

Q1. Who proposed the modern cell theory that includes the concept of cells arising from pre-existing cells?

- A. Schleiden and Schwann
- B. Robert Hooke
- C. Rudolf Virchow
- D. Anton van Leeuwenhoek

✓ Answer: C. Rudolf Virchow

Explanation: In 1855, Virchow added "Omnis cellula e cellula" – cells arise from pre-existing cells – to the earlier cell theory.

Q2. Which of the following is not a feature of a prokaryotic cell?

- A. Peptidoglycan cell wall
- B. Membrane-bound organelles
- C. Naked circular DNA
- D. 70S ribosomes

✓ Answer: B. Membrane-bound organelles

Explanation: Prokaryotic cells lack membrane-bound organelles like nucleus, mitochondria, etc.

Q3. Which of the following is unique to prokaryotes?

- A. Nucleolus
- B. Polysomes
- C. Mesosomes
- D. Chromatin

✓ Answer: C. Mesosomes

Explanation: Mesosomes are invaginations of the plasma membrane found only in prokaryotic cells; they aid in respiration and DNA replication.

Q4. Match the cell component with its function:

- | | |
|--------------------|----------------------------|
| A. Ribosome | 1. Protein synthesis |
| B. Mitochondrion | 2. ATP production |
| C. Lysosome | 3. Intracellular digestion |
| D. Golgi apparatus | 4. Packaging and transport |

Options:

- A. A-1, B-2, C-3, D-4
- B. A-4, B-2, C-3, D-1
- C. A-3, B-4, C-1, D-2
- D. A-2, B-3, C-1, D-4

☒ Answer: A. A-1, B-2, C-3, D-4

Explanation: Straightforward matching of organelles and their primary functions.

Q5. Assertion (A): Ribosomes are known as protein factories.

Reason (R): They are composed of rRNA and protein. **

- A. Both A and R are true, and R explains A
- B. Both A and R are true, but R does not explain A
- C. A is true, R is false
- D. A is false, R is true

☒ Answer: A. Both A and R are true, and R explains A

Explanation: Ribosomes make proteins and are made of rRNA and proteins – structure directly supports function.

Q6. The genetic material in a bacterial cell is found in the:

- A. Nucleoplasm
- B. Nucleoid
- C. Nucleus
- D. Chromatin

☒ Answer: B. Nucleoid

Explanation: In bacteria, the nucleoid is an irregular region where circular, naked DNA is located.

Q7. Which of the following is true for eukaryotic cells but not for prokaryotic cells?

- A. 70S ribosomes
- B. Peptidoglycan wall
- C. Endoplasmic reticulum
- D. Circular DNA

✓Answer: C. Endoplasmic reticulum

Explanation: ER is a membrane-bound organelle found only in eukaryotes.

Q8. Identify the incorrect match:

- A. Anton van Leeuwenhoek – First living cell
- B. Robert Hooke – Term “cell”
- C. Schleiden – Animals are made of cells
- D. Schwann – Proposed cell theory with Schleiden

✓Answer: C. Schleiden – Animals are made of cells

Explanation: Schleiden studied plants, Schwann studied animals.

Q9. Which feature distinguishes plant cells from animal cells?

- A. Plasma membrane
- B. Cytoplasm
- C. Mitochondria
- D. Presence of a large central vacuole

✓Answer: D. Presence of a large central vacuole

Explanation: Plant cells have a large vacuole for storage and turgidity; animal cells do not.

Q10. Which is true about cell theory?

- A. All cells arise by spontaneous generation
- B. Cells are only in plants and animals
- C. The cell is the structural and functional unit of life
- D. All cells are non-living

✓Answer: C. The cell is the structural and functional unit of life

Explanation: This is a key tenet of classical cell theory.

Q11. Which of the following structures is responsible for packaging and modifying proteins?

- A. Lysosome

- B. Nucleolus
- C. Golgi apparatus
- D. Peroxisome

✓Answer: C. Golgi apparatus

Explanation: The Golgi apparatus modifies proteins from the ER and packages them in vesicles for transport.

Q12. Which of the following cell organelles is semi-autonomous and contains its own DNA?

- A. Lysosome
- B. Endoplasmic Reticulum
- C. Ribosome
- D. Mitochondrion

✓Answer: D. Mitochondrion

Explanation: Mitochondria have their own DNA and ribosomes, and can produce some proteins independently.

Q13. The smooth endoplasmic reticulum (SER) is mainly involved in:

- A. Protein synthesis
- B. Steroid and lipid synthesis
- C. Cell division
- D. Chromosome organization

✓Answer: B. Steroid and lipid synthesis

Explanation: SER is involved in lipid and steroid metabolism, not protein synthesis (done by RER).

Q14. Which of the following is NOT a function of the rough endoplasmic reticulum (RER)?

- A. Protein synthesis
- B. Protein modification
- C. Detoxification
- D. Protein transport

✓Answer: C. Detoxification

Explanation: Detoxification is mainly the role of SER, not RER.

Q15. Match the organelle with its primary role:

- | A. Mitochondria | 1. ATP production
- | B. Peroxisome | 2. Hydrogen peroxide breakdown
- | C. Lysosome | 3. Intracellular digestion
- | D. Nucleolus | 4. Ribosome biogenesis

Options:

- A. A-1, B-2, C-3, D-4
- B. A-3, B-1, C-4, D-2
- C. A-2, B-1, C-3, D-4
- D. A-1, B-4, C-2, D-3

☒ Answer: A. A-1, B-2, C-3, D-4

Explanation: Standard functional matches of major organelles.

Q16. Assertion (A): Nucleolus is the site of rRNA synthesis.

Reason (R): Nucleolus contains enzymes for oxidative phosphorylation.**

- A. A and R are true; R explains A
- B. A and R are true; R does not explain A
- C. A is true, R is false
- D. A is false, R is true

☒ Answer: C. A is true, R is false

Explanation: Nucleolus makes rRNA, not involved in oxidative phosphorylation (done in mitochondria).

Q17. Which of the following organelles is involved in the formation of lysosomes?

- A. Ribosomes
- B. Golgi apparatus
- C. Mitochondria
- D. Centrosome

☒ Answer: B. Golgi apparatus

Explanation: Golgi bodies package hydrolytic enzymes into vesicles, forming lysosomes.

Q18. Which organelle has a single membrane?

- A. Nucleus
- B. Mitochondrion
- C. Peroxisome
- D. Chloroplast

✓ Answer: C. Peroxisome

Explanation: Peroxisomes are single-membrane-bound structures involved in lipid metabolism.

Q19. Which of the following is correctly matched?

- A. Cristae – Chloroplast
- B. Grana – Mitochondria
- C. Matrix – Mitochondria
- D. Thylakoid – Golgi

✓ Answer: C. Matrix – Mitochondria

Explanation: Matrix is the fluid-filled space of mitochondria; cristae are inner membrane folds.

Q20. Which of the following statements about lysosomes is incorrect?

- A. They contain hydrolytic enzymes
- B. They maintain acidic pH
- C. They are formed by the ER
- D. They can digest entire cells

✓ Answer: C. They are formed by the ER

Explanation: Lysosomes are formed by Golgi apparatus, not ER.

Q21. Which of the following cytoskeletal elements is primarily involved in muscle contraction?

- A. Intermediate filaments
- B. Microtubules
- C. Microfilaments
- D. Centrioles

✓ Answer: C. Microfilaments

Explanation: Microfilaments (made of actin) help in muscle contraction, cell movement, and shape changes.

Q22. Which structure is absent in plant cells but present in animal cells?

- A. Golgi apparatus
- B. Mitochondria
- C. Lysosomes
- D. Centrioles

✓ Answer: D. Centrioles

Explanation: Centrioles are typically found in animal cells, absent in most plant cells.

Q23. Which pair is incorrectly matched?

- A. Cilia – 9+2 arrangement
- B. Centriole – 9 triplets
- C. Basal body – Forms cilia
- D. Flagella – Absent in prokaryotes

✓ Answer: D. Flagella – Absent in prokaryotes

Explanation: Prokaryotes do have flagella, though structurally different from eukaryotic ones.

Q24. The 9+2 arrangement of microtubules is a characteristic of:

- A. Basal body
- B. Centriole
- C. Cilia and Flagella
- D. Spindle fibers

✓ Answer: C. Cilia and Flagella

Explanation: Eukaryotic cilia and flagella have a 9+2 arrangement of microtubules.

Q25. Match the cytoskeletal component with its role:

- | | |
|---------------------------|------------------------|
| A. Microtubules | 1. Spindle formation |
| B. Microfilaments | 2. Cell movement |
| C. Intermediate filaments | 3. Mechanical strength |

Options:

- A. A-1, B-2, C-3
- B. A-3, B-1, C-2
- C. A-2, B-1, C-3
- D. A-1, B-3, C-2

☒ Answer: A. A-1, B-2, C-3

Explanation: Each element plays a specific role in cell dynamics and structure.

Q26. In eukaryotic cells, the function of the centrosome is to:

- A. Synthesise proteins
- B. Detoxify harmful substances
- C. Organise spindle fibers during cell division
- D. Digest old organelles

☒ Answer: C. Organise spindle fibers during cell division

Explanation: Centrosomes with centrioles form the mitotic spindle during cell division.

Q27. Assertion (A): Plant cells do not form centrioles.

Reason (R): Plants lack microtubules.**

- A. Both A and R are true, and R explains A
- B. Both A and R are true, but R does not explain A
- C. A is true, R is false
- D. A is false, R is true

☒ Answer: C. A is true, R is false

Explanation: Plant cells usually lack centrioles but have microtubules for spindle formation.

Q28. Which feature is exclusive to plant cells?

- A. Lysosomes
- B. Centrosomes
- C. Plasmodesmata
- D. Centrioles

✓Answer: C. Plasmodesmata

Explanation: Plasmodesmata are cytoplasmic bridges between plant cells.

Q29. Which of the following is not a correct difference between plant and animal cells?

- A. Plant cells have chloroplasts; animal cells do not
- B. Animal cells have small vacuoles; plant cells have large central vacuoles
- C. Plant cells contain centrioles; animal cells do not
- D. Plant cells have cell walls; animal cells do not

✓Answer: C. Plant cells contain centrioles; animal cells do not

Explanation: Actually, animal cells contain centrioles, not plant cells.

Q30. Which cytoskeletal structure helps in the movement of chromosomes during mitosis?

- A. Microtubules
- B. Intermediate filaments
- C. Microfilaments
- D. Centrioles

✓Answer: A. Microtubules

Explanation: Spindle fibers made of microtubules pull chromosomes during cell division.

Q31. Which of the following structures allows selective transport between the nucleus and cytoplasm?

- A. Nuclear lamina
- B. Nuclear pores
- C. Nucleolus
- D. Centrosome

✓Answer: B. Nuclear pores

Explanation: Nuclear pores in the nuclear envelope allow regulated exchange of substances between the nucleus and cytoplasm.

Q32. The darkly stained, transcriptionally inactive region of chromatin is called:

- A. Euchromatin

- B. Heterochromatin
- C. Nucleoplasm
- D. Chromatid

☒ Answer: B. Heterochromatin

Explanation: Heterochromatin is tightly packed and transcriptionally inactive, whereas euchromatin is active.

Q33. Which of the following components is NOT part of a nucleosome?

- A. DNA
- B. Histone proteins
- C. RNA polymerase
- D. H1 histone

☒ Answer: C. RNA polymerase

Explanation: RNA polymerase is not part of nucleosomes; nucleosomes consist of DNA + histones.

Q34. How many base pairs wrap around a histone octamer to form one nucleosome?

- A. 100
- B. 146
- C. 50
- D. 300

☒ Answer: B. 146

Explanation: About 146 base pairs of DNA coil around the histone octamer in each nucleosome.

Q35. Which histone protein binds to linker DNA between nucleosomes?

- A. H2A
- B. H2B
- C. H1
- D. H4

☒ Answer: C. H1

Explanation: H1 histone binds to the linker DNA and stabilizes the nucleosome structure.

Q36. Match the following terms with their functions:

- | A. Nucleoplasm | 1. Synthesizes rRNA
- | B. Nucleolus | 2. Site for chromatin suspension
- | C. Nuclear pore | 3. Transport molecules in/out
- | D. Chromatin | 4. Genetic material

Options:

- A. A-2, B-1, C-3, D-4
- B. A-3, B-2, C-1, D-4
- C. A-1, B-4, C-2, D-3
- D. A-4, B-3, C-2, D-1

☒ Answer: A. A-2, B-1, C-3, D-4

Explanation: Each matches its respective role in nuclear function.

Q37. The functional segment of DNA that codes for a protein is called:

- A. Intron
- B. Gene
- C. Chromatid
- D. Exon

☒ Answer: B. Gene

Explanation: A gene is the coding segment of DNA responsible for synthesizing a functional protein.

Q38. Assertion (A): Euchromatin is transcriptionally active.

Reason (R): It is loosely packed and accessible to RNA polymerase.**

- A. Both A and R are true, and R explains A
- B. Both A and R are true, but R does not explain A
- C. A is true, R is false
- D. A is false, R is true

☒ Answer: A. Both A and R are true, and R explains A

Explanation: Euchromatin is loosely packed, allowing transcription enzymes to access DNA easily.

Q39. Which of the following statements is incorrect about nucleolus?

- A. It is non-membranous
- B. It is involved in rRNA synthesis
- C. It disappears during mitosis
- D. It forms the nuclear envelope

☒ Answer: D. It forms the nuclear envelope

Explanation: Nucleolus doesn't form the nuclear envelope—it's involved in rRNA production.

Q40. The number of chromosomes in human somatic cells is:

- A. 23
- B. 44
- C. 46
- D. 22

☒ Answer: C. 46

Explanation: Humans have 46 chromosomes (23 pairs) in somatic (body) cells.

Q41. Which of the following correctly describes the packaging of DNA in eukaryotes?

- A. Linear DNA without histones
- B. Circular DNA with nucleosomes
- C. DNA wrapped around histone octamers forming nucleosomes
- D. DNA without proteins

☒ Answer: C. DNA wrapped around histone octamers forming nucleosomes

Explanation: In eukaryotes, DNA is tightly coiled around histones forming nucleosomes.

Q42. What is the approximate length of DNA in a diploid human cell?

- A. 2 mm
- B. 2 m
- C. 2 cm
- D. 200 m

☒ Answer: B. 2 m

Explanation: 2 meters of DNA are compacted into each diploid human cell nucleus.

Q43. Which of the following is NOT found in prokaryotic cells?

- A. Ribosomes
- B. DNA
- C. Histone proteins
- D. Plasma membrane

☒ Answer: C. Histone proteins

Explanation: Prokaryotic DNA is not associated with histones, unlike eukaryotic DNA.

Q44. Which part of the chromosome is responsible for the movement during cell division?

- A. Telomere
- B. Centromere
- C. Chromatid
- D. Chromonema

☒ Answer: B. Centromere

Explanation: Centromeres bind with spindle fibers, facilitating movement of chromosomes.

Q45. Which is the correct descending order of DNA packaging levels in eukaryotic cells?

- A. Chromosome > Nucleosome > Solenoid > DNA
- B. DNA > Nucleosome > Solenoid > Chromosome
- C. Chromosome > Solenoid > Nucleosome > DNA
- D. DNA > Solenoid > Nucleosome > Chromosome

☒ Answer: B. DNA > Nucleosome > Solenoid > Chromosome

Explanation: The hierarchy of DNA packaging starts from DNA, wraps into nucleosomes, then solenoids, and finally chromosomes.