

AIPMT 2014 — Biology Question Paper with Solutions

81 Biology questions as set in the paper · answers checked by RankUp

AIPMT 2014

1. The main function of mammalian corpus luteum is to produce:

- (A) progesterone
- (B) human chorionic gonadotropin
- (C) relaxin only
- (D) estrogen only

AIPMT 2014

2. In which one of the following processes CO₂ is not released?

- (A) Aerobic respiration in animals
- (B) Alcoholic fermentation
- (C) Lactate fermentation
- (D) Aerobic respiration in plants

AIPMT 2014

3. Choose the correctly matched pair:

- (A) Moist surface of buccal cavity – Glandular epithelium
- (B) Tubular parts of nephrons – Cuboidal epithelium
- (C) Inner surface of bronchioles – squamous epithelium
- (D) Inner lining of salivary ducts – Ciliated epithelium

AIPMT 2014

4. Which of the following shows coiled RNA strand and capsomeres?

- (A) Tobacco mosaic virus
- (B) Measles virus
- (C) Retrovirus
- (D) Polio virus

AIPMT 2014

5. Just as a person moving from Delhi to Shimla to escape the heat for the duration of hot summer, thousands of migratory birds from Siberia and other extremely cold northern regions move to:

- (A) Meghalaya
- (B) Corbett National Park
- (C) Keoladeo National Park
- (D) Western Ghat

AIPMT 2014

6. You are given a fairly old piece of dicot stem and a dicot root. Which of the following anatomical structures will you use to distinguish between the two?

- (A) Secondary phloem
- (B) Protoxylem
- (C) Cortical cells
- (D) Secondary xylem

AIPMT 2014

7. In 'S' phase of the cell cycle:

- (A) amount of DNA remains same in each cell
- (B) chromosome number is increased
- (C) amount of DNA is reduced to half in each cell
- (D) amount of DNA doubles in each cell

AIPMT 2014

8. A species facing extremely high risk of extinction in the immediate future is called:

- (A) Endemic
- (B) Critically Endangered
- (C) Extinct
- (D) Vulnerable

AIPMT 2014

9. Fruit colour in squash is an example of:

- (A) Dominant epistasis
- (B) Complementary genes
- (C) Inhibitory genes
- (D) Recessive epistasis

AIPMT 2014

10. Identify the hormone with its correct matching of source and function:

- (A) Melatonin – pineal gland, regulates the normal rhythm of sleep-wake cycle
- (B) Progesterone – corpus-luteum, stimulation of growth and activities of female secondary sex organs
- (C) Atrial natriuretic factor – ventricular wall, increases the blood pressure
- (D) Oxytocin – posterior pituitary, growth and maintenance of mammary glands

AIPMT 2014

11. An example of edible underground stem is:

- (A) Groundnut
- (B) Sweet potato
- (C) Potato
- (D) Carrot

AIPMT 2014

12. Which of the following causes an increase in sodium reabsorption in the distal convoluted tubule?

- (A) Increase in antidiuretic hormone levels
- (B) Decrease in aldosterone levels
- (C) Decrease in antidiuretic hormone levels
- (D) Increase in aldosterone levels

AIPMT 2014

13. Which structures perform the function of mitochondria in bacteria?

- (A) Ribosomes
- (B) Cell wall
- (C) Mesosomes
- (D) Nucleoid

AIPMT 2014

14. Select the option which is not correct with respect to enzyme action:

- (A) Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate
- (B) A non-competitive inhibitor binds the enzyme at a site distinct from that which binds the substrate
- (C) Malonate is a competitive inhibitor of succinic dehydrogenase
- (D) Substrate binds with enzyme at its active site

AIPMT 2014

15. The solid linear cytoskeletal elements having a diameter of 6 nm and made up of a single type of monomer are known as:

- (A) Microfilaments
- (B) Intermediate filaments
- (C) Lamins
- (D) Microtubules

AIPMT 2014

16. Which one of the following living organisms completely lacks a cell wall?

- (A) Sea-fan (Gorgonia)
- (B) Saccharomyces
- (C) Blue-green algae
- (D) Cyanobacteria

AIPMT 2014

17. Tracheids differ from other tracheary elements in:

- (A) being imperforate
- (B) lacking nucleus
- (C) being lignified
- (D) having casparian strips

AIPMT 2014

18. Select the correct matching of the type of the joint with the example in human skeletal system:

- (A) Pivot joint – between third and fourth cervical vertebrae
- (B) Hinge joint – between humerus and pectoral girdle
- (C) Gliding joint – between carpals
- (D) Cartilaginous joint – between frontal and parietal

AIPMT 2014

19. A man whose father was colour blind marries a woman who had a colour blind mother and normal father. What percentage of male children of this couple will be colour blind?

- (A) 0%
- (B) 50%
- (C) 75%
- (D) 25%

AIPMT 2014

20. A few normal seedlings of tomato were kept in a dark room. After a few days they were found to have become white-coloured like albinos. Which of the following terms will you use to describe them?

- (A) Embolised
- (B) Etiolated
- (C) Defoliated
- (D) Mutated

AIPMT 2014

21. Function of filiform apparatus is to:

- (A) Stimulate division of generative cell
- (B) Produce nectar
- (C) Guide the entry of pollen tube
- (D) Recognize the suitable pollen at stigma

AIPMT 2014

22. Choose the correctly matched pair:

- (A) Adipose tissue – Dense connective tissue
- (B) Areolar tissue – Loose connective tissue
- (C) Cartilage – Loose connective tissue
- (D) Tendon – Specialized connective tissue

AIPMT 2014

23. Which one of the following is a non-reducing carbohydrate?

- (A) Sucrose
- (B) Lactose
- (C) Ribose 5-phosphate
- (D) Maltose

AIPMT 2014

24. At which stage of HIV infection does one usually show symptoms of AIDS?

- (A) When the infected retro virus enters host cells
- (B) When HIV damages large number of helper T-Lymphocytes
- (C) When the viral DNA is produced by reverse transcriptase
- (D) Within 15 days of sexual contact with an infected person

AIPMT 2014

25. What gases are produced in anaerobic sludge digesters?

- (A) Methane, Hydrogen Sulphide and CO₂
- (B) Methane, Hydrogen Sulphide and O₂
- (C) Hydrogen Sulphide and CO₂
- (D) Methane and CO₂ only

AIPMT 2014

26. Anoxygenic photosynthesis is characteristic of:

- (A) Spirogyra
- (B) Chlamydomonas
- (C) Ulva
- (D) Rhodospirillum

AIPMT 2014

27. Match the following and select the correct option: (a) Earthworm (b) Succession (c) Ecosystem service (d) Population growth — (i) Pioneer species (ii) Detritivore (iii) Natality (iv) Pollination

- (A) a-(iv), b-(i), c-(iii), d-(ii)
- (B) a-(iii), b-(ii), c-(iv), d-(i)
- (C) a-(ii), b-(i), c-(iv), d-(iii)
- (D) a-(i), b-(ii), c-(iii), d-(iv)

AIPMT 2014

28. A location with luxuriant growth of lichens on the trees indicates that the:

- (A) trees are heavily infested
- (B) location is highly polluted
- (C) location is not polluted
- (D) trees are very healthy

AIPMT 2014 · Q62

29. Fructose is absorbed into the blood through mucosa cells of intestine by the process called:

- (A) facilitated transport
- (B) simple diffusion
- (C) co-transport mechanism
- (D) active transport

AIPMT 2014

30. An alga which can be employed as food for human being is:

- (A) Chlorella
- (B) Spirogyra
- (C) Polysiphonia
- (D) Ulothrix

AIPMT 2014

31. Which one of the following growth regulators is known as 'stress hormone'?

- (A) Ethylene
- (B) GA₃
- (C) Indole acetic acid
- (D) Abscissic acid

AIPMT 2014

32. The enzyme recombinase is required at which stage of meiosis:

- (A) Zygotene
- (B) Diplotene
- (C) Diakinesis
- (D) Pachytene

AIPMT 2014

33. An example of ex situ conservation is:

- (A) Seed Bank
- (B) Wildlife Sanctuary
- (C) Sacred Grove
- (D) National Park

AIPMT 2014

34. The osmotic expansion of a cell kept in water is chiefly regulated by:

- (A) Vacuoles
- (B) Plastids
- (C) Ribosomes
- (D) Mitochondria

AIPMT 2014

35. Which one of the following is wrong about Chara?

- (A) Globule and nucule present on the same plant
- (B) Upper antheridium and lower oogonium
- (C) Globule is male reproductive structure
- (D) Upper oogonium and lower round antheridium

AIPMT 2014

36. The first human hormone produced by recombinant DNA technology is:

- (A) Estrogen
- (B) Thyroxin
- (C) Progesterone
- (D) Insulin

AIPMT 2014

37. Which one of the following statements is not correct?

- (A) In retina the rods have the photopigment rhodopsin while cones have three different photopigments
- (B) Retinal is a derivative of Vitamin C
- (C) Rhodopsin is the purplish red protein present in rods only
- (D) Retinal is the light absorbing portion of visual photo pigments

AIPMT 2014

38. Which one of the following statements is correct?

- (A) Mango is a parthenocarpic fruit
- (B) A proteinaceous aleurone layer is present in maize grain
- (C) A sterile pistil is called a staminode
- (D) The seed in grasses is not endospermic

AIPMT 2014

39. Pollen tablets are available in the market for:

- (A) Breeding programmes
- (B) Supplementing food
- (C) Ex situ conservation
- (D) In vitro fertilization

AIPMT 2014

40. Select the correct option (Direction of RNA synthesis ; Direction of reading of the template DNA strand):

- (A) $3' \rightarrow 5'$; $5' \rightarrow 3'$
- (B) $5' \rightarrow 3'$; $5' \rightarrow 3'$
- (C) $3' \rightarrow 5'$; $3' \rightarrow 5'$
- (D) $5' \rightarrow 3'$; $3' \rightarrow 5'$

AIPMT 2014

41. The organization which publishes the Red List of species is:

- (A) IUCN
- (B) UNEP
- (C) WWF
- (D) ICFRE

AIPMT 2014

42. A human female with Turner's syndrome:

- (A) has one additional X chromosome
- (B) exhibits male characters
- (C) is able to produce children with normal husband
- (D) has 45 chromosomes with XO

AIPMT 2014

43. Match the following and select the correct answer: (a) Centriole (b) Chlorophyll (c) Cristae (d) Ribozymes — (i) Infoldings in mitochondria (ii) Thylakoids (iii) Nucleic acids (iv) Basal body cilia or flagella

- (A) a-(i), b-(ii), c-(iv), d-(iii)
- (B) a-(i), b-(iii), c-(ii), d-(iv)
- (C) a-(iv), b-(iii), c-(i), d-(ii)
- (D) a-(iv), b-(ii), c-(i), d-(iii)

AIPMT 2014

44. Approximately seventy percent of carbon-dioxide absorbed by the blood will be transported to the lungs:

- (A) in the form of dissolved gas molecules
- (B) by binding to R.B.C
- (C) as carbamino-haemoglobin
- (D) as bicarbonate ions

AIPMT 2014

45. Which vector can clone only a small fragment of DNA?

- (A) Yeast artificial chromosome
- (B) Plasmid
- (C) Cosmid
- (D) Bacterial artificial chromosome

AIPMT 2014

46. Which one of the following fungi contains hallucinogens?

- (A) Amanita muscaria
- (B) Neurospora sp
- (C) Ustilago sp
- (D) Morchella esculenta

AIPMT 2014

47. Select the Taxon mentioned that represents both marine and fresh water species:

- (A) Ctenophora
- (B) Cephalochordata
- (C) Cnidaria
- (D) Echinoderms

AIPMT 2014

48. When the margins of sepals or petals overlap one another without any particular direction, the condition is termed as:

- (A) Imbricate
- (B) Twisted
- (C) Valvate
- (D) Vexillary

AIPMT 2014

49. An aggregate fruit is one which develops from:

- (A) Multicarpellary apocarpous gynoecium
- (B) Complete inflorescence
- (C) Multicarpellary superior ovary
- (D) Multicarpellary syncarpous gynoecium

AIPMT 2014

50. Commonly used vectors for human genome sequencing are:

- (A) BAC and YAC
- (B) Expression Vectors
- (C) T/A Cloning Vectors
- (D) T-DNA

AIPMT 2014

51. Fight-or-flight reactions cause activation of:

- (A) the kidney, leading to suppression of renin-angiotensin-aldosterone pathway
- (B) the adrenal medulla, leading to increased secretion of epinephrine and norepinephrine
- (C) the pancreas leading to a reduction in the blood sugar levels
- (D) the parathyroid glands, leading to increased metabolic rate

AIPMT 2014

52. Stimulation of a muscle fiber by a motor neuron occurs at:

- (A) the transverse tubules
- (B) the myofibril
- (C) the sarcoplasmic reticulum
- (D) the neuromuscular junction

AIPMT 2014

53. Planaria possess high capacity of:

- (A) regeneration
- (B) alternation of generation
- (C) bioluminescence
- (D) metamorphosis

AIPMT 2014

54. Placenta and pericarp are both edible portions in:

- (A) Banana
- (B) Tomato
- (C) Potato
- (D) Apple

AIPMT 2014

55. Geitonogamy involves:

- (A) fertilization of a flower by the pollen from the same flower
- (B) fertilization of a flower by the pollen from a flower of another plant in the same population
- (C) fertilization of a flower by the pollen from a flower of another plant belonging to a distant population
- (D) fertilization of a flower by the pollen from another flower of the same plant

AIPMT 2014

56. How do parasympathetic neural signals affect the working of the heart?

- (A) Heart rate is increased without affecting the cardiac output
- (B) Both heart rate and cardiac output increase
- (C) Heart rate decreases but cardiac output increases
- (D) Reduce both heart rate and cardiac output

AIPMT 2014

57. A marine cartilaginous fish that can produce electric current is:

- (A) Torpedo
- (B) Trygon
- (C) Scoliodon
- (D) Pristis

AIPMT 2014

58. An analysis of chromosomal DNA using the Southern hybridization technique does not use:

- (A) Blotting
- (B) Autoradiography
- (C) PCR
- (D) Electrophoresis

AIPMT 2014

59. Archaeobacteria differ from eubacteria in:

- (A) Mode of nutrition
- (B) Cell shape
- (C) Mode of reproduction
- (D) Cell membrane structure

AIPMT 2014

60. If 20 J of energy is trapped at producer level, then how much energy will be available to peacock as food in the following chain? plant → mice → snake → peacock

- (A) 0.002 J
- (B) 0.2 J
- (C) 0.0002 J
- (D) 0.02 J

AIPMT 2014 · Q96

61. The zone of atmosphere in which the ozone layer is present is called:

- (A) Mesosphere
- (B) Stratosphere
- (C) Troposphere
- (D) Ionosphere

AIPMT 2014

62. Which one of the following are analogous structures?

- (A) Gills of Prawn and Lungs of Man
- (B) Thorns of Bougainvillea and Tendrils of Cucurbita
- (C) Flippers of Dolphin and Legs of Horse
- (D) Wings of Bat and Wings of Pigeon

AIPMT 2014

63. Dr. F. Went noted that if coleoptile tips were removed and placed on agar for one hour, the agar would produce a bending when placed on one side of freshly-cut coleoptile stumps. Of what significance is this experiment?

- (A) It is the basis for quantitative determination of small amounts of growth-promoting substances
- (B) It supports the hypothesis that IAA is auxin
- (C) It demonstrated polar movement of auxins
- (D) It made possible the isolation and exact identification of auxin

AIPMT 2014 · Q98

64. A scrubber in the exhaust of a chemical industrial plant removes:

- (A) particulate matter of the size 5 micrometer or above
- (B) gases like ozone and methane
- (C) particulate matter of the size 2.5 micrometer or less
- (D) gases like sulphur dioxide

AIPMT 2014

65. Non-albuminous seed is produced in:

- (A) Castor
- (B) Wheat
- (C) Pea
- (D) Maize

AIPMT 2014

66. During which phase(s) of cell cycle, amount of DNA in a cell remains at 4C level if the initial amount is denoted as 2C?

- (A) G₁ and S
- (B) Only G₂
- (C) G₂ and M
- (D) G₀ and G₁

AIPMT 2014

67. Transformation was discovered by:

- (A) Hershey and Chase
- (B) Griffith
- (C) Watson and Crick
- (D) Meselson and Stahl

AIPMT 2014

68. In a population of 1000 individuals 360 belong to genotype AA, 480 to Aa and the remaining 160 to aa. Based on this data, the frequency of allele A in the population is:

- (A) 0.5
- (B) 0.6
- (C) 0.7
- (D) 0.4

AIPMT 2014 · Q103

69. To obtain virus-free healthy plants from a diseased one by tissue culture technique, which part/parts of the diseased plant will be taken?

- (A) Palisade parenchyma
- (B) Both apical and axillary meristems
- (C) Epidermis only
- (D) Apical meristem only

AIPMT 2014

70. Tubectomy is a method of sterilization in which:

- (A) ovaries are removed surgically
- (B) small part of vas deferens is removed or tied up
- (C) uterus is removed surgically
- (D) small part of the fallopian tube is removed or tied up

AIPMT 2014

71. Which of the following is responsible for peat formation?

- (A) Riccia
- (B) Funaria
- (C) Sphagnum
- (D) Marchantia

AIPMT 2014

72. Which one of the following shows isogamy with non-flagellated gametes?

- (A) Ectocarpus
- (B) Ulothrix
- (C) Spirogyra
- (D) Sargassum

AIPMT 2014

73. Which one of the following is wrongly matched?

- (A) Translation – Using information in m-RNA to make protein
- (B) Repressor protein – Binds to operator to stop enzyme synthesis
- (C) Operon – Structural genes, operator and promoter
- (D) Transcription – Writing information from DNA to t-RNA

AIPMT 2014

74. Which of the following is a hormone releasing Intra Uterine Device (IUD)?

- (A) LNG-20
- (B) Cervical cap
- (C) Vault
- (D) Multiload 375

AIPMT 2014 · Q108

75. Deficiency symptoms of nitrogen and potassium are visible first in:

- (A) Young leaves
- (B) Roots
- (C) Buds
- (D) Senescent leaves

AIPMT 2014

76. Male gametophyte with least number of cells is present in:

- (A) Funaria
- (B) Lilium
- (C) Pinus
- (D) Pteris

AIPMT 2014

77. The shared terminal duct of the reproductive and urinary system in the human male is:

- (A) Ureter
- (B) Vas deferens
- (C) Vasa efferentia
- (D) Urethra

AIPMT 2014

78. Injury localized to the hypothalamus would most likely disrupt:

- (A) co-ordination during locomotion
- (B) executive functions, such as decision making
- (C) regulation of body temperature
- (D) short-term memory

AIPMT 2014

79. Select the correct option describing gonadotropin activity in a normal pregnant female:

- (A) High level of FSH and LH facilitate implantation of the embryo
- (B) High level of hCG stimulates the synthesis of estrogen and progesterone
- (C) High level of hCG stimulates the thickening of endometrium
- (D) High level of FSH and LH stimulates the thickening of endometrium

AIPMT 2014

80. The motile bacteria are able to move by:

- (A) flagella
- (B) cilia
- (C) pili
- (D) fimbriae

AIPMT 2014

81. Person with blood group AB is considered as universal recipient because he has:

- (A) both A and B antibodies in the plasma
- (B) no antigen on RBC and no antibody in the plasma
- (C) both A and B antigens in the plasma but no antibodies
- (D) both A and B antigens on RBC but no antibodies in the plasma

Answer key and explanations

1. Answer: (A) progesterone

After ovulation the ruptured follicle becomes the corpus luteum, whose main secretion is progesterone, the hormone that maintains the endometrium for implantation and pregnancy. hCG is made by the trophoblast/placenta, not the corpus luteum, and the corpus luteum does not secrete only relaxin or only estrogen.

2. Answer: (C) Lactate fermentation

In lactic acid fermentation pyruvate is reduced directly to lactate by NADH, with no decarboxylation step, so no CO₂ is given off. Alcoholic fermentation releases CO₂ when pyruvate is decarboxylated to acetaldehyde, and aerobic respiration in both plants and animals releases CO₂ in the link reaction and the Krebs cycle.

3. Answer: (B) Tubular parts of nephrons - Cuboidal epithelium

The tubular parts of nephrons are lined by simple cuboidal epithelium (with brush border in the proximal tubule). The buccal cavity is lined by stratified squamous epithelium, bronchioles by ciliated epithelium, and salivary ducts by cuboidal epithelium, so the other pairings are wrong.

4. Answer: (A) Tobacco mosaic virus

Tobacco mosaic virus is a rod-shaped virus in which a single helically coiled RNA strand is surrounded by a protein coat made of repeating capsomeres. Measles, polio and retroviruses are not the classic example of this helical coiled-RNA architecture taught for TMV.

5. Answer: (C) Keoladeo National Park

Siberian cranes and many other migratory waterbirds from cold northern regions spend the winter at Keoladeo National Park (Bharatpur, Rajasthan), a wetland famous as a wintering ground. Corbett National Park is a tiger reserve and the Western Ghats and Meghalaya are noted for endemic flora and fauna, not as this classic migratory-bird refuge.

6. Answer: (B) Protoxylem

Even after secondary growth the primary xylem persists: protoxylem is endarch (towards the pith) in a dicot stem but exarch (towards the periphery) in a dicot root, so it distinguishes the two. Secondary xylem, secondary phloem and cortex are formed or arranged similarly in both old organs and do not reliably separate them.

7. Answer: (D) amount of DNA doubles in each cell

DNA replicates during the S (synthesis) phase, so the DNA content of the cell doubles (2C to 4C). The chromosome number does not increase because each chromosome simply comes to have two sister chromatids joined at the centromere.

8. Answer: (B) Critically Endangered

In IUCN categories a 'Critically Endangered' species faces an extremely high risk of extinction in the wild in the immediate future. 'Vulnerable' means a high risk in the medium-term future, 'Endemic' only means restricted to one region, and 'Extinct' species no longer exist.

9. Answer: (A) Dominant epistasis

In summer squash the dominant allele for white fruit colour masks the expression of the gene for yellow versus green, giving a 12 : 3 : 1 ratio in F_2 , which is dominant epistasis. Recessive epistasis gives 9 : 3 : 4 and complementary genes give 9 : 7, so those do not fit.

10. Answer: (A) Melatonin - pineal gland, regulates the normal rhythm of sleep-wake cycle

Melatonin is secreted by the pineal gland and regulates the diurnal (24-hour) sleep-wake rhythm, so this match is correct. Atrial natriuretic factor comes from the atrial wall and lowers blood pressure, growth of female secondary sex organs is due to estrogen, and oxytocin causes milk ejection rather than growth of mammary glands.

11. Answer: (C) Potato

Potato is a stem tuber: its 'eyes' are nodes bearing buds, which proves it is a modified underground stem. Sweet potato and carrot are modified storage roots, and groundnut is a fruit that develops underground.

12. Answer: (D) Increase in aldosterone levels

Aldosterone from the adrenal cortex (released through the renin-angiotensin pathway) increases Na^+ reabsorption in the distal convoluted tubule. ADH acts mainly on water permeability of the distal tubule and collecting duct, and a fall in aldosterone would reduce, not increase, Na^+ reabsorption.

13. Answer: (C) Mesosomes

Mesosomes are infoldings of the bacterial plasma membrane thought to bear respiratory enzymes, so they are described as performing the role of mitochondria. Ribosomes make proteins, the nucleoid holds the DNA, and the cell wall gives shape and protection.

14. Answer: (A) Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate

Malonate resembles succinate and is a competitive inhibitor of succinic dehydrogenase, so adding a large excess of succinate out-competes it and reverses the inhibition; the statement that it does not reverse the inhibition is therefore incorrect. The other statements (substrate binds at the active site, non-competitive inhibitors bind elsewhere, malonate is competitive) are all true.

15. Answer: (A) Microfilaments

Microfilaments are solid filaments about 6 nm thick made of a single kind of monomer, actin. Microtubules are hollow tubes of tubulin about 25 nm wide, and intermediate filaments (such as lamins) are about 10 nm and built from varied proteins.

16. Answer: (A) Sea-fan (Gorgonia)

Gorgonia (sea-fan) is a cnidarian, an animal, so its cells have no cell wall. Saccharomyces (yeast) has a chitinous/glucan wall, and blue-green algae (cyanobacteria) have a peptidoglycan cell wall.

17. Answer: (A) being imperforate

Tracheids are elongated cells with tapering ends and no perforations in their end walls (imperforate), whereas vessel members have perforation plates. Both tracheids and vessels are lignified and dead without a nucleus at maturity, and Casparian strips belong to the endodermis, not tracheary elements.

18. Answer: (C) Gliding joint - between carpals

Gliding joints occur between the carpals, allowing small sliding movements. The pivot joint is between atlas and axis (not the third and fourth cervical vertebrae), the humerus and pectoral girdle form a ball and socket joint, and frontal and parietal bones meet at a fibrous (suture) joint.

19. Answer: (B) 50%

The woman's colour-blind mother must give her X^c and her normal father gives a normal X, so she is a carrier (XX^c). Sons receive their X only from the mother, so half the sons get X^c and are colour blind: 50%. The man's father being colour blind does not matter, because a father never passes his X to his sons and the man himself is normal.

20. Answer: (B) Etiolated

Seedlings grown in darkness cannot form chlorophyll and become pale, yellow-white and elongated; this condition is called etiolation. They are not mutated (the change reverses in light), and defoliation and embolism refer to leaf loss and air blockage of xylem.

21. Answer: (C) Guide the entry of pollen tube

The filiform apparatus consists of finger-like wall thickenings at the micropylar tip of the synergids, and it guides the pollen tube into the synergid. Recognition of compatible pollen happens on the stigma, and nectar is produced by nectaries, not by the embryo sac.

22. Answer: (B) Areolar tissue - Loose connective tissue

Areolar tissue is a loose connective tissue found beneath the skin. Adipose tissue is also loose (not dense) connective tissue, tendon is dense regular connective tissue, and cartilage is a specialised connective tissue.

23. Answer: (A) Sucrose

In sucrose the glycosidic bond joins C1 of glucose with C2 of fructose, so both reducing (carbonyl) groups are tied up and the sugar is non-reducing. Lactose and maltose each keep one free anomeric carbon and ribose 5-phosphate has a free aldehyde group, so they are reducing.

24. Answer: (B) When HIV damages large number of helper T-Lymphocytes

After infection HIV multiplies in helper T-lymphocytes; symptoms of AIDS appear only when a large number of helper T-cells have been destroyed and immunity breaks down, often years later. Entry of the virus, formation of viral DNA by reverse transcriptase or a period of 15 days after contact do not by themselves produce AIDS symptoms.

25. Answer: (A) Methane, Hydrogen Sulphide and CO_2

Anaerobic bacteria digesting sludge produce biogas, a mixture of methane, hydrogen sulphide and carbon dioxide. Oxygen is not produced in this anaerobic process, and listing only methane and CO_2 or only H_2S and CO_2 leaves out a component.

26. Answer: (D) Rhodospirillum

Rhodospirillum is a purple non-sulphur photosynthetic bacterium that does not use water as the electron donor, so no oxygen is evolved: anoxygenic photosynthesis. Spirogyra, Chlamydomonas and Ulva are green algae that split water and release O_2 .

27. Answer: (C) a-(ii), b-(i), c-(iv), d-(iii)

Earthworm feeds on detritus, so it is a detritivore; succession begins with pioneer species; pollination is an ecosystem service; and natality (birth rate) adds to population growth. Only the option pairing earthworm with detritivore, succession with pioneer species, ecosystem service with pollination and population growth with natality has all four right.

28. Answer: (C) location is not polluted

Lichens are very sensitive to sulphur dioxide and do not grow in polluted air, so luxuriant lichen growth on trees indicates that the location is not polluted. Their presence says nothing about infestation or health of the trees.

29. Answer: (A) facilitated transport

Fructose is absorbed across the intestinal mucosa with the help of carrier proteins down its concentration gradient, which is facilitated transport. Glucose and amino acids are absorbed by active (Na^+ co-)transport, and simple diffusion applies to small molecules like some monosaccharides only to a limited extent.

30. Answer: (A) Chlorella

Chlorella is a unicellular green alga rich in proteins and is used as a food supplement, even by space travellers. Spirogyra, Polysiphonia and Ulothrix are not used as human food.

31. Answer: (D) Abscissic acid

Abscissic acid increases plant tolerance to stresses such as drought, for example by closing stomata, so it is called the stress hormone. Ethylene is a ripening/senescence hormone, and GA_3 and IAA are growth promoters.

32. Answer: (D) Pachytene

Crossing over between non-sister chromatids of homologous chromosomes takes place in pachytene, and it is catalysed by the enzyme recombinase. Synapsis occurs in zygotene, chiasmata become visible in diplotene and terminalisation occurs in diakinesis.

33. Answer: (A) Seed Bank

A seed bank stores germplasm away from the species' natural habitat, so it is ex situ conservation. Wildlife sanctuaries, national parks and sacred groves protect organisms in their natural habitat (in situ).

34. Answer: (A) Vacuoles

The large central vacuole contains cell sap with dissolved solutes; it controls the osmotic entry of water and so the expansion and turgidity of a plant cell kept in water. Plastids, ribosomes and mitochondria have no such osmotic role.

35. Answer: (B) Upper antheridium and lower oogonium

In Chara the oogonium (nucule) lies above and the round antheridium (globule) lies below at the same node, so the statement 'upper antheridium and lower oogonium' is wrong. Globule and nucule do occur on the same plant and the globule is the male structure, so those statements are correct.

36. Answer: (D) Insulin

Human insulin (Humulin, by Eli Lilly in 1983) was the first human hormone produced through recombinant DNA technology, by making the A and B chains separately in *E. coli*. Estrogen, progesterone and thyroxine are not proteins and were not made this way.

37. Answer: (B) Retinal is a derivative of Vitamin C

Retinal, the light-absorbing part of visual pigments, is an aldehyde derived from vitamin A, not vitamin C, so that statement is incorrect. The other statements about rhodopsin in rods and three photopigments in cones are true.

38. Answer: (B) A proteinaceous aleurone layer is present in maize grain

The endosperm of a maize grain is surrounded by a proteinaceous aleurone layer, so this statement is correct. Mango is not parthenocarpic, a sterile stamen (not pistil) is a staminode, and grass seeds are endospermic.

39. Answer: (B) Supplementing food

Pollen grains are rich in nutrients, and pollen tablets and syrups are sold as food supplements. They are not sold for breeding programmes, conservation or in vitro fertilisation.

40. Answer: (D) $5' \rightarrow 3'$; $3' \rightarrow 5'$

RNA polymerase can add nucleotides only to the $3'$ end, so RNA grows $5' \rightarrow 3'$; because the template is antiparallel, it is read $3' \rightarrow 5'$. Any combination that has RNA growing $3' \rightarrow 5'$ or the template read in the same direction as synthesis is wrong.

41. Answer: (A) IUCN

The Red List (Red Data Book) of threatened species is published by the IUCN, the International Union for Conservation of Nature and Natural Resources. UNEP, WWF and ICFRE do not publish it.

42. Answer: (D) has 45 chromosomes with XO

Turner's syndrome results from absence of one X chromosome, giving $44 + XO = 45$ chromosomes. Such females are sterile with rudimentary ovaries, so they cannot bear children, and they do not have an extra X (that is Klinefelter's XXY in males) or male characters.

43. Answer: (D) a-(iv), b-(ii), c-(i), d-(iii)

Centrioles form the basal bodies of cilia and flagella, chlorophyll is present in thylakoids, cristae are the infoldings of the inner mitochondrial membrane, and ribozymes are catalytic nucleic acids (RNA). Only the option giving exactly these four pairings is correct.

44. Answer: (D) as bicarbonate ions

About 70% of CO₂ is carried as bicarbonate ions formed by carbonic anhydrase in RBCs, about 20–25% as carbamino-haemoglobin and about 7% dissolved in plasma. So the bicarbonate route, not carbamino-haemoglobin, accounts for the seventy percent.

45. Answer: (B) Plasmid

Plasmids can accept only small inserts (roughly up to 10 kb). Cosmids carry about 40–45 kb, BACs about 100–300 kb and YACs even larger fragments, which is why they are used for big genomic DNA pieces.

46. Answer: (A) Amanita muscaria

Amanita muscaria (fly agaric) produces hallucinogenic compounds. Neurospora is used in genetics, Ustilago causes smut disease, and Morchella esculenta (morel) is edible.

47. Answer: (C) Cnidaria

Cnidaria are mostly marine but include freshwater forms such as Hydra, so the phylum has both marine and freshwater species. Ctenophores, cephalochordates (Amphioxus) and echinoderms are exclusively marine.

48. Answer: (A) Imbricate

In imbricate aestivation the margins of sepals or petals overlap one another but not in any particular direction, as in Cassia and gulmohur. In twisted aestivation the overlap is regularly in one direction, valvate whorls just touch without overlapping, and vexillary is the papilionaceous arrangement of pea.

49. Answer: (A) Multicarpellary apocarpous gynoecium

An aggregate fruit develops from a multicarpellary apocarpous (free-carpel) gynoecium, each carpel forming a fruitlet, as in Annona and strawberry. A syncarpous gynoecium gives a single simple fruit, and a whole inflorescence gives a composite (multiple) fruit.

50. Answer: (A) BAC and YAC

In the Human Genome Project the DNA was broken into large fragments and cloned in BAC (bacterial artificial chromosome) and YAC (yeast artificial chromosome) vectors, which accept very large inserts. Expression vectors, T/A cloning vectors and T-DNA are not the hosts used for genome sequencing.

51. Answer: (B) the adrenal medulla, leading to increased secretion of epinephrine and norepinephrine

In emergencies the sympathetic system stimulates the adrenal medulla to secrete epinephrine and norepinephrine (the fight-or-flight hormones), raising heart rate, blood glucose and alertness. Blood sugar rises rather than falls, and the kidney and parathyroid are not the effectors of this response.

52. Answer: (D) the neuromuscular junction

A motor neuron releases acetylcholine at the neuromuscular junction (motor end plate), where it generates an action potential in the sarcolemma. The impulse then travels through transverse tubules and causes Ca²⁺ release from the sarcoplasmic reticulum, but these are later steps, not the site of stimulation.

53. Answer: (A) regeneration

Planaria, a flatworm, has a remarkably high capacity for regeneration: even small pieces can regrow a whole animal. It does not show alternation of generations, bioluminescence or metamorphosis.

54. Answer: (B) Tomato

Tomato is a berry in which both the fleshy pericarp and the placenta are eaten. In banana the edible part is the mesocarp and endocarp, in apple it is the fleshy thalamus, and potato is a stem tuber, not a fruit.

55. Answer: (D) fertilization of a flower by the pollen from another flower of the same plant

Geitonogamy is the transfer of pollen from one flower to the stigma of another flower of the same plant; it is functionally cross pollination but genetically like selfing. Pollination within the same flower is autogamy, and pollen from a different plant is xenogamy.

56. Answer: (D) Reduce both heart rate and cardiac output

Parasympathetic (vagal) signals slow the SA node and AV conduction, so heart rate falls and with it the cardiac output. Increases in heart rate or cardiac output are caused by sympathetic stimulation, not parasympathetic.

57. Answer: (A) Torpedo

Torpedo, the electric ray, is a marine cartilaginous fish with electric organs that can produce shocks. Trygon (sting ray) has a poison sting, while Scoliodon (dogfish) and Pristis (saw fish) have no electric organs.

58. Answer: (C) PCR

Southern hybridisation involves restriction digestion of DNA, gel electrophoresis, blotting onto a membrane, hybridisation with a labelled probe and detection by autoradiography. PCR is not a step of this technique.

59. Answer: (D) Cell membrane structure

Archaeobacteria differ from eubacteria in having a different cell wall and cell membrane structure, with branched-chain lipids joined by ether links, which helps them survive extreme habitats. Shape, mode of nutrition and reproduction overlap between the two groups.

60. Answer: (D) 0.02 J

By the 10 percent law only about one tenth of energy passes to each next trophic level: 20 J (plant) → 2 J (mice) → 0.2 J (snake) → 0.02 J (peacock). The value 0.2 J is what the snake receives, one step short of the peacock.

61. Answer: (B) Stratosphere

The ozone layer lies in the stratosphere, the upper part of the atmosphere, where it absorbs UV-B radiation. Ozone in the troposphere is a harmful pollutant, and the mesosphere and ionosphere are not where the ozone layer lies.

62. Answer: (A) Gills of Prawn and Lungs of Man

Gills of prawn and lungs of man both carry out respiration but differ in origin and structure, so they are analogous. Thorns of Bougainvillea and tendrils of Cucurbita are both modified stems, flippers of dolphin and legs of horse are both pentadactyl forelimbs, and bat and pigeon wings share the vertebrate forelimb pattern, so these are homologous.

63. Answer: (A) It is the basis for quantitative determination of small amounts of growth-promoting substances

Went's Avena curvature test showed that a diffusible substance collected in agar from coleoptile tips causes bending in proportion to its amount, so it became a bioassay for quantitative estimation of small amounts of auxin. It did not identify the substance chemically as IAA or demonstrate polar transport.

64. Answer: (D) gases like sulphur dioxide

A scrubber sprays water or lime through the exhaust and dissolves or reacts with gases such as sulphur dioxide, removing them. Particulate matter is removed mainly by electrostatic precipitators, and scrubbers are not used for ozone or methane.

65. Answer: (C) Pea

In pea the endosperm is fully consumed by the developing embryo and food is stored in the cotyledons, so the seed is non-albuminous. Castor, wheat and maize retain endosperm in the mature seed (albuminous).

66. Answer: (C) G₂ and M

DNA is 2C in G₁, rises to 4C during S, and stays 4C through G₂ and M until the cell divides into two 2C cells. G₁ and G₀ are 2C, and S is only partly 4C, so the phases that stay at 4C are G₂ and M.

67. Answer: (B) Griffith

Frederick Griffith (1928), working with Streptococcus pneumoniae and mice, found that heat-killed virulent bacteria could transform live non-virulent ones: transformation. Hershey and Chase proved DNA is the genetic material, Watson and Crick gave the double helix, and Meselson and Stahl proved semiconservative replication.

68. Answer: (B) 0.6

Each AA individual carries two A alleles and each Aa carries one, so frequency of A = $(2 \times 360 + 480) / (2 \times 1000) = 1200/2000 = 0.6$. The value 0.4 is the frequency of allele a, not A.

69. Answer: (B) Both apical and axillary meristems

Even when a plant is infected with virus, its apical and axillary meristems remain free of virus, so both are cultured to obtain virus-free plants. Palisade parenchyma and epidermis are infected tissues, and limiting the choice to the apical meristem leaves out the axillary meristems.

70. Answer: (D) small part of the fallopian tube is removed or tied up

Tubectomy is female sterilisation in which a small part of the fallopian tube is removed or tied up through a small incision, blocking the passage of the ovum. Removal or tying of part of the vas deferens is vasectomy in males, and ovaries or uterus are not removed.

71. Answer: (C) Sphagnum

The moss Sphagnum accumulates as peat, which is used as fuel and as packing material because of its water-holding capacity. Riccia and Marchantia are liverworts and Funaria is a moss that does not form peat.

72. Answer: (C) Spirogyra

Spirogyra reproduces by isogamy in which the fusing gametes are similar in size and non-flagellated (non-motile). Ulothrix and Ectocarpus have flagellated isogametes, and Sargassum is oogamous.

73. Answer: (D) Transcription - Writing information from DNA to t-RNA

Transcription copies genetic information from DNA into RNA, chiefly mRNA, so 'writing information from DNA to t-RNA' is the wrong match. Translation, the repressor binding the operator, and an operon made of structural genes, operator and promoter are all correctly described.

74. Answer: (A) LNG-20

LNG-20 releases the progestogen levonorgestrel, so it is a hormone-releasing IUD. Multiload 375 is a copper-releasing IUD, and the cervical cap and vault are barrier methods.

75. Answer: (D) Senescent leaves

Nitrogen and potassium are mobile elements that are withdrawn from older leaves and sent to young growing parts, so their deficiency symptoms appear first in the older (senescent) leaves. Deficiency of immobile elements such as calcium appears first in young leaves and buds.

76. Answer: (B) Lilium

In angiosperms such as Lilium the male gametophyte is extremely reduced: a mature pollen grain has only a vegetative cell and a generative cell (or two male gametes), at most three cells. The male gametophyte of Pinus has more cells (prothallial cells as well), and in Pteris and Funaria it is a multicellular free-living or gametophytic body.

77. Answer: (D) Urethra

In the human male the urethra carries both urine from the bladder and semen from the ejaculatory ducts, so it is the shared terminal duct. The ureter carries only urine from kidney to bladder, and vasa efferentia and vas deferens carry only sperm.

78. Answer: (C) regulation of body temperature

The hypothalamus contains the centres that regulate body temperature (as well as hunger, thirst and pituitary control), so its injury would disrupt thermoregulation. Coordination during locomotion is a cerebellar function, and decision making and short-term memory depend on the cerebrum.

79. Answer: (B) High level of hCG stimulates the synthesis of estrogen and progesterone

During pregnancy the placenta secretes high levels of hCG, which maintains the corpus luteum so that it continues to produce estrogen and progesterone. FSH and LH are suppressed in pregnancy, and the endometrium is maintained by progesterone rather than thickened directly by hCG.

80. Answer: (A) flagella

Motile bacteria move by flagella, thin filamentous extensions of the cell wall and membrane. Pili and fimbriae are surface structures for attachment and conjugation, not locomotion, and bacteria have no cilia.

81. Answer: (D) both A and B antigens on RBC but no antibodies in the plasma

A person with AB blood has both A and B antigens on the RBCs and no anti-A or anti-B antibodies in the plasma, so donor RBCs of any ABO group are not agglutinated. Antigens are on the RBC surface, not in plasma, and group O (not AB) has no antigens.

Questions as set in the AIPMT/NEET papers conducted by CBSE and NTA. Answers checked and explanations written by the RankUp team. RankUp is not affiliated with CBSE or NTA.