AP Biology Unit 6 Practice Test **Name: _____**

____ 1. A group of cells is assayed for DNA content immediately following mitosis and is found to have an average of 8 picograms of DNA per nucleus. How many picograms would be found at the end of S and the end of G_2?
a. 8; 8 b. 8; 16 c. 16; 8 d. 16; 16 e. 12; 16

____ 2. Why do chromosomes coil during mitosis?
a. to increase their potential energy
b. to allow the chromosomes to move without becoming entangled and breaking
c. to allow the chromosomes to fit within the nuclear envelope
d. to allow the sister chromatids to remain attached
e. to provide for the structure of the centromere

____ 3. A plant–derived protein known as colchicine can poison cells by blocking the formation of the spindle. Which of the following would result if colchicine is added to a sample of cells in G_2?
a. The cells would immediately die.
b. The cells would be unable to begin M and stay in G_2.
c. The chromosomes would coil and shorten but have no spindle to which to attach.
d. The chromosomes would segregate but in a disorderly pattern.
e. Each resultant daughter cell would also be unable to form a spindle.

____ 4. What causes the decrease in the amount of cyclin at a specific point in the cell cycle?
a. an increase in production once the restriction point is passed
b. the cascade of increased production once its protein is phosphorylated by Cdk
c. the changing ratio of cytoplasm to genome
d. its destruction by a process initiated by the activity of its complex with a cyclin
e. the binding of PDGF to receptors on the cell surface

____ 5. 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?
a. PDGF b. MPF c. Cdk d. cyclin e. protein kinase

____ 6. Which of the following is a protein maintained at constant levels throughout the cell cycle that requires cyclin to become catalytically active?
a. PDGF b. MPF c. Cdk d. cyclin e. protein kinase

____ 7. The cyclin component of MPF is destroyed toward the end of which phase?
a. G_0 b. G_1 c. S d. G_2 e. M

____ 8. The MPF protein complex turns itself off by
a. activating a process that destroys cyclin components.
b. activating an enzyme that stimulates cyclin.
c. binding to chromatin.
d. exiting the cell.
e. activating the anaphase–promoting complex.

____ 9. Density–dependent inhibition is explained by which of the following?
a. As cells become more numerous, they begin to squeeze against each other, restricting their size and ability to produce control factors.
b. As cells become more numerous, the cell surface proteins of one cell contact the adjoining cells and they stop dividing.
c. As cells become more numerous, the protein kinases they produce begin to compete with each other, such that the proteins produced by one cell essentially cancel those produced by its neighbor.
d. As cells become more numerous, more and more of them enter the S phase of the cell cycle.
e. As cells become more numerous, the level of waste products increases, eventually slowing down metabolism.

____ 10. Cells from an advanced malignant tumor most often have very abnormal chromosomes, and often an abnormal total number of chromosomes. Why might this occur?
a. Cancer cells are no longer density dependent.
b. Cancer cells are no longer anchorage dependent.
c. Chromosomally abnormal cells can still go through cell cycle checkpoints.
d. Chromosomally abnormal cells still have normal metabolism.
e. Transformation introduces new chromosomes into cells.

____ 11. All cell cycle checkpoints are similar in which way?
a. They respond to the same cyclins.
b. They utilize the same Cdks.
c. They give the go–ahead signal to progress to the next checkpoint.
d. They each have only one cyclin/Cdk complex.
e. They activate or inactivate other proteins.

____ 12. 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?
a. The cells originated in the nervous system.
b. The cells are unable to form spindle microtubules.
c. They have altered series of cell cycle phases.
d. The cells show characteristics of tumors.
e. They were originally derived from an elderly organism.

The following questions are based on Figure 12.3.

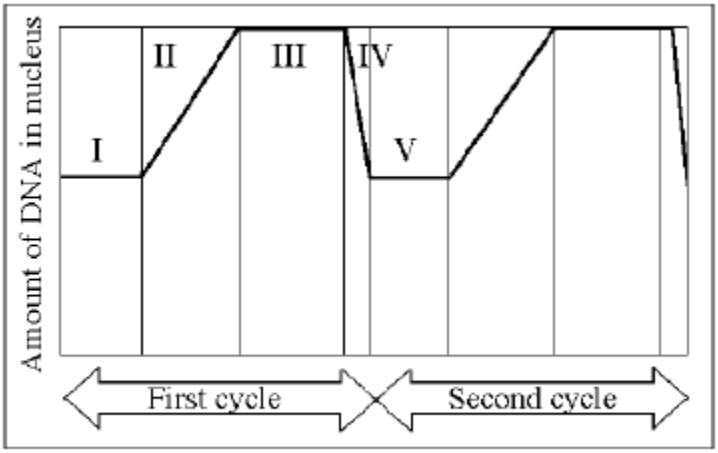

Figure 12.3

____ 13. Which number represents DNA synthesis?
a. I b. II c. III d. IV e. V

____ 14. MPF reaches its threshold concentration at the end of this stage.
a. I b. II c. III d. IV e. V

____ 15. One difference between cancer cells and normal cells is that cancer cells
a. are unable to synthesize DNA.
b. are arrested at the S phase of the cell cycle.
c. continue to divide even when they are tightly packed together.
d. cannot function properly because they are affected by density –dependent inhibition.
e. are always in the M phase of the cell cycle.

____ 16. The decline of MPF activity at the end of mitosis is due to
a. the destruction of the protein kinase Cdk.
b. decreased synthesis of Cdk.
c. the degradation of cyclin.
d. the accumulation of cyclin.
e. synthesis of DNA.

____ 17. Which of the following does *not* occur during mitosis?
a. condensation of the chromosomes
b. replication of the DNA
c. separation of sister chromatids
d. spindle formation
e. separation of the spindle poles

____ 18. Eukaryotic sexual life cycles show tremendous variation. Of the following elements, which do all sexual life cycles have in common?
I. Alternation of generations
II. Meiosis
III. Fertilization
IV. Gametes
V. Spores
a. I, IV, and V
b. I, II, and IV
c. II, III, and IV
d. II, IV, and V
e. I, II, III, IV, and V

____ 19. Which of the following is an example of alternation of generations?
a. A grandparent and grandchild each have dark hair, but the parent has blond hair.
b. A diploid plant (sporophyte) produces, by meiosis, a spore that gives rise to a multicellular, haploid pollen grain (gametophyte).
c. A diploid animal produces gametes by meiosis, and the gametes undergo fertilization to produce a diploid zygote.
d. A haploid mushroom produces gametes by mitosis, and the gametes undergo fertilization, which is immediately followed by meiosis.
e. A diploid cell divides by mitosis to produce two diploid daughter cells, which then fuse to produce a tetraploid cell.

____ 20. A karyotype results from which of the following?
a. a natural cellular arrangement of chromosomes in the nucleus
b. an inherited ability of chromosomes to arrange themselves
c. the ordering of human chromosome images
d. the cutting and pasting of parts of chromosomes to form the standard array
e. the separation of homologous chromosomes at metaphase I of meiosis

____ 21. Which of the following happens at the conclusion of meiosis I?
a. Homologous chromosomes are separated.
b. The chromosome number per cell is conserved.
c. Sister chromatids are separated.
d. Four daughter cells are formed.
e. The sperm cells elongate to form a head and a tail end.

Refer to the life cycles illustrated in Figure 13.1 to answer the following questions.

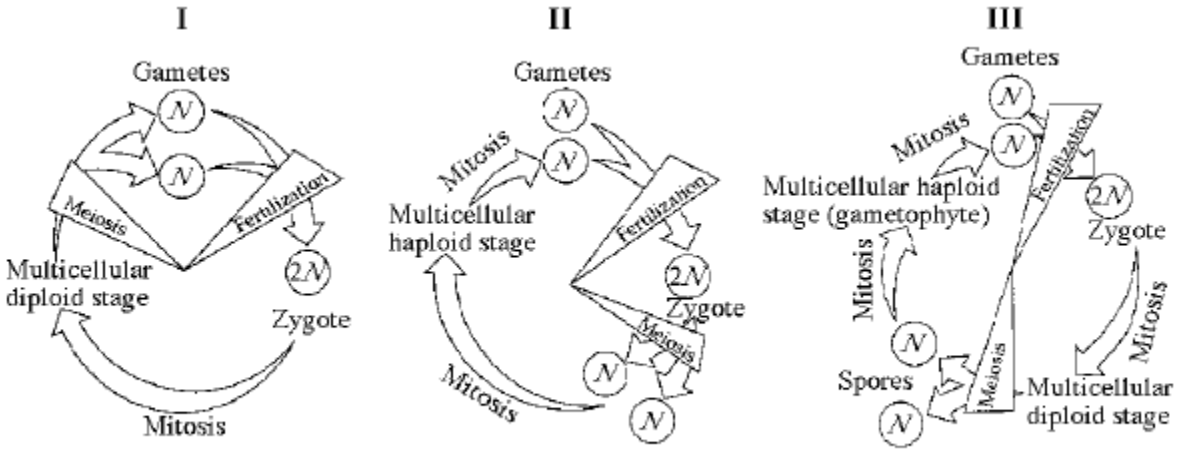

Figure 13.1

____ 22. Which of the life cycles is typical for most fungi and some protists?
a. I only b. II only c. III only d. I and II e. I and III

____ 23. In a life cycle such as that shown in part III of Figure 13.1, if the zygote's chromosome number is 10, which of the following will be true?
a. The sporophyte's chromosome number per cell is 10 and the gametophyte's is 5.
b. The sporophyte's chromosome number per cell is 5 and the gametophyte's is 10.
c. The sporophyte and gametophyte each have 10 chromosomes per cell.
d. The sporophyte and gametophyte each have 5 chromosomes per cell.
e. The sporophyte and gametophyte each have 20 chromosomes per cell.

You have isolated DNA from three different cell types of an organism, determined the relative DNA content for each type, and plotted the results on the graph shown in Figure 13.3. Refer to the graph to answer the following questions.

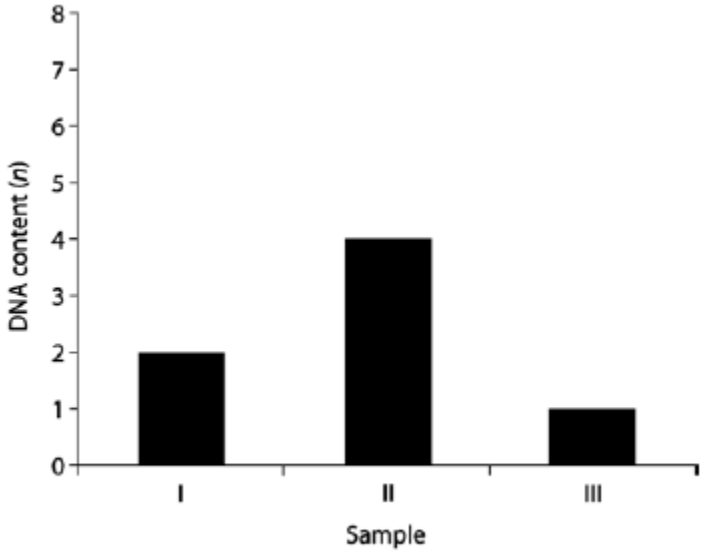

Figure 13.3

____ 24. Which sample of DNA might be from a nerve cell arrested in G_0 of the cell cycle?
a. I b. II c. III d. either I or II e. either I or III

____ 25. Two plants are crossed, resulting in offspring with a 3:1 ratio for a particular trait. What does this suggest?
a. that the parents were true–breeding for contrasting traits
b. that the trait shows incomplete dominance
c. that a blending of traits has occurred
d. that the parents were both heterozygous for a single trait
e. that each offspring has the same alleles for each of two traits

____ 26. Mendel accounted for the observation that traits which had disappeared in the F_1 generation reappeared in the F_2 generation by proposing that
a. new mutations were frequently generated in the F_2 progeny, "reinventing" traits that had been lost in the F_1.
b. the mechanism controlling the appearance of traits was different between the F_1 and the F_2 plants.
c. traits can be dominant or recessive, and the recessive traits were obscured by the dominant ones in the F_1.
d. the traits were lost in the F_1 due to dominance of the parental traits.
e. members of the F_1 generation had only one allele for each trait, but members of the F_2 had two alleles for each trait.

____ 27. Given the parents *AABBCc* × *AabbCc*, assume simple dominance for each trait and independent assortment. What proportion of the progeny will be expected to phenotypically resemble the first parent?
a. 1/4 b. 1/8 c. 3/4 d. 3/8 e. 1

____ 28. Which of the following is the best statement of the use of the addition rule of probability?
a. the probability that two or more independent events will both occur
b. the probability that two or more independent events will both occur in the offspring of one set of parents
c. the probability that either one of two independent events will occur
d. the probability of producing two or more heterozygous offspring
e. the likelihood that a trait is due to two or more meiotic events

Use the information given here to answer the following questions.

Feather color in budgies is determined by two different genes, *Y* and *B*, one for pigment on the outside and one for the inside of the feather. *YYBB*, *YyBB*, or *YYBb* is green; *yyBB* or *yyBb* is blue; *YYbb* or *Yybb* is yellow; and *yybb* is white.

____ 29. Two blue budgies were crossed. Over the years, they produced 22 offspring, 5 of which were white. What are the most likely genotypes for the two blue budgies?
a. *yyBB* and *yyBB*
b. *yyBB* and *yyBb*
c. *yyBb* and *yyBb*
d. *yyBB* and *yybb*
e. *yyBb* and *yybb*

____ 30. In cats, black fur color is caused by an X–linked allele; the other allele at this locus causes orange color. The heterozygote is tortoiseshell. What kinds of offspring would you expect from the cross of a black female and an orange male?
a. tortoiseshell females; tortoiseshell males
b. black females; orange males
c. orange females; orange males
d. tortoiseshell females; black males
e. orange females; black males

____ 31. Cinnabar eyes is a sex-linked recessive characteristic in fruit flies. If a female having cinnabar eyes is crossed with a wild-type male, what percentage of the F_1 males will have cinnabar eyes?
a. 0% b. 25% c. 50% d. 75% e. 100%

____ 32. What is the reason that linked genes are inherited together?
a. They are located close together on the same chromosome.
b. The number of genes in a cell is greater than the number of chromosomes.
c. Chromosomes are unbreakable.
d. Alleles are paired together during meiosis.
e. Genes align that way during metaphase I of meiosis.

____ 33. Recombination between linked genes comes about for what reason?
a. Mutation on one homolog is different from that on the other homolog.
b. Independent assortment sometimes fails because Mendel had not calculated appropriately.
c. When genes are linked they always "travel" together at anaphase.
d. Crossovers between these genes result in chromosomal exchange.
e. Nonrecombinant chromosomes break and then re–join with one another.

____ 34. Which of these statements about prokaryotes is correct?
a. Bacterial cells conjugate to mutually exchange genetic material.
b. Their genetic material is confined within vesicles known as plasmids.
c. They divide by binary fission, without mitosis or meiosis.
d. The persistence of bacteria throughout evolutionary time is due to their genetic homogeneity (in other words, sameness).
e. Genetic variation in bacteria is not known to occur, because of their asexual mode of reproduction.

____ 35. Genetic variation in bacterial populations cannot result from
a. transduction. b. meiosis. c. conjugation. d. mutation. e. transformation.