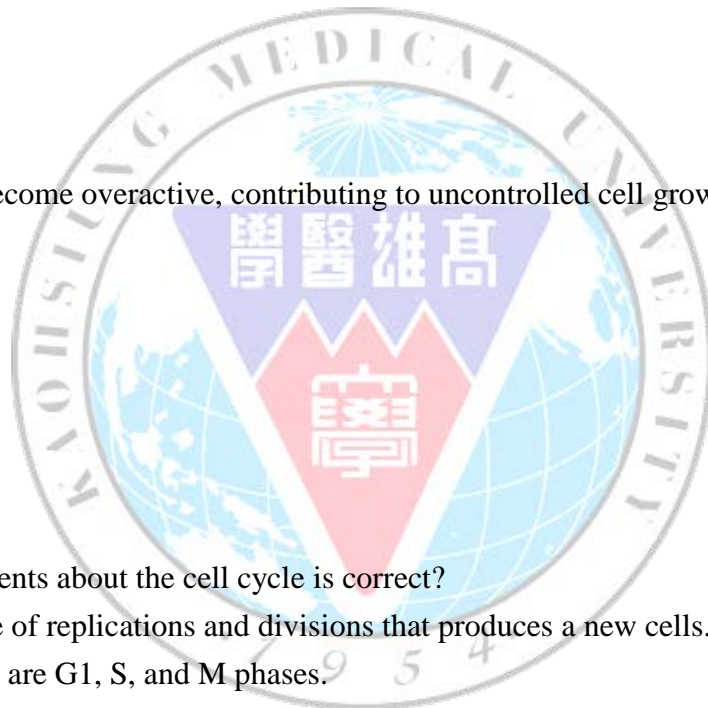


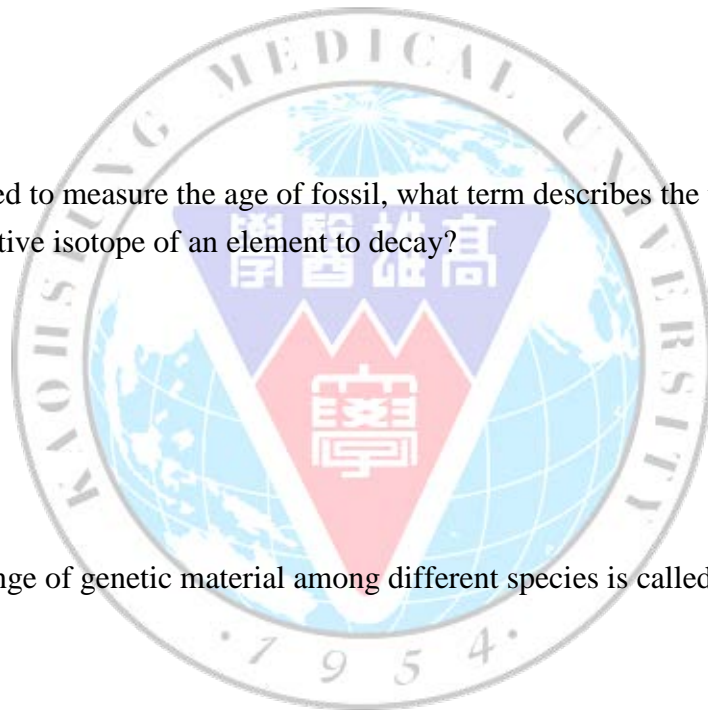
說明：一、請一律以「答案卷」作答，作答時不得使用鉛筆，違者該科答案卷不予計分；限用黑色或藍色墨水的筆書寫。
二、考生應在答案卷上規定範圍內作答，且不得書寫任何與答案無關之文字、符號，違者該科不予計分。
三、答案卷以每人一張為限，不得要求增補；試題與答案卷必須繳回，不得攜出試場。


1. Restriction enzymes are invaluable tools in gene cloning because :
 - A) they cut both strands of DNA at specific sites
 - B) they replicate the gene of interest
 - C) they can produce sticky ends so DNA from different sources can be joined together
 - D) they cut at specific sites within the DNA and produce sticky ends allowing DNA from different sources to be joined together
 - E) they replicate the DNA of interest, they cut at specific sites within the DNA, and produce sticky ends allowing DNA from different sources to be joined together
2. Which of the following statements is true?
 - A) Oxidative phosphorylation occurs in the mitochondria matrix.
 - B) Glycolysis occurs in the mitochondria inner membrane.
 - C) The citric acid cycle occurs in the cytosol.
 - D) The citric acid cycle occurs in the mitochondria matrix.
 - E) Electron transport chain and ATP synthase are in the cytosol.
3. In the photosynthesis, NADPH is produced by
 - A) the Calvin cycle alone.
 - B) light reactions alone.
 - C) NADPH production is not a part of photosynthesis.
 - D) both light reactions and the Calvin cycle.
 - E) neither the light reactions nor the Calvin cycle.
4. When receptors coupled to phospholipase C are activated, calcium levels in the cytosol increase when _____.
 - A) IP3 binds to ligand-gated channels on the plasma membrane, releasing calcium.
 - B) diacylglycerol binds to ligand-gated channels on the endoplasmic reticulum, releasing calcium.
 - C) phospholipase C phosphorylates the receptor leading to calcium production.
 - D) IP3 binds to ligand-gated channels on the endoplasmic reticulum, releasing calcium.
 - E) diacylglycerol binds to ligand-gated channels on the plasma membrane, releasing calcium
5. For heart muscles to beat in a coordinated rhythm ions must move from one cell to the next through _____.
 - A) desmosomes
 - B) gap junctions
 - C) focal adhesions
 - D) adherens junctions
 - E) hemidesmosomes

6. Who discovered that DNA was the genetic material or transforming factor that could convert nonvirulent R-type *Streptococcus pneumoniae* bacterium to the virulent S-type?
- A) Weismann and Nageli
 - B) Griffith
 - C) Avery, MacLeod, and McCarty
 - D) Hershey and Chase
 - E) Watson, Crick, Wilkins, and Franklin
7. Transcription begins near a site in the DNA called the _____.
- A) promoter
 - B) enhancer
 - C) response element
 - D) transcription unit
 - E) regulatory sequence
8. An mRNA that contains the coding sequence for two or more structural genes is called a
- A) polyintronic mRNA
 - B) polyextronic mRNA
 - C) polycistronic mRNA
 - D) polyexpressive mRNA
 - E) polyrepressor mRNA.
9. A mutation causes a gene to become overactive, contributing to uncontrolled cell growth. Which term best describes this gene?
- A) tumor-suppressor gene
 - B) oncogene
 - C) spliced gene
 - D) alternatively spliced gene
 - E) malignant gene
10. Which of the following statements about the cell cycle is correct?
- A) The cell cycle is a sequence of replications and divisions that produces a new cells.
 - B) The phases of the cell cycle are G1, S, and M phases.
 - C) In actively dividing cells, the S and G2 phases are collectively known as interphase.
 - D) When the S phase of the cell cycle is finished, a cell has twice as many chromatids as the number of chromosomes in the G1 phase.
 - E) During G2 phase, the cell grows and copies its chromosomes in preparation for cell division.
11. The probability of obtaining a recessive phenotype from self-fertilization of a heterozygous individual is
- A) 25%
 - B) 50%
 - C) 75%
 - D) 100%
 - E) 12.5%
12. The inheritance pattern where two or more genes do not assort independently because they are close together on the same chromosome is called
- A) Mendelian inheritance.
 - B) epistasis.
 - C) genomic imprinting.
 - D) linkage.
 - E) dominance.



13. Which one of following pathogens has no genetic materials?
- A) a prokaryote
 - B) a viroid
 - C) a plasmid
 - D) a virus
 - E) a prion
14. What is a homeobox?
- A) a cluster of homeotic genes
 - B) a sequence within a homeotic gene that encodes the DNA-binding portion of a transcription factor
 - C) the portion of the promoter to which a homeoprotein binds to activate transcription of genes important for development
 - D) an enhancer region needed for expression of a homeotic gene
 - E) none of these are correct
15. What nucleic acid is subject to alternative splicing?
- A) DNA
 - B) rRNA
 - C) pre-mRNA
 - D) mRNA
 - E) tRNA
16. Radioactive isotopes are applied to measure the age of fossil, what term describes the time it requires for exactly one-half of a given amount of a radioactive isotope of an element to decay?
- A) decay time
 - B) decay product
 - C) half-life
 - D) half-decay
 - E. useful dating range
17. The phenomenon about exchange of genetic material among different species is called
- A) homologous gene exchange.
 - B) horizontal gene transfer.
 - C) exon shuffling.
 - D) genetic recombination.
 - E) exon shuffling and or genetic recombination.
18. What phenomenon would counter the conditions for Hardy-Weinberg equilibrium?
- A) The population is isolated from other populations.
 - B) Females select males based on secondary sex traits.
 - C) The population is large.
 - D) No genotypes within the population have a reproductive advantage.
 - E) Genetic drift within the population does not change allele frequencies.
19. If deer is crossed with sheep, the embryos will form but cease development and spontaneously abort. This is an example of
- A) a prezygotic mechanism.
 - B) hybrid inviability.
 - C) hybrid sterility.
 - D) hybrid breakdown.
 - E) spermatric behavior.
20. A phylogenetic tree is a diagram that describes a phylogeny. A phylogeny is



- A) the evolutionary history of a species or group of species.
B) the geographic distribution of populations in a species.
C) the generations of individuals in a population.
D) the distribution of species in a given area in time.
E) a list of character traits of individual species set in a tree diagram.
21. The evolution of organisms that use oxygen in their respiration was possible only because of the action of a group of bacteria that produced oxygen and changed the Earth's atmosphere from an anoxic one to one rich in oxygen. That group of bacteria was:
A) actinobacteria
B) spirochaetes
C) proteobacteria
D) Staphylococcus
E) cyanobacteria
22. Bioluminescence is:
A) the absorption of light by pigments for transfer to chlorophyll a
B) the capture of moonlight for nocturnal photosynthesis
C) the ability to detect and move away from sources of light
D) the production and emission of light by organisms
E) the ability to detect and move toward sources of light
23. Endosperm is
A) sperm after it has entered the archegonium
B) nutritive tissue produced within antheridia
C) tissue stored in seeds that provides nutrition for embryos
D) sperm cells enclosed within pollen grains
E) sperm produced at the end of the flowering season
24. The term angiosperm refers to:
A) the narrow sperm of angiosperms
B) the enclosure of the seed within a fruit
C) the presence of endosperm
D) the branching of vascular veins
E) the presence of pollen
25. In the life cycle of a bread mold, the stage in which diploid nuclei occur is
A) the gametangium.
B) the aseptate hypha.
C) the asexual spores.
D) the sporangium.
E) the zygosporangium.
26. Metamerism is a characteristic feature of
A) Cnidaria.
B) Arthropoda.
C) Platyhelminthes.
D) Rotifera.
E) Nematoda.
27. The following invertebrate group most closely related to the vertebrates is the
A) Echinodermata.
- 

- B) Urochordata.
- C) Cephalochordata.
- D) Ophiuroidea.
- E) Notochordata.

28. The leaf axillary bud could be found :

- A) in the internode of the stem
- B) near the terminal bud
- C) between the leaf petiole and the stem
- D) between the leaf petiole and the leaf blade
- E) between leaflets on a compound leaf

29. The plant roots contain starch-heavy plastids known as:

- A) chloroplasts
- B) plastoplasts
- C) chromoplasts
- D) statoliths
- E) strongoliths

30. Mycorrhizal association with plant roots is best described as:

- A) detrimental to the roots.
- B) only a temporary association dependent on water uptake.
- C) a symbiotic relationship between the plant and certain bacteria
- D) a fungus root interrelationship.
- E) a kind of fungal parasite on plant roots.

31. The correct arrangement of flower parts from the outside to the inside is:

- A) carpels, stamens, sepals, petals.
- B) petals, stamens, carpels, sepals.
- C) stamens, sepals, petals, carpels.
- D) sepals, petals, stamens, carpels.
- E) stamens, carpels, sepals, petals.

32. The release of factors by cells that influence the activity of nearby cells is referred to as:

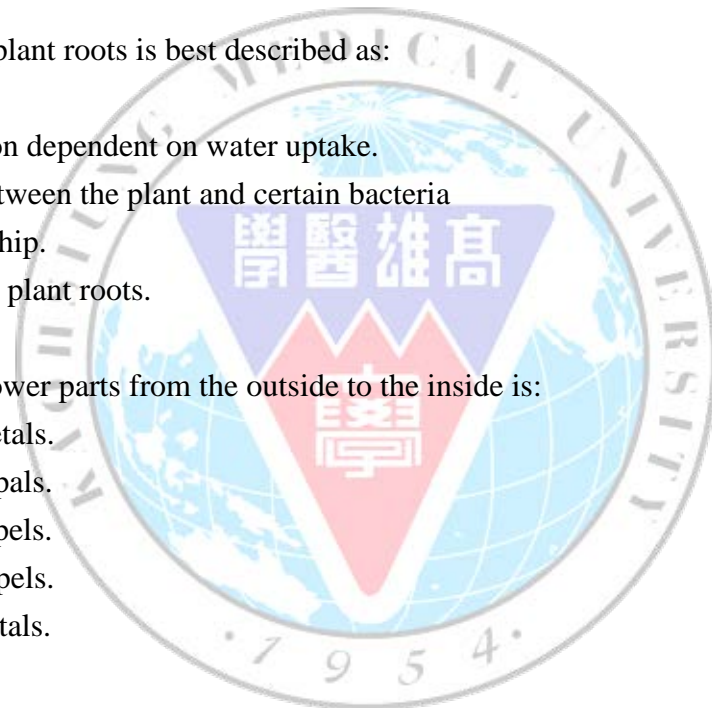
- A) autocrine signaling.
- B) paracrine signaling.
- C) pheromonal signaling.
- D) synaptic signaling.
- E) endocrine signaling.

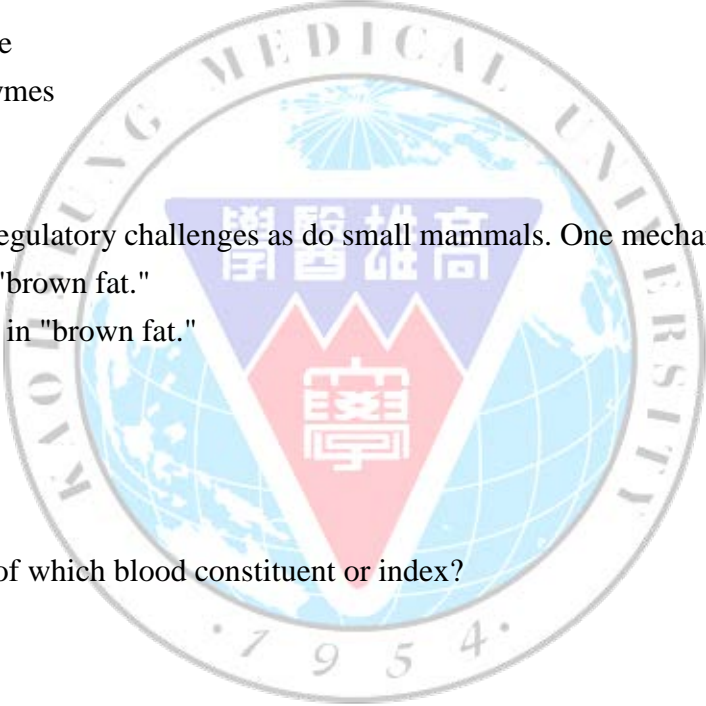
33. The critical function of the sodium-potassium pump of neurons is to move

- A) Na^+ and K^+ into the cell and H^+ out of the cell through an antiport mechanism.
- B) Na^+ and K^+ out of the cell.
- C) Na^+ and K^+ into the cell.
- D) Na^+ out of the cell and K^+ into the cell.
- E) Na^+ into the cell and K^+ out of the cell.

34. The development of Alzheimer disease is associated with deposits of

- A) beta-amyloid proteins.
- B) protein kinase A.
- C) myosin.
- D) hemoglobin.



- E) cAMP-response-element-binding protein (CREB).
35. Within the vestibular system of vertebrates, hair cells help detect movement when their cilia are bent by
- A) gravity.
 - B) statoliths.
 - C) the tectorial membrane.
 - D) otoliths.
 - E) the basilar membrane.
36. What is the role of calcium in muscle contractions?
- A) to break the cross-bridges as a cofactor in the hydrolysis of ATP
 - B) to spread the action potential through the T-tubules
 - C) to transmit the action potential across the neuromuscular junction
 - D) to bind with troponin, changing its shape so that binding sites on the actin filament are exposed
 - E) to re-establish the polarization of the plasma's membrane following an action potential
37. The glandular secretions involved in digestion that would most likely be released as inactive precursors are
- A) protein-digesting enzymes
 - B) fat-solubilizing bile salts
 - C) acid-neutralizing bicarbonate
 - D) carbohydrate-digesting enzymes
 - E) nucleases
38. Newborn humans face thermoregulatory challenges as do small mammals. One mechanism they use to generate heat is
- A) shivering thermogenesis in "brown fat."
 - B) nonshivering thermogenesis in "brown fat."
 - C) convection in "brown fat."
 - D) evaporation in "brown fat."
 - E) radiation in "brown fat."
39. The "hematocrit" is a measure of which blood constituent or index?
- A) blood clotting time
 - B) leukocytes number
 - C) erythrocytes volume
 - D) blood oxygen saturation rate
 - E) plasma volume
40. Most of the carbon dioxide in the blood of humans is transported
- A) as dissolved CO₂ in plasma.
 - B) as bicarbonate ion in plasma.
 - C) attached to hemoglobin in red blood cells.
 - D) attached to hemoglobin in plasma.
 - E) as carbonic acid.
41. What is the correct rank order for relative toxicity (most to least) of the primary nitrogenous wastes used by different animals?
- A) ammonia > urea > uric acid
 - B) uric acid > ammonia > urea
 - C) urea > uric acid > ammonia
 - D) ammonia > uric acid > urea
 - E) urea > ammonia > uric acid
- 
- The logo of Kunming Medical University is a circular emblem. It features a globe in the background with a grid of latitude and longitude lines. Overlaid on the globe is a stylized mountain range or a series of peaks. The emblem is surrounded by the text 'KUNMING MEDICAL UNIVERSITY' in a circular border. At the bottom of the emblem, the year '1954' is inscribed. In the center of the emblem, there are Chinese characters: '昆明医科大学' (Kunming Medical University).

42. Parathyroid hormone's main function is to
- A) increase glucose mobilization during stress or fasting.
 - B) increase calcium by mobilizing the ion from bone.
 - C) increase sodium through reabsorption from kidney.
 - D) increase basal metabolic rate.
 - E) antagonized with thyroid hormone in various functions.
43. Fertilization of an ovum of human normally occurs in the
- A) uterus.
 - B) ovary.
 - C) oviduct.
 - D) vagina
 - E) cervix.
44. In mammals, the melanocytes ultimately arise from
- A) the endoderm.
 - B) the mesoderm.
 - C) the ectoderm.
 - D) the notochord.
 - E) the neural tube.
45. To infect a cell, HIV must
- A) kill cytotoxic T cells and bind CD4.
 - B) bind both CD8 and a cytokine co-receptor.
 - C) bind both CD8 and a class I MHC protein.
 - D) bind both CD4 and a cytokine co-receptor.
 - E) bind CD4 and kill macrophage.
46. In animals, the chemicals used to attract mates are called
- A) hormones.
 - B) allomones.
 - C) pheromones.
 - D) allelopaths.
 - E) genetic byproducts.
47. If the number of individual is N , and the carrying capacity is K , and dN/dt as the rate of population growth. Base on the formula, $dN/dt = rN(K-N)/K$, the rate of population growth less than zero as
- A) carrying capacity approaches zero.
 - B) the age-specific fertility rate approaches zero.
 - C) the per capita growth rate declines.
 - D) the population size approaches the carrying capacity.
 - E) the population size over the carrying capacity.
48. Competition among individuals of different species is called
- A) resource competition.
 - B) basal competition.
 - C) interspecific competition.
 - B) intraspecific competition.
 - E) commensalism.
49. Community ecology is best defined as the study of
- A) plant distributions in a given region.



- B) mutual benefits between organisms at all scales in a region.
- C) the relationship between abiotic and biotic factors.
- D) global scale influences of major disturbances such as volcanos.
- E) how groups of species interact in the same place at the same time

50. What is gross primary production?

- A) The carbon fixed during photosynthesis.
- B) The carbon fixed after cellular respiration is accounted for.
- C) The mass increase of producers.
- D) Photosynthetic production plus energy recycled by detritivores.
- E) Total sun radio energy received by earth

