A-LEVEL

Multiple-choice questions on Cell cycle and cell division.

1. What is the main purpose of the cell cycle?
A. Energy production
B. Cell growth and repair
C. Waste elimination
D. DNA replication

Answer: B
Explanation: The cell cycle is primarily responsible for cell growth and repair through a series of events that lead to cell division.

2. 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
Explanation: DNA replication takes place during the S (synthesis) phase of the cell cycle.

3. Which checkpoint ensures that DNA is undamaged before progressing to the next stage of the cell cycle?
A. G1 checkpoint
B. S checkpoint
C. G2 checkpoint
D. M checkpoint

Answer: A
Explanation: The G1 checkpoint assesses the integrity of DNA before allowing the cell to proceed to the S phase.

4. During which stage of mitosis do sister chromatids separate and move to opposite poles of the cell?
A. Prophase
B. Metaphase
C. Anaphase
D. Telophase

Answer: C
Explanation: Sister chromatids separate during the Anaphase stage of mitosis.

5. What is the role of the spindle fibers in cell division?
A. DNA replication
B. Chromosome condensation
C. Separation of sister chromatids
D. Cell membrane formation

Answer: C
Explanation: Spindle fibers play a crucial role in the separation of sister chromatids during cell division.

6. Which enzyme is responsible for the unwinding of DNA during replication?
A. Helicase
B. Polymerase
C. Ligase
D. Topoisomerase

Answer: A
Explanation: Helicase is the enzyme that unwinds the DNA double helix during replication.

7. What is the purpose of the G2 phase in the cell cycle?
A. DNA synthesis
B. Cell growth and preparation for division
C. Chromosome condensation
D. Sister chromatid separation

Answer: B
Explanation: The G2 phase is a period of cell growth and preparation for division before entering mitosis.

8. During cytokinesis in animal cells, which structure is responsible for cell membrane constriction?
A. Contractile ring
B. Spindle fibers
C. Centriole
D. Microtubules

Answer: A
Explanation: The contractile ring is responsible for cell membrane constriction during cytokinesis in animal cells.

9. What is the function of cyclins in the cell cycle?
A. DNA repair
B. Control the cell cycle checkpoints
C. Chromosome condensation
D. Microtubule formation

Answer: B
Explanation: Cyclins regulate the progression of the cell cycle by controlling checkpoints and ensuring orderly cell division.

10. Which phase of the cell cycle is characterized by rapid cell growth and preparation for division?
A. G1 phase
B. S phase
C. G2 phase
D. M phase

Answer: C
Explanation: The G2 phase is characterized by rapid cell growth and preparation for cell division.

11. What is the function of the protein p53 in the cell cycle?
A. Promote cell division
B. Inhibit apoptosis
C. Monitor DNA damage
D. Initiate DNA replication

Answer: C
Explanation: p53 monitors DNA damage and plays a role in cell cycle arrest and repair or

apoptosis if damage is severe.

12. Which type of cell division produces haploid cells from diploid cells?
A. Mitosis
B. Meiosis
C. Binary fission
D. Budding

Answer: B
Explanation: Meiosis is the type of cell division that produces haploid cells from diploid cells.

13. The formation of a cleavage furrow is a characteristic of which type of cell division?
A. Mitosis
B. Meiosis I
C. Meiosis II
D. Binary fission

Answer: A
Explanation: The cleavage furrow forms during cytokinesis in animal cells undergoing mitosis.

14. Which of the following is NOT a phase of mitosis?
A. Prophase
B. Interphase
C. Metaphase
D. Telophase

Answer: B
Explanation: Interphase is not a phase of mitosis; it is the preparatory phase before mitosis.

15. What is the role of the centromere in cell division?
A. Chromosome condensation
B. DNA replication
C. Sister chromatid separation
D. Spindle fiber formation

Answer: C
Explanation: The centromere holds sister chromatids together and is critical for their proper separation during cell division.

16. Which phase of the cell cycle is often the longest and where cells spend most of their life?
A. G1 phase
B. S phase
C. G2 phase
D. M phase

Answer: A
Explanation: The G1 phase is often the longest and is where cells carry out most of their normal functions and growth.

17. What is the significance of crossing over during meiosis?
A. Increases genetic diversity
B. Ensures identical daughter cells
C. Prevents chromosomal abnormalities
D. Accelerates cell division

Answer: A
Explanation: Crossing over during meiosis increases genetic diversity by exchanging genetic material between homologous chromosomes.

18. Which organelle is responsible for the regulation of the cell cycle and apoptosis?
A. Nucleus
B. Golgi apparatus
C. Endoplasmic reticulum
D. Mitochondria

Answer: A
Explanation: The nucleus contains genetic material and controls the cell cycle and apoptosis.

19. Which type of cell division is common in unicellular organisms and results in the formation of two identical daughter cells?
A. Mitosis
B. Meiosis
C. Binary fission
D. Budding

Answer: C
Explanation: Binary fission is a form of cell division in unicellular organisms, producing two

identical daughter cells.

20. What is the purpose of the M checkpoint in the cell cycle?
A. Check for DNA damage
B. Ensure proper chromosome alignment
C. Verify completion of DNA replication
D. Control entry into the S phase

Answer: B
Explanation: The M checkpoint ensures proper chromosome alignment before the cell progresses to mitosis.

21. What is the primary function of the enzyme telomerase in the cell cycle?
A. DNA repair
B. Chromosome condensation
C. Telomere maintenance
D. Spindle fiber formation

Answer: C
Explanation: Telomerase maintains telomeres, which are protective caps on the ends of

chromosomes.

22. Which phase of meiosis involves the separation of homologous chromosomes?
A. Prophase I
B. Metaphase I
C. Anaphase I
D. Telophase I

Answer: C
Explanation: Anaphase I is the phase where homologous chromosomes separate during meiosis I.

23. What is the purpose of the G1/S checkpoint in the cell cycle?
A. Verify DNA synthesis
B. Assess DNA damage
C. Check for proper chromosome alignment
D. Ensure cell growth and readiness for DNA replication

Answer: D
Explanation: The G1/S checkpoint ensures that

the cell has grown sufficiently and is ready for DNA synthesis.

24. What structure holds the pair of homologous chromosomes together during meiosis?
A. Centromere
B. Telomere
C. Synaptonemal complex
D. Contractile ring

Answer: C
Explanation: The synaptonemal complex holds homologous chromosomes together during meiosis.

25. Which phase of mitosis involves the reformation of nuclear envelopes around separated chromatids?
A. Prophase
B. Metaphase
C. Anaphase
D. Telophase

Answer: D

Explanation: Telophase is the phase in which nuclear envelopes re-form around separated chromatids.

26. What is the role of the kinetochore during cell division?
A. Chromosome condensation
B. DNA replication
C. Sister chromatid separation
D. Attachment of spindle fibers to chromosomes

Answer: D
Explanation: The kinetochore is a protein structure that attaches spindle fibers to chromosomes during cell division.

27. During which phase of meiosis does genetic recombination occur?
A. Prophase I
B. Metaphase I
C. Anaphase I
D. Telophase I

Answer: A

Explanation: Genetic recombination occurs during Prophase I of meiosis.

28. What is the consequence of aneuploidy in a cell?
A. Increased genetic diversity
B. Balanced chromosome number
C. Abnormal chromosome number
D. Haploid cell formation

Answer: C
Explanation: Aneuploidy results in an abnormal chromosome number, leading to genetic disorders.

29. Which of the following is NOT a phase of the cell cycle?
A. Interphase
B. M phase
C. G phase
D. S phase

Answer: C
Explanation: G phase is not a phase of the cell

cycle; it consists of G1, S, and G2 phases.

30. What is the primary function of the G2/M checkpoint in the cell cycle?
A. Verify DNA synthesis
B. Assess DNA damage
C. Ensure cell growth
D. Control entry into mitosis

Answer: D
Explanation: The G2/M checkpoint ensures proper cell growth and readiness for mitosis.

31. Which enzyme is responsible for joining Okazaki fragments during DNA replication?
A. Helicase
B. DNA polymerase I
C. DNA ligase
D. Primase

Answer: C
Explanation: DNA ligase joins Okazaki fragments during DNA replication.

32. What is the role of the mitotic spindle in cell division?
A. DNA replication
B. Chromosome condensation
C. Sister chromatid separation
D. Telomere maintenance

Answer: C
Explanation: The mitotic spindle is responsible for the separation of sister chromatids during cell division.

33. Which phase of the cell cycle is characterized by the highest rate of protein synthesis?
A. G1 phase
B. S phase
C. G2 phase
D. M phase

Answer: C
Explanation: The G2 phase is characterized by a high rate of protein synthesis in preparation for cell division.

34. What is the main function of the anaphase-promoting complex (APC) in cell division?
A. DNA repair
B. Chromosome condensation
C. Sister chromatid separation
D. Telomere maintenance

Answer: C
Explanation: The APC is involved in regulating the separation of sister chromatids during cell division.

35. What is the purpose of the S checkpoint in the cell cycle?
A. Verify DNA synthesis
B. Assess DNA damage
C. Check for proper chromosome alignment
D. Ensure cell growth

Answer: A
Explanation: The S checkpoint verifies completion of DNA synthesis before the cell progresses to the G2 phase.

36. Which of the following is a characteristic of cytokinesis in plant cells?
A. Formation of a cleavage furrow
B. Contractile ring constriction
C. Cell plate formation
D. Centriole duplication

Answer: C
Explanation: Cytokinesis in plant cells involves the formation of a cell plate, leading to the separation of daughter cells.

37. What is the purpose of the G1 checkpoint in the cell cycle?
A. Verify DNA synthesis
B. Assess DNA damage
C. Check for proper chromosome alignment
D. Ensure cell growth and readiness for DNA replication

Answer: D
Explanation: The G1 checkpoint ensures that the cell has grown sufficiently and is ready for DNA

synthesis.

38. What happens during the process of chromatin condensation in preparation for cell division?
A. DNA unwinding
B. DNA replication
C. DNA coiling and packaging
D. DNA repair

Answer: C
Explanation: Chromatin condensation involves the coiling and packaging of DNA into visible chromosomes.

39. In meiosis, how many daughter cells are produced after the completion of both meiosis I and meiosis II?
A. Two
B. Four
C. Six
D. Eight

Answer: B

Explanation: Meiosis results in the formation of four daughter cells, two from each meiotic division.

40. What is the role of the enzyme topoisomerase during DNA replication?
A. DNA unwinding
B. DNA replication
C. DNA repair
D. DNA supercoiling regulation

Answer: D
Explanation: Topoisomerase regulates DNA supercoiling during DNA replication, preventing tangling and ensuring proper replication.**