A-LEVEL

Multiple-choice questions on CYTOLOGY

1. **Question:** What is the primary function of the endoplasmic reticulum?
A) Energy production
B) Protein synthesis
C) Lipid storage
D) DNA replication
Answer: B) Protein synthesis
Explanation: The endoplasmic reticulum is involved in protein synthesis and modification.

2. **Question:** Which organelle is responsible for ATP production through cellular respiration?
A) Nucleus
B) Golgi apparatus
C) Mitochondrion
D) Lysosome
Answer: C) Mitochondrion
Explanation: Mitochondria are the powerhouse of the cell, producing ATP through cellular respiration.

3. **Question:** What is the main function of the Golgi apparatus?
A) Energy production
B) Protein synthesis
C) Lipid storage
D) Packaging and modification of proteins
Answer: D) Packaging and modification of proteins
Explanation: The Golgi apparatus processes, modifies, and packages proteins for secretion or use within the cell.

4. **Question:** In which phase of the cell cycle does DNA replication occur?
A) G1 phase
B) S phase
C) G2 phase
D) M phase
Answer: B) S phase
Explanation: DNA replication takes place during the S phase of the cell cycle.

5. **Question:** Which type of cell division results in the formation of gametes?
A) Mitosis
B) Meiosis
C) Binary fission
D) Budding
Answer: B) Meiosis
Explanation: Meiosis is the specialized cell division that produces gametes (sperm and egg cells).

6. **Question:** What is the function of ribosomes in the cell?
A) ATP production

B) Protein synthesis
C) Lipid storage
D) DNA replication
Answer: B) Protein synthesis
Explanation: Ribosomes are responsible for protein synthesis in the cell.

7. **Question:** Which cellular structure contains the genetic material in eukaryotic cells?
A) Nucleus
B) Mitochondrion
C) Ribosome
D) Endoplasmic reticulum
Answer: A) Nucleus
Explanation: The nucleus contains the genetic material (DNA) in eukaryotic cells.

8. Question: What is the role of lysosomes in the cell?
A) Protein synthesis
B) Energy production
C) Cellular digestion and waste removal
D) Lipid storage

Answer: C) Cellular digestion and waste removal
Explanation: Lysosomes are responsible for breaking down cellular waste and digesting materials.

9. **Question:** During which phase of mitosis do sister chromatids separate and move to opposite poles of the cell?
A) Prophase
B) Metaphase
C) Anaphase
D) Telophase
Answer: C) Anaphase
Explanation: Anaphase is the phase of mitosis where sister chromatids are pulled apart towards opposite poles of the cell.

10. Question: What is the primary function of the cytoskeleton in the cell?
A) Cell division
B) Cellular respiration
C) Structural support and cell shape
D) Lipid synthesis

Answer: C) Structural support and cell shape
Explanation: The cytoskeleton provides structural support and helps maintain the cell's shape.

11. **Question:** Which cellular structure is responsible for maintaining cell turgor pressure in plant cells?
A) Vacuole
B) Chloroplast
C) Endoplasmic reticulum
D) Nucleus
Answer: A) Vacuole
Explanation: The vacuole in plant cells helps maintain turgor pressure by storing water and other substances.

12. **Question:** What is the function of the nuclear envelope?
A) Protein synthesis
B) Cellular respiration
C) Protecting the nucleus and controlling passage of molecules

D) Lipid synthesis
Answer: C) Protecting the nucleus and controlling passage of molecules
Explanation: The nuclear envelope surrounds the nucleus, providing protection and regulating the passage of molecules.

13. Question: Which organelle is responsible for detoxifying harmful substances in the cell?
A) Peroxisome
B) Lysosome
C) Golgi apparatus
D) Endoplasmic reticulum
Answer: A) Peroxisome
Explanation: Peroxisomes are involved in detoxification processes within the cell.

14. **Question:** During which phase of the cell cycle does the cell prepare for mitosis by growing and duplicating organelles?
A) G1 phase
B) S phase
C) G2 phase
D) M phase

Answer: A) G1 phase
Explanation: The G1 phase is the initial growth phase where the cell prepares for mitosis.

15. **Question:** What is the primary function of the smooth endoplasmic reticulum?
A) Protein synthesis
B) Lipid synthesis and detoxification
C) Energy production
D) DNA replication
Answer: B) Lipid synthesis and detoxification
Explanation: The smooth endoplasmic reticulum is involved in lipid synthesis and detoxification processes.

16. **Question:** Which of the following structures is composed of microtubules and is involved in cell division?
A) Microfilaments
B) Intermediate filaments
C) Centrioles
D) Microvilli
Answer: C) Centrioles

Explanation: Centrioles, composed of microtubules, play a role in organizing the spindle fibers during cell division.

17. **Question:** What is the purpose of the nucleolus in the nucleus?
A) Protein synthesis
B) Ribosome production
C) DNA replication
D) Lipid storage
Answer: B) Ribosome production
Explanation: The nucleolus is involved in the synthesis of ribosomal RNA and assembly of ribosomes.

18. **Question:** During which phase of meiosis does genetic recombination occur?
A) Prophase I
B) Metaphase I
C) Anaphase I
D) Telophase I
Answer: A) Prophase I

Explanation: Genetic recombination occurs during Prophase I of meiosis.

19. Question: Which cellular structure is responsible for the synthesis of phospholipids and steroids?
A) Ribosome
B) Nucleus
C) Golgi apparatus
D) Endoplasmic reticulum
Answer: D) Endoplasmic reticulum
Explanation: The endoplasmic reticulum, particularly the smooth ER, is involved in lipid synthesis, including phospholipids and steroids.

20. **Question:** What is the function of the nuclear pores in the nuclear envelope?
A) Facilitate the entry of ribosomes into the nucleus
B) Regulate the passage of molecules in and out of the nucleus
C) Synthesize nuclear proteins
D) Maintain nuclear shape

Answer: B) Regulate the passage of molecules in and out of the nucleus
Explanation: Nuclear pores control the movement of molecules between the nucleus and the cytoplasm.

21. **Question:** Which organelle is responsible for photosynthesis in plant cells?
A) Chloroplast
B) Vacuole
C) Mitochondrion
D) Endoplasmic reticulum
Answer: A) Chloroplast
Explanation: Chloroplasts are the site of photosynthesis in plant cells.

22. **Question:** What is the primary function of the spindle fibers during cell division?
A) Chromosome condensation
B) Separation of sister chromatids
C) Synthesis of DNA
D) Formation of the nuclear envelope
Answer: B) Separation of sister chromatids

Explanation: Spindle fibers are responsible for pulling apart sister chromatids during cell division.

23. **Question:** Which cell structure contains digestive enzymes for breaking down cellular components?
A) Nucleus
B) Lysosome
C) Peroxisome
D) Vacuole
Answer: B) Lysosome
Explanation: Lysosomes contain digestive enzymes for breaking down cellular components.

24. **Question:** During which phase of mitosis do chromosomes align at the cell's equator?
A) Prophase
B) Metaphase
C) Anaphase
D) Telophase
Answer: B) Metaphase

Explanation: Metaphase is the phase where chromosomes align at the metaphase plate.

25. **Question:** What is the main function of microfilaments in the cytoskeleton?
A) Provide structural support
B) Facilitate cell division
C) Aid in cellular movement
D) Synthesize proteins
Answer: C) Aid in cellular movement
Explanation: Microfilaments are involved in cellular movement, including muscle contraction and cell motility.

26. **Question:** Which phase of the cell cycle follows mitosis and results in the division of the cytoplasm?
A) G1 phase
B) S phase
C) G2 phase
D) Cytokinesis
Answer: D) Cytokinesis

Explanation: Cytokinesis is the phase following mitosis that results in the division of the cytoplasm.

27. **Question:** What is the function of the cilia and flagella in eukaryotic cells?
A) Cellular respiration
B) DNA replication
C) Cellular movement
D) Protein synthesis
Answer: C) Cellular movement
Explanation: Cilia and flagella are involved in cellular movement, allowing cells to move or propel substances.

28. **Question:** Which phase of meiosis is characterized by the separation of homologous chromosomes?
A) Prophase I
B) Metaphase I
C) Anaphase I
D) Telophase I
Answer: C) Anaphase I

Explanation: Anaphase I is when homologous chromosomes are separated.

29. **Question:** What is the role of the nucleoid in prokaryotic cells?
A) Synthesize proteins
B) Store genetic material
C) Facilitate cellular movement
D) Regulate cellular processes
Answer: B) Store genetic material
Explanation: The nucleoid in prokaryotic cells contains the genetic material (DNA) and is involved in genetic regulation.

30. **Question:** In which cellular process do microtubules form the mitotic spindle?
A) Mitosis
B) Meiosis
C) Binary fission
D) Budding
Answer: A) Mitosis
Explanation: Microtubules form the mitotic spindle during mitosis, aiding in chromosome segregation.

31. **Question:** Which cellular structure is responsible for sorting, modifying, and packaging proteins for secretion?
A) Ribosome
B) Nucleus
C) Golgi apparatus
D) Smooth endoplasmic reticulum
Answer: C) Golgi apparatus
Explanation: The Golgi apparatus is involved in sorting, modifying, and packaging proteins for secretion.

32. **Question:** During which phase of the cell cycle do chromosomes condense and become visible?
A) G1 phase
B) S phase
C) G2 phase
D) Prophase
Answer: D) Prophase
Explanation: Prophase is the phase where chromosomes condense and become visible.

33. **Question:** What is the function of the centrosome in animal cells?
A) Cellular respiration
B) Synthesis of DNA
C) Formation of the mitotic spindle
D) Storage of genetic material
Answer: C) Formation of the mitotic spindle
Explanation: The centrosome is involved in organizing and forming the mitotic spindle during cell division.

34. **Question:** Which organelle contains enzymes that break down fatty acids and detoxify harmful substances?
A) Lysosome
B) Peroxisome
C) Endoplasmic reticulum
D) Golgi apparatus
Answer: B) Peroxisome
Explanation: Peroxisomes contain enzymes for breaking down fatty acids and detoxification.

35. **Question:** During which phase of meiosis do sister chromatids separate and move to opposite poles of the cell?
A) Prophase I
B) Metaphase I
C) Anaphase I
D) Telophase I
Answer: C) Anaphase I
Explanation: Anaphase I of meiosis involves the separation of sister

36.Which cellular structure is responsible for the synthesis of ribosomal RNA (rRNA)?
A) Nucleolus
B) Endoplasmic Reticulum
C) Golgi Apparatus
D) Mitochondria
Answer: A
Explanation: The nucleolus is responsible for the synthesis of rRNA and the assembly of ribosomes.

37.During which phase of the cell cycle does DNA replication occur?

A) G1 Phase
B) S Phase
C) G2 Phase
D) M Phase
Answer: B
Explanation: DNA replication takes place during the Synthesis (S) phase of the cell cycle.

38.What is the primary function of the smooth endoplasmic reticulum (SER) in a cell?
A) Protein Synthesis
B) Lipid Synthesis
C) Ribosome Synthesis
D) ATP Production
Answer: B
Explanation: The smooth endoplasmic reticulum is involved in lipid synthesis and detoxification processes.

39.Which organelle is responsible for cellular respiration and ATP production?
A) Mitochondria

B) Chloroplast
C) Nucleus
D) Endoplasmic Reticulum
Answer: A
Explanation: Mitochondria are the powerhouse of the cell and are responsible for cellular respiration and ATP production.

40.During mitosis, in which phase do the sister chromatids separate and move towards opposite poles of the cell?
A) Prophase
B) Metaphase
C) Anaphase
D) Telophase
Answer: C
Explanation: Anaphase is the phase where sister chromatids separate and move to opposite poles.