Campbell Biology Test 4B (Chapter 10-12)

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Through a microscope, you can see a cell plate beginning to develop across the middle of a cell and nuclei forming on either side of the cell plate. This cell is most likely _____. 1) _____
A) an animal cell in the S phase of the cell cycle
B) an animal cell in the process of cytokinesis
C) a plant cell in metaphase
D) a plant cell in the process of cytokinesis

2) In a plant, the reactions that produce molecular oxygen (O_2) take place in _____. 2) _____
A) the light reactions and the Calvin cycle
B) the Calvin cycle alone
C) the light reactions alone
D) neither the light reactions nor the Calvin cycle

The following questions are based on the accompanying figure.

3) In the figure, the dots in the space between the two structures represent which of the following? 3) _____
A) neurotransmitters B) receptor molecules
C) signal transducers D) hormones

4) Which of the following types of signaling is represented in the figure? 4) _____
A) autocrine B) paracrine C) synaptic D) hormonal

5) Every ecosystem must have _____. 5) _____
A) autotrophs and heterotrophs B) autotrophs
C) producers and primary consumers D) photosynthesizers

6) Which of the following describes the events of apoptosis? 6) _____
A) The cell dies, it is lysed, its organelles are phagocytized, and its contents are recycled.
B) The cell's DNA and organelles become fragmented, the cell dies, and it is phagocytized.
C) The cell's nucleus and organelles are lysed, then the cell enlarges and bursts.
D) The cell's DNA and organelles become fragmented, the cell shrinks and forms blebs, and the cell's parts are packaged in vesicles that are digested by specialized cells.

7) Which of the following does NOT occur during mitosis? 7) _____
A) condensation of the chromosomes
B) separation of the spindle poles
C) spindle formation
D) replication of the DNA

8) When oxygen is released as a result of photosynthesis, it is a direct by-product of _____. 8) _____
A) splitting water molecules
B) the electron transfer system of photosystem II
C) the electron transfer system of photosystem I
D) chemiosmosis

9) If there are 20 centromeres in a cell at anaphase, how many chromosomes are there in each daughter cell following cytokinesis? 9) _____
A) 80
B) 40
C) 10
D) 20

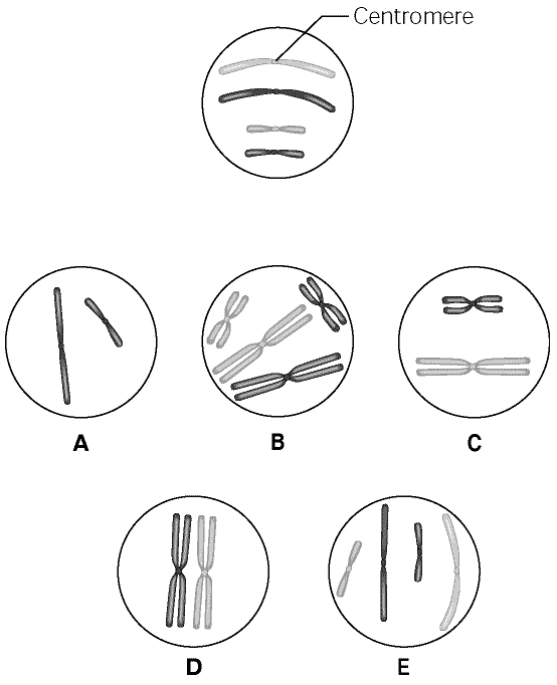
10) In the formation of biofilms, such as those forming on unbrushed teeth, cell signaling serves which function? 10) _____
A) digestion of unwanted parasite populations
B) aggregation of bacteria that can cause cavities
C) formation of mating complexes
D) secretion of substances that inhibit foreign bacteria

11) Which of the following does NOT occur during the Calvin cycle? 11) _____
A) consumption of ATP
B) release of oxygen
C) oxidation of NADPH
D) regeneration of the CO_2 acceptor

12) In autumn, the leaves of deciduous trees change colors. This is because chlorophyll is degraded and _____. 12) _____
A) the degraded chlorophyll changes into many other colors
B) carotenoids and other pigments are still present in the leaves
C) water supply to the leaves has been reduced
D) sugars are sent to most of the cells of the leaves

Use the following information to answer the questions below.

The unlettered circle at the top of the figure shows a diploid nucleus with four chromosomes that have not yet replicated. There are two pairs of homologous chromosomes, one long and the other short. One haploid set is black, and the other is gray. The circles labeled A to E show various combinations of these chromosomes.



13) What is the correct chromosomal condition at prometaphase of mitosis? 13) _____
A) B B) C C) D D) E

14) What is the correct chromosomal condition for one daughter nucleus at telophase of mitosis? 14) _____
A) B B) C C) D D) E

15) Early investigators thought the oxygen produced by photosynthetic plants came from carbon dioxide. In fact, it comes from _____. 15) _____
A) air B) glucose
C) water D) electrons from NADPH

16) Which of the following are products of the light reactions of photosynthesis that are utilized in the Calvin cycle? 16) _____
A) ADP, $\textcircled{P}_i$, and $NADP^+$ B) ATP and NADPH
C) H_2O and O_2 D) CO_2 and glucose

17) The accumulation of free oxygen in Earth's atmosphere began with the origin of _____. 17) _____
A) life and respiratory metabolism
B) chloroplasts in photosynthetic eukaryotic algae
C) land plants
D) cyanobacteria using photosystem II

18) Transcription factors _____. 18) _____
A) regulate the synthesis of lipids in the cytoplasm
B) transcribe ATP into cAMP
C) control gene expression
D) regulate the synthesis of DNA in response to a signal

19) In eukaryotic cells, chromosomes are composed of _____. 19) _____
A) DNA and phospholipids
B) DNA and RNA
C) DNA and proteins
D) DNA only

20) Apoptosis involves all but which of the following? 20) _____
A) fragmentation of the DNA
B) lysis of the cell
C) digestion of cellular contents by scavenger cells
D) activation of cellular enzymes

21) Plants photosynthesize _____. 21) _____
A) only in the dark but respire only in the light
B) only in the light but respire only in the dark
C) only in the light but respire in light and dark
D) and respire only in the light

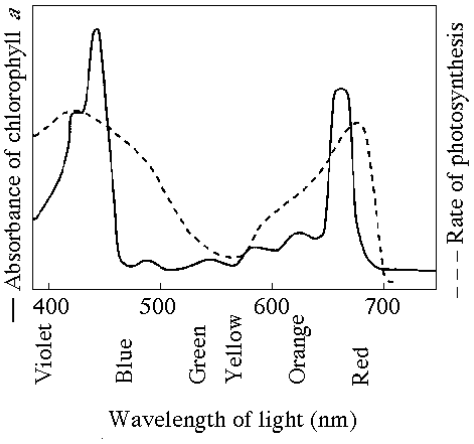
22) How is plant cell cytokinesis different from animal cell cytokinesis? 22) _____
A) Plant cells divide after metaphase but before anaphase; animal cells divide after anaphase.
B) The contractile filaments found in plant cells are structures composed of carbohydrates; the cleavage furrow in animal cells is composed of contractile phospholipids.
C) The structural proteins of plant cells separate the two cells; in animal cells, a cell membrane separates the two daughter cells.
D) Plant cells deposit vesicles containing cell-wall building blocks on the metaphase plate; animal cells form a cleavage furrow.

23) When a neuron responds to a particular neurotransmitter by opening gated ion channels, the neurotransmitter is serving as which part of the signal pathway? 23) _____
A) signal molecule
B) relay molecule
C) transducer
D) response molecule

24) The first gap in the cell cycle (G_1) corresponds to _____. 24) _____
A) the phase between DNA replication and the M phase
B) the phase in which DNA is being replicated
C) the beginning of mitosis
D) normal growth and cell function

25) If pigments from a particular species of plant are extracted and subjected to paper chromatography, which of the following is most likely? 25) _____
A) Paper chromatography would separate the pigments from a particular plant into several bands.
B) Paper chromatography for the plant would isolate a single band of pigment that is characteristic of that particular plant.
C) Paper chromatography would isolate only the pigments that reflect green light.
D) The isolated pigments would be some shade of green.

Use the following figure to answer the questions below.



26) What wavelength of light in the figure is most effective in driving photosynthesis? 26) _____
A) 730 mm B) 625 mm C) 575 mm D) 420 mm

27) Which of the following is a protein synthesized at specific times during the cell cycle that associates with a kinase to form a catalytically active complex? 27) _____
A) PDGF B) MPF C) cyclin D) Cdk

28) Metaphase is characterized by _____. 28) _____
A) cytokinesis B) aligning of chromosomes on the equator
C) splitting of the centromeres D) separation of sister chromatids

29) Which of the following is a type of local signaling in which a cell secretes a signal molecule that affects neighboring cells? 29) _____
A) synaptic signaling B) paracrine signaling
C) hormonal signaling D) autocrine signaling

30) In autotrophic bacteria, where is chlorophyll located? 30) _____
A) in the nucleoid B) in the infolded plasma membrane
C) in chloroplast membranes D) in the ribosomes

31) The final electron acceptor associated with photosystem I is _____. 31) _____
A) oxygen B) NADPH C) NADP D) water

32) What compound provides the reducing power for Calvin cycle reactions? 32) _____
A) $NADP^+$ B) ATP C) NADH D) NADPH

33) A research team began a study of a cultured cell line. Their preliminary observations showed them that the cell line did not exhibit either density-dependent inhibition or anchorage dependence. What could they conclude right away? 33) _____
A) They were originally derived from an elderly organism.
B) The cells show characteristics of tumors.
C) The cells are unable to form spindle microtubules.
D) They have altered the series of cell cycle phases.

34) Starting with a fertilized egg (zygote), a series of five cell divisions would produce an early embryo with how many cells? 34) _____

A) 64 B) 8 C) 16 D) 32

Use the following information to answer the questions below.

Theodor W. Engelmann illuminated a filament of algae with light that passed through a prism, thus exposing different segments of algae to different wavelengths of light. He added aerobic bacteria and then noted in which areas the bacteria congregated. He noted that the largest groups were found in the areas illuminated by the red and blue light.

35) An outcome of Engelmann's experiment was to help determine the relationship between _____. 35) _____

A) wavelengths of light and the rate of photosynthesis
B) wavelengths of light and the rate of aerobic respiration
C) the concentration of carbon dioxide and the rate of photosynthesis
D) wavelengths of light and the amount of heat released

36) What did Engelmann conclude about the congregation of bacteria in the red and blue areas? 36) _____

A) Bacteria congregated in these areas because these areas had the most oxygen being released.
B) Bacteria congregated in these areas due to an increase in the temperature caused by an increase in photosynthesis.
C) Bacteria congregated in these areas due to an increase in the temperature of the red and blue light.
D) Bacteria are attracted to red and blue light and thus these wavelengths are more reactive than other wavelengths.

37) The microtubule-organizing center found in animal cells is an identifiable structure present during all phases of the cell cycle. Specifically, it is known as the _____. 37) _____

A) kinetochore B) microtubulere C) centromere D) centrosome

38) If there are 20 duplicated chromosomes in a cell, how many centromeres are there? 38) _____

A) 10 B) 20 C) 30 D) 40

39) Why is apoptosis potentially threatening to the healthy "neighbors" of a dying cell? 39) _____

A) Neighboring cells would activate immunological responses.
B) Cell death would usually spread from one cell to the next via paracrine signals.
C) Bits of membrane from the dying cell could merge with neighboring cells and bring in foreign receptors.
D) Lysosomal enzymes exiting the dying cell would damage surrounding cells.

40) Which of the following statements about quorum sensing is FALSE? Quorum sensing _____. 40) _____

A) may result in biofilm formation
B) is species specific
C) is particularly well studied because of its medical importance
D) is cell-cell communication in eukaryotes

41) For a chemotherapeutic drug to be useful for treating cancer cells, which of the following is most desirable? 41) _____

A) It does not alter metabolically active cells. B) It interferes with rapidly dividing cells.
C) It is safe enough to limit all apoptosis. D) It interferes with cells entering G_0.

42) Where does the Calvin cycle take place? 42) _____
A) thylakoid membrane
B) outer membrane of the chloroplast
C) interior of the thylakoid (thylakoid space)
D) stroma of the chloroplast

43) In the thylakoid membranes, the pigment molecules in a light-harvesting complex _____. 43) _____
A) transfer electrons to ferredoxin and then NADPH
B) split water and release oxygen from the reaction-center chlorophyll
C) absorb and transfer light energy to the reaction-center chlorophyll
D) synthesize ATP from ADP and $\textcircled{P}_i$

44) The drug cytochalasin B blocks the function of actin. Which of the following aspects of the cell cycle would be most disrupted by cytochalasin B? 44) _____
A) cleavage furrow formation and cytokinesis
B) spindle attachment to kinetochores
C) cell elongation during anaphase
D) spindle formation

45) Why are there several structurally different pigments in the reaction centers of photosystems? 45) _____
A) They enable the reaction center to excite electrons to a higher energy level.
B) This arrangement enables the plant to absorb light energy of a variety of wavelengths.
C) Excited electrons must pass through several pigments before they can be transferred to electron acceptors of the electron transport chain.
D) They enable the plant to absorb more photons from light energy, all of which are at the same wavelength.

46) Besides the ability of some cancer cells to overproliferate, what else could logically result in a tumor? 46) _____
A) inability of chromosomes to meet at the metaphase plate
B) changes in the order of cell cycle stages
C) lack of appropriate cell death
D) inability to form spindles

47) What is the primary function of the Calvin cycle? 47) _____
A) use NADPH to release carbon dioxide
B) transport RuBP out of the chloroplast
C) synthesize simple sugars from carbon dioxide
D) split water and release oxygen

48) The process of photosynthesis probably originated _____. 48) _____
A) three separate times during evolution
B) in plants
C) in fungi
D) in prokaryotes

49) Carotenoids are often found in foods that are considered to have antioxidant properties in human nutrition. What related function do they have in plants? 49) _____
A) They protect against oxidative damage from excessive light energy.
B) They serve as accessory pigments to increase light absorption.
C) They shield the sensitive chromosomes of the plant from harmful ultraviolet radiation.
D) They reflect orange light and enhance red light absorption by chlorophyll.

50) Assume a thylakoid is somehow punctured so that the interior of the thylakoid is no longer separated from the stroma. This damage will most directly affect the _____. 50) _____

A) synthesis of ATP
B) splitting of water
C) flow of electrons from photosystem II to photosystem I
D) reduction of $NADP^+$