

- 1. When the intensity of light changes from bright to dim, the pupil of the eye:**
 - a) Dilates.
 - b) Constricts.
 - c) Remains the same.
 - d) Acquires a reddish tint as seen in pictures taken with flash.

- 2. Which of the following options completes the following sentence such that it is true:
A virus...**
 - a) Can act as a vector for genetic transfer.
 - b) Is a type of cell without a true nucleus.
 - c) Can only infect a unique host.
 - d) Cannot survive in its host further than one cell generation.

- 3. Which of the following options exist as RNA surrounded by a protein coat?**
 - a) Retrovirus.
 - b) Prion.
 - c) Prokaryote.
 - d) Streptococcus.

- 4. Which of these processes takes place in the cytoplasm of the eukaryotic cell?**
 - a) Glycolysis.
 - b) Electron transport.
 - c) Krebs cycle.
 - d) Ribosome biogenesis.

- 5. Which of the following best supports the following statement?
*Mitochondria are descendants of endosymbiotic bacteria.***
 - a) Mitochondria and bacteria possess similar ribosomes and DNA.
 - b) Mitochondria and bacteria possess similar nuclei.
 - c) Neither mitochondria nor bacteria contain chloroplasts.
 - d) Both bacteria and mitochondria have microtubules.

- 6. Which of the following statements about the cytoskeleton is false?**
 - a) Protein monomers that are held together with covalent bonds form cytoskeletal filaments.
 - b) The cytoskeleton is made up from of three types of protein filament.
 - c) The cytoskeleton of a cell can change in response to the environment.
 - d) The bacterial cytoskeleton is important for cell division and DNA segregation.

- 7. Epigenetics is defined as...**
 - a) The science that studies the changes in the regulation and expression of gene activity that are not dependent on gene sequence.
 - b) The collection of genes in a living organism including both coding and non-coding DNA sequences.
 - c) A type of harmless variation in the DNA sequence, present at a frequency greater than 1 to 3% in the human population.
 - d) The part of genetics that focuses on the actively expressed regions of DNA and their regulation.

- 8. Which of the following is NOT a bone in the upper limb?**
 - a) Astragalus.
 - b) Pisiform.

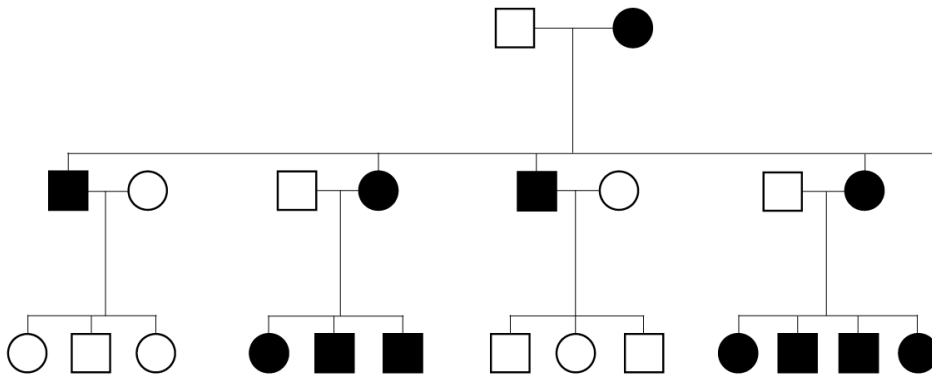
- c) Scapula.
- d) Trapezoid.

9. Which of the following sugars is a disaccharide?

- a) Lactose.
- b) Glucose.
- c) Fructose.
- d) Galactose.

10. The following family tree corresponds to a family affected by Leigh's syndrome. What is the inheritance pattern of this disease?

Key: Square = male; Circle = female; Shaded = affected; Non-shaded = non-affected.



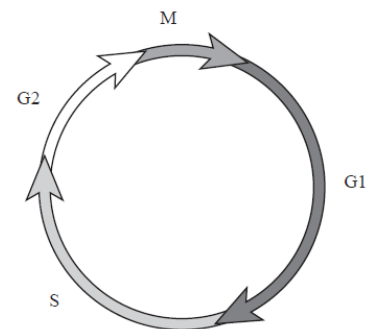
- a) Mitochondrial inheritance.
- b) Autosomal dominant inheritance.
- c) Autosomal recessive inheritance.
- d) X-linked inheritance.

11. Following analysis of the DNA of a bacterial cell, it is found that the adenine content is 40%. What is the percentage of guanine in the DNA?

- a) 10%.
- a) 20%.
- b) 40%.
- c) 80%.

12. The diagram represents a typical cell cycle. Which of the following activities occurs in the G1 phase?

- a) Growth of the cell.
- b) Replication of the DNA.
- c) Formation of the mitotic spindle.
- d) Breakdown of the nuclear membrane.



13. Enzymes are polymers made of what type of monomer

- a) Amino acids.
- b) Proteins.
- c) Nucleotides.
- d) Hexoses.

14. If we consider that every mammalian cell is composed of nucleus and cytoplasm, which of the following would not be considered cells?

- a) Platelets.
- b) Monocytes.
- c) Eosinophils.
- d) Lymphocytes.

15. Which of the following options completes the sentence?

Small intestine is divided in three sections: duodenum, jejunum and ...

- a) Ileum.
- b) Isquion.
- c) Hilum.
- d) Ilium.

16. A new disease has been discovered recently caused by an incorrect assembly of proteins due to a malfunction of a cell organelle. Which of the following organelles is most likely to be responsible for this disease?

- a) Ribosomes.
- b) Mitochondria.
- c) Lysosomes.
- d) Centrosome.

17. When we climb a high mountain, our cells could suffer from hypoxia due to?

- a) The erythrocytes do not pick up enough oxygen.
- b) Inability of our erythrocytes to transport oxygen,
- c) Erythrocytes do not release oxygen to the cells,
- d) At high altitude the number of erythrocytes is reduced.

18. Heroin use increases levels of brain serotonin, a neurotransmitter. The activity of serotonin-producing neurons is controlled and negatively regulated through a secondary neuron. Heroin acts on this secondary neuron. Which of the following sentences best describe the mechanism of action of heroin?

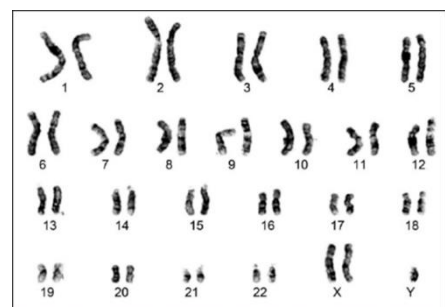
- a) Heroin inhibits the secondary neuron.
- b) Heroin activates the secondary neuron.
- c) Heroin potentiates but does not activate the secondary neuron.
- d) Heroin potentiates but does not inhibit the secondary neuron.

19. In order to improve its function, a cell with high-energy requirements will contain:

- a) Large amounts of mitochondria.
- b) Extremely active ribosomes.
- c) An extended plasma membrane.
- d) A higher cytoplasmic surface occupied by the Golgi apparatus.

20. The following karyotype belongs to a...

- a) Healthy female.
- b) Healthy male.
- c) Patient with Klinefelter syndrome or Trisomy 47, XXY.
- d) Patient with Jacob syndrome or Trisomy 47, XYY.



21. Apoptosis...

- a) Is a process of programmed cell death that occurs in multicellular organisms through genetically controlled cell signalling.
- b) Takes place in specialised membranes located in energy transforming organelles.
- c) Is the process regulating the binding of macromolecules to a transmembrane receptor-protein.
- d) Is an ordered sequence of events whereby a cell duplicates its content, and it splits in two.

22. The bond in the oxygen molecule O₂, is ...

- a) Nonpolar covalent.
- b) Polar covalent.
- c) A hydrogen bond.
- d) A metallic bond.

23. Which of the following statements is true for electronegative elements?

- a) They have high ionisation energy, high electron affinity and therefore are electronegative.
- b) Easily form ionic, covalent and metallic bonds with other compounds.
- c) Are placed towards the left in the periodic table.
- d) They have a tendency to lose electrons and form negative ions.

24. Which is the formal charge for the central nitrogen atom in the Lewis structure for N₂O?

- a) +1
- b) 0
- c) -1
- d) 0 in some resonance structures, whereas it will be -1 in others.

25. Which of the following compounds would produce the greatest amount of nitrogen gas (N₂ gas) if 1.0 g of the compound was to decompose into its constituent elements?

- a) NH₃
- b) NO
- c) NO₂
- d) N₂O₄