Test 3 Practice 2014

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| 1.     Compare and contrast the processes of (A) cloning a gene for a protein product, and (B) engineering a child to cure an inherited defect.  What manipulations of biotechnology do these processes have in common; and how do they differ?  What may be the consequences of (A) and (B) for the individual patient? For society?    2.  Here is a DNA gel from blood samples of two parents and three babies in the hospital.    A. Explain what techniques could be used to make this DNA pattern.    B.  The following chart shows the appearance of bands of DNA in an electrophoretic gel. Explain the process that generated this pattern. State which baby belongs to the parents, and explain why.  H:\BIOL103\2014_PPTs\Test_3_Practice_files\image001.jpg      3. How many times would you expect to find a restriction enzyme cut site "CCCATGGG" in a genome of size 200 million base pairs?    4.   Explain sex-linkage of traits with respect to color vision.  Why do most people see three primary colors? Explain how Chrys can see four different primary colors, one of which is seen by no other Valans. What colors do her parents see?    5.  Explain the basis of "adaptation" of the senses to stimuli. Why do all our senses "adapt" and become insensitive to stimuli that were detected before?  What is shown by the S curve?    6.    Explain the role of dopamine in signal transmission between neurons, and adaptation to prolonged stimuli.  Explain the role of adaptation (or failure to adapt) in addiction. What kinds of stimuli are most strongly addictive?    7.  Explain the structure of the arachnoid layer, and its relationship to the rest of the brain.  Why do the micros live there?    8. In Brain Plague when Chrys asks her micros whether the newcomers are "false blue angels," they tell her, "Who knows how many true blue angels once were false?" What do they mean? How is it possible for "good microbes" to become "bad microbes" and vice versa? Cite specific examples in real biology. (Hint: Recall our discussion of symbiosis or mutualism.)  SImilarly, chemical substances used as drugs can be "good" or "bad."  How is it possible for a "good drug" to also be a "bad drug"? What factors/conditions make the difference? Cite specific examples.    9. At the end of Brain Plague, why do the micros decide to rebuild the Underworld? Compare and contrast this project with their previous ambitions. How do you think "altruism" relates to the dopamine reward pathway?    10.  Could machines "evolve" into thinking, feeling beings with “personhood”? Discuss arguments for and against**.**    11. In Chrys's head, the micros reproduce by merging a pair, which then divides into three offspring. The merging and division process takes one hour. What is the micro's doubling time? How many hours will they take for their population to increase by a thousand?    12. In a controlled carrier, the actual growth of a micro population follows an S curve. Why? The midpoint of the S curve (the most dangerous time) has the highest proportion of children, greater than before and after the S curve. Why?    13. Suppose a population of micros migrates into a new carrier, and the two carriers stay apart from then on. After 20 days, the DNA sequence of the two micro populations has diverged by 1%. If their genome size is 5 million “base triplets,” what is the mutation rate per day? Why do carriers encourage exchange among micro populations?  14. How does dopamine function in the reward pathway? How does cocaine interact with the reward pathway? In general, how do other substances and behaviors relate to the reward pathway? What aspects of the neural connection determine the addictiveness of a given substance or behavior?    15. The availability of medical treatments in Valedon depends on what "plan" you have; the book mentions Plan 10, Plan 6, Plan 1.  Why are there different "plans"?  What levels of service are available for each?  How does the Valedon health system compare with our own health system in the USA?  What kinds of health coverage in real life are comparable to Plan 10, 6, or 1?  16. Suppose the growth of bacteria in your intestine looks like this:  H:\BIOL103\2014_PPTs\Test_3_Practice_files\TA212_1_001i.jpg  Can you sketch the curve of growth rate for your intestinal bacteria?  Can you explain why your intestinal bacteria might grow in this way?  17. What kinds of experiments or practice are permitted in biology or medicine that are not acceptable in society, or considered unacceptable by some people?  Why are they permitted?  Do you think they should be permitted? Cite specific examples.  18.  Explain the difference between reproductive sexuality and nonreproductive sexuality.  In *Brain Plague*, what kind of sexual relationships are portrayed among humans?  Among micros?  What sexual practices are considered "shocking" by Valan humans?  By micros?  How do their cultural views compare or contrast with cultural views in our own society?  **Cross-Cutting Questions**  For each concept listed below, compare and contrast the nature or definition of the concept in all of our five books: *Galápagos*, *Dune*, *A Door into Ocean*, *Jurassic Park*, *Brain Plague*.   * Humanity, or human being * Morality, good versus evil * Gender and reproduction * Nonreproductive sexuality * Machines: What they are, and what they can do * Biotechnology, its promise and consequences * Monsters: Who and what they are. (Include *X-Files: Postmodern Prometheus*). |