

1) Although enhancers in human genes can change location and still be functional, this change of position is limited to a certain distance because of:

- A) the formation of topologically associating domains
- B) the presence of many other regulatory elements including enhancers
- C) the monocistronic nature of human genes
- D) the restrictive length of enhancers
- E) the number of proteins that can bind to enhancers and promoters

Answer: D

2) As far as we know, the origins of replication in human cells are determined by:

- A) three-dimensional structures of DNA
- B) noncoding RNA molecules
- C) localization of nucleosomes
- D) automatically replicating sequences
- E) DnaA protein

Answer: A

3) Defective CSB protein causes cockayne syndrome. This protein is linked to this molecular process

A) movement of transposons

B) transcription

C) translation

D) DNA replication

E) DNA recombination

Answer: B

4) DNA topoisomerases function through:

A) removing stem-loop structures in DNA

B) assembling nucleosome structural of DNA

C) breaking phosphodiester bonds in DNA

D) separating the two strands of DNA

E) altering DNA structures from heterochromatin to euchromatin

Answer: C

5) during transcription and elongation of RNA in prokaryotic cells, the two strands are separated from each other by:

- A) DNA gyrase
- B) the RNA polymerase itself
- C) helicase
- D) the AT-rich regions of genes
- E) the sigma subunit

Answer: B

6) gene amplification results in

- A) increasing number of chromosomes
- B) initiation of gene expression
- C) changing the ploidy nature of chromosomes (that is, haploid or diploid)
- D) increasing protein level produced from amplified gene
- E) changing zygosity of genes (that is, homozygous and heterozygous)

Answer: D

7) hormone response elements are examples of

- A)insulators
  - B)CpG island
  - C)promoter-proximal elements
  - D)core promoters
  - E)enhancers
- Answer:C

8)how do transcriptional repressors with DNA-binding domains only function?

- A)they chemically modify the bases within promoters
- B)they modify the chromatin structure of promoters
- C)they compete with activators in binding to promoters
- D)they change the DNA sequence of promoters
- E)they prevent enhancers-promoter interaction

Answer:C

9)in eukaryotes, the pre-mRNA is

- A)the mRNA that is non-coding
- B)the mRNA that is ready for transcription
- C)the mRNA that is not poly-adenylated

D)the mRNA that is not capped

E)the mRNA that is not spliced

Answer: E

10)in eukaryotic genomes, promoter-proximal elements are NOT this

A)they are binding sites of gene-specific transcriptional regulatory factors

B)they can be located upstream of the core promoter

C)they can either induce or suppress transcription

D)they can change positions or be flipped and still be functional

E)they are found in the promoters of genes that participate in similar end-points

Answer:D

11)In the presence of glucose,one the following is NOT NECESSARILY true in regards to the lac operon

A)The enzyme adenylyl cyclase is not active

B)CAP is not bound to upstream of the promoter region

C)The lac repressor is always bound to the operator

D)cAMP levels are low

E)CAP cannot stimulate the RNA polymerase

Answer:C

12)instead of a sigma subunit of the RNA polymerase in prokaryotic cells, eukaryotic cells have this

A)an intrinsic activity of RNA polymerase

B)a proof-reading mechanism

C)enhancers

D)regulatory transcriptional protein

E)general transcription factors

Answer:E

13)major and minor grooves in DNA structures are formed because of this reason

A)the anti-parallel nature of the two strands of DNA

B)DNA packing by histones

C)the pattern of hydrogen bonding between nucleotides

D)DNA is not perfectly helical

E)the bending capability of DNA

Answer:D

14)nucleotide excision repair in bacteria does NOT require the following molecular components

A)primase

B)an endonuclease

C)a DNA ligase

D)a helicase

E)a DNA polymerase

Answer:A

15)one of the following is a feature of gel electrophoresis of DNA

A)the migration of DNA fragments is influenced by chromatin structure and total charge

B)movement of DNA fragments is dependent of their length only

C)DNA fragments appear as band because of the way they interact with each other

D)the distinct color of DNA makes them observable

E)(GC) content is an important factor in separation of DNA fragments

Answer:B

16)one of the following is NOT true regards to any particular operon

A)it exists in bacteria but not in human cells

B)it is regulated by multiple promoters

C)it contains several shine-dalgarno sequences

D)it contains only one transcription start site

E)it produces proteins of different functional activities

Answer:B

17) one of the following is NOT true regards to deamination reaction

A)deaminated cytosine is inserted by DNA polymerase

B)they are considered spontaneous mutations



C)when delaminated, adenine becomes hypoxanthine

D)examples include deamination of methyl cytosine in DNA

E)mutations persist following DNA replication,if not repaired

Answer:A

18)one of the following is NOT true regards to histone acetylation?

A)the interaction between DNA and histones become weaker

B)the extended "tail" of histones is the part that is acetylated

C)histone acetylation activates transcription

D)the amino acid lysine is the main target of the enzyme, histone acetyltransferase

E)transcription factor II H (TFIIH) is responsible for histone acetylation

Answer:E

19)one of the following is NOT true in regards to human retrotransposons

A)although mostly immovable, they are associated with diseases

B)they originate from retroviruses

C)they are RNA regions within the human genome

D)they make up the the majority of the human genome

E)they are not transcribed

Answer:C

20)one of the following is NOT true in regards to human ribosomes

A)the large ribosomal subunits are the sites of forming peptide bonds

B)they can bind up to tow transfer RNA (tRNA) molecules at a time

C)ribosomal RNA (rRNA) molecules catalyze peptide bond formation

D)small ribosomal subunits are responsible for identifying the translation start codon

E)RNA polymerase I is responsible for synthesis of all rRNA molecules

Answer:E

21)one of the following is NOT true in regards to microRNA molecules

A)they are synthesized by RNA polymerase II

B)they can bind to 5'- and 3'- untranslated regions

C)only one strand is needed for action

D)they result in reduction of protein levels

E)they are synthesized as single-RNA molecules

Answer:B

22)one of the following is NOT true in regards to this DNA fragment : AGCTGGCTCGAG

A)all nucleotides are in the deoxysugar form

B)if transcribed, the RNA produced will be CUCGAGCCAGCU

C)the terminal A is located at 5'- end

D)its complementary strand is TCGACCGAGCTC

E)it has a higher melting point than  
TTAGCTACAATT

ANSWER:D

23)one of the following is TRUE in regards to  
silent point mutations

A)they occur in noncoding regions

B)they involve change in chromatin structure

C)they cannot be detected

D)they involve changes in the DNA sequence  
but not the protein's amino acid sequence

E)they are considered epigenetic mutations

Answer:D

24)one of the following is TRUE in regards to  
the protein shelterin

A)it converts euchromatin to heterochromatin

B)it creates Barr bodies of one of the x-  
chromosomes

C)it is synthesized from centromeres

D)it increases the stability of centromeres

E)it binds to telomeres protecting them from degradation

Answer: E

25)regeneration of active eukaryotic initiation factor (eIF2) is blocked by

A)empty tRNA molecules

B)phosphorylation

C)binding to eIF2B

D)release factors

E)binding to GDP

Answer:B

26)removal of iron response elements from the ferritin mRNA results in

A)production of different protein isoforms

B)increased binding of the iron regulatory protein to the mRNA

C)decreased stability of mRNA

D)increased half-life of the mRNA

E)increased translation regardless of iron levels

Answer:E

27)RNase H is important in this process

A)termination of translation in eukaryotic cells

B)degradation of noncoding RNA

C)DNA repair in prokaryotic cells

D)removal of primers from a replicating DNA in eukaryotic cells

E)RNA processing in eukaryotic cells

Answer:D

28)single nucleotide polymorphism (SNPs)

CANNOT help in this

A)understanding individual variation towards developing disease

B)revealing ethnic relatedness

C)guiding us to disease-causing genes

D)predicting the length of repeated DNA regions like VNTRs and STRs

E)determining changes in amino acid sequence of proteins among individuals

Answer:D

29) i said that some promoters are “leaky” because

A) the phenomenon is also called basal expression

B) interactions are based on reversible, non-covalent forces

C) they are mutated

D) repressors are not produced all the time

E) repressors repress themselves

Answer is B

30) specimens from individuals were analysed by southern blotting following digestion by a restriction endonuclease resulting in the detection of different banding patterns. This is because:

A) the probe used is not specific

B) one of the DNA samples contains mutations causing various diseases

C) the DNA molecules were not completely cut by the endonuclease

D) the DNA molecules are naturally polymorphic

E)the endonuclease randomly cleaves the DNA molecules

Answer is B

31)telomerase is considered a reverse transcriptase because

A)it can act as both a DNA polymerase and a RNA polymerase

B)it acts in 3'- to 5' direction rather than 5'-to-3'

C)it uses RNA as a template to synthesize DNA

D)it uses a RNA primer

E)A RNA molecule is pair of it

Answer is C

32)the anti-codon of the methionine-carrying tRNA is

A)UGA

B)CAU

C)UAC

D)GUA

E)AUG

Answer is B



33)the consensus sequence for the termination of transcription in prokaryotic cells functions in this manner

A) it destabilizes the interaction of the RNA polymerase to the DNA

B)it causes the RNA polymerase to stop until it dissociate spontaneously

C)it attracts transcription termination proteins to the site

D)it forces the RNA polymerase to move in the opposite direction

E)it encodes an endonuclease-specific sequence

Answer is A

34)the following mRNA

(ACGAUGAUGAUCGUUGAA) is translated starting at the first codon. How many amino acids exist in the produced peptide?

A)6

B)1

C)2

D)0

E)5

Answer is A

35)the high accuracy of DNA replication  
PRIMARILY comes from

A)the DNA repair system

B)replication protein A

C)the specific hydrogen bonding of nucleotides

D)the enzymatic specificity of the DNA  
polymerases themselves

E)the proofreading activity of the DNA  
polymerases

Answer is E

36)the main function of eukaryotic translation  
initiation factor 4 (eIF4) proteins is

A)stabilizing the complexing of small and large  
ribosomal subunit

B)linking the mRNA cap to the poly-A tail

C)guiding ribosomes to the translation start  
codon

D)recruiting transfer RNA molecules to the  
mRNA

E)chemically modify mRNA to initiate translation

Answer is B

37)the main function of proteasomes is

A)RNA degradation

B)production of ubiquitins

C)RNA processing

D)regulation of translation

E)protein degradation

Answer is E

38)the MAIN purpose of measuring the expression of a housekeeping gene in northern blotting is to

A)confirm the cellular localisation of RNA molecules

B)confirm the sizes of tested RNA molecules

C)ensure that probes are specific

D)ensure applying equal amounts of total RNA samples in a gel

E)confirm that cells have active transcriptional activities

Answer is D

39)the melting temperature of DNA fragment (X) is 60oC, whereas it is 75oC for fragment (Y).

This **SURELY** informs us that

A)fragment (x) is shorter than fragment (y)

B)fragment (x) exists in an alkaline solution but not fragment (y)

C)the sources of both fragments are different

D)fragment (x) has less GC content than fragment (y)

E)fragment (x)has weaker hydrogen bonding between the tow strands than fragment (y)

Answer is E

40)the problem associated with translation repair system is that

A)it creates mutations

B)it is slow

C)it causes DNA nicks

D)it leads to cell death

E)it has low transcriptional efficiency

Answer is A

41)the purpose of histone 1 (H1) is thought to be

A) stabilization of the histone core particle

B)protection of the linker DNA from degradation

C)marking regulatory regions of DNA

D)activation of transcription

E)formation of heterochromatin

Answer is A

42)the Xist gene on the X chromosome produces

A)a cytosine methyltransferase

B)a long non-coding RNA

C)a microRNA

D)a gene repressor protein

E)a histone modifying

Answer is B

43)what is the effect of a repressed mutation within the permease gene of the lac operon?

- A)the lac operon is regulated normally
- B)there will be high levels of cAMP in cells
- C)the lac repressor will be mostly bound to the operator
- D)the lacI gene will not be expressed
- E)the lac operon will be turned on most of the time

Answer is C

44)what is the effect of cation like magnesium ions on DNA ?

- A)they facilitate DNA denaturation
- B)they neutralize the negative charges of phosphate groups
- C)they break phosphodiester bonds between nucleotides
- D)they strengthen the binding of regulatory proteins to DNA
- E)they increase the hydrogen bonds between complementary bases

Answer is B

45) what would the ABSORBANCE an ORIGINAL DNA sample be if the concentration of the sample, when diluted 1:5, is 2 ug/mL ?

A) 0.1

B) 1

C) 0.2

D) 0.5

E) 5

Answer is C

46) when doing southern blotting for paternity testing, you expect the following in normal situations

A) the bands seen in each child's DNA sample equally come from both parents

B) all bands seen in each child's DNA sample must be present in at least one parent's

C) all bands seen in the DNA sample of one child come from one parent's aDNA

D) the thickness of bands indicates that more DNA comes from one parent

E)the number of bands in each child's DNA sample should be half of the total bands seen for each parent's sample

Answer is E

47)when replicating DNA in bacteria, the number of leading strands is expected to be

A)unlimited

B)1

C)2

D)4

E)cannot be determined

Answer is C

48)you expect this to be a restriction site

A)GTAGTA

B)GTGC

C)AGCTAGCT

D)ACGTTGCA

E)AACCTTGG

Answer is C



49) you have three individuals (A, B, and C) where A is homozygous for a normal allele, B is homozygous for a mutated allele, and C is heterozygous. You perform dot blotting using allele-specific oligonucleotides (ASO) for the normal (ASOX) and mutated (ASOY) alleles. One of the following is TRUE

A) signals will be seen for individual C by dot blotting when using either ASO

B) a signal will be seen for individuals A and B by dot blotting when using ASOX

C) ASOX cannot differentiate individuals A and B from each other by dot blotting

D) a signal will be seen for individual A only when using ASOY

E) ASOY is more specific than ASOX

Answer is D

50) you performed in situ hybridization (ISH) and immunohistochemistry (IHC) for a steroid nuclear receptor such as the androgen receptor in the presence or absence of a steroid

hormone. Where would expect STRONG cellular staining of RNA and proteins to be at ?

A)+ hormone ; ISH: cytoplasmic; IHC: nuclear

B)no hormone; ISH:cytoplasmic;IHC:nuclear

C)no hormone ; ISH: nuclear ;IHC: nuclear

D)+hormone ; ISH: nuclear; IHC: cytoplasmic

E)with or without hormones; ISH: cytoplasmic;  
IHC: nuclear

Answer is B

Good luck 

