



# BIOLOGY

## BOOKS - CENGAGE BIOLOGY

### EVOLUTION

#### Mandatory Exercise

1. Define biogenesis.



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2. Define speciation.



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3. Which statement best describes evolution?

A. Evolution is a predictable change from simple to complex organisms

B. Evolution is a process of change through time.

C. Evolution often proceeds from complex to simpler organisms.

D. Evolution causes organism to develop characteristics they need.

**Answer: B**



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4. Given below are the following terms (letters) with their appropriate definition (numbered items).

- (a) Fossil \_\_\_\_\_
- (b) Evolution \_\_\_\_\_
- (c) Pasteur \_\_\_\_\_
- (d) Spallanzani \_\_\_\_\_
- (e) Darwin \_\_\_\_\_

(i) Boiled broth experiment gave rise to the process. (ii). Trace of a dead organism. (iii) Used swan-necked flask to disprove theory of spontaneous generation. (iv) Change in population over time. (v) Wrote "The origin of species' book.



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5. Assertion: Variations occur in organisms.

Reason: Random change in the frequency of gene occurs in small population.

A. If both A and R are true: R is the correct explanation of A.

B. If both A and R are true but R is not the correct explanation of A.

C. If A is true but R is false.

D. If both A and R are false.

**Answer: B**



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6. Differentiate between Homologous organs and analogous organs



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7. Differentiate between Sympatric speciation and allopatric speciation



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8. Differentiate between Darwinism and neo-Darwinism



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9. Choose the connecting links from the brackets given below:

(Peripatus, hemichordates, Euglena)

\_\_\_\_\_ is a connecting link between plants and animals.



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**10.** Choose the connecting links from the brackets given below:

(Peripatus, hemichordates, Euglena)

\_\_\_\_\_ is/are a connecting link between echinoderms and chordates.



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**11.** Choose the connecting links from the brackets given below:

(Peripatus, hemichordates, Euglena)

\_\_\_ is a connecting link between annelida and arthropoda.



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**12.** Match the items in column A with those in column B.

| Column A (Theories)            | Column B (Scientists) |
|--------------------------------|-----------------------|
| (a) Theory of Panspermia       | (i) George Cuvier     |
| (b) Theory of Catastrophism    | (ii) Aristotle        |
| (c) Theory of special creation | (iii) Hebrewetal      |
| (d) Theory of Biogenesis       | (iv) Ritche           |
| (e) Theory of Abiogenesis      | (v) Pasteur           |



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**13.** Read the following statements and identify the stage of human in evolution:

A. Walked erect, lived on ground, 4 feet tall  
and probably used stones as weapons.

B. Robust jaws, thickened tooth enamel and shorter canines.

C. Large size of canines, premolars, long armed apes also known as oak wood apes.

D. Superior brain power, but eye sight is feeble and powers of smell and hearing are poor.

**Answer:**



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**14.** List out salient characteristics of Homo sapiens



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**15.** Given below is a picture of a fossil. There is absolutely no clue about this fossil. How can you determine the age of fossil and its link in

the evolutionary series?



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**16.** Why should not evolution be equated with progress? Explain.

A.

B.

C.

D.

**Answer:**



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**17.** Use each of the terms below just once to complete the passage.

|                |                  |               |
|----------------|------------------|---------------|
| microorganisms | vital force      | Louis Pasteur |
| biogenesis     | nonliving matter | S-shaped      |
| disproved      | francesco Redi   | organisms     |
| broth          | microscope       | air           |
| spontaneously  | spontaneous      | generation    |

Early scientists believed that life arose from \_\_\_ through a process they called \_\_\_\_\_. In 1668, Italian Physician \_\_\_\_\_ conducted an experiment with flies that \_\_\_\_\_ this idea. At about the same time, biologists began to use an important new research tool, the \_\_\_\_\_. They soon discovered the vast world of \_\_\_\_\_. The number and diversity of these organisms was so great that scientists were led to believe once again that these organisms must have

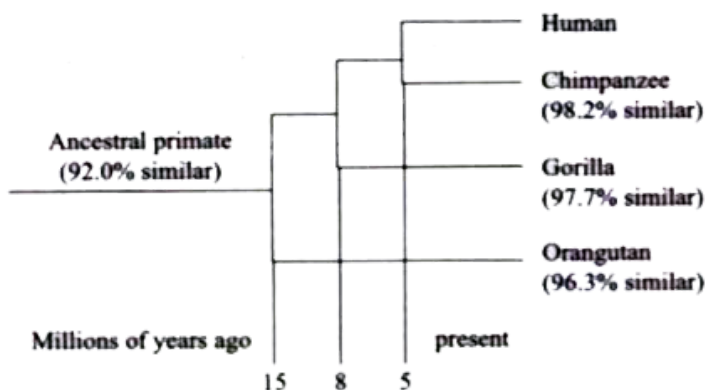
arisen \_\_\_\_\_. By the mid-1800's however \_\_\_\_\_ was able to disprove this hypothesis once and for all. He set up an experiment, using flasks with unique \_\_\_\_\_ necks. These flasks allowed \_\_\_\_\_, but no organisms, to come into contact with a broth containing nutrients. If some \_\_\_\_\_ existed, as had been suggested, it would be able to get into the \_\_\_\_\_ through the open neck of the flask. His experiment proved that organisms arise only from other \_\_\_\_\_. This idea called \_\_\_\_\_ is one of the cornerstones of biology today.



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18. The diagram shown below a comparison of nitrogen base sequences in the DNA of some organism to those of a human. According to this diagram, humans may be most closely relates to the



A. gorilla

B. ancestral primate

C. orangutan

D. chimpanzee

**Answer: D**



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**19.** I am X 1.8 metres tall with sturdy, less hairy body, cranial capacity of 1650 cc. I am an omnivore and direct ancestor of the living man. Guess who am I?



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**20.** Identify the stages in human evolution.

Oak wood apes \_\_\_\_\_



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**21.** Identify the stages in human evolution.

First to exhibit bipedal locomotion \_\_\_\_\_



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**22.** Identify the stages in human evolution.

Erect ape man \_\_\_\_\_



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**23.** Identify the stages in human evolution.

Living modern man \_\_\_\_\_



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**24.** Identify the stages in human evolution.

The toolmaker \_\_\_\_\_



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**25.** Karthik believes that giraffes have long necks because they have stretched their necks.

Sukesh believes that giraffes have long necks because the ones with long necks were inherited.

Who thinks like Lamarck?





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**26.** Karthik believes that giraffes have long necks because they have stretched their necks. Suresh believes that giraffes have long necks because the ones with long necks were inherited.

Who thinks like Darwin?



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27. Do the following pairs of animals give examples of convergent or divergent evolution? Tick on the appropriate.

- |                         |                      |
|-------------------------|----------------------|
| (a) Bat and eagle       | Convergent/divergent |
| (b) Tiger and lion      | Convergent/divergent |
| (c) Tortoise and turtle | Convergent/divergent |
| (d) Tortoise and shark  | Convergent/divergent |



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28. Why are vestigial organs important in the concept of evolution?



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**29.** The embryos of fish, chickens and pigs have gill slits and a tail. The presence of these features suggests that

A. all these animals can swim.

B. these animals may have had a common ancestor.

C. gill slits and tails are required for embryonic development.

D. pigs developed from chickens.



**Answer: C**



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## Consolidated Exercise

1. Complete the crossword puzzle using the clues given below:

Across

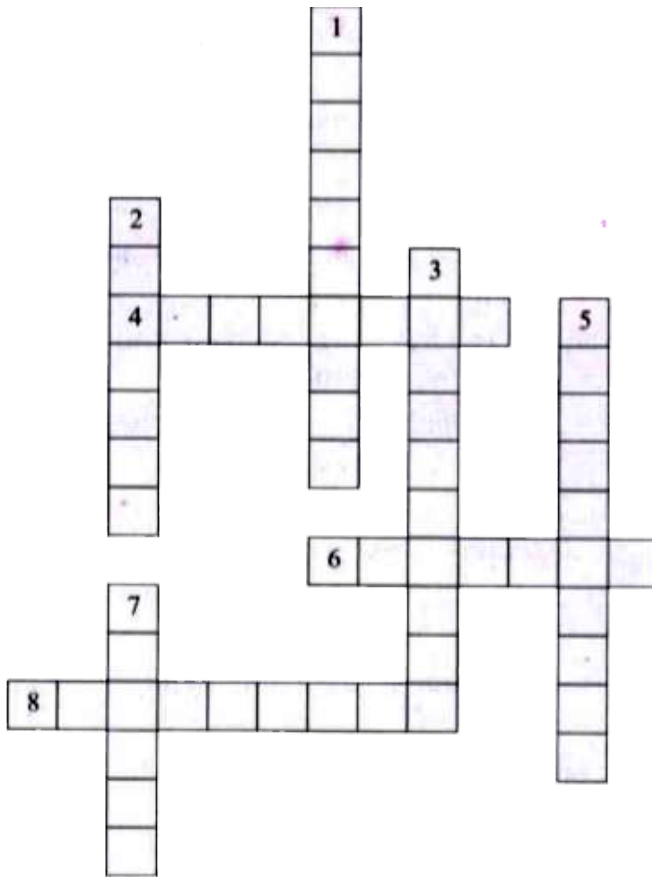
4. change in the inherited features of an organism over time  
6. survival of individuals with the most adapted \_\_\_\_\_ traits, selection  
8.

appearance of an inherited trait that makes an individual different from other members of the same species

Down

1. geographic speciation is also called 2. a group of organisms whose members look similar and successfully reproduce among themselves 3. a group of organisms of one species that lives in an area 5. a slow change of one species to another new species 7. developed the theory of evolution by natural

selection



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2. Use the information provided in the box below and answer the questions that follow.

| Species    | Sequence of aminoacid in the same part of the haemoglobin molecule |
|------------|--|
| Human      | Lys - Glu - His - Iso  |
| Horse      | Arg - Lys - His - Lys  |
| Gorilla    | Lys - Glu - His - Lys  |
| Chimpanzee | Lys - Glu - His - Iso  |
| Zebra      | Arg - Lys - His - Arg  |

According to this information in the chart, the closest evolutionary relationship most likely exists between the

A. human and chimpanzee

B. human and gorilla

C. chimpanzee and gorilla

D. horse and zebra

**Answer: A**



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**3.** Use the information provided in the box below and answer the questions that follow.

| Species    | Sequence of aminoacid in the same part of the haemoglobin molecule |
|------------|--|
| Human      | Lys - Glu - His - Iso  |
| Horse      | Arg - Lys - His - Lys  |
| Gorilla    | Lys - Glu - His - Lys  |
| Chimpanzee | Lys - Glu - His - Iso  |
| Zebra      | Arg - Lys - His - Arg  |

The information in the box provides data that can help in the identification of possible evolutionary relationships from the study of comparative

A. cytology

B. embryology

C. anatomy

D. biochemistry

**Answer: B**



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## Consolidated Exercise Comprehension

**1. Match the following with one or more than one correct answer.**

| Column A               | Column B                           |
|------------------------|------------------------------------|
| (i) Lamarck            | (n) Adaptive radiation             |
| (ii) Homologous organs | (o) Origin of life                 |
| (iii) Analogous organs | (p) New variations                 |
| (iv) Genetic drift     | (q) Theory of acquired inheritance |
| (v) Darwin             | (r) Wings of bat                   |
| (vi) Oparin            | (s) Forelimb of horse              |
| (vii) Allopatric       | (t) Forelimb of man                |

| Column A         | Column B   |
|------------------|--|
| (viii) Sympatric | (u) Philosophic zoologique   |
|                  | (v) Wing of bird   |
|                  | (w) New species  |
|                  | (x) Geographically separated                                       |
|                  | (y) Related species present side by side in same geographical area |
|                  | (z) Natural selection  |



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# Consolidated Exercise Multiple Choice Questions With One Or More Than One Correct Answer

1. If the fossil of an organism is found in the deeper layer of earth, then we can predict that

A. the extinction of organism has occurred recently.

B. the extinction of organism has occurred thousands of years ago.

C. the fossil position in the layers of earth is not related to its time of extinction.

D. time of extinction cannot be determined.

**Answer: B**



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**2. All the finches on the Galapagos islands**

A. are unrelated but descended from a common ancestor.

B. are descended from a common ancestor and therefore related.

C. rarely compete for the same food source.

D. are related but not descended from a common ancestor.

**Answer: B::C**



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**3. Which of the following sets represents the correct sequence of the evolution of man?**

A. Australopithecus → Homo habilis →

Pithecanthropus → Homo sapiens.

B. Australopithecus → Pithecanthropus

→ Homo habilis → Homo sapiens.

C. Ramapithecus → Australopithecus

→ Homo erectus to Homo sapiens.

D. Australopithecus → Ramapithecus

→ Homo erectus → Homo sapiens.

**Answer: C**



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4. Organisms such as whales and sea turtles that are adapted to an aquatic way of life

A. will probably have homologous structures

B. will have similar adaptations but not necessarily homologous structures.

C. may very well have analogous structures.

D. will have the same degree of fitness.

**Answer: B::C**



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5. Which of these is necessary to natural selection?

A. Variation

B. Differential reproduction.

C. Inheritance of differences.

D. differential adaptiveness.

**Answer: A::B::C**



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6. When a population is small, there is a greater chance of

A. gene flow

B. genetic drift

C. natural selection

D. occurrence of mutations

**Answer: B**



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## 7. Fossils

A. are the remains and traces of past life.

B. can be dated absolutely according to their location in strata.

C. are usually found embedded in sedimentary rock.



D. have been found for all types of animals  
except humans.

**Answer: A::B::C**



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**8. Coacervates are**

A. tiny spherical droplet of assorted  
organic molecules.

B. microspheres

C. liposomes

D. monomers

**Answer: A::B**



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9. Male moths recognize females of their species by sensing chemical signals called pheromones. This is an example of

A. gamete isolation.

B. habitat isolation.

C. behavioral isolation.

D. mechanical isolation.

**Answer: C**



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**10.** According to the theory of inheritance of acquired characteristics

A. if a man loses his hand, then his children will also be missing a hand.

B. changes in phenotype are passed on by way of the genotype to the next generation.

C. organisms are able to bring about a change in their phenotype.

D. evolution is striving toward particular traits.

**Answer: A::B::C::D**



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**11.** The fossil record offers direct evidence for common descent because you can

A. see that the types of fossils change over time

B. sometimes find common ancestors.

C. Trace the ancestry of a particular group.

D. Trace the biological history of living things.

**Answer: A::B::C::D**



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**12.** A connecting/missing link between reptiles and birds is

A. Archaeopteryx

B. Platypus

C. Java

D. Whale

**Answer: A**



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**13. Golden age of reptiles was**

- A. Mesozoic
- B. Coenozoic
- C. Palaeozoic
- D. Psychozoic

**Answer: A**



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**14.** Homologous organs are

- A. Dissimilar origin and dissimilar structure
- B. Dissimilar origin but similar functions
- C. Similar origin with dissimilar function
- D. None of these

**Answer: C**



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**15.** Process of evolution is

A. Discontinuous

B. Continuous

C. Both A and B

D. Continuous in the past but  
discontinuous presently

**Answer: B**



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**16.** Which animal has become extinct recently?

A. Draco

B. Dinosaur

C. Mammoth

D. Pteridosperms

**Answer: C**



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17. A vestigial organ of human is

A. Ear pinna

B. Nictitating membrane

C. Knee bone

D. Hand

**Answer: B**



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**18.** A vestigial tooth is

A. Incisor

B. Molar

C. Premolar

D. Canine

**Answer: D**



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**19.** Birbal Shani Institute of Palaeobotany is located

A. Lucknow

B. Delhi

C. Calcutta

D. Jodhpur

**Answer: A**



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20. Individuals of a species which occur in a particular area constitute

A. Flora

B. Fauna

C. Community

D. Population

**Answer: D**



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21. Darwin wrote origin of species in

A. 1530

B. 1795

C. 1859

D. 1895

**Answer: C**



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22. Who is not related to organic evolution?

- A. T.R. Malthus
- B. Erasmus Darwin
- C. Charles Darwin
- D. Darlington

**Answer: D**



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**23.** Darwin is associated with

- A. Natural selection
- B. Mutation
- C. Inorganic evolution
- D. All of the above

**Answer: A**



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24. Closely related morphologically similar, reproductively isolated sympatric populations are designated as

- A. Clones
- B. Demes
- C. Sibling species
- D. Clines

**Answer: C**



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25. The name of Charles Darwin ship which sailed around the world is

A. Monkey

B. H.M.S. Beagle

C. Glapogous

D. None of the above

**Answer: B**



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26. Which one of the following is closest to modern man?

A. Peking man

B. Cro-magnon man

C. Java-ape man

D. African man

**Answer: B**



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27. Java ape man was discovered by:

A. Dubois

B. Leakey

C. Cuvier

D. Black

**Answer: A**



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**28.** Zoological name of Java man is

A. Homohabilis

B. Homo sapiens

C. Homo erectus

D. Australopithecus

**Answer: C**



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**29.** Cranial capacity of modern man is

A. 450-650 cc

B. 600-1000 cc

C. 900-1100 cc

D. 1200-1600 cc

**Answer: D**



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30. The primate which is closest to humans in evolution are

A. Lemur

B. New world monkey

C. Gorilla

D. Tree shrew

**Answer: C**



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31. The least cranial capacity was that of

A. Cro-magnon man

B. Java man

C. Neanderthal man

D. Modern man

**Answer: B**



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32. Cranial capacity was highest in

A. Cro-magnon man

B. Neanderthal man

C. Java man

D. Peking man

**Answer: A**



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**33.** Fossil Man having cranial capacity similar to that of modern man was

A. Australopithecus

B. Java ape man

C. Neanderthal man

D. Peking man

**Answer: C**



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**34.** The modern man differs from the apes in

A. Protruding eyes

B. Sparse body hair

C. Arms shorter than legs

D. Wearing of clothes

**Answer: C**



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**35.** Fossil man who was expert in making cave paintings and tools was

A. Cro-magnon man

B. Peking man

C. Java man

D. Neanderthal man

**Answer: A**



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**36.** Taung baby is

A. Brachiasm

B. Smaller jaws

C. Larger jaws

D. Cannibalism

**Answer: B**



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**37. Neanderthal man lived in**

A. Desert

B. Deep forest

C. Mountains

D. Caves

**Answer: D**



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**38.** History of modern man goes back to

A. 25000 years

B. 10000 years

C. 1 lakh years

D. 5000 years

**Answer: A**



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**39.** Common origin of man and chimpanzee is best shown by

- A. Cranial capacity
- B. Binocular vision
- C. Chromosomes
- D. Dental formula



**Answer: C**



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**40.** Prosimian formed only on the island of Madagascar is

A. Galapagos

B. Loris

C. Lemur

D. Bush baby

**Answer: C**



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**41.** The continent where maximum fossils of prehistoric man have been found is

A. Asia

B. Africa

C. Europe

D. America

**Answer: B**



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**42.** Common link between apes and man was

- A. Ramapithecus
- B. Dryopithecus
- C. Homo erectus
- D. Homo neanderthal

**Answer: B**



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**43.** Connecting link between plants and animals

A. Euglena

B. Virus

C. Peripatus

D. Archaeopteryx

**Answer: A**



**44.** Connecting link between Annelids and Arthropoda is

A. Euglena

B. Neoplina

C. Peripatus

D. Virus

**Answer: C**



**45.** Theory of abiogenesis or spontaneous generation was finally disapproved by

A. Louis Pasteur

B. Oparin

C. Wallace

D. Fox

**Answer: A**



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**46.** First life consisted of

A. Provirus

B. Virus

C. Bacteria

D. Protovirus

**Answer: D**



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47. The term hot dilute soup was given by

A. Haldane

B. Urea

C. Oparin

D. Mendel

**Answer: A**



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1. Gases present in the primitive earth were

A. methane, ammonia, oxygen and water vapour

B. methane, ammonia, carbon dioxide and chlorine

C. methane, ammonia, hydrogen, carbon dioxide

D. methane, ammonium oxide, hydrogen peroxide, carbon dioxide

**Answer: C**



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2. Who among the following scientists was the first to test the theory of abiogenesis and proved that the flesh of dead animals could not generate maggots spontaneously?

A. Van Helmont

B. Francesco Redi

C. Louis Pasteur

D. Aristotle

**Answer: B**



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3. Although the phylogenetic lineages for hominids are not definitive, which of the following statements is not a possibility?

A. Homo preceded Australopithecus.

B. Homo is the most recent.

C. Australopithecus is probably more ancient than Homo

D. Homo erectus preceded Homo sapiens.

**Answer: A**



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4. The term 'protobionts' is used for describing the

A. first formed bacteria

B. first formed viruses

C. first formed protozoans

D. first formed cells

**Answer: D**



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5. J.B.S. Haldane described the primitive oceans containing simple organic substances in abundance as

A. the hot dilute soup or the primitive  
broth

B. coacervates

C. the cold dilute soup

D. nebula

**Answer: A**



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6. Anaerobes were the first organisms to appear on the primitive earth because

A. they had no enzyme system for oxygen utilisation

B. free oxygen could not be assimilated

C. free molecular oxygen was absent

D. they were simple in organisation

**Answer: C**



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7. Gene flow is described as the :

- A. the transfer of genes between populations which differ genetically from one another but can interbreed
- B. the exchange of genes from the female to male organism
- C. the transfer of genes from the nucleus to the chromosomes



D. the transfer of genes from sperm to the  
egg

**Answer: A**



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**8. T.R. Malthus wrote**

A. An Essay on Population

B. Origin of Species

C. Discovery of India

## D. Text Book of Mathematics

**Answer: A**



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**9. The pioneers of organic evolution are**

**A. Karl Landsteiner, Hugo de Vries, Malthus,**

**Darwin**

**B. Darwin, Hugo de Vries, Huxley, Lamarck**

C. Darwin, Hugo de Vries, Karl Landsteiner,  
Lamarck

D. Malthus, Hugo de Vries, Karl Landsteiner,  
Lamarck

**Answer: B**



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**10.** When first proposed, Darwin's theory of natural selection did not fully explain how evolution could occur. This was due to

A. Darwin's failure to recognise the tendency of organisms to over-reproduce

B. Darwin's initial overemphasis of the significance of genetic drift

C. the fact that accurate mechanisms explaining genetic inheritance were not widely known

D. the absence of accurate descriptions of the embryological development of most

## plants and animals

**Answer: A**



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**11.** In a small group of people living in a remote area, there is a high incidence of 'blue skin, a condition that results from a variation in the structure of hemoglobin. All of the blue-skinned residents can trace their ancestry to one couple, who were among the original

settlers of this region. The unusually high frequency of blue skin in the area is an example of

- A. mutation
- B. genetic drift
- C. natural selection
- D. speciation

**Answer: C**



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## Challenging Exercise

1. Explain the significance of Lamarck's theory of evolution.



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2. Explain why allopatric speciation would be less likely to occur on an island close to a mainland than on a more isolated island of the same size.



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3. Explain why an individual organism cannot be said to evolve.



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4. Why does comparative embryology show similarities between organisms that do not appear to be similar as adults?



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5. Explain why genetic drift is most likely to occur in a small population.



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