. FSH and LH D. Progesterone and LH	1

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4	The experimental proof on the thermal stability of genetic material was first provided by experiments of A. Hershey and Chase B. Meselson and Stahl C. Frederick Griffith D. Jacob an Monod	1
5	Short stretches of DNA used to identify complementary sequences in a sample are called A. Probes B. Markers C. Primers D. Minisatellites	1
6	Select the **incorrect statement** among the following. A. $p^2+2pq+q^2 = 1$. This is binomial expansion of $(p+q)^2$. B. When frequency measured differs from expected values, the difference (direction) indicates the extent of evolutionary change. C. Hardy-Weinberg principle says that phenotype frequencies in a population are stable and are constant from generation to generation. D. The gene pool (total genes and their alleles in a population) remains constant. This is called genetic equilibrium. Sum total of all the allelic frequencies is 1.	1
7	Albinism is known to be due to an autosomal recessive mutation. The first child of a couple with normal skin pigmentation was an albino. What is the probability that their second child will also be an albino? A. 100% B. 25% C. 50% D. 75%	1
8	"In Cricket species, the sound produced by rubbing the wings or legs together play a crucial role in attracting mates, any change in the morphology of Cricket legs could potentially affect their ability to produce sound". A mutant Cricket had thicker hind legs. What would you expect for this cricket species? A. The leg mutation will not lead to speciation if they diversify into new habitats. B. The leg mutation will have little effect on other external features, and therefore have little effect on speciation. C. The leg mutation will have no effect on behavior, and thus have little effect on speciation. D. The leg mutation might lead to reproductive isolation and speciation due to an effect on the mating call.	1

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<table>
<tr><td>9</td><td>Plasmodium is a pathogen that causes malaria. Identify the correct sequence of transmission of the pathogen.
<table>
<tr><th></th><th>I
Stage of pathogen as it is transferred by vector bite</th><th>II
First site in the host body where the pathogens infect and proliferates</th><th>III
Second site in the host body where the pathogen infects and manifests clinical symptoms</th><th>IV
Stage of pathogen as it is transferred to a new vector</th></tr>
<tr><td>A</td><td>Sporozoites</td><td>Erythrocyte infection</td><td>Liver infection</td><td>Gametocytes</td></tr>
<tr><td>B</td><td>Gametocytes</td><td>Erythrocyte infection</td><td>Liver infection</td><td>Sporozoites</td></tr>
<tr><td>C</td><td>Gametocytes</td><td>Liver infection</td><td>Erythrocyte infection</td><td>Sporozoites</td></tr>
<tr><td>D</td><td>Sporozoites</td><td>Liver infection</td><td>Erythrocyte infection</td><td>Gametocytes</td></tr>
</table></td><td>1</td></tr>
<tr><td>10</td><td>Which mRNA will be translated to a polypeptide chain containing 8 amino acids?
A. AUGUUAAUAGACGAGUAGCGACGAUGU
B. AUGAGACGGACUGCAUUCCCAACCUGA
C. AUGCCCAACCGUUAUUCAUGCUAG
D. AUGUCGACAGUCUAAAACAGCGGG</td><td>1</td></tr>
<tr><td>11</td><td>In order to isolate genetic material of a bacterium, the cell must be treated with
A. Lysozyme, ribonuclease, protease, chilled ethanol
B. Cellulase, ribonuclease, protease, chilled ethanol
C. Chitinase, ribonuclease, chilled ethanol, water
D. Ribonuclease, protease, chilled ethanol, water</td><td>1</td></tr>
<tr><td>12</td><td>Integrated Pest Management involves
I. Using pesticides/insecticides judiciously
II. Using biocontrol agents
III. Engaging in organic farming
A. Only I
B. Only II
C. Both I and II
D. Only III</td><td>1</td></tr>
<tr><td colspan="3">Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:
A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true.</td></tr>
<tr><td>13</td><td>Assertion (A): The ability of the pistil to recognise the pollen is the result of a continuous dialogue between pollen and pistil.
Reason (R): This electrical dialogue allows only compatible pollen to germinate.</td><td>1</td></tr>
</table>

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<table>
<tr><td>14</td><td>Assertion (A): Some organisms are better adapted to survive in an otherwise hostile environment.
Reason (R): Adaptive ability is inherited and has a genetic basis.</td><td>1</td></tr>
<tr><td>15</td><td>Assertion (A): Excess dose of coke or crack produces a sense of euphoria, increased energy and causes hallucinations.
Reason(R): It interferes with the transport of dopamine</td><td>1</td></tr>
<tr><td>16</td><td>Assertion (A): Rosie was the first transgenic cow to make more nutritionally balanced milk for consumption by human babies.
Reason (R): The milk of Rosie cow contained human beta- lactalbumin which made the milk rich in protein.</td><td>1</td></tr>
<tr><td colspan="3">Section - B</td></tr>
<tr><td>17</td><td>During artificial hybridisation it is important to ensure that only desired pollen grains are used for pollination. How is it ensured?</td><td>2</td></tr>
<tr><td>18</td><td>How is the rate of initiation of RNA polymerase at a given promoter in a transcriptional unit of prokaryotes regulated ?</td><td>2</td></tr>
<tr><td>19</td><td>The table below shows a hypothetical blood report of a patient.
<table>
<tr><th>Test description</th><th>Observed value</th><th>Unit</th><th>Reference range</th></tr>
<tr><td>Leucocytes</td><td></td><td></td><td></td></tr>
<tr><td>Total leucocyte count</td><td>1100</td><td>Per Microliter</td><td>4400-11000</td></tr>
<tr><td>Neutrophils</td><td>31</td><td>%</td><td>55-70</td></tr>
<tr><td>Lymphocytes</td><td>25</td><td>%</td><td>20-40</td></tr>
<tr><td>Basophils</td><td>0.5</td><td>%</td><td>0.5 - 1</td></tr>
<tr><td>Eosinophils</td><td>02</td><td>%</td><td>1-4</td></tr>
<tr><td>Monocytes</td><td>0</td><td>%</td><td>1-8</td></tr>
</table>
A. Looking at the values suggest which defense mechanism/ immunity is affected and state how this defense mechanism provides immunity.
B. Name the barrier with least count and enumerate its role in providing immunity.</td><td>2</td></tr>
<tr><td>20</td><td>A cheese maker claims to be a biotechnologist. How will you support the same?</td><td>2</td></tr>
<tr><td>21</td><td><u>Attempt either option A or B.</u>
A.
(i) Compare the two ecological pyramids of biomass I and II given below and explain the situations in which this is possible.</td><td>2</td></tr>
</table>

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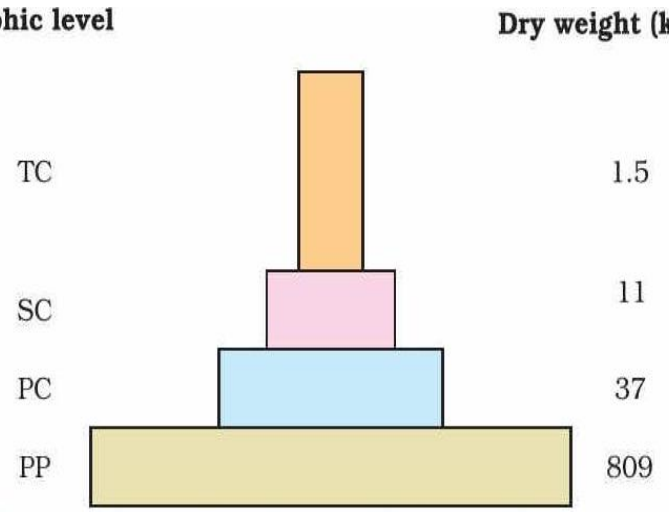

Fig. I

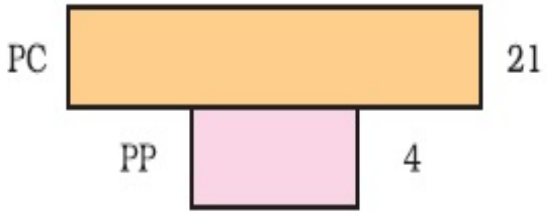

Fig. II

(ii) Construct an ideal pyramid of energy if 200,000 joules of sunlight are available.

- - - - - - - - - - - - - - - - - - -

For Visually impaired students:

A.

(i) Compare the upright and inverted ecological pyramids of biomass and explain the situations in which this is possible.

(ii) Construct an ideal pyramid of energy if 200,000 joules of sunlight is available.

OR

B. A tropical rainforest in South America is home to more than 40,000 species of plants, 3,000 of fishes, 1,300 of birds, 427 of mammals, 427 of amphibians, 378 of reptiles and 1,25,000 insects, snails and worms.

(i) From the given data, calculate the total number of known vertebrate species in the rainforest.

(ii) Give a reason to justify the huge difference in the number of plant and animal species.

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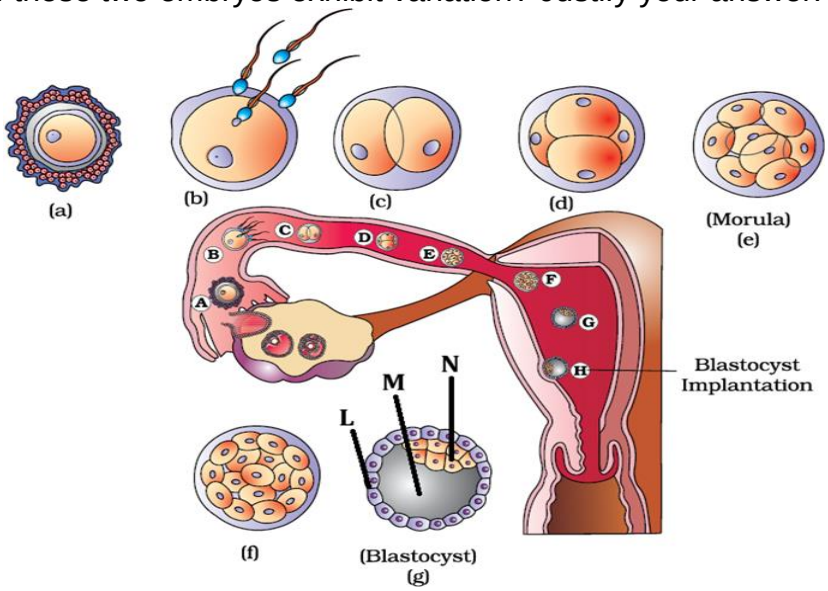
Section - C		
22	Suggest a suitable contraceptive device for the following cases with justification. (i) Mohini does not want to take the risk of conception and sexually transmitted infections (STIs). (ii) Lalita has two children and does not want any more children. (iii) Geeta wants a contraceptive that she can take till she wants to avoid conception and can resume back to her fertile life without the intervention of the doctor. Also, it should have a lower failure rate.	3
23	Given below is a figure showing transport of ovum, fertilisation and passage of growing embryo through fallopian tube in a human female. Answer the questions that follow: (i) What will be the ploidy of cells shown in (a) and (c) stage in the figure given below? (ii) What will happen if component L as shown in the figure (g) given below does not attach properly to the endometrium? (iii) In a pregnant mother (case X), during early pregnancy, the fertilised egg splits into two embryos at stage C shown in the figure given below, resulting in the formation of twins. Will the genome of cells of these two embryos exhibit variation? Justify your answer.  - - - - - - - - - - - - - - - - - - *For Visually impaired students* Explain the events and journey of an ovum in the fallopian tube of a mother from fertilisation stage to implantation.	3
24	In guinea pigs, black coat colour (G) dominates over white (g) and brown eyes (B) dominate over blue (b). The alleles for coat colour and eye colour are not linked. What will be the probability of the offspring having blue eyes and a white coat if both parents are heterozygous for eye and coat colour? Find the probability using a Punnett square	3

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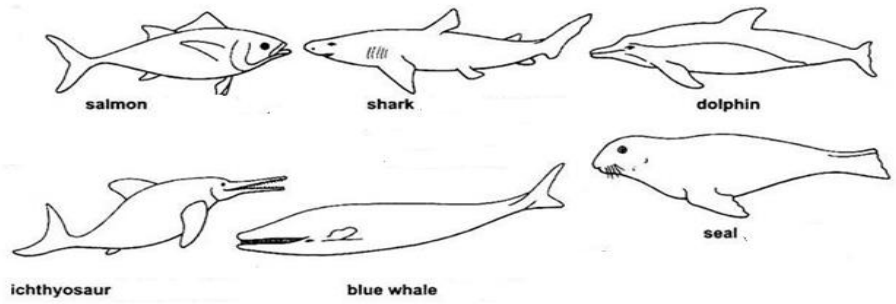
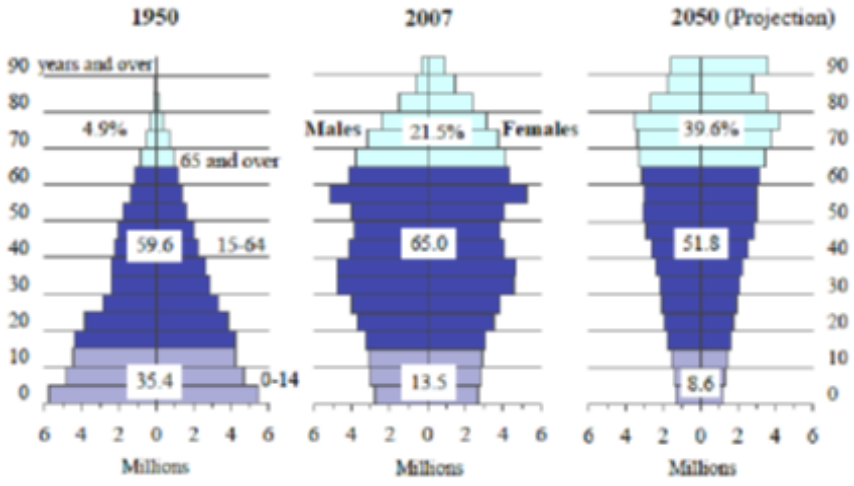
25	Shown below are certain aquatic vertebrates, where natural selection has favoured them to develop certain characteristics which enable them to live in water.  A. Name and explain the phenomenon exhibited by the above animals. B. Which one of the above is the most primitive one? What is its significance? - - - - - - - - - - - - - - - - - - - *For Visually impaired students* A. What are the basic conceptual similarities and differences between Lamarckian and Darwinian theory of evolution? B. Give an example that supports any one of the above two theories.	3
26	The Biological Oxygen Demand (BOD) of a primary effluent during sewage treatment is reduced. Enlist the process of how this is achieved.	3
27	***Attempt either option A or B.*** A. Expand ELISA. On what principle is the ELISA test based? List two ways by which an infection can be detected by this test. **OR** B. Gene expression can be controlled with the help of complementary RNA molecules. Justify it with the help of an example.	3
28	The population pyramids of Japan for 1950, 2007 and 2050 (projections) are shown below to answer the questions that follow:  	3

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C. Identify the age pyramids for 1950, 2007 and 2050.
D. What insights can you gain about their population dynamics?

- - - - - - - - - - - - - - - - - -

For visually impaired students

The population pyramid of Japan for 1950, 2007 and 2050 (projections) shows the shape of a pyramid, broad-based, inverted bell and urn shape, respectively. Answer the questions that follow:

A. Identify the age pyramids for 1950, 2007 and 2050.
B. What insights can you gain about their population dynamics?

Section - D

29 Given below is a set of information about some fruits and seeds. 4

Fruit	Fruit and seed formation
P	Nucellar cells surrounding the embryo sac develop into embryos.
Q	Ovary develops into the fruit by the application of growth hormones.
R	Thalamus contributes to fruit formation.
S	Ovary matures into a fruit after fertilisation.

On the basis of the information provided above, answer the following questions with justification for each answer.

A. How many embryo sacs will be present in each ovule of S before maturation and how many egg(s) will be present in each embryo sac when the embryo sac is developed from a single megaspore? (1)

B.

(i) Which of these fruits exhibits polyembryony? Will their embryos exhibit genetic variation? Justify.
(ii) What will be ploidy of the embryonic cells in the above case? (2)

Attempt either subpart C or D.

C. Which of these fruits can be considered as parthenocarpic? Give a reason. (1)

OR

D. Which of the fruits P, Q, R or S is a true fruit with seeds? Give reason. (1)

30 The graph below shows the Antibody concentration in young calves. Study the graph and answer the questions that follow: 4

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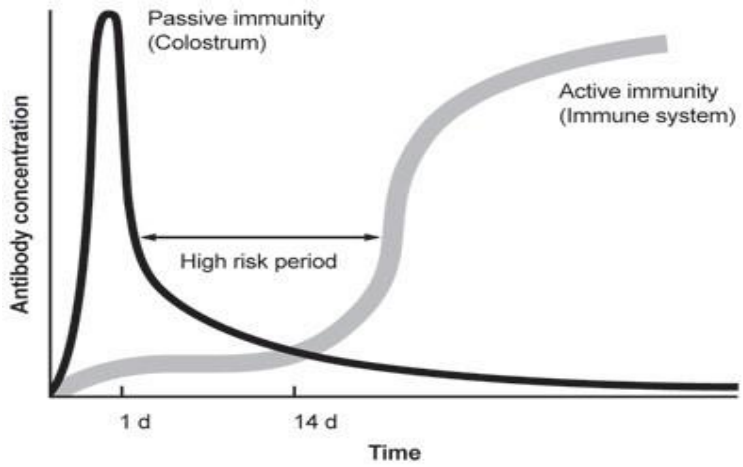

A. What do you think is the difference between passive and active immunity **i**n this case? (1)
B. What happens to passive immunity as days go by and why? (1)

Attempt either subpart C or D.

C. What kind of trend does active immunity show and why?
OR
D. What kind of immunity will be observed when a vaccine is administered to the calf and why? (2)

- - - - - - - - - - - - - - - - - -

For visually impaired students

The antibody concentration in a young calf was studied. It was found that the antibodies derived from colostrum (passive immunity) decreased from day 1 to 14, while the antibodies derived from immune cells (active immunity) increased between day 1 to day 14 and remained steady thereafter.

A. What do you think is the difference between passive and active immunity **i**n this case?
B. What happens to passive immunity as days go by and why?

Attempt either subpart C or D.

C. What kind of trend does active immunity show and why?
OR
D. What kind of immunity will be observed when a vaccine is administered to the calf and why?

Section - E

31

A. Construct a complete transcription unit with promoter and terminator on the basis of the hypothetical template strand given below. 5

B. How is transcription a more complex process in eukaryotic cells? Explain the additional processes that a precursor mRNA has to undergo in these organisms.

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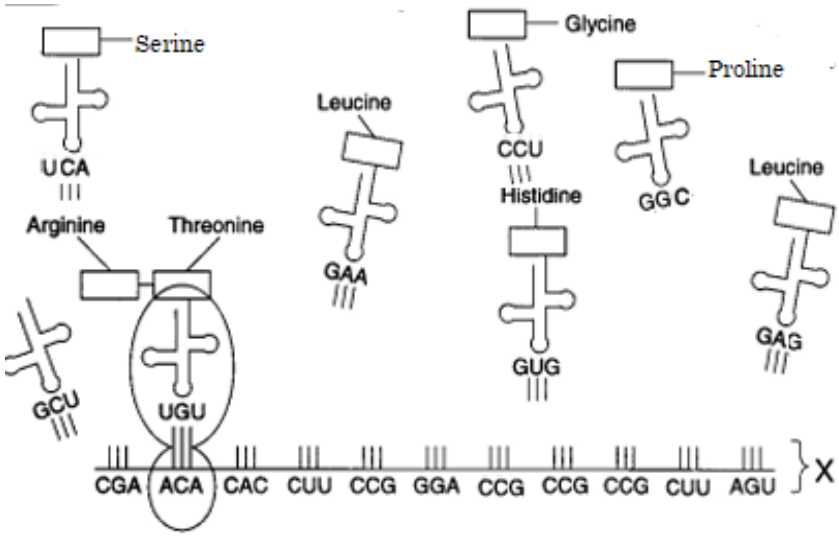
	- - - - - - - - - - - - - - - - - - *For visually impaired students* A. Why are both the strands not copied during transcription? B. How is transcription a more complex process in eukaryotic cells? Explain the additional processes that a precursor mRNA has to undergo in these organisms. **OR** A. Explain the process of aminoacylation of tRNA. Mention its role in translation. B. How do ribosomes in the cells act as factories for protein synthesis? C. Given below is a strand of mRNA undergoing the process of translation, what will be the sequence of Amino acids that will be translated? Name the triplet codons that should be added to bring to the end of translation at X.  - - - - - - - - - - - - - - - - - - *For visually impaired students* C. Explain the phenomenon that forms the genetic basis to prove that codon is a triplet and it is read in a contiguous manner.	
32	Some plant and animal pathogens serve as one of the tools of recombinant DNA (rDNA) technology.' A. Name one animal and one plant pathogen and discuss the pathogenic nature of both. State how they serve as a tool in rDNA technology. B. What are the enzymes needed for rDNA technology? C. A farmer owns a cotton farm land which is getting infested with coleopteran pests. He is not willing to use the microbes to protect his farm. i. Name an alternate method to introduce the gene of interest the pathogen would have otherwise delivered and discuss how the alternate method would deliver the gene. ii. State how this gene would control the pest.	5

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<table>
<tr><td></td><td>OR
BamH1 is a restriction enzyme which recognizes the sequence-
5' - GGATCC - 3'. The restriction activity of this enzyme is between G and G.
A. Construct the palindrome for the above sequence.
B. Draw a labeled diagram to show the formation of recombinant DNA (rDNA) using BamH1.
C. PBR322 is a plasmid that has a restriction site for this enzyme at the tetracycline resistant gene. If BamH1 were to be used, how will it impact the response of the transformant with rDNA to antibiotics-ampicillin and tetracycline. Justify.</td><td></td></tr>
<tr><td>33</td><td>Justify the following statements with suitable proof/examples: -
A. ‘competition is not limited to closely related species’
B. ‘competition is not always dependent on resources being limiting’
C. ‘competitive exclusion occurs in nature’
D. ‘competing species may evolve mechanisms for co-existence’
E. ‘competition in nature comes from what is called ‘competitive release’’
OR
A. How does a simple food chain exemplify the First Law of Thermodynamics?
B. The table below shows the number of species in different parts of the world.
<table><tr><th>Name of Place</th><th>Number of Bird species</th></tr><tr><td>Columbia</td><td>1400</td></tr><tr><td>India</td><td>1200</td></tr><tr><td>Northern South America</td><td>1300</td></tr><tr><td>New York</td><td>105</td></tr><tr><td>Denmark</td><td>504</td></tr></table>
Identify the common factor in regions with a higher number of bird species and suggest at least two reasons for this greater diversity.</td><td>5</td></tr>
</table>

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