Answers

Q1

i) plasma membrane

ii) endoplasmic reticulum

iii) Golgi apparatus

iv) ribosomes on the rough endoplasmic reticulum

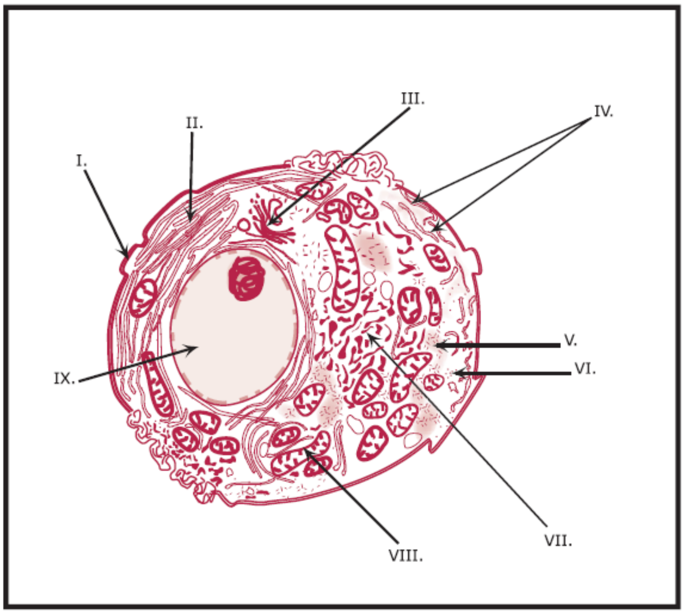
v) cytoplasm

vi) free ribosomes

vii) smooth ER

viii) mitochondrion

ix) Nucleus



Q2.A key point in the theory of evolution is: slight variations among individuals significantly affect the chance that a given individual will survive in its environment and reproduce. These variations among individuals are due to **mutations.**

Q3) The building blocks of DNA are nucleotides.

Q4 The building blocks of proteins are amino acids.

Q5 All cells have a membrane composed of phospholipids.

Q6 In the process of glycolysis, cells make energy in the form of ATP.

Q7. The genes in the two are the same.

Q8. Prokaryotic cells do not have a nucleus nor organelles like mitochondria, ER, and Golgi apparatus.

Q9. 6 x 10^{39} (= 6 x 10^{27} g/10^{-12} g) bacteria would have the same mass as the earth. And

6 x 10^{39} = 2t/20, according to the equation describing exponential growth. solving this equation for t results in t = 2642 minutes (or 44 hours). This represents only 132 generation times(!), whereas 5 x 10^{14} bacterial generation times have passed during the last 3.5 billion years. Obviously, the total mass of bacteria on this planet is nowhere close to the mass of the earth. This illustrates that exponential growth can occur only for very few generations, i.e., for minuscule periods of time compared with evolution. In any realistic scenario, food supplies very quickly become limiting.

This simple calculation shows us that the ability to grow and divide quickly when food is ample is only one factor in the survival of a species. Food is generally scarce, and individuals of the same species have to compete with one another for the limited resources. natural selection favors mutants that win the competition, or that find ways to exploit food sources that their neighbors are unable to use.

Q10

Because the basic workings of cells are so similar, a great deal has been learned from studying model systems. Brewer's yeast is a good model system because yeast cells are much simpler than human cancer cells. we can grow yeast inexpensively and in vast quantities, and we can manipulate yeast cells genetically and biochemically much more easily than human cells.

This allows us to use yeast to decipher the ground rules governing how cells divide and grow. Cancer cells divide when they should not (and therefore give rise to tumors), and a basic understanding of how cell division is controlled is therefore directly relevant to the cancer problem. Indeed, the various Cancer Institutes, the Cancer society, and many other institutions that are devoted to finding a cure for cancer strongly support basic research on various aspects of cell division in different model systems, such as yeast