國立台灣大學九十三學年度碩士班招生考試試題

科目:遺傳學(D)

題號:318

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※ 注	意:請於答案卷上依序作答,並應註明作答之題號。
一、單逻	題:請就下列各題所列選項中,挑選一個最適合的答案(70%
1) The se	equence of bases of a molecule of mRNA is converted into a corresponding
	sequence during
A) transloc	
B) replicat	
C) transcri	
D) transfor E) translat	
	type of RNA is found only in eukaryotes?
A) mRNA B) snRNA	
C) tRNA	
D) rRNA	
E) all of th	e above
	4081681684
	is located adjacent to the beginning of a gene's coding region.
A) transcriB) initiator	
C) termina	
D) promot	17 17 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18
E) all of th	
-,,	
4) The so	equence of a template strand of DNA is:
	CATTACGCTT-5'
	he following is the sequence of the corresponding mRNA?
	AATGCGAA-3'
	UUACGCUU-3'
	A A U G C G A A-3'
	A A U G C G A A-3'
E) 3'-A A	G C G T A A T G-5'
5) Whiel	type of cloning vector occurs in nature?
A) plasmid	
B) cosmid	
C) bacterio	
D) both A	
E) all of the	
	sequencing gel, which fragment of DNA would travel the farthest distance fro
the sample	ewell?
	GGAATTTTAGGCAT
B) ATCC	
C) ATCC	3G
D) AT	
E) ATCC	JGAT
,	A copy of an mRNA molecule is called a(n)
A) dDNA	
B) rDNA.	
C) rnaDN	
D) cDNA	
E) mDNA	

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8) Which polymerase is used in the polymerase chain reaction?
A) <i>Taq</i> polymerase B) <i>E. coli</i> DNA polymerase I
C) yeast DNA polymerase III
D) T4 DNA polymerase E) all of the above
9) To clone a eukaryotic gene that is approximately 925 kb in length, ashould be used as the cloning vector.
A) cosmid
B) bacteriophage
C) YAC D) plasmid
E) all of the above
10) Which enzyme is required to make a cDNA library?
A) DNA ligase B) reverse transcriptase
C) DNA polymerase
D) all of the above
E) none of the above
Polymorphism can be detected by PCR amplification using primers that flank the
STRs or VNTRs only if A) there is only one VNTR.
B) the sequences of the flanking regions are known.
C) the locus is homozygous. D) all of the above
E) none of the above
12) Genes that are located on the same chromosome are
A) linked.
B) homozygous. C) homologous.
D) chromologs.
13) Crossing over occurs during which stage of meiosis?
A) anaphase I
B) metaphase II
C) prophase II D) metaphase I
E) prophase l
14) During sexual reproduction in Neurospora crassa, fusion of the haploid nuclei of
cells with different mating types results in ascospores in an ascus.
A) eight diploid B) four haploid
C) four diploid
D) four diploid and four haploid E) eight haploid
15) When two linked alleles on a single chromosome are either both wild-type or both mutant, the arrangement of the alleles on the chromosome is said to be in
A) recombination.
B) fixation. C) repulsion.
D) coupling.
E) regression.

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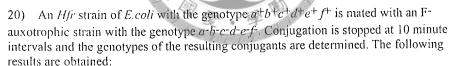
共5頁之第3頁

16) X, Y , and Z are linked genes. Based on testcross data, the frequency of
recombination between genes X and Y was determined to be 33.1 map units; between
genes X and Z the distance was 11.8 mu; and between genes Y and Z the distance was
21.3 mu. What is the order of these three genes on the chromosome?

- A) X-Z-Y
- B) Y-X-Z
- C) Z-Y-X
- D) X-Y-Z
- 17) Two genes that show recombination between them more than 50% of the time are probably
- A) on different chromosomes.
- B) far apart on the same chromosome.
- C) close together on the same chromosome.
- D) both A and B
- E) all of the above
- 18) Which bacterium is commonly used for experiments in genetics and molecular biology?
- A) Saccharomyces cerevisiae
- B) Edwarsiella tarda
- C) Escherichia coli
- D) Neurospora crassa
- E) all of the above



- 19) Which type of genetic exchange in bacteria requires direct cell-to-cell contact?
- A) transformation
- B) transduction
- C) conjugation
- D) all of the above
- E) none of the above



After 10 minutes

 e^+

After 20 minutes a^+e^+

After 30 minutes

 $a^+b^+e^+$

After 40 minutes

 $a^+b^+d^+e^+$ $a^+b^+c^+d^+e^+$

After 50 minutes
After 60 minutes

 $a^{+}b^{+}c^{+}d^{+}e^{+}f^{+}$

Which represents the correct order of genes on this bacterial chromosome?

- A) e-f-a-b-c-d
- B) f-e-d-c-g-a
- C) c-d-e-f-a-b
- D) a-b-c-d-e-f
- E) e-a-b-d-c-f
- 21) When a promoter element is bound by a positive regulatory protein, the result is
- A) activation of transcription.
- B) repression of replication.
- C) repression of transcription.
- D) repression of translation.
- E) activation of replication.
- 22) A mutation in a gene may alter a cell's
- A) phenotype.
- B) genotype and phenotype.
- C) genotype.

接背面

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23)	Ionizing	radiation	creates	mutations	by	causing
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- A) chromosomal rearrangements.
- B) base substitutions.
- C) chromosomal breakage.
- D) both B and C
- 24) A chromosomal mutation that results in an increase in the amount of DNA is a(n)
- A) duplication.
- B) deletion.
- C) inversion.
- D) both A and C
- E) all of the above
- 25) A heterozygous chromosomal inversion can be detected
- A) through genetic studies indicating a decrease in the frequency of recombination between genes.
- B) by cytogenetic observation of loops in chromosomes.
- C) by observing a decrease in the number of viable progeny following genetic crosses.
- D) all of the above
- 26) During cell division, cytokinesis is completed by the end of
- A) anaphase.
- B) prophase.
- C) interphase.
- D) metaphase
- E) telophase.
- 27) Crossing over occurs most frequently during which stage of cell division?
- A) metaphase II of meiosis
- B) prophase I of meiosis
- C) prophase of mitosis
- D) prophase II of meiosis
- E) telophase of mitosis
- 28) Which of the following is a pyrimidine found only in RNA?
- A) adenine B) thymine C) guanine D) cytosine E) uracil
- 29) Chromatin contains
- A) DNA.
- B) RNA.
- C) protein.
- D) both A and C
- E) all of the above
- 30) Gregor Mendel performed his now famous breeding experiments that led to the proposal of his principles of heredity on which organism?
- A) mice
- B) yeast
- C) corn
- D) bacteria
- E) peas
- 31) In pea plants, the smooth seed allele is dominant to the wrinkled seed allele. The F1 generation resulting from a mating between a true-breeding pea plant bearing smooth seeds and one bearing wrinkled seeds would show which phenotype?
- A) all wrinkled seeds
- B) 3/4 wrinkled and 1/4 smooth
- C) all smooth seeds
- D) 1/2 smooth seeds and 1/2 wrinkled seeds
- E) 1/4 wrinkled and 3/4 smooth

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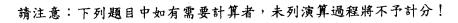
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32)	a testcross between an individual with an unknown genotype that exhibits the
domir	nt phenotype, and a known homozygous recessive individual, the progeny showed
a 1:1 i	tion of dominant to recessive phenotypes. The individual of unknown genotype is
theref	e for that gene.

- A) homozygous
- B) heterozygous
- C) homogeneous
- D) hemizygous
- 33) In the F₂ generation, how many genotypic classes are possible from a dihybrid cross of two heterozygotes in which the genes involved show complete dominance?
- A) 4
- B) 8
- C) 12
- D) 9
- E) 3
- 34) The offspring of two phenotyically normal people who are heterozygotes for albinism would be expected to exhibit which phenotypic ratio of normal to affected individuals?
- A) 4:0
- B) 3:1
- C) 1:2:1
- D) 1:3
- E) 1:1
- 35) What is the probability that the first child of two parents is a girl?
- A) 1/256
- B) 1/8
- C) 1/16
- D) 1/2
- E) 1/4



- 二.解釋名詞:(6%)
 - 甲、近親係數 (Inbreeding coefficient)
 - 乙、狹義遺傳率 (Narrow sense heritability)
 - 丙、Realized heritability
- 三. 淘汰是演化的動力,然而自然界處與淘汰的壓力之下,仍然能夠保存基因的多型性,請描述三種可能的機制。(6%)
- 四. 以圖形表示 Stabilizing selection 時, Δq (Y軸) 與q (X軸)的關係,請注意正負號的關係。(4%)
- 五. 請描述控制數量性狀基因(數量基因)的特性。(5%)
- 六.請描述近親交配 (inbreeding) 對於族群遺傳結構的影響。(5%)
- 七. 人類 MN 血型樣品 (200 人) 的分佈如下: MM 114, MN 76, NN 10 · 請計算 p (M 對偶基因頻度) 與 q (N 對偶基因頻度)。(4%)

試題隨卷繳回