

國立彰化師範大學 101 學年度博士班招生考試試題

系所：科學教育研究所 組別：丁 科目：基礎生物(含分生、普通動植物學)

☆☆請在答案卷上作答☆☆

第 1 頁，共 6 頁

A. 單選題 (每題2%，共40%)：

- 1) The circulatory system of bony fishes, rays, and sharks is similar to
 - A) that of birds, with a four-chambered heart.
 - B) the portal systems of mammals, where two capillary beds occur sequentially, without passage of blood through a pumping chamber.
 - C) that of reptiles, with one pumping chamber driving blood flow to a gas-exchange organ, and a different pumping chamber driving blood to the rest of the circulation.
 - D) that of sponges, where gas exchange in all cells occurs directly with the external environment.
 - E) that of humans, where there are four pumping chambers to drive blood flow.

- 2) Organisms with a circulating body fluid that is distinct from the fluid that directly surrounds the body's cells are likely to have
 - A) an open circulatory system.
 - B) a closed circulatory system.
 - C) a gastrovascular cavity.
 - D) branched tracheae.
 - E) hemolymph.

- 3) Cave art by early humans recognized the existence of the major signs of inflammation. The most inclusive set of symptoms of inflammation that might appear in such early human art is
 - A) heat, pain, and redness.
 - B) pain and whitening of the surrounding tissue.
 - C) swelling and pain.
 - D) antibody-producing cells.
 - E) swelling, heat, redness, and pain.

- 4) The cells and signaling molecules that initiate inflammatory responses are
 - A) the phagocytes and the lysozymes.
 - B) the phagocytes and the chemokines.
 - C) the dendritic cells and the interferons.
 - D) the mast cells and the histamines.
 - E) the lymphocytes and the interferons.

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第 2 頁，共 6 頁

- 5) Urea is produced in the
- A) liver from NH_3 and CO_2 .
 - B) liver from glycogen.
 - C) kidneys from glucose.
 - D) kidneys from glycerol and fatty acids.
 - E) bladder from uric acid and H_2O .
- 6) A paracrine signal that relaxes smooth muscle cells is
- A) nitric oxide.
 - B) vitamin D.
 - C) testosterone.
 - D) cortisol.
 - E) antidiuretic hormone.
- 7) Ecdysone is a(n)
- A) peptide hormone.
 - B) amine derivative.
 - C) steroid hormone.
 - D) iodinated protein hormone made by the thyroid gland.
 - E) gaseous neurotransmitter.
- 8) Which of the following patterns of reproduction are found only among invertebrate animals?
- A) sexual and asexual reproduction
 - B) external and internal fertilization
 - C) hermaphroditism and parthenogenesis
 - D) pheromonal and hormonal coordination
 - E) fission and budding
- 9) The formation of the fertilization membrane requires an increase in the availability of
- A) bicarbonate ions.
 - B) calcium ions.
 - C) hydrogen ions.
 - D) potassium ions.
 - E) sodium ions.

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第 3 頁，共 6 頁

10) During the early part of the cleavage stage in frog development, the rapidly developing cells

- A) skip the mitosis phase of the cell cycle.
- B) skip the S phase of the cell cycle.
- C) skip the G₁ and G₂ phases of the cell cycle.
- D) rapidly increase the volume and mass of the embryo.
- E) skip the cytokinesis phase of the cell cycle.

11) Which part of a plant absorbs most of the water and minerals taken up from the soil?

- A) taproots
- B) root hairs
- C) the thick parts of the roots near the base of the stem
- D) storage roots
- E) sections of the root that have secondary xylem

12) Which cells are no longer capable of carrying out the process of DNA transcription?

- A) tracheids
- B) mature mesophyll cells
- C) companion cells
- D) meristematic cells
- E) glandular cells

13) CO₂ enters the inner spaces of the leaf through the

- A) cuticle.
- B) epidermal trichomes.
- C) stoma.
- D) phloem.
- E) walls of guard cells.

14) Which of the following is *not* a function of the plasma membrane proton pump?

- A) hydrolyzes ATP
- B) produces a proton gradient
- C) generates a membrane potential
- D) equalizes the charge on each side of a membrane
- E) stores potential energy on one side of a membrane

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第 4 頁，共 6 頁

- 15) Most of the water taken up by a plant is
- A) used as a solvent.
 - B) used as a hydrogen source in photosynthesis.
 - C) lost during transpiration.
 - D) converted to CO₂.
 - E) used to keep cells turgid.
- 16) Which of the following soil minerals is most likely leached away during a hard rain?
- A) Na⁺
 - B) K⁺
 - C) Ca⁺⁺
 - D) NO₃⁻
 - E) H⁺
- 17) In flowering plants, pollen is released from the
- A) anther.
 - B) stigma.
 - C) carpel.
 - D) filament.
 - E) pollen tube.
- 18) Plants growing in a partially dark environment will grow toward light in a response called phototropism. Which of the following statements is true regarding phototropism?
- A) It is caused by an electrical signal.
 - B) One chemical involved is ethylene.
 - C) Auxin causes a growth increase on one side of the stem.
 - D) Auxin causes a decrease in growth on the side of the stem exposed to light.
 - E) Removing the apical meristem enhances phototropism.
- 19) Gravitropism in plant shoots and roots differ in that
- A) only shoots depend upon auxin distribution.
 - B) only shoots depend upon the aggregation of statoliths.
 - C) only roots exhibit rapid elongation of specific cells.
 - D) only roots sense gravity at the tips.
 - E) the threshold and response time is much less in shoots than in roots.

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20) The plant hormone involved in aging and ripening of fruit is

- A) auxin.
- B) ethylene.
- C) florigen.
- D) abscisic acid.
- E) gibberellin.

B. 簡答題 (20%) :

1. Please explain GMO (Genetically Modified Organism), and its advantages and disadvantages. (6%)
2. Please describe the plant hormones (8 general classes), and the major functions of them. (14%)

C. 配合題 (每格 2%，共 40%) :

1. 下表為單子葉與雙子葉植物比較，請於空格內填入適當a~l：

	Embryos	Leaf venation	Stems	Roots	Pollen	Flowers
Monocot						
Eudicot						

- a. One cotyledon
- b. Two cotyledons
- c. Veins usually netlike
- d. Veins usually parallel
- e. Vascular tissue usually arranged in ring
- f. Vascular tissue scattered
- g. Root system usually fibrous (no main root)
- h. Taproot (main root) usually present
- i. Pollen grain with one opening
- j. Pollen grain with three openings
- k. Floral organs usually in multiples of four or five
- l. Floral organs usually in multiples of three

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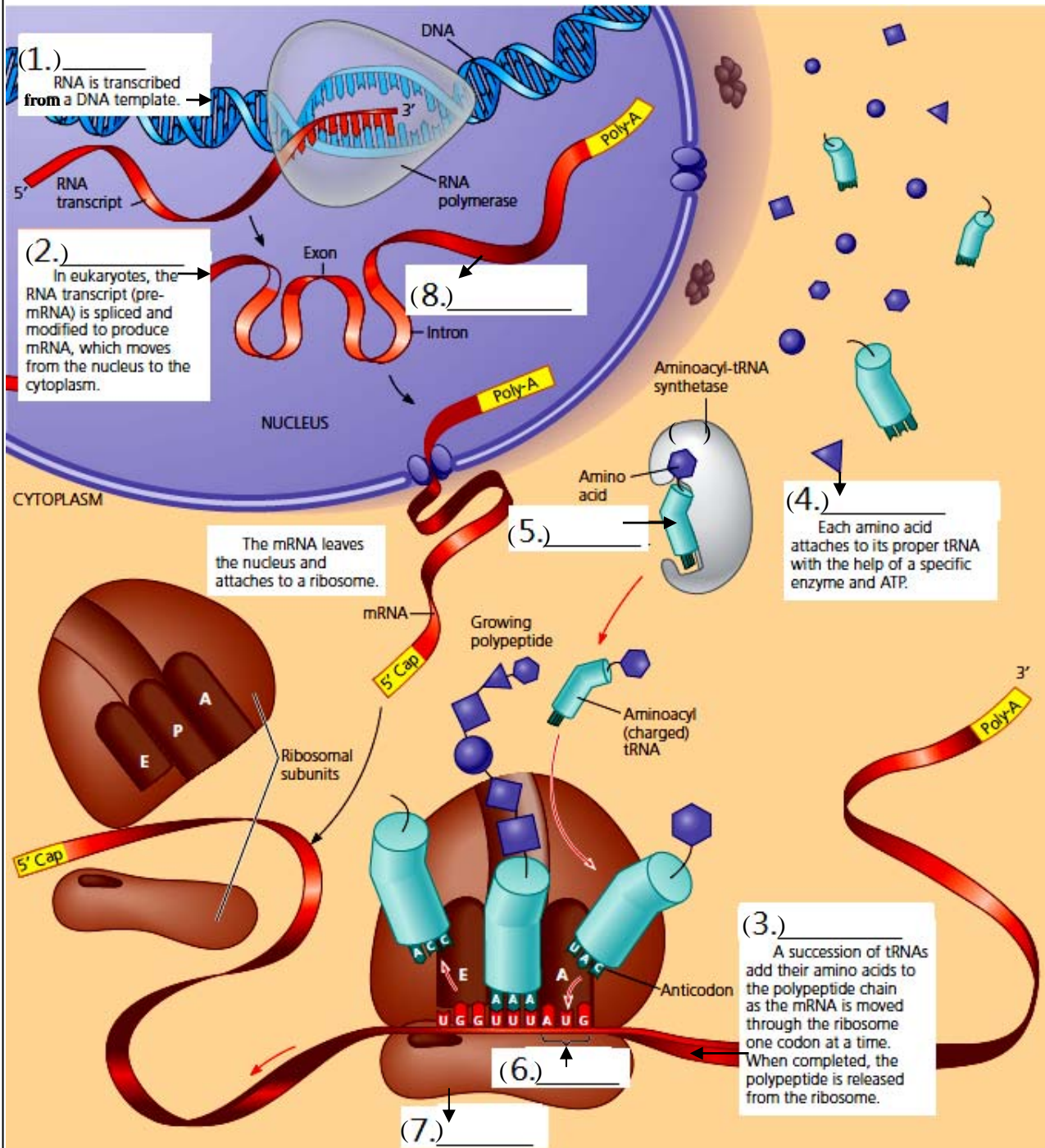
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2. 下表為基因表現分子機制，請於空格內填入適當過程或所對應的分子a-h：



a. Amino acid activation

b. Translation

c. RNA processing

d. Transcription

e. pre-mRNA

f. codon

g. Ribosome

h. tRNA