This print-out should have 34 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

GA SB2 40
001 10.0 points

One segment of DNA letters that codes for a specific protein (which may determine a trait) is called a

1. nucleotide.

2. ribosome.

3. chromosome.

4. gene. **correct**

5. chromatin.

Explanation:
Genes are small sections of DNA that code for specific proteins. Thousands of genes can be on a chromosome, which is a larger piece of DNA.

Holt Bio 10 04
002 10.0 points

Which of the following represents the codons that correspond to the segment TATCAGGAT of DNA?

1. TCA−CUG−GUA

2. ACA−CUC−GUA

3. AUA−GUC−CUA **correct**

4. ATA−GTC−CTA

5. AUAGU−CCUA

Explanation:
Recall

Holt Bio 10 09
003 10.0 points

Gene regulation is necessary in living organisms

1. to ensure that protein synthesis occurs as encoded in the DNA molecule of that organism

2. to avoid wasting its energy and resources on producing proteins that are not needed nor are already available. **correct**

3. to allow RNA polymerase continuous access to genes.

4. so that the repressor will never bind to the operator.

5. to ensure that the operon is always in the "on" mode.

Explanation:
Gene regulation ensures maximum utilization of energy with a minimum of wastage.

Raven14 49
004 10.0 points

Several researchers, Sanger and Ingram for example, developed procedures for determining how DNA coded for proteins.

Their work and others helped formulate the idea that the sequence of

1. amino acids are determined by the position of the homologous chromosomes before DNA replication.

2. amino acids are determined by the nucleotides in a gene sequence to synthesize a specific protein. **correct**

3. amino acids are not determined by the nucleotides in a gene sequence.

4. nucleotides in a DNA controls the assemblage of the amino acids into an ordered protein.

5. amino acids are determined by the replication of DNA.

Explanation:
Recall

Raven15 46
005 10.0 points
What is the Central Dogma of biology?

1. DNA → RNA → proteins **correct**

2. proteins → RNA → DNA

3. RNA → proteins → DNA

4. RNA → DNA → proteins

5. DNA → proteins → RNA

Explanation:
Recall

Starr 14 12
006 10.0 points
Which is not an anticodon?

1. TAG **correct**

2. CCG

3. AUG

4. UUC

Explanation:
Recall

Starr 14 13
007 10.0 points
Which statement is false?

1. There are sixty-four different codons.

2. Some codons are signals for termination of translation.

3. There are more codons than amino acids.

4. By far the majority of amino acids are specified by a single codon. **correct**

5. There are more anticodons than amino acids.

Explanation:
Recall

StarrC 13 13
008 10.0 points
Which of the following binds to a promoter region of the DNA at the initiation of transcription?

1. a ribosome

2. RNA polymerase **correct**

3. DNA ligase

4. DNA polymerase

5. anticodon

Explanation:
Transcription begins when the enzyme RNA polymerase binds to a promoter region.

GA SB2 34
009 10.0 points
The complementary mRNA sequence for the DNA sequence GAACCT is

1. GAACCT.

2. CTTGGA.

3. GAACCU.

4. CUUGGA. **correct**

Explanation:
mRNA will have complementary base pairs to DNA: A with T, U with A, C with G, and G with C. Remember that RNA has uracil (U) instead of thymine (T).

GA SB2 45
010 10.0 points
The mRNA receives information from DNA by

1. joining with the two DNA strands and forming a triple helix.

2. joining with its complementary bases on a single DNA strand. **correct**

3. accepting proteins through the nuclear membrane pores.

4. making an exact copy of both strands of the DNA molecule.

Explanation:
mRNA pairs up nucleotides with only one of the strands of DNA, called the template strand.

Raven15 27
011 10.0 points

What is the name of the enzyme that initiates transcription?

1. carbonic anhydrase

2. DNA polymerase

3. RNA polymerase **correct**

4. transformation principle

5. ATP synthetase

Explanation:
Recall

Raven15 44
012 10.0 points

In eukaryotes, mRNA processing involves which of the following events?

I) Elongation factors must first make the molecule longer;
II) A poly A tail is added to the $3'$ end;
III) A cap is added to the $5'$ end.

1. III only

2. I and II only

3. I only

4. I and III only

5. None of these

6. II only

7. All of these

8. II and III only **correct**

Explanation:
Recall

Raven15 54
013 10.0 points

Transcription is the first stage in the Central Dogma and is initiated by

1. tRNA polymerase binding to a site known as the promoter.

2. mRNA polymerase binding to a site known as the promoter.

3. RNA polymerase binding to a site known as the promoter. **correct**

4. DNA polymerase binding to a site known as the promoter.

5. RNA polymerase binding to a site known as the initiator.

Explanation:
Recall

Raven15 64
014 10.0 points

RNA splicing in eukaryotic cell protein synthesis means that the product of translation called the

1. secondary transcript is cut and put back together to produce the mature tRNA transcript.

2. primary transcript is cut and put back together to produce the mature mRNA transcript. **correct**

3. secondary transcript does not sufficiently explain RNA splicing.

4. primary transcript is cut and put back together to produce the mature tRNA transcript.

Explanation:
Recall

Raven15 65
015 10.0 points

By what name are the segments of noncoding DNA that interrupt the nucleotide sequence of a gene called?

1. exons

2. spliceosome

3. axons

4. introns **correct**

5. anRNPs (snurps)

Explanation:
Recall

Starr 14 06
016 10.0 points

A mature messenger RNA

1. has no introns.

2. leaves the nucleus and carries out its function in the cytoplasm.

3. All of these **correct**

4. contains a sequence of triplet codons that specify amino acids.

5. occurs in very small amounts compared to the total RNA.

Explanation:
Recall

Starr 14 15
017 10.0 points

The large ribosomal unit has binding sites for

1. All of these

2. DNA polymerase.

3. mRNA and tRNA. **correct**

4. promoter.

5. DNA.

Explanation:
Recall

Starr 14 18
018 10.0 points

What class of RNA binds free amino acids and carries them to ribosomes?

1. rRNA

2. tRNA **correct**

3. All of these

4. None of these

5. mRNA

Explanation:
Recall

Starr 15 16
019 10.0 points

Which of the following processes allows for different proteins to be created from the same gene sequence?

1. gene amplification

2. X chromosome inactivation

3. alternative splicing **correct**

4. None of these

5. polyadenylation of the transcript

Explanation:
Recall

StarrC 13 02
020 10.0 points

Which regions of DNA are transcribed to RNA and then translated to form a polypeptide?

1. introns

2. primer

3. exons **correct**

4. poly(a) tail

5. tata box

Explanation:
Both the introns and the exons are transcribed, but only the exons are translated.

StarrW 04 17
021 10.0 points

Identify the term best matching "phytosynthesis."

1. mitochondrion

2. Golgi body

3. rough ER

4. ribosome

5. chloroplast **correct**

Explanation:
Chloroplast is involved in phytosynthesis.

StarrW 14 04
022 10.0 points

A base sequence signaling the start of a gene is

1. an operator.

2. a promoter. **correct**

3. an enhancer.

4. an activator protein.

Explanation:
Recall

GA SB2 15
023 10.0 points

The function of messenger RNA (mRNA) is to

1. translate the base sequence at the ribosomes.

2. carry amino acids to the ribosome.

3. make a copy of the DNA instructions and bring it to the ribosome. **correct**

4. prevent DNA mutations during replication.

Explanation:
mRNA travels from the nucleus to the ribosome with the DNA instructions for building proteins.

Raven15 24
024 10.0 points

The majority of amino acids have a specific tRNA molecule that transports it to the site of protein synthesis. Therefore, in humans the number of different tRNA molecules would be at least

1. 40.

2. 20. **correct**

3. thousands.

4. 3.

5. 80.

Explanation:

Raven15 34
025 10.0 points

The tRNA nucleotide sequence that lines up on the mRNA is

1. an exon.

2. an anticodon. **correct**

3. an intron.

4. an initiation factor.

5. a release factor.

Explanation:
Recall

Raven15 39
026 10.0 points

The bond that forms between the newly added amino acid and the previous amino acid on the chain is called a

1. hydrophobic bond.

2. peptide bond. **correct**

3. hydrophilic bond.

4. phosphodiester bond.

5. hydrogen bond.

Explanation:
Recall

Raven15 50
027 10.0 points

If the DNA triplet code were ATG-CGT, the tRNA anticodons would be

1. AUGCGU **correct**

2. TGCGTA

3. UAGCGU

4. UACGCA

5. ATGCGT

Explanation:
The DNA is transcribed into mRNA which reads UACGCA. The anticodon needed to pair with this would be AUGCGU.

StarrC 14 13
028 10.0 points

In which of the following is the DNA not physically separated from the ribosomes? Transcription is rapid, and translation is initiated even before mRNA transcripts are finished.

1. prokaryotic **correct**

2. virus

3. eukaryotic

4. cancer

5. fungi

Explanation:
In prokaryotic cells there is no nucleus – the process of transcription is not physically separated from that of translation, as it is in eukaryotic cells.

Raven15 30
029 10.0 points

The general code operates on which of the following principles?

I) Each combination of any three nucleotides can act as a codon;
II) All four of the nucleotide bases must be used in each codon;
III) The first nucleotide in every codon is always the same.

1. I and III only

2. III only

3. None of these

4. II and III only

5. II only

6. All of these

7. I only **correct**

8. I and II only

Explanation:
Recall

Raven15 17
030 10.0 points

The many different functions and behaviors of living organisms are essentially based on the performance of their cells.

The cells' performance in turn is dependent upon the

1. production of correct membranes.

2. production of steroids and hormones.

3. production of many varieties of polypeptides and proteins. **correct**

4. ability to reproduce.

5. proper conformation for water in the cells.

Explanation:

Cells require a variety of polypeptides and proteins in order to function and regulate functions.

Raven15 31
031 10.0 points

How many unique mRNA codons can be constructed from the four different RNA nucleotides?

1. 8

2. 64 **correct**

3. 4

4. 16

5. 32

Explanation:

A codon contains 3 nucleotides. There is a choice of 4 nucleotides for each spot in the codon, so the number of different codons is equal to $4 \times 4 \times 4 = 64$.

Raven15 51
032 10.0 points

Human insulin is synthesized by a bacterium called *E.coli.*

How is this possible?

1. The human insulin gene appears in bacteria that have been exposed to radiation treatments for diabetes.

2. The human insulin gene appears naturally in the bacteria.

3. The human insulin gene is a mutated form of a bacterial gene for bacterial insulin.

4. The human insulin gene appears naturally in bacteria that inhabit the GI tract of diabetic patients.

5. The human insulin gene was inserted into a bacterium's genome. **correct**

Explanation:

Since the genetic code is nearly universal, the bacterium is able to produce human insulin.

Raven15 53
033 10.0 points

How is gene information processing different between eukaryotic and prokaryotic organisms?

1. Prokaryotic genes are translated without being transcribed into mRNA. Eukaryotic genes are transcribed into mRNA and then translated.

2. Prokaryotic genes are transcribed into tRNA, whereas eukaryotic genes are transcribed into mRNA.

3. Prokaryotic genes are transcribed directly into a polypeptide without the intervention of mRNA.

4. Prokaryotic genes are transcribed into mRNA, which is translated immediately. Eukaryotic genes contain long sequences of nucleotides that do not code for amino acids and have to be removed from the primary tran-

script. **correct**

5. Prokaryotic genes are edited of all introns before being transcribed into mRNA, while eukaryotic genes are edited after mRNA formation.

Explanation:
Eukaryotic genes contain introns which need to be removed before translation. Prokaryotic genes do not have introns and the entire trasncript is translated.

Raven15 62
034 10.0 points

Why are there only 45 different tRNA anticodons rather than 64 to match each of the mRNA codons?

1. The first nucleotide of a tRNA anticodon allows some flexibility or "wobble".

2. The remaining 19 tRNA anticodons simply do not occur within living organisms; there is no explanation for their absence.

3. The remaining 19 tRNA anticodons are used for initiation and termination of protein synthesis.

4. The third nucleotide of a tRNA anticodon allows some flexibility or "wobble". **correct**

5. The second nucleotide of a tRNA anticodon allows some flexibility or "wobble".

Explanation:
This third nucleotide can recognize more than one type of nucleotide on the mRNA strand, allowing a single tRNA to recognize all codons which code for its specific amino acid.