

Exam

Name _____

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

- 1) To cause a human pandemic, the H5N1 avian flu virus would have to _____ 1) _____
- A) develop into a virus with a different host range.
 - B) become much more pathogenic.
 - C) spread to primates such as chimpanzees.
 - D) become capable of human-to-human transmission.
 - E) arise independently in chickens in North and South America.
- 2) Viral envelopes can best be analyzed with which of the following techniques? _____ 2) _____
- A) immunofluorescent tagging of capsid proteins
 - B) use of plaque assays for quantitative measurement of viral titer
 - C) transmission electron microscopy
 - D) antibodies against specific proteins not found in the host membranes
 - E) staining and visualization with the light microscope

Use the following information to answer the next few questions.

Poliovirus is a positive-sense RNA virus of the picornavirus group. At its 5' end, the RNA genome has a viral protein (VPg) instead of a 5' cap. This is followed by a nontranslated leader sequence, and then a single long protein coding region (~7,000 nucleotides), followed by a poly-A tail. Observations were made that used radioactive amino acid analogues. Short period use of the radioactive amino acids result in labeling of only very long proteins, while longer periods of labeling result in several different short polypeptides.

- 3) What conclusion is most consistent with the results of the radioactive labeling experiment? _____ 3) _____
- A) Host cell ribosomes only translate the viral code into short polypeptides.
 - B) The large radioactive polypeptides are coded by the host, whereas the short ones are coded for by the virus.
 - C) The RNA is translated into short polypeptides, which are subsequently assembled into large ones.
 - D) The RNA is only translated into a single long polypeptide, which is then cleaved into shorter ones.
 - E) The host cell cannot translate viral protein with the amino acid analogues.
- 4) Emerging viruses arise by _____ 4) _____
- A) mutation of existing viruses, the spread of existing viruses to new host species, and the spread of existing viruses more widely within their host species.
 - B) mutation of existing viruses.
 - C) the spread of existing viruses to new host species.
 - D) the spread of existing viruses more widely within their host species.
 - E) none of these.

- 5) A bacterium is infected with an experimentally constructed bacteriophage composed of the T2 phage protein coat and T4 phage DNA. The new phages produced would have 5) _____
- A) T2 protein and T2 DNA.
 - B) T4 protein and T4 DNA.
 - C) T2 protein and T4 DNA.
 - D) T4 protein and T2 DNA.
 - E) a mixture of the DNA and proteins of both phages.
- 6) Which of the following can be effective in preventing the onset of viral infection in humans? 6) _____
- A) taking vitamins
 - B) taking nucleoside analogs that inhibit transcription
 - C) taking antibiotics
 - D) applying antiseptics
 - E) getting vaccinated
- 7) Which viruses have single-stranded RNA that acts as a template for DNA synthesis? 7) _____
- A) proviruses
 - B) viroids
 - C) bacteriophages
 - D) lytic phages
 - E) retroviruses
- 8) The host range of a virus is determined by 8) _____
- A) the proteins on its surface and that of the host.
 - B) the proteins in the host's cytoplasm.
 - C) whether its nucleic acid is DNA or RNA.
 - D) the enzymes produced by the virus before it infects the cell.
 - E) the enzymes carried by the virus.

Use the following information to answer the following questions.

In 1971, David Baltimore described a scheme for classifying viruses based on how the virus produces mRNA.

The table below shows the results of testing five viruses for nuclease specificity, the ability of the virus to act as an mRNA, and presence (+) or absence (-) of its own viral polymerase.

Virus	Nuclease Sensitivity	Genome as mRNA	Polymerase
A	Dnase	-	-
B	Rnase	+	-
C	Dnase	-	+
D	Rnase	-	+
E	Rnase	+	-

- 9) Given Baltimore's scheme, a positive sense single-stranded RNA virus such as the polio virus would be most closely related to which of the following? 9) _____
- A) retroviruses that require a DNA intermediate
 - B) T-series bacteriophages
 - C) single-stranded DNA viruses such as herpes viruses
 - D) linear double-stranded DNA viruses such as adenoviruses
 - E) nonenveloped double-stranded RNA viruses

- 10) Based on the above table, which virus meets the requirements for a bacteriophage? 10) _____
- A) A B) B C) C D) D E) E

Use the following information to answer the next few questions.

A eukaryotic gene has "sticky ends" produced by the restriction endonuclease *EcoRI*. The gene is added to a mixture containing *EcoRI* and a bacterial plasmid that carries two genes conferring resistance to ampicillin and tetracycline. The plasmid has one recognition site for *EcoRI* located in the tetracycline resistance gene. This mixture is incubated for several hours, exposed to DNA ligase, and then added to bacteria growing in nutrient broth. The bacteria are allowed to grow overnight and are streaked on a plate using a technique that produces isolated colonies that are clones of the original. Samples of these colonies are then grown in four different media: nutrient broth plus ampicillin, nutrient broth plus tetracycline, nutrient broth plus ampicillin and tetracycline, and nutrient broth without antibiotics.

- 11) Bacteria that do not take up any plasmids would grow on which media? 11) _____
- A) the nutrient broth and the ampicillin broth
 - B) all three broths
 - C) the nutrient broth and the tetracycline broth
 - D) the nutrient broth only
 - E) the tetracycline broth and the ampicillin broth

Use the following information to answer the next few questions.

A group of six students has taken samples of their own cheek cells, purified the DNA, and used a restriction enzyme known to cut at zero, one, or two sites in a particular gene of interest.

- 12) Why might they be conducting such an experiment? 12) _____
A) to collect population data that can be used to assess natural selection
B) to collect population data that can be used to study genetic drift
C) to find the location of this gene in the human genome
D) to find which of the students has which alleles
E) to prepare to isolate the chromosome on which the gene of interest is found
- 13) Plants are more readily manipulated by genetic engineering than are animals because 13) _____
A) a somatic plant cell can often give rise to a complete plant.
B) genes can be inserted into plant cells by microinjection.
C) plant cells have larger nuclei.
D) more vectors are available for transferring recombinant DNA into plant cells.
E) plant genes do not contain introns.
- 14) A researcher is using adult stem cells and comparing them to other adult cells from the same tissue. Which of the following is a likely finding? 14) _____
A) The cells from the two sources exhibit different patterns of DNA methylation.
B) The nonstem cells have lost the promoters for more genes.
C) The nonstem cells have fewer repressed genes.
D) Adult stem cells have more DNA nucleotides than their counterparts.
E) The two kinds of cells have virtually identical gene expression patterns in microarrays.
- 15) Which of the following is most closely identical to the formation of twins? 15) _____
A) cell cloning
B) therapeutic cloning
C) embryo transfer
D) organismal cloning
E) use of adult stem cells
- 16) Which of the following sequences in double-stranded DNA is most likely to be recognized as a cutting site for a restriction enzyme? 16) _____
A) AGTC B) GGCC C) ACCA D) AAAA E) AAGG
 TCAG CCGG TGGT TTTT TTCC
- 17) A researcher needs to clone a sequence of part of a eukaryotic genome in order to express the sequence and to modify the polypeptide product. She would be able to satisfy these requirements by using which of the following vectors? 17) _____
A) a bacterial plasmid
B) a YAC with appropriate cellular enzymes
C) a human chromosome
D) BAC to accommodate the size of the sequence
E) a modified bacteriophage

- 18) Silencing of selected genes is often done using RNA interference (RNAi). Which of the following questions would not be answered with this process? 18) _____
- A) Is the gene on *Drosophila* chromosome 2L at this locus responsible for part of its production of nitrogen waste?
 - B) What will happen in this insect's digestion if gene 173 is not able to be translated?
 - C) Will the disabling of this gene in *Drosophila* and in a mouse cause similar results?
 - D) What is the function of gene 432 in this species of annelid?
 - E) Is gene HA292 responsible for this disorder in humans?
- 19) Why are BACs preferred today rather than bacteriophages for making genomic libraries? 19) _____
- A) The BAC can carry entire genes and their regulatory elements, and larger BACs are easier to store.
 - B) The BAC carries more DNA.
 - C) The BAC carries more DNA, the BAC can carry entire genes and their regulatory elements, and larger BACs are easier to store.
 - D) The BAC can carry entire genes and their regulatory elements.
 - E) Larger BACs are easier to store.
- 20) Fragments of DNA have been extracted from the remnants of extinct woolly mammoths, amplified, and sequenced. These can now be used to 20) _____
- A) study the relationships among woolly mammoths and other wool-producers.
 - B) introduce into relatives, such as elephants, certain mammoth traits.
 - C) appreciate the reasons why mammoths went extinct.
 - D) clone live woolly mammoths.
 - E) understand the evolutionary relationships among members of related taxa.
- 21) Two eukaryotic proteins have one domain in common but are otherwise very different. Which of the following processes is most likely to have contributed to this similarity? 21) _____
- A) histone modification
 - B) gene duplication
 - C) random point mutations
 - D) RNA splicing
 - E) exon shuffling
- 22) For mapping studies of genomes, most of which were far along before 2000, the three-stage method was often used. Which of the following is the usual order in which the stages were performed, assuming some overlap of the three? 22) _____
- A) cytogenetic linkage, sequencing, physical map
 - B) linkage map, physical map, sequencing of fragments
 - C) physical map, linkage map, sequencing
 - D) genetic map, sequencing of fragments, physical map
 - E) sequencing of entire genome, physical map, genetic map
- 23) What is metagenomics? 23) _____
- A) the sequencing of only the most highly conserved genes in a lineage
 - B) genomics as applied to an entire phylum
 - C) the sequence of one or two representative genes from several species
 - D) genomics as applied to a species that most typifies the average phenotype of its genus
 - E) sequencing DNA from a group of species from the same ecosystem

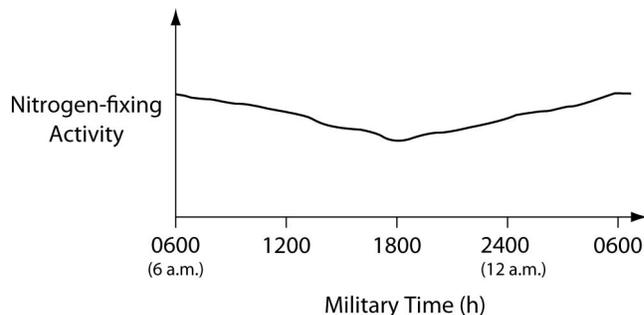
- 24) In order to determine the probable function of a particular sequence of DNA in humans, what might be the most reasonable approach? 24) _____
- A) Genetically engineer a mouse with a copy of this sequence and examine its phenotype.
 - B) Prepare a genetically engineered bacterial culture with the sequence inserted and assess which new protein is synthesized.
 - C) Mate two individuals heterozygous for the normal and mutated sequences.
 - D) Prepare a knockout mouse without a copy of this sequence and examine the mouse phenotype.
 - E) Look for a reasonably identical sequence in another species, prepare a knockout of this sequence in that species, and look for the consequences.
- 25) What characteristic of short tandem repeat DNA makes it useful for DNA fingerprinting? 25) _____
- A) The number of repeats varies widely from person to person or animal to animal.
 - B) The sequence of DNA that is repeated varies significantly from individual to individual.
 - C) Every racial and ethnic group has inherited different short tandem repeats.
 - D) The sequence variation is acted upon differently by natural selection in different environments.
- 26) Bioinformatics can be used to scan sequences for probable genes looking for start and stop sites for transcription and for translation, for probable splice sites, and for sequences known to be found in other known genes. Such sequences containing these elements are called 26) _____
- A) multigene families.
 - B) short tandem repeats.
 - C) cDNA.
 - D) proteomes.
 - E) expressed sequence tags.
- 27) Barbara McClintock, who achieved fame for discovering that genes could move within genomes, had her meticulous work ignored for nearly four decades, but eventually won the Nobel Prize. Why was her work so distrusted? 27) _____
- A) Geneticists did not want to lose their cherished notions of DNA stability.
 - B) The work of women scientists was still not allowed to be published.
 - C) There were too many alternative explanations for transposition.
 - D) She allowed no one else to duplicate her work.
 - E) She worked only with maize, which was considered "merely" a plant.

The following table depicts characteristics of five prokaryotic species (A—E). Use the information in the table to answer the following questions.

Trait	Species A	Species B	Species C	Species D	Species E
Plasmid	R	None	R	F	None
Gram Staining Results	Variable	Variable	Negative	Negative	Negative
Nutritional Mode	Chemoheterotroph	Chemoautotroph	Chemoheterotroph	Chemoheterotroph	Photoautotroph
Specialized Metabolic Pathways	Aerobic methanotroph (obtains carbon and energy from methane)	Anaerobic methanogen	Anaerobic butanolic fermentation	Anaerobic lactic acid fermentation	Anaerobic nitrogen fixation and aerobic photosystems I and II
Other Features	Fimbriae	Internal membranes	Flagellum	Pili	Thylakoids

- 28) Which species is most self-sustaining in terms of obtaining nutrition in environments containing little fixed nitrogen or carbon? 28) _____
- A) species A
 - B) species B
 - C) species C
 - D) species D
 - E) species E

- 29) The data were collected from the heterocysts of a nitrogen-fixing cyanobacterium inhabiting equatorial ponds. Study the following graph and choose the most likely explanation for the shape of the curve. 29) _____



- A) Light-dependent reaction rates must be highest between 1800 hours and 0600 hours.
- B) Enough O_2 enters heterocysts during hours of peak photosynthesis to have a somewhat-inhibitory effect on nitrogen fixation.
- C) The amount of fixed nitrogen that is dissolved in the pond water in which the cyanobacteria are growing peaks at the close of the photosynthetic day (1800 hours).
- D) Heterocyst walls become less permeable to N_2 influx during darkness.
- E) Atmospheric N_2 levels increase at night because plants are no longer metabolizing this gas, so they are not absorbing this gas through their stomata.

30) Match the numbered terms to the description that follows. Choose all appropriate terms.

30) _____

1. autotroph
2. heterotroph
3. phototroph
4. chemotroph

an organism that relies on photons to excite electrons within its membranes

- A) 1 only
- B) 1 and 3
- C) 3 only
- D) 1, 3, and 4
- E) 2 and 4

The following questions refer to Figure 27.1.

In this eight-year experiment, 12 populations of *E. coli*, each begun from a single cell, were grown in low-glucose conditions for 20,000 generations. Each culture was introduced to fresh growth medium every 24 hours. Occasionally, samples were removed from the populations, and their fitness in low-glucose conditions was tested against that of members sampled from the ancestral (common ancestor) *E. coli* population.

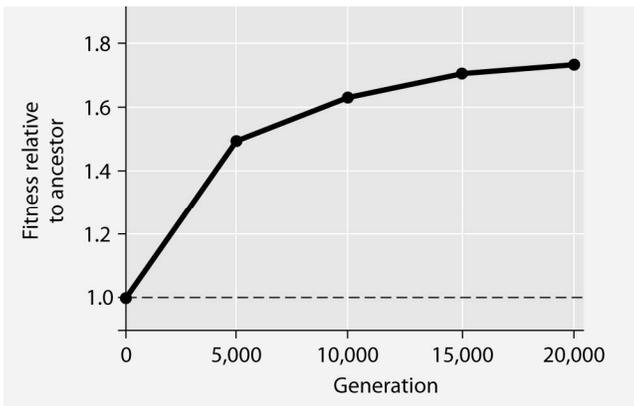


Figure 27.1

31) *E. coli* cells typically make most of their ATP by metabolizing glucose. Under the conditions of this experiment, what should be true of *E. coli*'s generation time (especially early in the course of the experiment, but less so later on)?

31) _____

- A) Generation time should be the same as in the typical environment.
- B) Generation time should be slower than in the typical environment.
- C) Generation time should be faster than in the typical environment.
- D) It is theoretically impossible to make any predictions about generation time under these conditions.

Figure 27.2 depicts changes to the amount of DNA present in a recipient cell that is engaged in conjugation with an Hfr cell. Hfr cell DNA begins entering the recipient cell at Time A. Assume that reciprocal crossing over occurs (in other words, a fragment of the recipient's chromosome is exchanged for a homologous fragment from the Hfr cell's DNA). Use Figure 27.2 to answer the following questions.

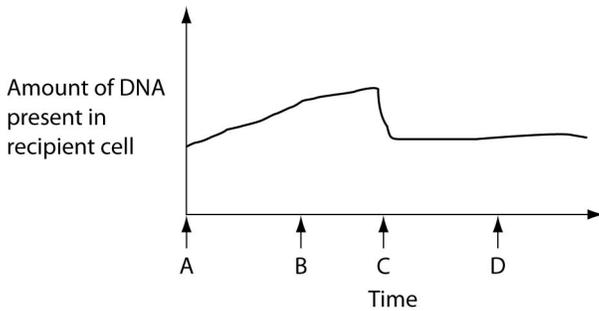


Figure 27.2

- 32) Which question, arising from the results depicted in Figure 27.2, is most interesting from a genetic perspective, and has the greatest potential to increase our knowledge base? 32) _____
- What makes a cell an Hfr cell?
 - What forces are generally responsible for disrupting the sex pilus?
 - If reciprocal crossing over could occur even if the piece of donated Hfr DNA is identical to the homologous portion of the recipient's chromosome, what prevents this from occurring?
 - How is it that a recipient cell does not necessarily become an Hfr cell as the result of conjugation with an Hfr cell?
- 33) Which of the following traits do archaeans and bacteria share? 33) _____
- composition of the cell wall
 - presence of plasma membrane
 - lack of a nuclear envelope
 - identical rRNA sequences
- A) 1 and 3 B) 2 and 3 C) 2 and 4 D) 1 only E) 3 only
- 34) The fibers responsible for the elastic resistance properties of tendons are 34) _____
- spindle fibers.
 - elastin fibers.
 - collagenous fibers.
 - reticular fibers.
 - fibrin fibers.
- 35) Most of the exchange surfaces of multicellular animals are lined with 35) _____
- smooth muscle cells.
 - connective tissue.
 - neural tissue.
 - epithelial tissue.
 - adipose tissue.

- 36) To increase the effectiveness of exchange surfaces lining the lungs and the intestines, evolutionary pressures have 36) _____
- A) increased the volume of the cells in these linings.
 - B) increased the thickness of the membranes in these linings.
 - C) increased the number of cell layers in these linings.
 - D) decreased the metabolic rate of the cells in these linings.
 - E) increased the exchange surface area with folds and branches.
- 37) An exchange surface in direct contact with the external environment is found in the 37) _____
- A) brain.
 - B) lungs.
 - C) heart.
 - D) liver.
 - E) skeletal muscles.
- 38) Humans can lose, but cannot gain, heat through the process of 38) _____
- A) radiation.
 - B) convection.
 - C) conduction.
 - D) metabolism.
 - E) evaporation.
- 39) The body's automatic tendency to maintain a constant and optimal internal environment is termed 39) _____
- A) static equilibrium.
 - B) balanced equilibrium.
 - C) physiological chance.
 - D) homeostasis.
 - E) estivation.
- 40) If you were to jog 1 km a few hours after lunch, which stored fuel would you probably tap? 40) _____
- A) fat stored in adipose tissue
 - B) muscle and liver glycogen
 - C) muscle proteins
 - D) fat stored in the liver
 - E) blood proteins
- 41) Excessive iron absorption and accumulation to toxic levels is associated with 41) _____
- A) menstruation and menopause.
 - B) excessive blood volume.
 - C) the genetic disorder known as hemochromatosis.
 - D) a liver abnormality that results in a decreased number of red blood cells.
 - E) various forms of inherited or acquired anemia.
- 42) An enlarged cecum is typical of 42) _____
- A) tapeworms and other intestinal parasites.
 - B) rabbits, horses, and herbivorous bears.
 - C) tubeworms that digest via symbionts.
 - D) carnivorous animals.
 - E) humans and other primates.

- 43) Glandular secretions that are released initially as inactive precursors of digestive enzymes are the _____
43) _____
A) acid-neutralizing bicarbonate.
B) protein-digesting enzymes.
C) carbohydrate-digesting enzymes.
D) hormones such as gastrin.
E) fat-solubilizing bile salts.
- 44) A hiatal hernia that disrupts the functional relationship between the smooth muscle in the esophagus and that in the stomach would be most likely to increase the frequency of _____
44) _____
A) retention of food in the stomach.
B) increased stomach pH.
C) premature entry of food into the duodenum.
D) excess secretion of pepsinogen.
E) gastric reflux.
- 45) The production of red blood cells is stimulated by _____
45) _____
A) epinephrine.
B) low-density lipoproteins.
C) immunoglobulins.
D) erythropoietin.
E) platelets.
- 46) The hemocyanin of arthropods and molluscs differ from the hemoglobin of mammals in that _____
46) _____
A) hemocyanin includes cyanic acid.
B) hemocyanin carries appreciably more carbon dioxide.
C) the oxygen dissociation curve for hemocyanin is linear.
D) the protein of hemocyanin is not bound to metal.
E) hemocyanin has protein coupled to copper rather than iron.
- 47) At an atmospheric pressure of 870 mm Hg of 21% oxygen, the partial pressure of oxygen is _____
47) _____
A) 127 mm Hg.
B) 219 mm Hg.
C) 151 mm Hg.
D) 182 mm Hg.
E) 100 mm Hg.
- 48) Hemoglobin and hemocyanin _____
48) _____
A) are both found within blood cells.
B) are both red in color.
C) are both found in mammals.
D) are both freely dissolved in the plasma.
E) both transport oxygen.

- 49) Which of the following describes plant virus infections? 49) _____
- A) They have little effect on plant growth.
 - B) They can be controlled by the use of antibiotics.
 - C) They can never be passed vertically.
 - D) They are seldom spread by insects.
 - E) They are spread via the plasmodesmata.

- 50) A researcher lyses a cell that contains nucleic acid molecules and capsomeres of tobacco mosaic virus (TMV). The cell contents are left in a covered test tube overnight. The next day this mixture is sprayed on tobacco plants. Which of the following would be expected to occur? 50) _____
- A) The plants would develop some but not all of the symptoms of the TMV infection.
 - B) The plants would become infected, but the sap from these plants would be unable to infect other plants.
 - C) The plants would develop the typical symptoms of TMV infection.
 - D) The plants would not show any disease symptoms.
 - E) The plants would develop symptoms typically produced by viroids.

- 51) Which of the following statements describes the lysogenic cycle of lambda (λ) phage? 51) _____
- A) After infection, the viral genes immediately turn the host cell into a lambda-producing factory, and the host cell then lyses.
 - B) The phage DNA is incorporated by crossing over into any nonspecific site on the host cell's DNA.
 - C) Most of the prophage genes are activated by the product of a particular prophage gene.
 - D) The phage genome replicates along with the host genome.
 - E) Certain environmental triggers can cause the phage to exit the host genome, switching from the lytic to the lysogenic.

Use the following information to answer the next few questions.

CML (chronic myelogenous leukemia) results from a translocation between human chromosomes 9 and 22. The resulting chromosome 22 is significantly shorter than usual, and it is known as a Philadelphia (Ph') chromosome. The junction at the site of the translocation causes overexpression of a thymine kinase receptor. A new drug (Gleevec or imatinib) has been found to inhibit the disease if the patient is treated early.

- 52) Why would Gleevec most probably cause remission of the disease? 52) _____
- A) It removes Ph'-containing progenitor cells.
 - B) The drug inhibits the specific thymine kinase receptor.
 - C) The drug inhibits the replication of the affected chromosome.
 - D) It eliminates the Ph' chromosome.
 - E) It reverses the chromosomal translocation.

- 53) Which of the following uses reverse transcriptase to make cDNA followed by amplification? 53) _____
- A) Eastern blotting
 - B) Northern blotting
 - C) Southern blotting
 - D) RT-PCR
 - E) Western blotting

54) *Pax-6* is a gene that is involved in eye formation in many invertebrates, such as *Drosophila*. *Pax-6* is found as well in vertebrates. A *Pax-6* gene from a mouse can be expressed in a fly and the protein (PAX-6) leads to a compound fly eye. This information suggests which of the following?

54) _____

- A) PAX-6 proteins have identical amino acid sequences.
- B) PAX-6 proteins are different for formation of different kinds of eyes.
- C) *Pax-6* is highly conserved and shows shared evolutionary ancestry.
- D) *Pax-6* genes are identical in nucleotide sequence.
- E) PAX-6 from a mouse can function in a fly, but a fly's *Pax-6* gene cannot function in a mouse.

Use the following figure to answer the next few questions.

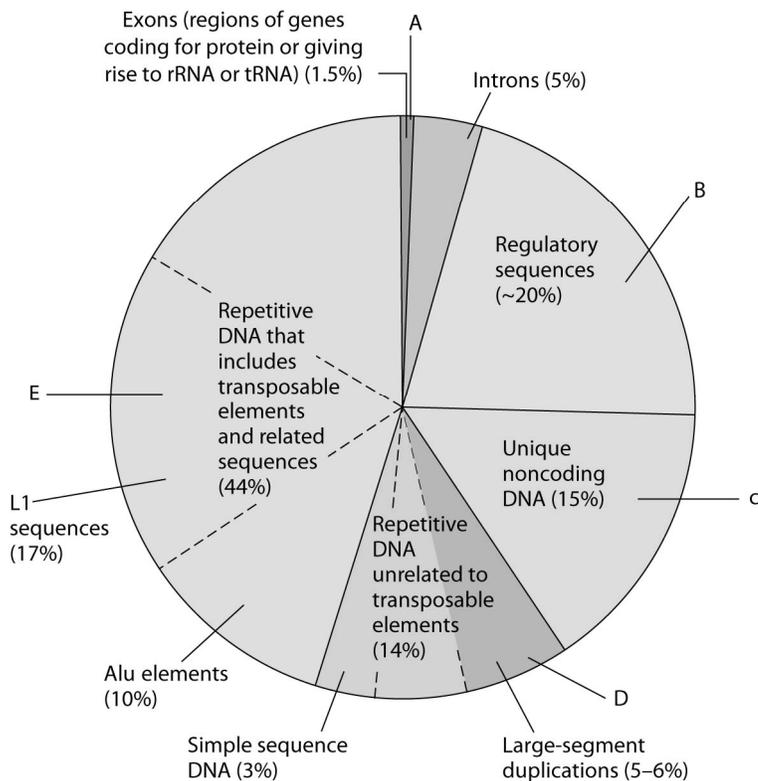


Figure 21.1 Types of DNA sequences in the human genome.

The pie chart in Figure 21.1 represents the relative frequencies of the following in the human genome:

- I. repetitive DNA unrelated to transposons
- II. repetitive DNA that includes transposons
- III. unique noncoding DNA
- IV. introns and regulatory sequences
- V. exons

55) Which region is occupied by exons only (V)?

55) _____

- A) A
- B) B
- C) C
- D) D
- E) E

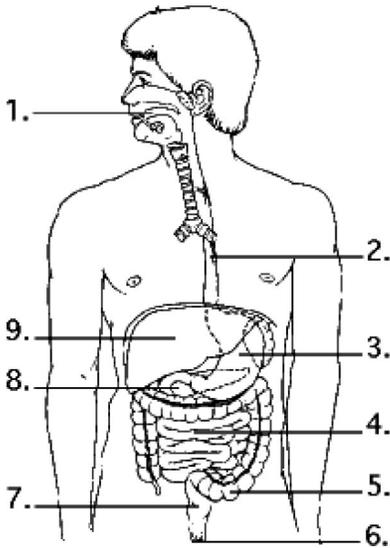
- 56) If humans have 2,900 Mb, a specific member of the lily family has 120,000 Mb, and a yeast has ~13 Mb, why can't this data allow us to order their evolutionary significance? 56) _____
- A) Size does not vary with gene complexity.
 - B) Size is mostly due to "junk" DNA.
 - C) Size does not compare to gene density.
 - D) Size is comparable only within phyla.
 - E) Size matters less than gene density.
- 57) Which of the following most correctly describes a shotgun technique for sequencing a genome? 57) _____
- A) cloning several sizes of fragments into various size vectors, ordering the clones, and then sequencing them
 - B) genetic mapping followed immediately by sequencing
 - C) cloning large genome fragments into very large vectors such as YACs, followed by sequencing
 - D) cloning the whole genome directly, from one end to the other
 - E) physical mapping followed immediately by sequencing
- 58) Though plants, fungi, and prokaryotes all have cell walls, we place them in different taxa. Which of these observations comes closest to explaining the basis for placing these organisms in different taxa, well before relevant data from molecular systematics became available? 58) _____
- A) Some have cell walls only for protection from herbivores.
 - B) Some have cell walls only for support.
 - C) Their cell walls are composed of very different biochemicals.
 - D) Some closely resemble animals, which lack cell walls.
 - E) Some have cell walls only to control osmotic balance.
- 59) In Fred Griffith's experiments, harmless R strain pneumococcus became lethal S strain pneumococcus as the result of which of the following? 59) _____
1. horizontal gene transfer
 2. transduction
 3. conjugation
 4. transformation
 5. genetic recombination
- A) 4 only
 - B) 1, 4, and 5
 - C) 1, 3, and 5
 - D) 2 only
 - E) 2 and 5
- 60) All skeletal muscle fibers are both 60) _____
- A) striated and electrically coupled to neighboring fibers.
 - B) smooth and under involuntary control.
 - C) smooth and operate independently of other skeletal muscle fibers.
 - D) smooth and under voluntary control.
 - E) striated and under voluntary control.

- 61) For adult human females, the metabolic "costs" of pregnancy and lactation are 61) _____
A) 10–20% less than when she was nonpregnant.
B) 30–40% more than when she was nonpregnant.
C) 30–40% less than when she was nonpregnant.
D) 100–125% more than when she was nonpregnant.
E) 5–8% more than when she was nonpregnant.
- 62) PKU (phenylketonuria) is a hereditary condition in which infants and young children who 62) _____
ingest the amino acid phenylalanine risk serious neurological damage. However, the risk of
damage can be substantially reduced by the severe restriction of phenylalanine in the diet.
Which of the following is the nutritional concept that forms the basis for this preventive
treatment?
A) essential nutrients
B) structural anatomy of the brain
C) symbiosis
D) dehydration synthesis
E) enzymatic hydrolysis
- 63) Because the foods eaten by animals are often composed largely of macromolecules, this requires 63) _____
the animals to have mechanisms for
A) dehydration synthesis.
B) enzymatic hydrolysis.
C) elimination.
D) demineralization.
E) regurgitation.
- 64) The diagnosis of hypertension in adults is based on the 64) _____
A) measurement of the LDL/HDL ratio in peripheral blood.
B) number of leukocytes per mm³ of blood.
C) percent of blood volume made up of platelets.
D) measurement of fatty deposits on the endothelium of arteries.
E) blood pressure being greater than 140 mm Hg systolic and/or >90 diastolic.
- 65) What are prions? 65) _____
A) mobile segments of DNA
B) tiny molecules of RNA that infect plants
C) viruses that invade bacteria
D) misfolded versions of normal brain protein
E) viral DNA that has had to attach itself to the host genome

Use the following information to answer the next few questions.

CML (chronic myelogenous leukemia) results from a translocation between human chromosomes 9 and 22. The resulting chromosome 22 is significantly shorter than usual, and it is known as a Philadelphia (Ph') chromosome. The junction at the site of the translocation causes overexpression of a thymine kinase receptor. A new drug (Gleevec or imatinib) has been found to inhibit the disease if the patient is treated early.

- 66) Which of the following would be a reasonably efficient technique for confirming the diagnosis of CML? 66) _____
- A) enzyme assay for thymine kinase activity
 - B) FISH study to determine the chromosomal location of all chromosome 22 fragments
 - C) looking for a Ph' chromosome in a peripheral blood smear
 - D) identification of the disease phenotype in review of the patient's records
 - E) searching for the number of telomeric sequences on chromosome 22
- 67) What is the most probable explanation for the continued presence of pseudogenes in a genome such as our own? 67) _____
- A) They are genes that are not expressed, even though they have nearly identical sequences to expressed genes.
 - B) They are genes that have accumulated mutations to such a degree that they would code for different functional products if activated.
 - C) They are genes that had a function at one time, but that have lost their function because they have been translocated to a new location.
 - D) They are duplicates or near duplicates of functional genes but cannot function because they would provide inappropriate dosage of protein products.
 - E) They are genes with significant inverted sequences.
- 68) Photoautotrophs use 68) _____
- A) light as an energy source and methane as a carbon source.
 - B) light as an energy source and CO₂ as a carbon source.
 - C) N₂ as an energy source and CO₂ as a carbon source.
 - D) H₂S as an energy source and CO₂ as a carbon source.
 - E) CO₂ as both an energy source and a carbon source.
- 69) Cardiac muscle cells are both 69) _____
- A) striated and operate independently of other cardiac cells.
 - B) striated and interconnected by intercalated disks.
 - C) smooth and under voluntary control.
 - D) smooth and under involuntary control.
 - E) striated and under voluntary control.



70) Examine the digestive system structures in the figure above. Bacteria that produce vitamins as products are residents of location 70) _____
 A) 5. B) 3. C) 8. D) 4. E) 7.

71) Circulatory systems have the primary benefit of overcoming the shortcomings of 71) _____
 A) the slow rate at which diffusion occurs across cells.
 B) communication systems involving only the nervous system.
 C) fetal organisms maintaining an optimal body temperature.
 D) temperature differences between the lungs and the active tissue.
 E) having to cushion animals from trauma.

Use the following information to answer the next few questions.

Poliovirus is a positive-sense RNA virus of the picornavirus group. At its 5' end, the RNA genome has a viral protein (VPg) instead of a 5' cap. This is followed by a nontranslated leader sequence, and then a single long protein coding region (~7,000 nucleotides), followed by a poly-A tail. Observations were made that used radioactive amino acid analogues. Short period use of the radioactive amino acids result in labeling of only very long proteins, while longer periods of labeling result in several different short polypeptides.

72) What part of the poliovirus would first interact with host cell ribosomes to mediate translation? 72) _____
 A) the leader sequence
 B) the VPg protein
 C) the AUG in the leader sequence
 D) the poly-A tail
 E) the AUG at the start of the coding sequence

73) In recent times, it has been shown that adult cells can be induced to become pluripotent stem cells (iPS). In order to make this conversion, what has been done to the adult cells? 73) _____
 A) Cytoplasm from embryonic cells is injected into the adult cells.
 B) The nucleus of an embryonic cell is used to replace the nucleus of an adult cell.
 C) An adenovirus vector is used to transfer embryonic gene products into adult cells.
 D) The adult stem cells must be fused with embryonic cells.
 E) A retrovirus is used to introduce four specific regulatory genes.

- 74) The comparison between the number of human genes and those of other animal species has led to many conclusions, including 74) _____
- A) the number of proteins expressed by the human genome is far more than the number of its genes.
 - B) the density of the human genome is far higher than in most other animals.
 - C) the genomes of other organisms are most significantly smaller than the human genome.
 - D) most human DNA consists of genes for protein, tRNA, rRNA, and miRNA.
- 75) Carl Woese and collaborators identified two major branches of prokaryotic evolution. What was the basis for dividing prokaryotes into two domains? 75) _____
- A) ecological characteristics such as the ability to survive in extreme environments
 - B) metabolic characteristics such as chemoautotrophy and photosynthesis
 - C) genetic characteristics such as ribosomal RNA sequences
 - D) metabolic characteristics such as the production of methane gas
 - E) microscopic examination of staining characteristics of the cell wall