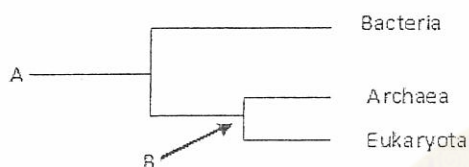


第一大題：單選題

考生請注意！下列題目請依題號按順序於試卷翻開第一頁之【選擇題作答區】作答，

每題2分。

1) In the diagram below, "A" is _____ ; "B" is _____.



- A) the most recent species identified on Earth; an ancestor of group "A"
 B) the common ancestor of all life; the common ancestor of Bacteria and Archaea
 C) the most recent species identified on Earth; the common ancestor of Archaea and Eukaryota
 D) the common ancestor of life; the common ancestor of Archaea and Eukaryota
- 2) Based on what you know about the structure and function of the antenna complex in the thylakoid membrane, irradiating a leaf with which of the following light types would result in the release of the greatest quantities of oxygen?
 A) red and orange light
 B) green and blue light
 C) red and blue light
 D) violet and red light
- 3) Some cells have several nuclei per cell. How could such multinucleated cells be explained?
 A) The cell underwent repeated cytokinesis but no mitosis.
 B) The cell underwent repeated mitosis with simultaneous cytokinesis.
 C) The cell underwent repeated mitosis, but cytokinesis did not occur.
 D) The cell had multiple S phases before it entered mitosis.
- 4) Which of the following situations could NOT lead to evolution via natural selection?
 A) Some hemoglobins have a higher affinity for oxygen than do others.
 B) Plants growing in soils contaminated with heavy metals upregulate production of enzymes to stop uptake of metals.
 C) Bacteria in areas with high sunlight intensity begin to photosynthesize faster, making more sugar in a given time period.
 D) Larger fungi produce more spores than smaller fungi.

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- 5) Which of the following is the most predictable outcome of increased gene flow between two populations?
- A) lower average fitness in both populations
 - B) higher average fitness in both populations
 - C) increased genetic difference between the two populations
 - D) decreased genetic difference between the two populations
- 6) Biologists sometimes divide living organisms into two groups: autotrophs and heterotrophs. How do these two groups differ?
- A) They use different sources of energy.
 - B) They use different electron acceptors.
 - C) They use different sources of carbon.
 - D) They differ in the way they generate ATP.
- 7) A particular species of protist has obtained a chloroplast via secondary endosymbiosis. How can you tell?
- A) The chloroplasts have both nuclear and cyanobacterial genes.
 - B) The chloroplasts are exceptionally small.
 - C) The chloroplasts have three or four membranes.
 - D) The chloroplasts have only a single pigment.
- 8) Which of the following represents the correct sequence of the events of alternation of generations?
- A) gametophyte → gamete → fusion → sporophyte → spore → gametophyte
 - B) sporophyte → spore → fusion → gametophyte → gamete → sporophyte
 - C) gametophyte → fusion → sporophyte → spore → gamete → gametophyte
 - D) gamete → fusion → gametophyte → spore → sporophyte → gamete
- 9) Which of these activities is not a part of development of crop plants from wild relatives?
- A) people planting seeds of the plants with the characteristic wanted
 - B) people making observations of desired plant characteristics
 - C) people eating products from only the plants with desired characteristics
 - D) people developing several varieties of crops from a wild relative
- 10) Which of these is a major trend in land plant evolution?
- A) the trend toward smaller size
 - B) the trend toward a gametophyte-dominated life cycle
 - C) the trend toward a sporophyte-dominated life cycle
 - D) the trend toward larger gametophytes

11) Most moss gametophytes do not have a cuticle and are one to two cells thick. What does this imply about moss gametophytes and their structure?

- A) They use stomata for gas exchange regulation.
- B) They can easily lose water to, and absorb water from, the atmosphere.
- C) Photosynthesis occurs throughout the entire gametophyte surface.
- D) They have branching veins in their leaves.

12) It has been hypothesized that fungi and plants have a mutualistic relationship because fungi provide critical nitrogen for the plants' use. How do we know this happens?

- A) Plants acquire more radioactive nitrogen when they are associated with fungi.
- B) Radioactively labeled nitrogen shows up in fungi when they are symbiotic with plants.
- C) When plants are associated with fungi, they can fix atmospheric nitrogen that has been tagged with a radioactive label.
- D) Radioactively labeled sugars in plants eventually find their way to their symbiotic fungi.

13) What is NOT a function of modified leaves?

- A) trapping and digesting insects for an additional nutrient source
- B) attracting pollinating insects with their bright colors
- C) absorbing oxygen for photosynthesis
- D) storing nutrients and water

14) Canada thistle is a dicot that spreads via growth from lateral roots. You want to use a root miner insect for weed control. What would you need to observe to verify that this weed spreads via lateral roots and not by underground stems?

- A) an epidermis at the periphery
- B) vascular bundles in a ring around the outside of a cross section
- C) a vascular bundle in the center surrounded by parenchyma tissue
- D) meristematic tissue at the tips of the branches

15) After mutagenesis and screening, you have found a mutant that is able to grow in soil with high salt content. Chemical analysis showed that this plant has a decreased amount of Na^+ relative to normal plants. What kind of mutation do you predict this plant contains?

- A) mutation in the plasma membrane sodium channel
- B) mutation in the metallothioneins
- C) mutation in the tonoplast sodium channel
- D) mutation in the tonoplast antiporter

16) Researchers using a dendrograph found that the trunk diameter of a beech tree increased and decreased slightly on a daily basis and that this variation correlated negatively with transpiration rate. Under which of the following sets of conditions should the daily changes in trunk diameter be the smallest?

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- A) cool spring day, no wind, high soil moisture
- B) cool spring day, no wind, soil partially frozen
- C) hot summer day, windy, low soil moisture
- D) hot summer day, no wind, low soil moisture

17) Which of the following supports the finding that sugar translocation in phloem is an active (energy-requiring) process?

- A) Sucrose occurs in higher concentrations in companion cells than in the mesophyll cells where it is produced.
- B) Movement of water occurs from xylem to phloem and back again.
- C) Strong pH differences exist between the cytoplasm of the companion cell and the mesophyll cell.
- D) H^+ -ATPases are abundant in the plasma membranes of the mesophyll cells.

18) As an undergraduate research assistant in the lab of the famous Dr. S. Nameerf, you are assisting with a radioisotope tracer experiment. You expose a mature leaf on one side of the lower shoot of a sugar beet plant to $^{14}CO_2$ and then track the movement of the ^{14}C atoms by radiography. Where are you least likely to detect ^{14}C ?

- A) the roots
- B) the shoot apical meristem
- C) a young leaf directly above the treated leaf
- D) a mature upper leaf on the opposite side of the plant from the treated leaf

19) Which of the following experiments is able to determine if an element is essential for plant growth?

- A) measuring the amount of the element stored in plant tissues
- B) growth of a plant by hydroponics without the element
- C) measuring the weight of the plant and soil before and after plant growth
- D) measuring the amount of the element in the soil before and after plant growth

20) Which of the following is not a characteristic of plant hormones?

- A) They exist in plants in very tiny amounts.
- B) They change their shape in response to stimulus.
- C) They are able to move from one cell to another cell through extracellular spaces.
- D) They affect only cells having an appropriate receptor.

21) In lettuce seeds, blue light initiates germination. If you measured hormone levels within the seed, which hormone would be produced upon exposure to blue light?

- A) ethylene
- B) gibberellin
- C) abscisic acid
- D) cytokinins

22) A certain bacterium infects a plant's upper leaves. A few days later, bacteria of the same species attempt to infect the same plant's roots but are unsuccessful. What process is responsible for the plant's ability to prevent this infection?

- A) antivirulence response
- B) pathogenesis resistance
- C) systemic acquired resistance
- D) sequential immunity

23) Cloning of plants from cuttings demonstrates that

- A) mature plant cells retain genetic information
- B) differentiated plant cells may contain embryonic mRNAs
- C) plants can reverse the differentiation process
- D) an individual plant cell cannot de-differentiate and then redifferentiate

24) What does the ABC model of flower development attempt to explain?

- A) why apical meristems are converted to floral meristems in response to specific cell-to-cell signals
- B) why petals are found on the inside of the whorl of sepals instead of on the outside
- C) why the four types of floral organs occur in whorls
- D) how different combinations of gene products trigger the formation of different floral organs

25) It is estimated that animal- or insect-pollinated plants produce 1000 pollen grains for each ovule; wind-pollinated plants produce 1,000,000 pollen grains for each ovule. What does that indicate about pollination systems?

- A) Wind-pollinated plants rarely produce seeds.
- B) Wind pollination is less common than animal-assisted pollination.
- C) Wind pollination is less efficient than animal-assisted pollination.
- D) Wind pollination is costlier to the plant than animal-assisted pollination.

* 考生請注意！以下題目答案有5個選項！

26) Which one of the following is the stage of food processing that removes undigested material from the body?

- A) ingestion
- B) gestation
- C) elimination
- D) digestion
- E) absorption

27) Which one of the following is false?

- A) Unlike the tracheal system of insects, vertebrate lungs are restricted to one location in the body.

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- B) The structure of the trachea is like the structure of a vacuum cleaner hose.
- C) Most amphibians use lungs and their skin for gas exchange.
- D) Gas exchange in the human lungs occurs in the alveoli.
- E) Vocal cords in our bronchi allow us to speak.

28) Which of the following vessels transports oxygenated blood from the lung back to the heart?

- A) pulmonary vein
- B) aorta
- C) vena cava
- D) coronary artery
- E) pulmonary artery

29) The specific location of the heart pacemaker is the

- A) atrioventricular node.
- B) heart center of the brain.
- C) sinoatrial node.
- D) Purkinje fibers.
- E) None of the choices are correct.

30) Why do diseases involving widespread infection usually result in a fever?

- A) because the inflammatory and immune responses result in extra heat production
- B) because the brain's temperature control center responds to systemic inflammation by creating a hot environment unfavorable to microorganisms
- C) because the rapid multiplication of the invading microorganisms results in extra heat production
- D) because the microorganisms trick the brain's temperature control center into creating a hot environment that favors their growth
- E) None of the choices are correct.

31) Which of the following is not a way in which the secondary immune response differs from the primary immune response?

- A) The secondary response allows new antigens to be recognized faster.
- B) The secondary response begins faster.
- C) The secondary response only occurs after a primary response for the same antigen.
- D) The secondary response produces higher levels of antibodies.
- E) The secondary response lasts longer.

32) The transfer of heat from arteries carrying warm blood past veins returning cooler blood is an example of

- A) evaporative cooling.
- B) insulation.
- C) metabolic heat production.

D) a countercurrent heat exchanger.

E) behavioral thermoregulation.

33) Steroid hormones are made from

A) carbohydrates.

B) amino acids.

C) carbohydrates and amino acids.

D) cholesterol.

E) nucleic acids.

34) Reproductive systems with external fertilization are most common in

A) aquatic animals.

B) populations with many more males than females.

C) populations with many more females than males.

D) terrestrial animals.

E) animals that are widely dispersed.

35) Which of the following represents the sequence in which most animals develop?

A) zygote, cleavage, gastrula, blastula, organ formation

B) blastula, cleavage, zygote, organ formation, gastrula

C) cleavage, zygote, gastrula, blastula, organ formation

D) zygote, cleavage, blastula, gastrula, organ formation

E) zygote, cleavage, organ formation, blastula, gastrula

36) Once the threshold potential is reached

A) K to power of ((+)) channels open.

B) an action potential is inevitable.

C) the membrane potential is positive.

D) Na to power of ((+)) channels close.

E) None of the choices are correct.

37) In a chemical synapse, what is the name of the gap between the transmitting and receiving neurons?

A) synaptic node

B) synaptic knob

C) synaptic cleft

D) gap myelin

E) gap junction

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38) Which one of the following statements is false?

- A) Nerves are part of the peripheral nervous system.
- B) Spinal nerves contain either sensory or motor axons but not both.
- C) The spinal cord is part of the central nervous system.
- D) Ganglia are part of the central nervous system.
- E) The brain is part of the central nervous system.

39) Which of the following is not a variety of mechanoreceptor?

- A) pressure receptors
- B) touch receptors
- C) stretch receptors
- D) auditory hair cells
- E) pain receptors

40) Which of the following choices lists muscle components in order from smallest to largest?

- A) sarcomeres, myofibrils, muscle fibers, muscle
- B) muscle, sarcomeres, myofibrils, muscle fibers
- C) muscle, sarcomeres, muscle fibers, myofibrils
- D) myofibrils, muscle, sarcomeres, muscle fibers
- E) sarcomeres, myofibrils, muscle, muscle fibers

第二大題：解釋名詞

考生請注意！下列題目請依題號按順序填答於試卷作答區並請註明題號，每題4分。答

案若僅有英翻中將只給1分！

1. action potential
2. gastrulation
3. negative feedback
4. neutrophil
5. metastasis

試題隨卷繳回