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Answers Key:

1. Taxonomical Aids help scientists keep a record and study common and uncommon characteristics of animals and plants. This study helps them to decide about the correct place of a species in the given taxonomical category.
   Herbarium :
   Collected plant species are dried for preservation. The place where they are kept as collection is known as herbarium.
   Botanical Gardens :
   Here live plants are reared for ready reference. Through live plants botanists can study certain features, like mode of reproduction, pattern of pollination, etc.
   Museums :
   Dead animal specimens are preserved in museums. Extinct species, like Dodo are kept in certain museum and act as good reference source.
   Zoological Parks :
   They are helpful in studying live specimens of animal species. Certain ferocious animals are easier to study in zoological parks.
   Keys :
   Keys are pairs of contrasting characters, out of which either of the characters is carried forward across generations and another is discarded to gain better adaptability. These keys are good tool to understand how complex organisms evolved from simpler organisms.
   Manuals and Records :
   Manuals and records show historical data about flora and fauna of a particular geographical location.
2. (i) Human beings have the ability to express themselves through a proper language or script, which makes them different from other living things. They are also the only organisms that are self-conscious.
   (ii) The characteristics of living things are growth, reproduction, metabolism, consciousness, etc.
   (iii) Due to the absence of metabolism in viruses, they cannot be regarded as living. They are considered a connecting link between living and non-living.
   (iv) Abhay is intelligent, inquisitive and has a scientific attitude.
3. (i) We should conserve biodiversity as it provides us source of food, drugs, and medicines, aesthetic, cultural value, gene pool, etc.
   (ii) Botanical gardens play an important role in conservation by growing a wide variety of plants and protecting them from any harm, both from humans, animals and save them from extinction.
   (iii) It is the gardeners who look after the plants in botanical gardens besides botanists.
   (iv) Respect for nature, care for biodiversity, and scientific attitude with a vision for future.
4. Advantages of scientific names are
   (i) These are acceptable in every part of the world.
   (ii) These are assigned on agreed principles by scientists.
   (iii) These are very specific. It means no two organisms can have the same name.
5. Taxonomical aids are helpful in various fields such as agriculture, forestry, industry and in knowing our bioresources.
   All the above-mentioned studies need correct identification and classification of organisms. Identification of organisms requires intensive laboratory and field studies.
   Biologists use herbarium, botanical gardens, museum, zoological parks, and taxonomical keys while doing taxonomical studies.
6. Metabolic reactions can be demonstrated outside the body in cell-free systems. When an isolated metabolic reaction is performed outside the body of an organism in a test tube, it is neither living nor non-living. Hence, while metabolism is a defining feature of all living organisms without exception, isolated metabolic reactions *in vitro* are not living things, but are living reactions. Here, it can also be said that cellular organisation of the body is the defining feature of life forms.
7. The living organisms are made up of molecules. These are of various sizes, classes, functions, etc. They need to change in some other biomolecules. These conversions are chemical reactions or metabolic reactions.
   Metabolism is a defining feature of life, as living things depend on various biochemical reactions. These reactions can be demonstrated outside the body in cell-free systems, which are neither living nor non-living nor non-living, Isolated metabolic reactions in vitro are thus, not living things, but surely living reactions.
8. Reproduction is required for the perpetuation of a population. It is not necessary for the survival of living organism. Many organisms, e.g., mules, sterile worker bees, infertile human couples are not able to reproduce, while they have all other defining properties of life, so they can be called as living.
   Sexual reproduction involves the formation and fusion of two kinds of gametes to produce an offspring. In asexual reproduction, new individuals can arise by the specialised parts of body or without the fusion of gametes.
9. For the preparation of herbarium sheets, a sheet of about 29 x 41 cm is cut from chart paper. Dried specimens are mounted on the sheets with the help of glue or cellotape. A label is pasted on sheets at lower right corner of the sheet.
   Tools for collection are
   (i) digger
   (ii) pruning knife
   (iii) scissors
   (iv) vasculum
   (v) polythene bags
   (vi) old newspapers
   (vii) blotting papers
   (viii) plant press
   (ix) field notebook
   (x) magnifying glass

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Information from herbarium sheets : The label of herbarium sheets has information like scientific name of plant, family, common and English name, local name, collector's name, place, time and date of collection.

10. **Phylum:**
Phylum comes next to Kingdom in the taxonomical hierarchy. All broad characteristics of an animal or plant are defined in a phylum. For example, all chordates have a notochord and gill at some stage of life cycle. Similarly, all arthopods have jointed legs made of chitin.
Order:
Order further zeroes down on characteristics and includes related genera. For example, humans and monkeys belong to the order Primates. Both humans and monkeys can use their hands to manipulate objects and can walk on their hind legs.
Genus:
Comprises a group of related species which has more characters in common in comparison to species of other genera. We can say that genera are aggregates of closely related species. For example, potato, tomato and brinjal are three different species but all belong to the genus Solanum. Lion (Panthera leo), leopard (P. Pardus) and tiger (P. Tigris) with several common features, are all species of the genus Panthera. This genus differs from another genus Felis which includes cats.
Species:
Taxonomic studies consider a group of individual organisms with fundamental morphological similarities as a species. One should be able to distinguish one species from the other closely related species based on the distinct morphological differences.
11. It is difficult and dangerous to study ferocious animals in their natural habitats. Further, it is cruel to study them in captivity. So zoological garden is a better option. Scientists can study different behavioural patterns, like feeding habits, mating rituals. This can help in a better understanding about them.
12. (i) It is a method of naming the organisms, in which every organism is given a scientific name, which has two parts (words); the first is the name of the genus (generic name) and the second part is the name of the species (specific epithet). e.g., Mangifera indica.
(ii) In this, Mangifera is the name of the genus while indica is the name of the species (specific epithet) belonging to the genus Mangifera.
13. A label on the herbarium sheet must have the following information:
(i) Localityl Place (Habitat)
(ii) Name of the collector
(iii) Date and time of collection
(iv) Common English name
(v) Vernacular name
(vi) Scientific name with the author's name
(vii) Name of the family.
14. Consciousness enables an organisms to respond to various external factors. It is the ability of living organisms to respond to various physical, chemical and biological stimuli from their surroundings.
15. All living organisms contain genetic material in the form of DNA which is responsible for the transmission of trails from one generation to the next. However, in some viruses another nucleic acid, i.e., RNA is present as the genetic material.
16. In plants, growth continues throughout the life as they have meristematic regions, where the cell division occurs continuously. In animals, growth occurs only upto a certain age, after which cells divide only to replace worn out and lost cells.
17. No, this is not growth, as increase in size of ball of snow is just because of the addition of similar material externally.
In living organisms, growth is due to increase in body material from inside.
18. All organisms from the prokaryotes to the most complex eukaryotes can sense and respond to their environment.
The human have five sense organs, which help them to sense their environment.These are eyes, ears, nose, tongue and skin.
19. The organisation in a living body produces a new functional entity, which has its own properties not found in its components. Hence, a cell organelle is the one having its own properties not found in its molecular constituents.
20. We should call it biodiversity or biological diversity as it shows variety of living organisms present on earth.
21. The knowledge of the characteristics of an individual or its whole population helps in the identification of similarities and dissimilarities among individuals of the same kind or between different types of organisms. ex

Genus	Species
Solanum	tuberosum
Solanum	nigrum

Both are two different species included in genus Solanum.
22. Botanists use binomial nomenclature to solve this problem.A scientific name is given to the plant based on certain principles and criteria.The scientific name of a particular plant is same all over the world and is not given to any other plant.
23. Keys are pairs of two contrasting characters. Selection of one character leads to rejection of another character while identifying a particular species or genera or family and so on. For example, presence or absence of hair on body can give a clue if an animal belongs to Mammalia or not.
24. **ICBN**: International Code of Botanical Nomenclature.
ICZN: Internat!onal Code of Zoological Nomenclature.
25. Systematics refers to study of diversity of kinds of organisms and their relationship.
26. Genus represents a group of closely related species of plants or animals.
27. (a) 18 gm
28. (b) International Code for Botanical Nomenclature
29. (b) Phylum
30. (c) Division
31. (c) To show Latin Origin
32. (d) Herbarium
33. (c) Growth

34. (c) Convolvulaceae
35. (b) indica
36. (a) Gamete formation
37. (c) A group of closely related species of plants or animals
38. (c) Division
39. (d) Response to external stimuli
40. (c) Both a and b
41. (b) Statement I is incorrect, but II is correct
42. (a) Statement I is correct, but II is incorrect
43. (b) classification
44. (d) Only III
45. (d) Generic and specific names should start with small letters.
46. (d) Division - a group of related phyla
47. (a) Class < Family < Genus < Species
48. (b) (b) Both A and R are true, but R is not the correct explanation of the A.
49. (b) (b) Both A and R are true, but R is not the correct explanation of the A.

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