Mcqs with explanation

1. Parts of a cell can be isolated and cultured in a laboratory.
a) True
b) False
.

Answer: b
Explanation: Parts of a cell called cell organelles deteriorate if isolated from the whole cell and hence they cannot be cultured in vitro. Whole cells on the other hand can be cultured in a laboratory.

2. The first culture of human cells began in _____
a) 1851
b) 1951
c) 2000
d) 1780

Answer: b
Explanation: The first culture of human cells was performed by George and Martha Gey in 1951 at John Hopkins University in 1951. Henrietta Lacks donated these cells from her malignant tumor named – HeLa cells.

3. Which cells are found in the intestinal lining?
a) Neurons
b) Epithelial cells
c) Hepatocytes
d) RBCs
.

Answer: b
Explanation: Epithelial cells line the intestine and are responsible for the uptake and absorption of nutrients from the digestive tract. Microvilli are located at the apical end of these cells and mitochondria are located at the basal end.

4. Microvilli are composed of _____
a) red blood cells
b) myosin
c) white blood cells
d) actin
.

Answer: d
Explanation: The microvilli facilitate absorption of nutrients and project outwards from the apical cell surface because of the presence of a skeleton made of filaments. These filaments are composed of the protein actin.

5. Which organelle is located at the basal end of epithelial cells lining the intestine?
a) Mitochondria
b) Nucleus
c) Golgi complex

d) Cilia
.

Answer: a
Explanation: Large numbers of mitochondria are located at the basal end of epithelial cells and they generate ATP (energy unit of a cell) that provides energy for membrane transport processes of the cell.

6. In cellular division, one cell gives rise to two daughter cells containing equal volume. However such a case of regular division is not observed in _____
a) White blood cells
b) Liver cells
c) Oocytes
d) Red blood cells
.

Answer: c
Explanation: Oocytes undergo irregular cell division where one daughter cell retains nearly all the cytoplasm which is later fertilized by a sperm cell and gives rise to an embryo. The other cell only consists of half the genetic material and no cytoplasm.

7. Light energy is converted to chemical energy by photosynthesis and is stored in_____
a) Glial cells
b) Mitochondria
c) Proteins
d) Carbohydrates
.

Answer: d
Explanation: The light energy which is converted to chemical energy by the photosynthetic pigments present in plant cells is stored in energy-rich carbohydrates like sucrose and starch.

8. In humans, glucose in the body is released by _____
a) Intestine
b) Kidney
c) Liver
d) Lungs
.

Answer: c
Explanation: Glucose is released by liver into the blood stream which circulates throughout the body delivering chemical energy to all the cells of the body. This energy is stored in the form of ATP.

9. The sum total of all the chemical reactions taking place inside the cell, represent the cell's _____
a) Metabolism
b) Catabolism
c) Anabolism
d) Regulation
.

Answer: a
Explanation: All the chemical reactions that take place inside the cell represent the cell's metabolism. Nearly all chemical reactions involved in the metabolism require enzymes that help pace up these reactions.

10. Motor proteins help in regulation which activities in a cell?
a) Mechanical
b) Chemical
c) Uptake
d) Regulation
.

Answer: a
Explanation: Cells perform lot of bustling activities in their daily discourse. This requires a lot of mechanical activities, regulation, uptake etc. The motor protein is one class of proteins amongst many that help in the mechanical activities of the cell.

11. German embryologist, Hans Driesch used which organism's embryo in his studies?
a) Star-fish
b) Sea-urchin
c) Whale
d) Monkey
.

Answer: b
Explanation: In his studies, Hans Driesch used sea urchin's embryo and found that first two or four cells could be isolated and can lead individually lead to the formation of complete new embryo.

12. Which are the two most important macromolecules of a cell?
a) Protein, carbohydrates
b) Protein, mitochondria
c) Protein, nucleus
d) Protein, membrane
.

Answer: c
Explanation: Proteins and nucleus are the most important macromolecules found in a living cell. All the regulation is done by the nucleus of the cell which harbors genetic code. Proteins on the other hand are necessary in the metabolism that takes place inside a cell.

1. The following diseases is caused by viruses _____
a) Influenza
b) Measles
c) Typhoid
d) Both Influenza and Measles
.

Answer: d
Explanation: Measles and Influenza are diseases caused by the infection of viruses. Typhoid is caused by a bacteria known as Salmonella typhi.

2. Which of the following is not true for TMV Virus?
a) It does not contain spikes
b) TMV Virus affects tobacco plants
c) It contains viral coat containing copies of multiple proteins
d) It is a retrovirus
.

Answer: c
Explanation: TMV or Tobacco Mosaic Virus causes viral infection to the tobbacco plant. It is a rod-shaped helical RNA virus which consists of a single strand of RNA placed centrally enveloped by a protein coat.

3. Which of the following is the largest bacteriophage?
a) T4 bacteriophage
b) T6 bacteriophage
c) Lambda phage
d) T2 bacteriophage
.

Answer: a
Explanation: T4 bacteriophage is among the largest bacteriophages. It is approximately 90-100 nm wide and 200 nm long. Its double stranded DNA genome is about 169 kb long and encodes 289 proteins.

4. The integrated genetic material of a virus is called _____
a) Viroid
b) Provirus
c) Virus-like-particle (VLP)
d) Prion
.

Answer: b
Explanation: The virus infection is caused by the entry of entry of viral DNA into the host cell. After this, the viral DNA is integrated into the host genome. This viral genetic material incorporated into host genome and able to replicate itself is called as provirus.

5. Virus like particles (VLP) are _____
a) Immunogenic and infectious
b) Immunosuppressive and infectious
c) Infectious but not immunogenic
d) Immunogenic but not infectious
.

Answer: d
Explanation: An immunogenic organism can evoke the immune response when entered inside a host. Immunosuppressive organism can suppress the host immune response and infectious organism can cause infection to the host. VLP or Virus like particles are the outer protein covering of the virus with no viral genetic material. Hence, they can evoke host immune response but cannot cause infection to the host.

6. Which of the following viruses have DNA as its genetic material?
a) Tobacco Mosaic Virus
b) Potato Mosaic Virus
c) Tomato Mosaic Virus
d) Cauliflower Mosaic Virus
.

Answer: d
Explanation: Cauliflower Mosaic virus is a DNA virus with a nucleotide sequence of 8024 nucleotides. Tobacco Mosaic Virus, Potato Mosaic Virus and Tomato Mosaic Virus are retroviruses with RNA as its genetic material.

7. HIV antagonizes the _____ cell in human body.
a) Red Blood Cell (RBC)
b) Cytotoxic T cell
c) B cell
d) Helper T cell
.

Answer: d
Explanation: HIV or Human Immune deficiency Virus infects the Helper T cells present in the blood. It recognizes the CD4 proteins on the surface of the helper T cells and thus infects it. By doing this, HIV manipulates the very cells which activate both B cells and Cytotoxic T cells.

8. Which of the following has the largest DNA sequence?
a) Pithovirus sibericum
b) Megavirus chilensis
c) TMV
d) T4 bacteriophage
.

Answer: b
Explanation: Megavirus chilensis has the largest genome length of 1,259,197 base-pair with around 1120 proteins. Pithovirus sibericum is currently the largest known virus with a length of 1500 nm and diameter 500 nm.

9. Which of the following enables a Dengue virus to affect human beings?
a) RNA Polymerase enzyme
b) DNA Polymerase enzyme
c) Reverse Transcriptase enzyme
d) Gyrase enzyme
.

Answer: c
Explanation: The Dengue Virus is a retrovirus which contains RNA as its genetic material. So, to infect a human being by integrating its genome into the human DNA genome, it is necessary to convert its RNA sequence into DNA. Reverse Transcriptase enzyme catalyzes the reverse transcription of viral RNA into DNA.

10. Viruses can be cultivated in_____
a) Whole plant
b) Cell lines
c) Chick Embryo
d) All of the mentioned
.

Answer: d
Explanation: Viruses need a living system to survive and replicate. They complete their life cycle inside the living host but otherwise remain inert. Whole plant, cell lines and chick embryo act as appropriate living systems for the virus.

11. The capsomeres contain small protein subunits known as _____
a) Protomeres
b) Capsoproteins
c) Prions
d) None of the mentioned
.

Answer: a
Explanation: Capsomeres are the subunits of the protein coat enveloping the viral genome known as the Capsid. The Capsomeres assemble to form the capsid and are in turn made up of an assembly of smaller protein subunits known as Protomeres.

12. Which of the following viruses is found in saliva?
a) HIV
b) Dengue virus
c) Hepatitis B virus
d) Epstein-Barr virus (EBV virus)
.

Answer: d
Explanation: Epstein-Barr virus or EBV is also known as Herpes virus 4. It causes an infection called Mononucleosis, which is a contagious disease. Since the virus is present in the saliva of the host, it can be contracted by a healthy individual by kissing or eating from the same utensils.

13. How many structural and non-structural proteins are there in the dengue virus?
a) 7 ; 2
b) 3 ; 8
c) 3 ; 7
d) 3 ; 9
.

Answer: c
Explanation: Dengue virus has 3 structural or surface proteins namely the Capsid protein (C), the Membrane protein (M) and the Envelope protein (E). It also has 7 non-structural proteins (NS proteins) namely NS1, NS2A, NS2B, NS3, NS4A, NS4B and NS5

1. Which of the following is released when a Hydrogen atom loses an electron?
a) Nucleus
b) Proton
c) Charge
d) Ion
.

Answer: b
Explanation: Whenever a hydrogen atom releases a shared electron in solution, a proton is also released. For example, acetic acid undergoes dissociation reaction to release acetate ion and a proton.

2. Which of the following is an example of amphoteric molecule?
a) Acetic acid
b) Malic acid
c) Sugars

d) Water
.

Answer: d
Explanation: Water is an example of both an acid and a base, and is therefore an amphoteric molecule. It can accept a proton thereby acting as a base and can also donate a proton acting as an acid.

3. Acids that lose a proton easily are weak acids.
a) True
b) False
.

Answer: b
Explanation: The strength of an acid is measured by the relative ease by which it loses a proton. The more readily the proton is lost, more strong is the acid. An example of a strong acid is Hydrogen Chloride which readily transfers its protons to water.

4. What is the full form of pH?
a) Positive hydrogen
b) Potential Hydrogen
c) Positron
d) Proton of hydrogen
.

Answer: b
Explanation: The acidity of a compound is measured by the concentration of hydrogen ions and is expressed in terms of pH- potential hydrogen. pH equals negative logarithmic concentration of protons.

5. A solution having a pH of 6 has a proton concentration of _____
a) 10^{-6} M
b) 10^{6} M
c) 6 M
d) 0.6 M
.

Answer: a
Explanation: pH equals negative logarithmic concentration of protons. Since the pH scale is logarithmic, an increase of one pH unit corresponds to ten-fold decrease in hydrogen ion/ proton concentration.

6. What is the concentration of pure water?
a) 55.51 M
b) 25.51 M
c) 55 M
d) 25 M
.

Answer: a
Explanation: The concentration of pure water is always 55.51 Molar. On the basis of this universal value ion-product constant Kw for water is calculated, which is a constant value at 25°C.

7. In presence of an acid, amino group can be _____
a) Polarized
b) Washed away
c) Protonated

d) Replaced
.

Answer: c
Explanation: In presence of an acid, amino group can be Protonated because an acid release proton, thereby increasing the hydrogen ion concentration in its vicinity and this can result in disruption of the protein activity to which amine group is attached.

8. Buffers react with _____ ions.
a) hydrogen, hydroxyl
b) magnesium, calcium
c) potassium
d) sodium
.

Answer: a
Explanation: Buffers react with free hydrogen and free hydroxyl ions resisting changes in the pH and protecting cells and solutions from destroying. Buffers are also routinely used in laboratories.

9. Buffers usually contain _____ with its conjugate _____
a) weak base, acid
b) strong base, acid
c) weak acid, base
d) strong acid, base
.

Answer: c
Explanation: Buffers are used for resisting changes in the pH. A buffer usually contains a weak acid and its conjugate base. Even slight changes in pH can halt biological reactions.

10. Carbonic acid and bicarbonate ions buffer which of the following?
a) Cytosol
b) Cytoplasm
c) Blood
d) Lymph
.

Answer: c
Explanation: Carbonic acid and bicarbonate ions buffer the blood and hold its pH at 7.4. Carbonic acid is a weak acid and bicarbonate ions are basic in nature. A change in pH of the blood can lead to abnormalities