1. **Biology Short Answer**- By name or number, denote all of the following three prokaryotes that are correctly pared with its capability?

**1.** Halobacterium- can tolerate high amounts of salinity

**2.** Picrophilus oshimae- can tolerate pH as low as .03

**3.** Deinococcus radiodurans- can survive up to 20 million rads of radiation

**4.** Geogemma barossii- can reproduce at 121⁰C

**ANSWER:** 1, 2, and 3

1. **Biology Multiple Choice**- Which of the following is not an advantage chorionic villus sampling (CVS) has over amniocentesis?

**W.** CVS can be performed as early as the 8th to 10th week of pregnancy whereas amniocentesis can be performed at the 14th and 16th

**X.** CVS has a lower risk than amniocentesis

**Y.** Cells taken from the villi do not have to be cultured for several weeks before testing

**Z.** CVS does not need to use centrifugation to separate the fetal cells from the amniotic fluid

**ANSWER:** X

1. **Biology Multiple Choice**- Erythromycin and tetracycline acts as antibiotics due to which of the following capabilities?

**W.** It can bind to ribosomes and block protein synthesis in prokaryotes but not eukaryotes

**X.** It destroys the peptidoglycan cross-linking of both gram-positive and gram-negative prokaryotes

**Y.** It renders the capsule or fimbriae of a prokaryote useless, preventing it from adhering to a substrate

**Z.** It prevents prokaryotes from creating endospores, preventing them from reacting to hostile environmental stimuli

**ANSWER:** W

1. **Biology Short Answer**- By name or number denote all of the following tests that support the existence of viruses.
2. Tobacco sap filtered through a porcelain filter known to trap bacteria still infected healthy plants
3. The organisms in tobacco sap could reproduce in test tubes and petri dishes
4. Wendell Stanley crystallized tobacco mosaic virus
5. Viruses cannot be seen through a microscope

**ANSWER:** 1 and 3

1. **Biology Short Answer**- A person with the sex chromosomes XXY is more commonly known as having what syndrome?

**ANSWER:** Klinefelter syndrome

1. **Biology Multiple Choice**- Which of these is not a clade of Archaea?

**W.** Korarchaeota

**X.** Nanoarchaeota

**Y.** Crenarchaeota

**Z.** Proarchaeota

**ANSWER:** Z

1. **Biology Short Answer**- What is the name of the site of crossing over between sister chromatids?

**ANSWER:** Chiasma (accept: chiasmata)

1. **Biology Short Answer**- From the following statements, denote all that is true.
2. In anaphase, kinetochore microtubules shorten from the side nearest the spindle
3. Cleavage furrows is when microtubules form a contractile ring around a animal cell
4. Prometaphase is the first phase in which discrete chromosomes are visible
5. In diatoms and dinoflagellates, chromosomes are split by attaching to the nuclear envelop, which remains intact during cell division

**ANSWER:** 3

1. **Biology Multiple Choice**- Approximately how much of DNA in the human genome codes for proteins, rRNA, or tRNA?

**W.** 44%

**X.** 99%

**Y.** 15%

**Z.** 1.5%

**ANSWER:** Z

1. **Biology Short Answer**- Which of the following three is not true about endosymbiosis?
2. A dinoflagellate can arise when a heterotrophic eukaryote ingested green algae
3. A mini vestigial nucleus inside a endosymbiont is called a nucleomorph
4. The DNA of plastids in eukaryotic cells are similar to the DNA of the endosymbiont before it was engulfed

**ANSWER**: 1

1. **Biology Multiple Choice**- What is the name of the process when a F+ cell transfers DNA to a F- cell?

**W.** Transformation

**X.** Transduction

**Y.** Conjugation

**Z.** F Factor Instigation

**ANSWER:** Y

1. **Biology Short Answer**- Sutherland performed research that discovered that epinephrine could not activate glycogen phosphorylation when it was in a test tube with glycogen and the enzyme glycogen phosphorylase. However, it did activate glycogen phosphorylation when intact cells were also present. Denote all of the following that this experiment proved.
2. The plasma membrane acts as a barrier to glycogen phosphorylation
3. An intermediate step in glycogen breakdown takes place in a cell
4. Epinephrine directly interacts with the enzyme glycogen phosphorylase
5. The enzyme glycogen phosphorylase requires a cell to provide proteins that take place in the reaction

**ANSWER:** 2

1. **Biology Multiple Choice**- Which of the following is not a difference between charophyte algae and Plantae?

**W.** The spores released from algae lack sporopollenin

**X.** Plantae have alternation of generations, which involves two generations that include both gametophytes and sporophytes

**Y.** Algae produce in multicellular organs called gametangia

**Z.** Apical meristems is not located in algae

**ANSWER:** Y

1. **Biology Short Answer**- What is the name of the phenomenon where bacteria cells use signaling molecules to detect the density of other bacterial cells

**ANSWER:** Quorum sensing

1. **Biology Multiple Choice**- Which of the following is not an enzyme in DNA replication?

**W.** DNA polymerase III

**X.** Okazaki fragment

**Y.** Helicase

**Z.** Primase

**ANSWER:** X

1. **Biology Short Answer**- Assume that each day, 2 x 10^10 new E. Coli cells are formed in a person’s intestine. In every ten million cells, one will have a mutation in a particular gene. Given there are 4,300 genes, calculate how many mutated E. Coli there would be, assuming no one bacteria has two or more mutations. Give two significant figures.

**ANSWER:** 8.6 million

1. **Biology Multiple Choice**- Which of the following is true about different types of protists?

**W.** Rhizaria have an excavated groove on the cell body

**X.** Unikonta consist of amoeba with thin pseudopodia

**Y.** Excavata have lobe-shaped pseudopodia

**Z.** Chromalveolata includes diatoms and other photosynthetic organisms

**ANSWER:** Z

1. **Biology Short Answer**- In almonds, there is a bitter secondary compound called amygdalin that repels birds and animals. This is because of the toxic molecule amygdalin breaks down into. What is the molecule?

**ANSWER:** Cyanide

1. **Biology Short Answer**- What is the name of the molecule that breaks, swivels, and rejoins parental DNA ahead of the replication fork?

**ANSWER:** Topoisomerase

1. **Biology Multiple Choice**- Gel electrophoresis is when a gel of a polymer acts as a sieve to sort nucleic acids based off size and other properties. Which of the following best describes the reason behind its abilities to sort DNA and other molecules?

**W.** The phosphate groups of the nucleic acid molecules carry positive charges so they travel to the cathode

**X.** The phosphate groups of the nucleic acid molecules carry negative charges so they travel to the anode

**Y.** It carries radioactively labeled probes that stain the DNA fragments so they are visible

**Z.** The polymer fibers impedes longer molecules more than shorter ones, separating htem by length

**ANSWER:** Z

1. **Biology Short Answer**- What is the name of lipopolysaccharide compartments in the outer membrane of gram-negative bacteria that are released when the cell dies and the cell walls break down?

**ANSWER:** Endotoxins

1. **Biology Multiple Choice**- Photoblepharon palbebratus, more commonly known as “flashlight” fish, contains bacteria under its eye socket. Which one of the following ecological interactions does this display?

**W.** Mutualism

**X.** Commensalism

**Y.** Parasitism

**Z.** Neutralism

**ANSWER:** W

1. **Biology Short Answer**- Phage λ is what kind of phage, concerning its reproduction cycles?

**ANSWER:** Temperate phage

1. **Biology Multiple Choice**- Acetylsalicylic acid is what we call aspirin. It was synthesized as a derivative of willow leaves and bark. In the US, what percentage of prescription drugs contain ingredients derived or extracted from plants?

**W.** 15%

**X.** 25%

**Y.** 40%

**Z.** 50%

**ANSWER:** X

1. **Biology Short Answer**- What is the initiator amino acid for protein synthesis in bacteria?

**ANSWER:** Formylmethionine