

International Academic
Competitions

Biology Examination

2024 Asian Championships

Name _____

School _____

Grade _____

Instructions – Mark your answers on the scantron provided. Correct answers are worth 2 points. Incorrect answers are worth –1 point. Questions left blank are worth 0 points. Write the answer to your tiebreaker question in the box at the top of your scantron.

1. What is the smallest unit that can live on its own and makes up all living organisms?

- A. Bacteria
- B. Cell
- C. Atom
- D. Organelle

2. What state do animals undergo in order to save energy and survive the winter?

- A. Sleep
- B. Migration
- C. Hibernation
- D. Camouflage

3. What byproduct do all animals expel after breathing in oxygen?

- A. Carbon dioxide
- B. Carbon monoxide
- C. Nitrogen dioxide
- D. All of the above

4. Which of the following animals are NOT warm-blooded?

- A. Birds
- B. Monkeys
- C. Fish
- D. Mice

5. How many chambers does the human heart have?

- A. One
- B. Two
- C. Three
- D. Four

6. Which of the following proteins is responsible for the red color of red blood cells?

- A. Myoglobin
- B. Hemoglobin
- C. Neuroglobin
- D. Cytoglobin

7. Which of the following is NOT a branch of biology?

- A. Zoology
- B. Botany
- C. Ecology
- D. Quantum mechanics

8. Which of the following animals are nocturnal?

- A. Bats
- B. Squirrels
- C. Dogs
- D. Honeybees

9. How many pairs of legs do insects have?

- A. Three
- B. Four
- C. Six
- D. Eight

10. What process cannot be performed by the human body?

- A. Cellular respiration
- B. Aerobic respiration
- C. Digestion
- D. Photosynthesis

11. Charles Darwin's book On the Origin of Species primarily concerns what concept?

- A. Evolution
- B. Taxonomy
- C. Fossils
- D. Taxidermy

12. What is the outermost layer of roots and stems of woody plants?

- A. Mulch
- B. Bark
- C. Branch
- D. Xylem

13. Which of the following organs is associated with the nervous system?

- A. Heart
- B. Liver
- C. Brain
- D. Kidney

14. All of the following animals are strictly carnivorous EXCEPT

- A. Tiger
- B. Anteater
- C. Hippopotamus
- D. Lion

15. What organisms are at the base of a food chain?

- A. Decomposers
- B. Primary consumers
- C. Primary producers
- D. Scavengers

16. What substance is primarily released from the nasolacrimal duct?

- A. Blood
- B. Sweat
- C. Tears
- D. Mucus

17. What type of energy drives photosynthesis?

- A. Light energy
- B. Thermal energy
- C. Potential energy
- D. Nuclear energy

18. Which of the following is the basic building block of nucleic acids?

- A. Nucleosome
- B. Nucleotide
- C. Nucleoside
- D. Nucleon

19. What does the table, shown in the photo below, visualize?

	R	r
R	RR	Rr
r	Rr	rr

- A. Number of chromosomes an organism has
- B. Similarities between two organisms
- C. Possible allele combinations of an offspring
- D. Complications regarding a cell's ability to divide

20. People with what blood type are referred to as being "universal donors"?

- A. Type O-
- B. Type A
- C. Type B
- D. Type AB+

21. Which of the following is NOT an element of an optical microscope?

- A. Magnetic lens
- B. Objective lens
- C. Stage
- D. Eyepiece

22. Which of the following is a protist?

- A. *Penicillium glabrum*
- B. *Paramecium caudatum*
- C. *Escherichia coli*
- D. *Lactobacillus rhamnosus*

23. Which of the following is the shape of a DNA molecule?

- A. Single helix
- B. Double helix
- C. Triple helix
- D. Beta sheet

24. What is the largest muscle in the human body?

- A. Quadriceps
- B. Gluteus maximus
- C. Latissimus dorsi
- D. Hamstrings

25. Antibodies belong to which of the following groups of biomolecules?

- A. Lipids
- B. Proteins
- C. Carbohydrates
- D. Nucleic acids

26. Which of the following is NOT an arthropod?

- A. Arachnids
- B. Insects
- C. Crustaceans
- D. Annelids

27. What is the correct order of major groups used in taxonomic classification?

- A. Kingdom → Phylum → Class → Order → Genus → Class → Species
- B. Phylum → Kingdom → Order → Family → Class → Genus → Species
- C. Kingdom → Phylum → Class → Order → Family → Genus → Species
- D. Phylum → Kingdom → Order → Class → Family → Genus → Species

28. Which of the following bones is also known as kneecap?

- A. Femur
- B. Patella
- C. Vomer
- D. Tibia

29. Which of the following nitrogenous bases is absent in DNA?
- Guanine
 - Thymine
 - Adenine
 - Uracil
30. An arranged collection of trees is known as a what?
- Arachnoid
 - Aristate
 - Arboretum
 - Areolate
31. Which of the following animals does NOT use echolocation?
- Bat
 - Shark
 - Whale
 - Dolphin
32. What term is described as “the process of maintaining a stable environment inside a cell or organism”?
- Homeostasis
 - Niche
 - Equilibrium
 - Metabolism
33. Jane Goodall is notable for her study of what animals?
- Baboons
 - Chimpanzees
 - Gorillas
 - Lemurs
34. During translation, proteins are created from a sequence of what molecules?
- Carbohydrates
 - Nucleic acids
 - Nucleotides
 - Amino acids
35. Which of the following is a voluntary muscle?
- Skeletal muscle
 - Cardiac muscle
 - Smooth muscle
 - All of the above
36. Animals that are classified as “ungulates” have what anatomical structure in common?
- Wings
 - Hoofs
 - Scales
 - Pouches
37. Photosynthesis is divided into what stages?
- Light-dependent reactions and glycolysis
 - Light-dependent reactions and the Krebs cycle
 - Light-dependent reactions and oxidative phosphorylation
 - Light-dependent reactions and the Calvin cycle
38. Salamanders belong to which of the following classes?
- Reptiles
 - Amphibians
 - Fish
 - Birds
39. What is biofilm?
- The protein coat that surrounds the DNA of a virus
 - A sticky substance excreted by a colony of prokaryotes that adhere to a surface
 - The outer embryonic cell layer in animals
 - All the genes of all the members of a population
40. What era is often referred to as the “Age of Dinosaurs”?
- Precambrian
 - Paleozoic
 - Mesozoic
 - Cenozoic
41. Barnacles and whales exhibit what type of symbiotic relationship with one another?
- Mutualism
 - Commensalism
 - Parasitism
 - Competition
42. What acid is formed in the muscle under conditions with high energy demand, such as after an intense workout?
- Glycolic acid
 - Lactic acid
 - Mandelic acid
 - Citric acid
43. Where in the world is the most biodiversity found?
- Amazon Rainforest
 - Great Barrier Reef
 - Galápagos Islands
 - Great Plains
44. Which of the following RNA molecules has an anticodon?
- siRNA
 - snRNA
 - tRNA
 - mRNA
45. Which organelle is primarily responsible for digesting macromolecules?
- Endoplasmic reticulum
 - Lysosome
 - Vesicles
 - Golgi apparatus
46. Which of the following saccharides is fungal cell wall primarily composed of?
- Cellulose
 - Chitin
 - Murein
 - Glycogen

47. Prokaryotes are divided into what two groups?
- Bacteria and viruses
 - Bacteria and archaea
 - Bacteria and protozoa
 - Bacteria and fungi
48. What is the term for the asexual reproduction executed by yeast?
- Conjugation
 - Meiosis
 - Budding
 - Conidia
49. Hair and nails are primarily made of which of the following proteins?
- Creatine
 - Phosphocreatine
 - Keratin
 - Creatinine
50. Down syndrome is caused by trisomy of which of the following chromosomes?
- 1
 - 11
 - 12
 - 21
51. Which of the following organelles is NOT surrounded by a phospholipid bilayer?
- Golgi Apparatus
 - Ribosome
 - Endoplasmic reticulum
 - Nucleus
52. Which of the following is NOT a viral disease?
- Hepatitis A
 - Mumps
 - Chickenpox
 - Diphtheria
53. Which of the following vessels carries blood from the right ventricle?
- Aorta
 - Pulmonary trunk
 - Pulmonary vein
 - Subclavian artery
54. Which of the following is the first stage of meiosis?
- Anaphase I
 - Metaphase I
 - Prophase I
 - Telophase I
55. Which of the following is a pigment produced in the human skin?
- Melatonin
 - Melanin
 - Myelin
 - Methionine
56. What is the difference between the phloem and the xylem?
- The xylem transports water in a plant, whereas the phloem transports sugar.
 - The phloem transports water in a plant, whereas the xylem transports sugar.
 - The xylem is found in woody plants, whereas the phloem is not.
 - The phloem is found in flowers, whereas the xylem is not.
57. What is the ploidy of human gametes (sex cells)?
- 1n
 - 2n
 - 3n
 - 4n
58. How many incisors do humans have?
- Two
 - Four
 - Six
 - Eight
59. Sarcoplasmic reticulum can be found in which of the following cells?
- Muscle cell
 - Neuron
 - White blood cell
 - Hepatocyte
60. Bacteriophages are
- macrophages that engulf bacteria.
 - bacteria that infect macrophages.
 - bacteria that cause pertussis.
 - viruses that infect bacteria.
61. Which of the following is the earliest documented representative of the genus Homo?
- Homo sapiens
 - Homo erectus
 - Homo neanderthalensis
 - Homo habilis
62. How many autosomes are there in a human gamete?
- 22
 - 23
 - 44
 - 46

63. Which of the following microscopes was used to obtain this image of a mitochondrion?



- A. Optical microscope
- B. Fluorescence microscope
- C. Scanning electron microscope
- D. Transmission electron microscope

64. Which of the following valves separates the right atrium from the right ventricle?

- A. Mitral valve
- B. Bicuspid valve
- C. Tricuspid valve
- D. Aortic valve

65. Which of the following is NOT a part of the limbic system?

- A. Hippocampus
- B. Pituitary gland
- C. Hypothalamus
- D. Amygdala

66. Which of the following channels are open during depolarization of a neuron?

- A. Voltage-gated sodium channels
- B. Voltage-gated potassium channels
- C. Ligand-gated sodium channels
- D. Ligand-gated potassium channels

67. Gametophyte is the dominant generation in which of the following plants?

- A. Conifers
- B. Angiosperms
- C. Flowering plants
- D. Bryophytes

68. The endosymbiotic theory explains the origin of which of the following organelles?

- A. Chloroplast
- B. Nucleolus
- C. Centriole
- D. Cytosol

69. Which of the following cells of the pancreatic islets produce insulin?

- A. Alpha cells
- B. Beta cells
- C. Delta cells
- D. PP cells

70. Which of the following diseases is shown in this chest X-ray?



- A. Tuberculosis
- B. Tetanus
- C. Graves' disease
- D. Coeliac disease

71. What crop did Gregor Mendel experiment on to determine his laws of inheritance?

- A. Carrots
- B. Pea plants
- C. Vanilla
- D. Potato

72. What type of insect is often used for genetic experiments due to its plentiful offspring, low chromosome number, and rapid life cycle?

- A. Fruit fly
- B. Mayfly
- C. Hercules beetle
- D. Praying mantis

73. The axolotl is a critically endangered species of

- A. Mammal
- B. Fish
- C. Mollusks
- D. Amphibians

74. Which of the following animals undergo migration?

- A. Blue wildebeest
- B. Cardinals
- C. Pigeons
- D. Gray wolf

75. Which of the following phyla is characterized as possessing no true tissues and organs?

- A. Porifera
- B. Arthropoda
- C. Chordata
- D. Cnidaria

Tiebreaker

This question will only be scored if there is a tie for placement on the exam. **This is a required question, but there is no penalty for a wrong answer to this question.**

Write your answer legibly in the space provided on your scantron.

On average, how many cells does a human male have?