

**Big Idea 1.B Formatives****Multiple Choice**

Identify the letter of the choice that best completes the statement or answers the question.

- \_\_\_\_\_ 1. If two modern organisms are *distantly* related in an evolutionary sense, then one should expect that
- they live in very different habitats.
  - they should share fewer homologous structures than two more closely related organisms.
  - their chromosomes should be very similar.
  - they shared a common ancestor relatively recently.
  - they should be members of the same genus.
- \_\_\_\_\_ 2. Over evolutionary time, many cave-dwelling organisms have lost their eyes. Tapeworms have lost their digestive systems. Whales have lost their hind limbs. How can natural selection account for these losses?
- Natural selection cannot account for losses, only for innovations.
  - It can account for these losses by the principle of use and disuse.
  - Under particular circumstances that persisted for long periods, each of these structures presented greater costs than benefits.
  - These organisms had the misfortune to experience harmful mutations, which caused the loss of these structures.
  - B and D only
- \_\_\_\_\_ 3. What would be the best technique for determining the evolutionary relationships among several closely related species, each of which still contains living members?
- examining the fossil record
  - comparison of homologous structures
  - comparative embryology
  - comparative anatomy
  - DNA or RNA analysis
- \_\_\_\_\_ 4. Ichthyosaurs were aquatic dinosaurs. Fossils show us that they had dorsal fins and tails just as fish do, even though their closest relatives were terrestrial reptiles that had neither dorsal fins nor aquatic tails. The dorsal fins and tails of ichthyosaurs and fish are
- homologous.
  - examples of convergent evolution.
  - adaptations to a common environment.
  - A and C only
  - B and C only
- \_\_\_\_\_ 5. The four-chambered hearts of birds and the four-chambered hearts of mammals evolved independently of each other. If one were unaware of this independence, then one might logically conclude that
- the common ancestor of birds and mammals had a three-chambered heart.
  - birds and mammals are more distantly related than is actually the case.
  - early mammals possessed feathers.
  - the common ancestor of birds and mammals had a four-chambered heart.
  - birds and mammals should be placed in the same class.

- \_\_\_\_\_ 6. Phylogenetic hypotheses (such as those represented by phylogenetic trees) are strongest when
- they are based on amino acid sequences from homologous proteins, as long as the genes that code for such proteins contain no introns.
  - each clade is defined by a single derived character.
  - they are supported by more than one kind of evidence (such as when fossil evidence corroborates molecular evidence).
  - they are accepted by the foremost authorities in the field.
  - they are based on a single putatively homologous DNA sequence.
- \_\_\_\_\_ 7. Typically, mutations that modify the active site of an enzyme are more likely to be harmful than mutations that affect other parts of the enzyme. A hypothetical enzyme consists of four domains (A-D), and the amino acid sequences of these four domains have been determined in five related species. Given the proportion of amino acid homologies among the five species at each of the four domains, which domain probably contains the active site?

Domain	Percentage of Homologous Amino Acids
A	38%
B	8%
C	78%
D	45%

- A
  - B
  - C
  - D
  - E
- \_\_\_\_\_ 8. Which is an actual observation that provides the strongest evidence for the possible origin of the eukaryotic cytoskeleton?
- Prokaryotic flagella possess microtubules in the 9 + 2 pattern.
  - Only certain bacteria possess flagella.
  - Homologs of actin and tubulin are found in certain bacteria.
  - There is a lamina located within prokaryotic nuclei.
  - The flagella of prokaryotes are hollow, like the microtubules of eukaryotic flagella.
- \_\_\_\_\_ 9. Certain protists, namely the parabasalids and diplomonads, have tiny mitochondrial "remnants" that lack DNA. Where, in these organisms, would one look if one were trying to confirm the hypothesis that the lack of mitochondrial DNA is due to horizontal gene transfer?
- centrioles
  - cilia and flagella
  - chloroplasts
  - transport vesicles
  - nucleus

- \_\_\_\_\_ 10. The photosystems of cyanobacteria are embedded in plasma membranes and, in some cases, in internal membranes derived from the plasma membrane. Where would one expect to find the homologous photosystems in green plant cells?
- plasma membrane
  - outer membrane of chloroplasts
  - inner compartments (stroma) of chloroplasts
  - inner membranes of chloroplasts
  - the membranes of other organelles (amyloplasts and tonoplasts)
- \_\_\_\_\_ 11. Which of the following is a *correct* statement about the genomes of prokaryotes?
- Prokaryotic genomes are diploid throughout most of the cell cycle.
  - Prokaryotic chromosomes are sometimes called "genochromes."
  - Prokaryotic cells have multiple chromosomes packaged with a relatively large amount of protein.
  - Prokaryotic chromosomes are not contained within a nucleus but, rather, are found at the nucleoid region.
  - Prokaryotic genomes are composed of linear DNA (that is, DNA existing in the form of a line with two ends).
- \_\_\_\_\_ 12. All of the following are part of a prokaryotic cell *except*
- DNA.
  - a cell wall.
  - a plasma membrane.
  - ribosomes.
  - an endoplasmic reticulum.

*For the following questions, use the lettered answers to match the structure to its proper cell type. Choose the most inclusive category. Each answer may be used once, more than once, or not at all.*

- a feature of all cells
- found in prokaryotic cells only
- found in eukaryotic cells only
- found in plant cells only
- found in animal cells only

- \_\_\_\_\_ 13. nucleoid
- A
  - B
  - C
  - D
  - E
- \_\_\_\_\_ 14. Of the following, which is probably the most common route for membrane flow in the endomembrane system?
- Golgi → lysosome → ER → plasma membrane
  - tonoplast → plasma membrane → nuclear envelope → smooth ER
  - nuclear envelope → lysosome → Golgi → plasma membrane
  - rough ER → vesicles → Golgi → plasma membrane
  - ER → chloroplasts → mitochondrion → cell membrane

- \_\_\_\_\_ 15. Organelles other than the nucleus that contain DNA include
- ribosomes.
  - mitochondria.
  - chloroplasts.
  - B and C only
  - A, B, and C
- \_\_\_\_\_ 16. Which of the following are capable of converting light energy to chemical energy?
- chloroplasts
  - mitochondria
  - leucoplasts
  - peroxisomes
  - Golgi bodies
- \_\_\_\_\_ 17. Where does glycolysis takes place?
- mitochondrial matrix
  - mitochondrial outer membrane
  - mitochondrial inner membrane
  - mitochondrial intermembrane space
  - cytosol
- \_\_\_\_\_ 18. Which of the following produces the most ATP when glucose ( $C_6H_{12}O_6$ ) is completely oxidized to carbon dioxide ( $CO_2$ ) and water?
- glycolysis
  - fermentation
  - oxidation of pyruvate to acetyl CoA
  - citric acid cycle
  - oxidative phosphorylation (chemiosmosis)
- \_\_\_\_\_ 19. Which of the following occurs in the cytosol of the cell?
- glycolysis and fermentation
  - fermentation and chemiosmosis
  - oxidation of pyruvate to acetyl CoA
  - citric acid cycle
  - oxidative phosphorylation
- \_\_\_\_\_ 20. Fermentation takes place in the
- cytosol.
  - mitochondrial outer membrane.
  - mitochondrial inner membrane.
  - mitochondrial intermembrane space.
  - mitochondrial matrix.
- \_\_\_\_\_ 21. Which metabolic pathway is common to both cellular respiration and fermentation?
- the oxidation of pyruvate to acetyl CoA
  - the citric acid cycle
  - oxidative phosphorylation
  - glycolysis
  - chemiosmosis

Name: \_\_\_\_\_

ID: A

- \_\_\_\_\_ 22. In the absence of oxygen, yeast cells can obtain energy by fermentation, resulting in the production of
- ATP, CO<sub>2</sub> and ethanol (ethyl alcohol).
  - ATP, CO<sub>2</sub>, and lactate.
  - ATP, NADH, and pyruvate.
  - ATP, pyruvate, and oxygen.
  - ATP, pyruvate, and acetyl CoA.
- \_\_\_\_\_ 23. Which of the following is *true* of the mating signal transduction pathway in yeast?
- The pathway carries an electrical signal between mating cell types.
  - Mating type a secretes a signal called a factor.
  - The molecular details of the pathway in yeast and in animals are very different.
  - Scientists think the pathway evolved long after multicellular creatures appeared on Earth.
  - The signal reception, transduction, and response occur in the nucleus.

Use the table of codons below to answer the following questions.

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

24. A peptide has the sequence NH<sub>2</sub>-phe-pro-lys-gly-phe-pro-COOH. Which of the following sequences in the coding strand of the DNA codes for this peptide?
- 3' UUU-CCC-AAA-GGG-UUU-CCC
  - 3' AUG-AAA-GGG-TTT-CCC-AAA-GGG
  - 5' TTT-CCC-AAA-GGG-TTT-CCC
  - 5' GGG-AAA-TTT-AAA-CCC-ACT-GGG
  - 5' ACT-TAC-CAT-AAA-CAT-TAC-UGA
25. A codon
- consists of two nucleotides.
  - may code for the same amino acid as another codon.
  - consists of discrete amino acid regions.
  - catalyzes RNA synthesis.
  - is found in all eukaryotes, but not in prokaryotes.

Name: \_\_\_\_\_

ID: A

- \_\_\_\_\_ 26. Which of the following are transcribed from DNA?
- a. protein
  - b. exons
  - c. rRNA
  - d. B and C only
  - e. A, B, and C

**Big Idea 1.B Formatives**  
**Answer Section****MULTIPLE CHOICE**

1. ANS: B	PTS: 1	TOP: Concept 22.3
2. ANS: C	PTS: 1	TOP: Concept 22.3
3. ANS: E	PTS: 1	TOP: Concept 22.3
4. ANS: E	PTS: 1	TOP: Concept 22.3
5. ANS: D	PTS: 1	TOP: Concept 25.3
6. ANS: C	PTS: 1	TOP: Concept 25.3
7. ANS: C	PTS: 1	TOP: Concept 25.4
8. ANS: C	PTS: 1	TOP: Concept 26.4
9. ANS: E	PTS: 1	TOP: Concept 26.4
10. ANS: D	PTS: 1	TOP: Concept 26.4
11. ANS: D	PTS: 1	TOP: Concept 27.1
12. ANS: E	PTS: 1	TOP: Concept 6.2
13. ANS: B	PTS: 1	TOP: Concept 6.3
14. ANS: D	PTS: 1	TOP: Concept 6.4
15. ANS: D	PTS: 1	TOP: Concept 6.5
16. ANS: A	PTS: 1	TOP: Concept 6.5
17. ANS: E	PTS: 1	TOP: Concept 9.1
18. ANS: E	PTS: 1	TOP: Concept 9.4
19. ANS: A	PTS: 1	TOP: Concept 9.2   Concept 9.5
20. ANS: C	PTS: 1	TOP: Concept 9.5
21. ANS: D	PTS: 1	TOP: Concept 9.5
22. ANS: A	PTS: 1	TOP: Concept 9.5
23. ANS: B	PTS: 1	TOP: Concept 11.1
24. ANS: C	PTS: 1	TOP: Concept 17.1
25. ANS: B	PTS: 1	TOP: Concept 17.1
26. ANS: D	PTS: 1	TOP: Concept 17.2