

題號： 468
科目： 遺傳學(B)
節次： 7

國立臺灣大學 107 學年度碩士班招生考試試題

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一、選擇題 (每題2分，共50分) ※ 本大題請於試卷內之「選擇題作答區」依序作答。

1. Which of the following is not potentially part of a chromosome in eukaryotes?

- a. centromere.
- b. histone.
- c. sister chromatid.
- d. nucleosome
- e. all of these are part of a eukaryotic chromosome.

2. If the DNA triplets are ATG CGT, the mRNA codons are

- a. AUG CGU.
- b. ATG CGT.
- c. UAC GCA.
- d. UAG CGU.
- e. all of these.

3. DNA replication is

- a. redundant.
- b. semiconservative.
- c. progressive.
- d. conservative.
- e. repetitive.

4. Which of the following is not true of mutations?

- a. They are always dangerous.
- b. They can occur as DNA replication errors.
- c. They cannot be repaired after replication.
- d. They may become cancerous.
- e. If in eggs or sperm they pass to the next generation.

5. All of the different kinds of RNA are transcribed in the

- a. mitochondria.
- b. cytoplasm.
- c. ribosomes.
- d. nucleus.
- e. endoplasmic reticulum.

6. The relationship between strands of RNA and DNA is

- a. antagonistic.
- b. opposite.
- c. complementary.
- d. an exact duplicate.
- e. unrelated.



見背面

7. In this depiction of transcription, the ____ strand is ____ because it ____.
- upper; RNA; is single-stranded.
 - lower; RNA; contains uracil.
 - lower; RNA; contains thymine.
 - upper; RNA; has no uracil (U).
 - lower; DNA; contains adenine (A).
8. Of all the different codons that exist, three of them
- are involved in mutations.
 - do not specify a particular amino acid.
 - cannot be copied.
 - provide instructions such as STOP.
 - do not specify a particular amino acid and provide instructions such as STOP.
9. During the termination stage
- a STOP codon enters the ribosome.
 - release factors bind the ribosome.
 - mRNA detaches from the ribosome and the polypeptide chain.
 - ribosomal subunits separate.
 - all of these occur.
10. Which of the following statements is(are) true concerning promoters?
- They are short sequences in DNA.
 - They are locations in DNA where regulatory proteins gather.
 - They control transcription.
 - They are associated with specific genes.
 - All of these are true.
11. The conversion of proteins by the removal of a portion of polypeptide chain is an example of
- transcriptional control.
 - transcript processing control.
 - transport control.
 - translational control.
 - post-translational control.
12. A mammalian female's
- cells usually have multiple Barr bodies.
 - body is a mosaic for the X-linked traits she inherits.
 - Barr bodies are active in some cells.
 - Barr bodies are produced after puberty.
 - X-linked recessive genes are always expressed because of the deactivation of an X chromosome in each cell.
13. Which of the following accounts for the negative control of operons?
- promoters
 - repressors

- c. structural genes
- d. operators
- e. all of these

14. A gene can be silenced by the addition of what to a nucleotide?

- a. $-\text{CH}_3$
- b. $-\text{COOH}$
- c. $-\text{OH}$
- d. $-\text{NH}_2$
- e. $-\text{PO}_4^{-3}$

15. The distribution of cytoplasm to daughter cells is accomplished during

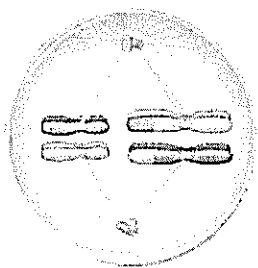
- a. prokaryotic fission.
- b. mitosis.
- c. meiosis.
- d. cytokinesis.
- e. karyokinesis.

16. Which of the following is NOT an advantage of sexual reproduction?

- a. It offers an alternative adaptation in a changing environment.
- b. It is adaptive in coevolution situations.
- c. Half of a parent's genome is passed on.
- d. The genetic variation it provides may be useful in the future.
- e. It yields offspring with novel combinations of traits.

17. Duplicated chromosomes linked together at their centromeres at the beginning of meiosis are appropriately called what kind of chromatids?

- a. mother
- b. daughter
- c. sister
- d. homologous
- e. haploid



18. The cell in this illustration is in _____.

- a. prophase I.
- b. metaphase I.
- c. anaphase I.
- d. prophase II.
- e. anaphase II.

19. Crossing over occurs during
- anaphase I.
 - metaphase II.
 - prophase I.
 - prophase II.
 - telophase II.
20. Which of the following does NOT produce variation?
- crossing over
 - random alignment of chromosomes during meiosis
 - asexual reproduction
 - genetic recombination of alleles
 - sexual reproduction
21. A gene locus is
- a recessive gene.
 - an unmatched allele.
 - a sex chromosome.
 - the location of an allele on a chromosome.
 - a dominant gene.
22. According to Mendel, what kinds of genes "disappear" in F_1 pea plants?
- sex-linked
 - dominant
 - recessive
 - codominant
 - lethal
23. For Mendel's explanation of inheritance to be correct,
- the genes for the traits he studied have to be located on the same chromosome.
 - the combination of gametes at fertilization has to be due to chance.
 - genes cannot be transmitted independently of each other.
 - only diploid organisms demonstrate inheritance patterns.
 - none of these apply.
24. In _____, a pair of nonidentical alleles affecting two phenotypes for a given trait are both expressed at the same time in heterozygotes.
- pleiotropy
 - polygenic inheritance
 - complete dominance
 - codominance
 - a multiple allele system
25. A bell-shaped curve of phenotypic variation is indicative of
- incomplete dominance.
 - continuous variation.

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- c. multiple alleles.
- d. epistasis.
- e. environmental variables on phenotypes.

二、簡要解釋下面的名詞（每項3分，共30分）

1. anticodon 2. telomere 3. nucleosome 4. exon 5. test cross 6. transposon 7. epigenetics 8. RNA interference (RNAi) 9. plasmid 10. *Arabidopsis thaliana*

三、問答題（每題10分，共20分）

1. 簡要解釋原核生物與真核生物在染色體結構，基因結構和基因轉錄方面的差異。
2. 簡要說明那幾個重要發現證明 DNA 是遺傳物質。

試題隨卷繳回