

Biology 155
PRACTICE FINAL EXAM

Name _____

- Which ordering of the steps in the scientific method is correct?
 - observation, hypothesis, prediction, test, conclusion
 - observation, prediction, hypothesis, test, conclusion
 - hypothesis, test, prediction, observation, conclusion
 - test, observation, test, conclusion
- Which does NOT normally result in a change in the frequency of alleles in a population?
 - small population size
 - random mating
 - differential survival of different genotypes
 - differential reproduction of different genotypes
- Which is NOT necessary for evolution by natural selection?
 - differences in fitness
 - large population size
 - heritability of fitness differences
 - genetic differences
- If you could compare two atoms, you could conclude they were the same element only if
 - they had the same number of protons in their nuclei
 - they had the same number of electrons
 - they had the same number of electron in the nuclei
 - they had the same number of electron orbitals
- Which statement about chemical bonds is NOT correct?
 - hydrogen bonds form between atoms with weak charge differences
 - covalent bonds result when two atoms share electrons
 - ionic bonds dissociate readily in water
 - hydrogen bonds are stronger than covalent bonds
- Where are you LEAST likely to see hydrogen bonds
 - between two amino acids within a protein
 - between the two strands of a DNA molecule
 - between the fatty acid chains of a triglyceride
 - between an enzyme and its substrate
- If you add a base to a solution
 - its hydrogen ion (H^+) concentration decreases
 - its hydroxyl ion (OH^-) concentration decreases
 - it becomes more neutral
 - its pH decreases
- Which statement about oxidation-reduction reactions is NOT correct?
 - NAD^+ is reduced in the Krebs cycle
 - $NADH$ is oxidized in the Electron Transport System
 - $NADP$ is reduced in the dark reactions of photosynthesis
 - water serves as the source of electrons in photosynthesis
- Which biological structure does NOT normally contain phosphorus?
 - chromosomes
 - enzymes
 - cell membranes
 - ribosomes
- Proteins have many important functions. Which is NOT an important function of proteins?
 - information storage
 - structural support
 - catalyzing biological reactions
 - gene regulation
- Lipids have many important functions. Which is NOT an important function of lipids?
 - membrane structure
 - hormones
 - catalyzing biological reactions
 - energy storage

12. Which building block does not match the polymer?

Building block polymer

- a. cholesterol triglyceride
- b. monosaccharide cellulose
- c. amino acid polypeptide
- d. nucleotide RNA

13. It can be argued that many of the organelles of eukaryotes may have a symbiotic origin. Which organelle is LEAST likely to have a symbiotic origin?

- a. ribosomes
- b. chloroplasts
- c. mitochondria
- d. flagella

14. Which statement about the evolution of eukaryotes is NOT consistent with current ideas?

- a. chloroplasts are descended from a cyanobacterium
- b. mitochondria are descended from a eubacterium
- c. eukaryotes originated before photosynthesis originated
- d. the original host cell may have been an Archaeobacterium

15. Which statement about the movement of materials through membranes is NOT correct?

- a. water moves through membranes from areas of high solute concentration to of low solute concentration
- b. nonpolar molecules move through the phospholipid portion of membranes more easily than polar molecules
- c. many substances move through membranes with the aid of proteins
- d. potassium ions are more common inside cells than outside because of active transport

16. In animal cells, phagocytized particles are

- a. taken into the nucleus and incorporated into the DNA
- b. enclosed within a vesicle that fuses with a lysosome for digestion
- c. transported into the mitochondria and metabolized by the Krebs cycle
- d. incorporated into the Golgi apparatus for processing

17. Each of the following events is involved in the production and secretion of insulin by the pancreas.

- I. packaging at the Golgi
- II. exocytosis
- III. transcription within the nucleus
- IV. translation on the rough ER
- V. transport within the ER

Which is the correct order of the events?

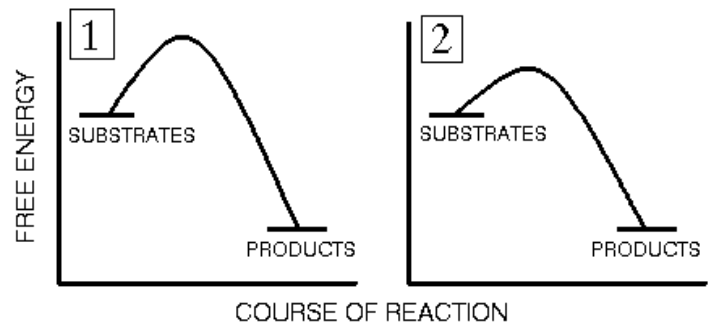
- a. II \Rightarrow I \Rightarrow III \Rightarrow V \Rightarrow IV
- b. I \Rightarrow II \Rightarrow III \Rightarrow IV \Rightarrow V
- c. IV \Rightarrow III \Rightarrow V \Rightarrow I \Rightarrow II
- d. III \Rightarrow IV \Rightarrow V \Rightarrow I \Rightarrow II

18. Which statement about enzymes is NOT correct?

- a. they provide energy to a reaction
- b. they make reactions happen faster
- c. they lower the activation energy of a reaction
- d. their properties can be influenced by the environment

19. Which is NOT a normal function of the endoplasmic reticulum?

- a. detoxification
- b. protein synthesis
- c. intracellular transport
- d. energy storage



20. For the reactions shown above, which statement is NOT correct? Assume equal starting concentration of the substrates for both reactions.

- a. both reactions are exergonic
- b. reaction 2 will produce product more quickly than reaction 1
- c. reaction 2 will produce more product than reaction 1
- d. reaction 2 has a lower activation energy than reaction 1

21. Which statement about competitive inhibitors is NOT correct?

- a. the degree of inhibition should change with changes in substrate concentration
- b. they interact with the enzyme at the active site
- c. some result in permanent inhibition of the enzyme
- d. their structure usually resembles the structure of the substrate

22. Which statement about anaerobic glycolysis (fermentation) is NOT correct?

- a. ethyl alcohol is one possible end-product
- b. the net energy yield from one glucose molecule is usually 2 ATP
- c. lactate is formed by reduction of pyruvate with electrons from NADH
- d. most energy comes from the electron transport system

23. Which statement about respiration is NOT correct?

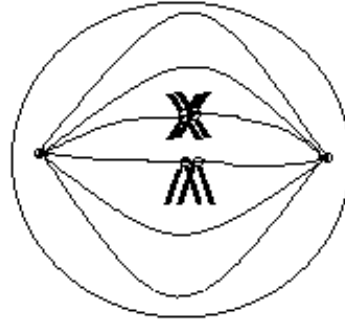
- a. a proton gradient is important in ATP production
- b. for every NADH generated in the Krebs cycle 3 ATP are produced by the ETS
- c. water is a by-product of respiration
- d. during respiration carbon and oxygen are combined to produce CO₂

24. Which statement about the light reactions of photosynthesis is NOT correct?

- a. one of the products of the light reactions is ATP
- b. the final acceptor of electrons in the light reactions is NADP
- c. glucose is the final product of the light reactions
- d. oxygen is a by-product of the light reactions

25. Which statement about the dark reactions of photosynthesis is NOT correct?

- a. for every turn of the Calvin cycle one molecule of PGAL is produced
- b. RuBisCo is involved in the capture of CO₂
- c. in C₄ plants CO₂ is first fixed as malate
- d. fixed carbon is combined with oxygen to make CO₂



26. The diagram above shows a cell that is probably in

- a. metaphase II of meiosis
- b. anaphase II of meiosis
- c. metaphase of mitosis
- d. metaphase I of meiosis

27. Which statement about meiosis is NOT correct?

- a. between the two divisions of meiosis DNA must be replicated
- b. meiosis normally results in cells with one complete set of genetic information
- c. meiosis produces haploid cells from diploid cells
- d. homologous chromosomes segregate during anaphase I

28. Sexually reproducing organisms are hypothesized to have an advantage over asexually reproducing organisms that has resulted in sexual reproduction being the predominant form of reproduction in multicellular organisms. What is the hypothetical advantage?

- a. higher birth rates
- b. faster population growth
- c. greater resistance to disease
- d. larger populations size

29. Albinism is the product of a recessive allele. When an albino and a nonalbino are crossed their first offspring is an albino. What is the probability that their next offspring will be an albino?

- a. 1 (absolute certainty)
- b. 1/2
- c. 1/4
- d. 3/4

30. Rh blood typing is the result of a pair of alleles. The Rh⁺ type is the dominant phenotype and the Rh⁻ is a recessive phenotype. Usually the Rh type (-/+) is associated with the ABO blood type, so an individual can be O⁺ or O⁻, A⁺ or A⁻, etc. If a woman who is A⁺ has a child who is O⁻ then which blood type could be RULED OUT for the father.

- a. AB⁺ b. B⁺ c. O⁻ d. O⁺

31. Each of the events below is involved in the replication of DNA.

- I. DNA polymerase synthesizes DNA
- II. RNA polymerase synthesizes RNA primer
- III. ligase unites DNA fragments
- IV. removal of RNA primer
- V. unwinding of DNA double helix

Which ordering of the events is correct?

- a. V ⇒ II ⇒ I ⇒ IV ⇒ III
- b. I ⇒ II ⇒ III ⇒ IV ⇒ V
- c. V ⇒ II ⇒ IV ⇒ I ⇒ III
- d. III ⇒ II ⇒ I ⇒ V ⇒ V

32. If in a given DNA molecule a C-G base pair is changed to a U-G base pair the following mutational change in the DNA will result

- a. C-G to G-C
- b. C-G to T-A
- c. C-G to A-T
- d. C-G to A-U

33. The following events are involved in the translation of mRNA.

- I. a peptide bond is formed
- II. the large ribosomal subunit associates with the messenger RNA
- III. the small ribosomal subunit associates with the messenger RNA
- IV. tRNA carrying methionine resides at the P site
- V. tRNA carrying an amino acid associates at the A site

Which ordering of the events is correct?

- a. I ⇒ II ⇒ III ⇒ IV ⇒ V
- b. III ⇒ II ⇒ IV ⇒ V ⇒ I
- c. III ⇒ IV ⇒ II ⇒ V ⇒ I
- d. III ⇒ II ⇒ V ⇒ IV ⇒ I

Codon Chart

		Second Letter				
		U	C	A	G	
U		UUU-Phe	UCU-Ser	UAU-Tyr	UGU-Cys	U
		UUC-Phe	UCC-Ser	UAC-Tyr	UGC-Cys	C
		UUA-Leu	UCA-Ser	UAA-Stop	UGA-Stop	A
		UUG-Leu	UCG-Ser	UAG-Stop	UGG-Trp	G
F	i	CUU-Leu	CCU-Pro	CAU-His	CGU-Arg	U
	r	CUC-Leu	CCC-Pro	CAC-His	CGC-Arg	C
	s	CUA-Leu	CCA-Pro	CAA-Gln	CGA-Arg	A
	t	CUG-Leu	CCG-Pro	CAG-Gln	CGG-Arg	G
L	A	AUU-Ile	ACU-Thr	AAU-Asn	AGU-Ser	U
		AUC-Ile	ACC-Thr	AAC-Asn	AGC-Ser	C
	e	AUA-Ile	ACA-Thr	AAA-Lys	AGA-Arg	A
	t	AUG-Met	ACG-Thr	AAG-Lys	AGG-Arg	G
e	r	GUU-Val	GCU-Ala	GAU-Asp	GGU-Gly	U
		GUC-Val	GCC-Ala	GAC-Asp	GGC-Gly	C
		GUA-Val	GCA-Ala	GAA-Glu	GGA-Gly	A
		GUG-Val	GCG-Ala	GAG-Glu	GGG-Gly	G

34. The mRNA sequence, AUG UGG AUC AGG UGA, codes for which polypeptide?

- a. Met-Trp-Ile-Ser
- b. Met-Trp-Phe-Thr
- c. Met-Trp-Ile-Arg
- d. Met-Trp-Met-Cys

35. Which statement about the lac operon of E. coli is NOT correct?

- a. the repressor protein associates with the operator in the presence of lactose
- b. the catabolite activator protein binds to the promoter in the presence of cAMP
- c. transcription can only occur when glucose levels are low
- d. transcription can only occur when ATP levels are low

36. Sunflowers can have either a single large flower, or many small flowers. This is controlled by a single gene with two alleles. The single flower allele is dominant. In a population of sunflowers, the frequency of the single flower allele is 0.6. What is the frequency of the other allele?

- a. 0.6
- b. 0.36
- c. 0.16
- d. 0.4

37. Using the information in the previous question, what proportion of the population will have single flowers?
- 36%
 - 60%
 - 84%
 - 16%
38. In which situation would you expect genetic drift to be least likely?
- in a species that is in danger of extinction
 - in a species that lives predominantly in small isolated lakes in Minnesota
 - in a species that colonizes islands in the Caribbean
 - in a species that seldom migrates and has large population size
39. Which is the best definition of natural selection?
- differential perpetuation of genotypes due to differences in reproductive success
 - the origin of species
 - change in the genetic composition of a population through time
 - survival of the fittest
40. Wild boars have large canines in their jaws but females do not. What is the most likely cause of this difference?
- males choose females with small canines for mates
 - males with large canines are able to compete better in battles for mates or mating territories
 - males have better resistance to disease
 - males are able to fight off predators better than females
41. Male robins have brighter breast plumage than female robins. What is the most likely cause of this?
- females choose males with bright breasts for mates
 - males with bright breast feathers are better competitors in battles for mates
 - bright males are better able to avoid predators
 - drab females are more resistant to disease
42. Two species of frogs live in the same area and look very similar, but they are considered different species because they don't interbreed. One species has a higher pitched call than the other and the females of each species don't respond to the calls of males of the other species. This is an example of what type of reproductive isolation?
- mechanical
 - hybrid inviability
 - temporal
 - behavioral
43. The peninsula of Florida separates many different fish species in the Gulf of Mexico from their relatives in the Atlantic. Some of the Gulf forms have begun to look different from their Atlantic relatives. This may lead to
- sympatric speciation
 - genetic drift
 - natural selection
 - allopatric speciation
44. Most eukaryotic chromosomes contain noncoding DNA sequences embedded at random locations within their genes. These noncoding sequences are called
- symbions
 - exons
 - virions
 - introns
45. Which statement comparing eukaryotes and prokaryotes is NOT correct?
- only eukaryotes have ribosomes
 - only eukaryotes have chloroplasts
 - eukaryotes and some prokaryotes use the Krebs cycle
 - both eukaryotes and prokaryotes have membranes made of phospholipids

1	a	11	c	21	c	31	a	41	a
2	b	12	a	22	d	32	b	42	d
3	b	13	a	23	d	33	c	43	d
4	a	14	c	24	c	34	c	44	d
5	d	15	a	25	d	35	a	45	a
6	c	16	b	26	d	36	d	46	
7	a	17	d	27	a	37	c	47	
8	c	18	a	28	c	38	d	48	
9	b	19	d	29	b	39	a	49	
10	a	20	c	30	a	40	b	50	