Campbell Biology Test 4A (Chapter 10-12)

Name_____

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

1) 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 _____. 1) _____
A) splitting of water
B) reduction of $NADP^+$
C) synthesis of ATP
D) flow of electrons from photosystem II to photosystem I

2) Which of the following statements about quorum sensing is FALSE? Quorum sensing _____. 2) _____
A) is species specific
B) may result in biofilm formation
C) is particularly well studied because of its medical importance
D) is cell-cell communication in eukaryotes

3) Transcription factors _____. 3) _____
A) control gene expression
B) regulate the synthesis of DNA in response to a signal
C) transcribe ATP into cAMP
D) regulate the synthesis of lipids in the cytoplasm

4) If there are 20 duplicated chromosomes in a cell, how many centromeres are there? 4) _____
A) 10 B) 30 C) 40 D) 20

5) 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 _____. 5) _____
A) centromere B) microtubulere C) centrosome D) kinetochore

6) 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? 6) _____
A) MPF B) PDGF C) cyclin D) Cdk

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.

7) An outcome of Engelmann's experiment was to help determine the relationship between _____. 7) _____
A) wavelengths of light and the amount of heat released
B) the concentration of carbon dioxide and the rate of photosynthesis
C) wavelengths of light and the rate of aerobic respiration
D) wavelengths of light and the rate of photosynthesis

8) What did Engelmann conclude about the congregation of bacteria in the red and blue areas? 8) _____
A) Bacteria are attracted to red and blue light and thus these wavelengths are more reactive than other wavelengths.
B) Bacteria congregated in these areas because these areas had the most oxygen being released.
C) Bacteria congregated in these areas due to an increase in the temperature caused by an increase in photosynthesis.
D) Bacteria congregated in these areas due to an increase in the temperature of the red and blue light.

9) For a chemotherapeutic drug to be useful for treating cancer cells, which of the following is most desirable? 9) _____
A) It interferes with cells entering G_0.
B) It is safe enough to limit all apoptosis.
C) It does not alter metabolically active cells.
D) It interferes with rapidly dividing cells.

10) Metaphase is characterized by _____. 10) _____
A) separation of sister chromatids
B) cytokinesis
C) aligning of chromosomes on the equator
D) splitting of the centromeres

11) Which of the following does NOT occur during mitosis? 11) _____
A) separation of the spindle poles
B) spindle formation
C) condensation of the chromosomes
D) replication of the DNA

12) Starting with a fertilized egg (zygote), a series of five cell divisions would produce an early embryo with how many cells? 12) _____
A) 16 B) 64 C) 8 D) 32

13) Which of the following describes the events of apoptosis? 13) _____
A) 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.
B) The cell's nucleus and organelles are lysed, then the cell enlarges and bursts.
C) The cell's DNA and organelles become fragmented, the cell dies, and it is phagocytized.
D) The cell dies, it is lysed, its organelles are phagocytized, and its contents are recycled.

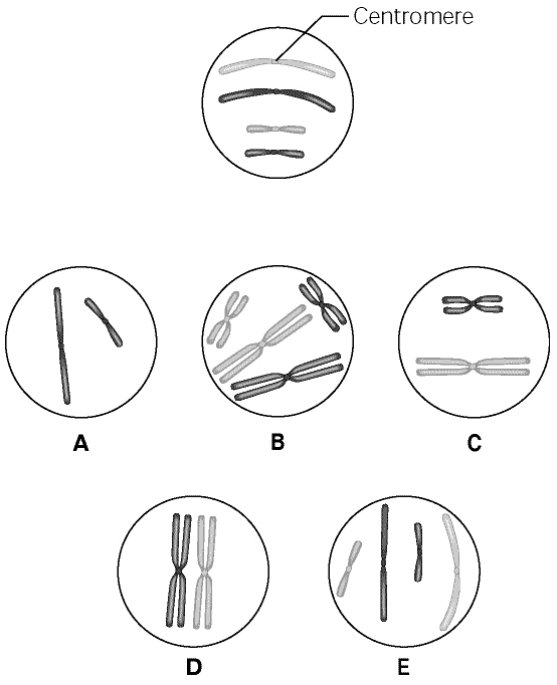
14) Which of the following does NOT occur during the Calvin cycle? 14) _____
A) consumption of ATP
B) regeneration of the CO_2 acceptor
C) oxidation of NADPH
D) release of oxygen

15) What compound provides the reducing power for Calvin cycle reactions? 15) _____
A) NADPH B) ATP C) NADH D) $NADP^+$

16) 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 _____. 16) _____
A) a plant cell in the process of cytokinesis
B) an animal cell in the S phase of the cell cycle
C) an animal cell in the process of cytokinesis
D) a plant cell in metaphase

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.



17) What is the correct chromosomal condition for one daughter nucleus at telophase of mitosis? 17) _____
A) B B) C C) D D) E

18) What is the correct chromosomal condition at prometaphase of mitosis? 18) _____
A) B B) C C) D D) E

The following questions are based on the accompanying figure.

19) Which of the following types of signaling is represented in the figure? 19) _____
A) paracrine B) hormonal C) synaptic D) autocrine

20) In the figure, the dots in the space between the two structures represent which of the following? 20) _____
A) signal transducers
B) receptor molecules
C) neurotransmitters
D) hormones

21) Early investigators thought the oxygen produced by photosynthetic plants came from carbon dioxide. In fact, it comes from _____. 21) _____
A) air
B) water
C) glucose
D) electrons from NADPH

22) Apoptosis involves all but which of the following? 22) _____
A) fragmentation of the DNA
B) activation of cellular enzymes
C) lysis of the cell
D) digestion of cellular contents by scavenger cells

23) What is the primary function of the Calvin cycle? 23) _____
A) synthesize simple sugars from carbon dioxide
B) transport RuBP out of the chloroplast
C) split water and release oxygen
D) use NADPH to release carbon dioxide

24) Why is apoptosis potentially threatening to the healthy "neighbors" of a dying cell? 24) _____
A) Neighboring cells would activate immunological responses.
B) Cell death would usually spread from one cell to the next via paracrine signals.
C) Lysosomal enzymes exiting the dying cell would damage surrounding cells.
D) Bits of membrane from the dying cell could merge with neighboring cells and bring in foreign receptors.

25) Carotenoids are often found in foods that are considered to have antioxidant properties in human nutrition. What related function do they have in plants? 25) _____
A) They serve as accessory pigments to increase light absorption.
B) They shield the sensitive chromosomes of the plant from harmful ultraviolet radiation.
C) They reflect orange light and enhance red light absorption by chlorophyll.
D) They protect against oxidative damage from excessive light energy.

26) In autumn, the leaves of deciduous trees change colors. This is because chlorophyll is degraded and _____. 26) _____
A) carotenoids and other pigments are still present in the leaves
B) the degraded chlorophyll changes into many other colors
C) sugars are sent to most of the cells of the leaves
D) water supply to the leaves has been reduced

27) In a plant, the reactions that produce molecular oxygen (O_2) take place in _____. 27) _____
A) the light reactions alone
B) the Calvin cycle alone
C) the light reactions and the Calvin cycle
D) neither the light reactions nor the Calvin cycle

28) 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? 28) _____
A) They have altered the series of cell cycle phases.
B) The cells are unable to form spindle microtubules.
C) The cells show characteristics of tumors.
D) They were originally derived from an elderly organism.

29) The process of photosynthesis probably originated _____. 29) _____
A) three separate times during evolution
B) in fungi
C) in plants
D) in prokaryotes

30) Which of the following is a type of local signaling in which a cell secretes a signal molecule that affects neighboring cells? 30) _____
A) autocrine signaling
B) paracrine signaling
C) hormonal signaling
D) synaptic signaling

31) The accumulation of free oxygen in Earth's atmosphere began with the origin of _____. 31) _____
A) chloroplasts in photosynthetic eukaryotic algae
B) cyanobacteria using photosystem II
C) life and respiratory metabolism
D) land plants

32) Plants photosynthesize _____. 32) _____
A) only in the light but respire only in the dark
B) only in the dark but respire only in the light
C) only in the light but respire in light and dark
D) and respire only in the light

33) Why are there several structurally different pigments in the reaction centers of photosystems? 33) _____
A) Excited electrons must pass through several pigments before they can be transferred to electron acceptors of the electron transport chain.
B) This arrangement enables the plant to absorb light energy of a variety of wavelengths.
C) They enable the plant to absorb more photons from light energy, all of which are at the same wavelength.
D) They enable the reaction center to excite electrons to a higher energy level.

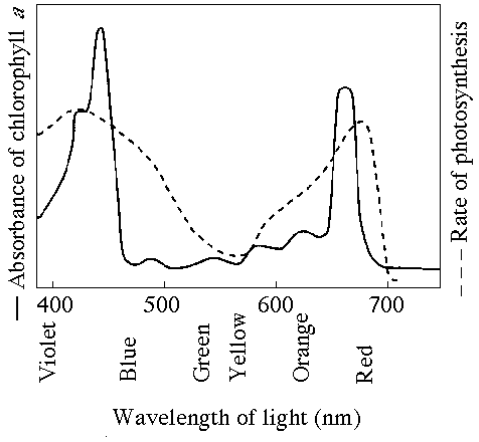
34) If pigments from a particular species of plant are extracted and subjected to paper chromatography, which of the following is most likely? 34) _____
A) Paper chromatography for the plant would isolate a single band of pigment that is characteristic of that particular plant.
B) The isolated pigments would be some shade of green.
C) Paper chromatography would isolate only the pigments that reflect green light.
D) Paper chromatography would separate the pigments from a particular plant into several bands.

35) The first gap in the cell cycle (G_1) corresponds to _____. 35) _____
A) the phase between DNA replication and the M phase
B) normal growth and cell function
C) the phase in which DNA is being replicated
D) the beginning of mitosis

36) In eukaryotic cells, chromosomes are composed of _____. 36) _____

A) DNA and phospholipids
B) DNA only
C) DNA and proteins
D) DNA and RNA

Use the following figure to answer the questions below.



37) What wavelength of light in the figure is most effective in driving photosynthesis? 37) _____

A) 420 mm
B) 575 mm
C) 730 mm
D) 625 mm

38) When a neuron responds to a particular neurotransmitter by opening gated ion channels, the neurotransmitter is serving as which part of the signal pathway? 38) _____

A) response molecule
B) signal molecule
C) transducer
D) relay molecule

39) In autotrophic bacteria, where is chlorophyll located? 39) _____

A) in the ribosomes
B) in the infolded plasma membrane
C) in chloroplast membranes
D) in the nucleoid

40) Which of the following are products of the light reactions of photosynthesis that are utilized in the Calvin cycle? 40) _____

A) H_2O and O_2
B) CO_2 and glucose
C) ATP and NADPH
D) ADP, $\textcircled{P}_i$, and $NADP^+$

41) How is plant cell cytokinesis different from animal cell cytokinesis? 41) _____

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

42) If there are 20 centromeres in a cell at anaphase, how many chromosomes are there in each daughter cell following cytokinesis? 42) _____

A) 40
B) 10
C) 80
D) 20

43) 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? 43) _____
A) spindle attachment to kinetochores
B) cell elongation during anaphase
C) spindle formation
D) cleavage furrow formation and cytokinesis

44) Every ecosystem must have _____. 44) _____
A) autotrophs and heterotrophs
B) autotrophs
C) photosynthesizers
D) producers and primary consumers

45) The final electron acceptor associated with photosystem I is _____. 45) _____
A) NADP B) water C) oxygen D) NADPH

46) In the thylakoid membranes, the pigment molecules in a light-harvesting complex _____. 46) _____
A) split water and release oxygen from the reaction-center chlorophyll
B) synthesize ATP from ADP and $\textcircled{P}_i$
C) transfer electrons to ferredoxin and then NADPH
D) absorb and transfer light energy to the reaction-center chlorophyll

47) Besides the ability of some cancer cells to overproliferate, what else could logically result in a tumor? 47) _____
A) changes in the order of cell cycle stages
B) inability to form spindles
C) lack of appropriate cell death
D) inability of chromosomes to meet at the metaphase plate

48) In the formation of biofilms, such as those forming on unbrushed teeth, cell signaling serves which function? 48) _____
A) aggregation of bacteria that can cause cavities
B) formation of mating complexes
C) digestion of unwanted parasite populations
D) secretion of substances that inhibit foreign bacteria

49) When oxygen is released as a result of photosynthesis, it is a direct by-product of _____. 49) _____
A) splitting water molecules
B) the electron transfer system of photosystem II
C) chemiosmosis
D) the electron transfer system of photosystem I

50) Where does the Calvin cycle take place? 50) _____
A) outer membrane of the chloroplast
B) thylakoid membrane
C) interior of the thylakoid (thylakoid space)
D) stroma of the chloroplast