



BIOLOGY

BOOKS - KVPY PREVIOUS YEAR

QUESTION PAPER 2013

Part I Biology

1. The Bowmans capsule, a part of the kidney is
the site of

- A. filtration of blood constituents
- B. re-absorption of water and glucose
- C. formation of ammonia
- D. formation of urea

Answer: A



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2. In human brain the sensation of touch, pain and temperature is controlled by the

A. parietal lobe of cerebrum

B. limbic lobe of cerebrum

C. temporal lobe of cerebrum

D. frontal lobe of cerebrum

Answer: A



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3. A pathogen which cannot be cultured on an artificial medium is:

A. protozoan

B. virus

C. bacterium

D. fungus

Answer: B



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4. Meiosis I and Meiosis II are characterised by the separation of,

A. homologous chromosomes, sister chromatids

B. sister chromatids, homologous chromosomes

C. centromere, telomere

D. telomere, centromere

Answer: A



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5. People suffering from albinism cannot synthesize.

A. suberin

B. melanin

C. keratin

D. collagen

Answer: B



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6. Short sightedness in humans can be corrected by using

- A. concave lens
- B. convex lens
- C. cylindrical lens
- D. plain glass

Answer: A



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7. A person with blood group "A" can (a) donate blood to, and (b) receive blood from,

A. (a) persons with blood group "AB", and

(b) persons with any blood group

B. (a) person with blood group "A" or "AB",

and (b) "A" or "O" blood groups

C. (a) person with blood group "B" or "AB",

and (b) "B" or "O" blood groups

D. (a) person with any blood group, and (b)

"O" blood group only

Answer: B



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8. Animal cells after removal of nuclei still contained DNA. The source of this DNA is

A. nucleosomes

B. mitochondria

C. peroxisomes

D. lysosome

Answer: B



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9. Which one of the following combinations is found in DNA?

A. Guanine and guanidine

B. Guanidine and cytosine

C. Guanine and cytosine

D. Adenine and guanidine

Answer: C



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10. Which one of the following is NOT a mode of asexual reproduction?

A. Binary fission

B. Multiple fission

C. Budding

D. Conjugation

Answer: D



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11. Which one of the following class of animals constitutes the largest biomass on earth?

A. Insects

B. Fish

C. Mammals

D. Reptilians

Answer: A



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12. In the digestive system, the pH of the stomach and the intestine, respectively are,

A. alkaline, acidic

B. acidic, alkaline

C. acidic, neutral

D. acidic, acidic

Answer: B



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13. The major nitrogenous excretory product in mammals is,

A. amino acids

B. ammonia

C. urea

D. uric acid

Answer: C



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14. Which of the following plant traits (characters) is NOT an adaptation to dry (Xeric) habitats?

A. Sunken stomata on leaves

B. Highly developed root system

C. Thin epidermis without a cuticle on stem
and leaves

D. Small leaves and photosynthetic stem

Answer: C



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15. Biological diversity increases with the productivity of an ecosystem. In which of the

following habitats do we see the greatest diversity of species?

- A. Tropical dry grasslands
- B. Temperate deciduous forests
- C. Alpine grasslands
- D. Tropical evergreen forests

Answer: D



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1. Sister chromatids of a chromosome have :

A. different genes at the same locus

B. different alleles of the same gene at the same locus

C. same alleles of the same gene at the same locus

D. same alleles at different loci

Answer: C



2. A diabetic individual becomes unconscious after self-administering insulin. What should be done immediately to revive the individual?

- A. Provide him sugar
- B. Give him high dose of insulin
- C. Provide him salt solution
- D. Provide him lots of water

Answer: A



3. A regular check on the unborn baby of a lady towards the end of her pregnancy showed a heart rate of 80 beats per minute. What would the doctor infer about the baby's heart condition from this?

- A. Normal heart rate
- B. Faster heart rate
- C. Slower heart rate
- D. Defective brain function

Answer: C



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4. Three uniformly watered plants i, ii and iii were kept in 45% relative humidity, 45% relative humidity with blowing wind and 95% relative humidity, respectively. Arrange these plants in the order (faster to slowest) in which they will dry up.

A. i = ii, iii

B. ii, i, iii

C. iii, ii, i

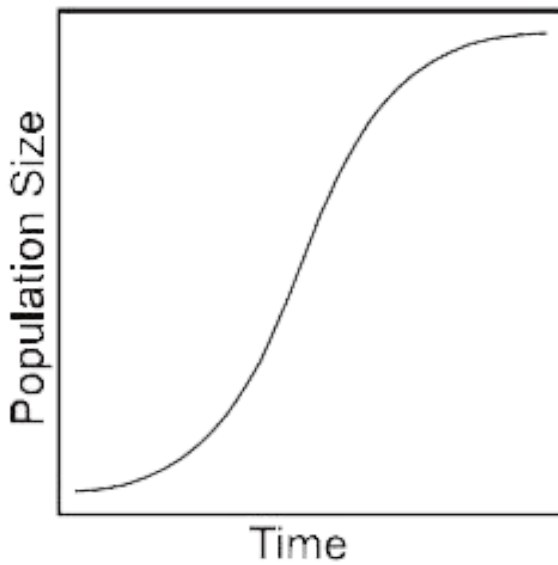
D. iii, i = ii

Answer: B



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5. Many population colonising a new habitat show a logistic population growth pattern over time, as shown in the figure below.



In such a population, the POPULATION growth rate

A. stays constant over time

B. increases and then reaches an asymptote

C. decreases over time

D. increases to a maximum and then decrease

Answer: B



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6. 10^9 bacteria were spread on an agar plate containing penicillin. After incubation overnight at $37^\circ C$, 10 bacterial colonies were observed on the plate. That the colonies are

likely to be resistant to penicillin can be tested by

- A. measuring their growth rate
- B. observing the colour of the colonies
- C. checking their ability to grow on another plate containing penicillin
- D. checking their ability to cause disease

Answer: C



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7. Watson and Crick model of DNA is

- A. B-form DNA with a spiral length of 34 Å
and a diameter of 20 Å
- B. A-form DNA with a spiral length of 15 Å
and a diameter of 20 Å
- C. Z-form DNA with a spiral length of 34 Å
and a diameter of 20 Å
- D. B-form DNA with a spiral length of 28Å
and a diameter of 14Å

Answer: A



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8. Eco RI and Rsa I restriction endonucleases require 6 bp and 4 bp sequences respectively for cleavage. In a 10 kb DNA fragment how many probable cleavage sites are present for these enzymes

A. 0 Eco RI and 10 Rsa I

B. 1 Eco RI and 29 Rsa I

C. 4 Eco RI and 69 Rsa I

D. 2 Eco RI and 39 Rsa I

Answer: D



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9. From an early amphibian embryo the cells that would give rise to skin in adults were transplanted into the developing brain region of another embryo. The transplanted cells developed into brain tissue in the recipient

embryo. What do you infer from this experiment?

A. Cell fate is permanently determined during early embryonic development

B. Developmental fate of donor cells is influenced by the surrounding cells.

C. Developmental fate of donor cells is not influenced by recipient cells

D. Any cell which is transplanted into another embryo always develops into a

brain.

Answer: B



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10. Presence of plastids in Plasmodium suggests

A. it is a plant species

B. it is a parasite with a cyanobacterium as an endosymbiont

C. it is a parasite with a archebacterium as an endosymbiont

D. it is a plant species with a archebacterium as an endosymbiont

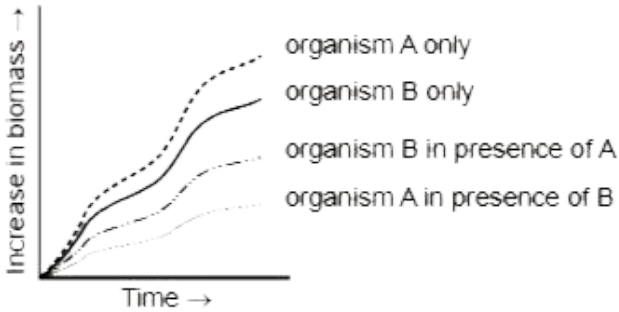
Answer: B



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11. The figure below demonstrates the growth curves of two organisms A and B growing in the same area. What kind of relation exists

between A and B?



A. Competition

B. Symbiosis

C. Commensalisms

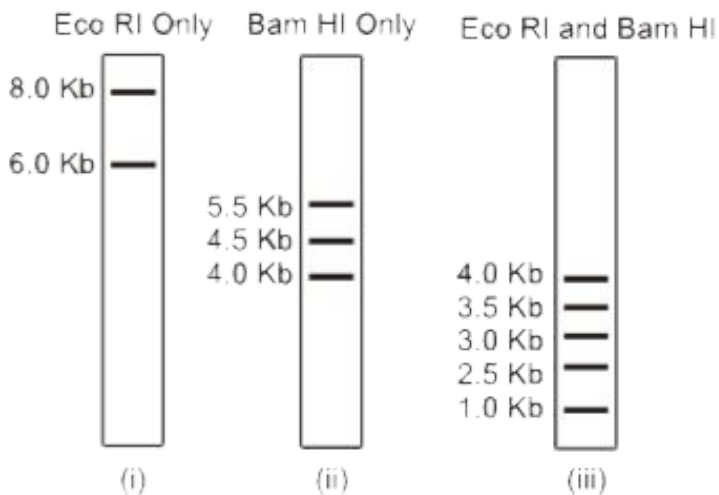
D. Mutualism

Answer: A



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12. A scientist has cloned an 8 Kb fragment of a mouse gene into the Eco RI site of a vector of 6 Kb size. The cloned DNA has no other Eco RI site within. Digestions of the cloned DNA is shown below.



Which one of the following sets of DNA fragments generated by digestion with both

Eco RI and Bam HI as shown in (iii) is from the gene?

A. 1 Kb and 4 Kb

B. 1 Kb and 2.5 Kb

C. 1 Kb and 3 Kb

D. 1 Kb and 3.5 Kb

Answer: A::C



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13. Brown fat is a specialised adipose tissue with abundant mitochondria and rich blood supply. Brown fat

A. insulates animals that are acclimatised to cold

B. is the major source of heat production of birds.

C. provides energy to muscles.

D. produces heat without producing ATP.

Answer: D



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14. In some species, individuals forego reproduction and help bring up another individual's offspring. Such altruistic behaviour **CANNOT** be explained by which of the following?

A. An individual helps relatives only and gets indirect genetic benefits.

B. The individual benefits because it can later inherit the breeding position.

C. The individual benefits because it gets access to resources, such as food and security from predators, in return.

D. The species benefits from a reduction in competition among offspring.

Answer: C



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15. Lions in India are currently restricted to Gir, Gujarat. Efforts are being made to move them to other parts of the country. This is because they are **MOST** susceptible to extinction due to infectious diseases under the following conditions when present as

- A. several small, isolated populations
- B. one large population
- C. several large, connected populations
- D. several large, isolated populations

Answer: B



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Part I Biology

1. Human fetal haemoglobin differs from the adult haemoglobin in that it has

- A. higher affinity for oxygen
- B. lower affinity for oxygen
- C. two subunits only

D. is glycosylated

Answer: A



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2. Nucleolus is an organelle responsible for the production of

A. carbohydrates

B. messenger RNA

C. lipids

D. ribosomal RNA

Answer: D



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3. The sequences of four DNA molecules are given below:

i. TATATATATATATA

ATATATATATATAT

ii. TTTCCCGGGAAA

AAAGGGCCCTTT

iii. TTGCGTTGCC

AACGCAACGGG

iv. GCCGGATCCGGC

CGGCCTAGGCCG

Which one of these DNA molecules will have the highest melting temperature (T_m)?

A. i

B. ii

C. iii

D. iv

Answer: D



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4. If DNA codons are ATG GAA, insertion of thymine after the first codon results in,

- A. non-sense mutation
- B. mis-sense mutation
- C. frameshift mutation
- D. silent mutation

Answer: A



5. Genetic content of a cell reduces to half during

- A. meiotic prophase I
- B. mitotic prophase
- C. meiotic prophase II
- D. meiotic telophase

Answer: D



6. Which one of the following techniques is used for the detection of proteins ?

A. Northern blotting

B. Western blotting

C. Southern blotting

D. In-situ hybridization

Answer: B



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7. Fission yeasts are

A. Archaeobacteria

B. Eubacteria

C. Prokaryotes

D. Eukaryotes

Answer: D



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8. In green leaves, the light and dark reactions occur in

A. stroma and grana respectively

B. grana and stroma respectively

C. cristae and matrix respectively

D. both occur in cytoplasm

Answer: B



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9. According to Mendel,
segregate and assort
independently

A. alleles of a gene, alleles of different
genes

B. alleles of different genes, alleles of a
gene

C. dominant traits, recessive traits

D. recessive traits, recessive traits

Answer: A



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10. The two enzymatic activities associated with RUBISCO are

- A. oxidase and oxygenase
- B. oxygenase and carboxylase
- C. oxidase and carboxylase
- D. oxygenase and carbamylation

Answer: B



11. Chlorofluorocarbons (CFCs) are believed to be associated with cancers because,

A. CFCs react with DNA and cause mutations

B. CFCs react with proteins involved in DNA repair

C. CFCs destroy the ozone layer and permit harmful UV rays to reach the earth

D. CFCs react with DNA polymerase and
reduce fidelity of DNA replication

Answer: C



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12. Morphogenetic movements take place
predominantly during the following embryonic
stage

A. blastula

B. Morula

C. Gastrula

D. Fertilized eggs

Answer: C



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13. The only organ which is capable of producing Fructose in humans is

A. liver

B. pancreas

C. seminal vesicles

D. muscle

Answer: C



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14. Stroke could be prevented/treated with

A. balanced diet

B. clotting factors

C. insulin

D. blood thinners

Answer: D



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15. In orange and lemon, the edible part of the fruit is

A. placenta

B. thalamus

C. hairs of the ovary wall

D. succulent Mesocarp

Answer: C



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16. Which one of the following statements about nitrogenase is correct?

A. It is sensitive to CO_2 and therefore present in isolated nodules.

B. It requires O_2 and therefore functional during the day

C. It is sensitive to O_2 and therefore is functional in anaerobic environments

D. It is sensitive to light and therefore functions only in dark.

Answer: C



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17. Part of epidermis that keeps out unwanted particles is called

- A. columnar epithelium
- B. squamous epithelium
- C. ciliated epithelium
- D. cuboidal epithelium

Answer: C



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18. Species that are most effective at colonising new habitats show

- A. low reproductive ability
- B. high dispersal ability
- C. slow growth and maturation
- D. high competitive ability

Answer: D



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19. In a large isolated population, alleles p and q at a locus are at Hardy Weinberg equilibrium. The frequencies are $p = 0.6$ and $q = 0.4$. The proportion of the heterozygous genotype in the population is

A. 0.24

B. 1

C. 0.48

D. 0.12

Answer: C



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20. In vertebrates glycogen is stored chiefly in

- A. heart and blood
- B. spleen and stomach
- C. bones and lymph
- D. liver and muscles

Answer: D



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