

Cell Cycle and Cell Division — NEET Biology PYQ (2005-2021)

Class 11 Biology · 30 real NEET & AIPMT questions, year-tagged · answers checked by RankUp

NEET 2021

1. Which of the following stages of meiosis involves division of centromere ?

- (A) Metaphase I
- (B) Metaphase II
- (C) Anaphase II
- (D) Telophase II

NEET 2021

2. Match List - I with List - II.

List - I | List - II

(a) S phase | (i) Proteins are synthesized

(b) G₂ phase | (ii) Inactive phase

(c) Quiescent stage | (iii) Interval between mitosis and initiation of DNA replication

(d) G₁ phase | (iv) DNA replication

Choose the correct answer from the options given below.

- (A) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)
- (B) (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)
- (C) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
- (D) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)

NEET 2021

3. The fruit fly has 8 chromosomes (2n) in each cell. During interphase of Mitosis if the number of chromosomes at G₁ phase is 8, what would be the number of chromosomes after S phase ?

- (A) 8
- (B) 16
- (C) 4
- (D) 32

NEET 2021

4. Which stage of meiotic prophase shows terminalisation of chiasmata as its distinctive feature ?

- (A) Leptotene
- (B) Zygotene
- (C) Diakinesis
- (D) Pachytene

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5. The centriole undergoes duplication during :

- (A) S-phase
- (B) Prophase
- (C) Metaphase
- (D) G₂ phase

NEET 2020 · Q14

6. Identify the correct statement with regard to G₁ phase (Gap 1) of interphase.

- (A) DNA synthesis or replication takes place.
- (B) Reorganisation of all cell components takes place.
- (C) Cell is metabolically active, grows but does not replicate its DNA.
- (D) Nuclear Division takes place.

NEET 2020 · Q52

7. Match the following with respect to meiosis:

(a) Zygotene | (i) Terminalization

(b) Pachytene | (ii) Chiasmata

(c) Diplotene | (iii) Crossing over

(d) Diakinesis | (iv) Synapsis

Select the correct option from the following:

(A) (a)-iii, (b)-iv, (c)-i, (d)-ii

(B) (a)-iv, (b)-iii, (c)-ii, (d)-i

(C) (a)-i, (b)-ii, (c)-iv, (d)-iii

(D) (a)-ii, (b)-iv, (c)-iii, (d)-i

NEET 2020 · Q86

8. Dissolution of the synaptonemal complex occurs during:

(A) Pachytene

(B) Zygotene

(C) Diplotene

(D) Leptotene

NEET 2019 · Q108

9. The correct sequence of phases of cell cycle is :

(A) $M \rightarrow G_1 \rightarrow G_2 \rightarrow S$

(B) $G_1 \rightarrow G_2 \rightarrow S \rightarrow M$

(C) $S \rightarrow G_1 \rightarrow G_2 \rightarrow M$

(D) $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$

NEET 2019 · Q135

10. Cells in G_0 phase :

(A) exit the cell cycle

(B) enter the cell cycle

(C) suspend the cell cycle

(D) terminate the cell cycle

NEET 2018 · Q123

11. The stage during which separation of the paired homologous chromosomes begins is

(A) Diakinesis

(B) Diplotene

(C) Pachytene

(D) Zygotene

NEET 2017 (Gujarati paper) · Q74

12. At what phase of meiosis homologous chromosomes are separated?

(A) Prophase I

(B) Prophase II

(C) Anaphase I

(D) Anaphase II

NEET 2017 (Gujarati paper) · Q79

13. Which of the following statements is correct with respect to cell cycle?

(A) A cell in G_1 phase has double the amount of DNA than a cell in G_2 phase

(B) Each chromosome has two chromatids in G_1 phase

(C) Nerve cells in adult human are in G_0 state

(D) DNA content of cell remains constant during entire cell cycle

14. During cell growth, DNA synthesis takes place in

- (A) S phase
- (B) G₁ phase
- (C) G₂ phase
- (D) M phase

15. Match the stages of meiosis in Column-I to their characteristic features in Column-II and select the correct option using the codes given below:

Column-I: a. Pachytene; b. Metaphase I; c. Diakinesis; d. Zygotene

Column-II: (i) Pairing of homologous chromosomes; (ii) Terminalization of chiasmata; (iii) Crossing-over takes place; (iv) Chromosomes align at equatorial plate

- (A) a-(iii), b-(iv), c-(ii), d-(i)
- (B) a-(i), b-(iv), c-(ii), d-(iii)
- (C) a-(ii), b-(iv), c-(iii), d-(i)
- (D) a-(iv), b-(iii), c-(ii), d-(i)

16. Spindle fibres attach on to:

- (A) Telomere of the chromosome
- (B) Kinetochore of the chromosome
- (C) Centromere of the chromosome
- (D) Kinetosome of the chromosome

17. Which of the following is not a characteristic feature during mitosis in somatic cells?

- (A) Spindle fibres
- (B) Disappearance of nucleolus
- (C) Chromosome movement
- (D) Synapsis

18. Select the correct option: Column I — (a) Synapsis aligns homologous chromosomes (b) Synthesis of RNA and protein (c) Action of enzyme recombinase (d) Centromeres do not separate but chromatids move towards opposite poles; Column II — (i) Anaphase-II (ii) Zygotene (iii) G₂-phase (iv) Anaphase-I (v) Pachytene

- (A) a-(ii), b-(iii), c-(iv), d-(v)
- (B) a-(ii), b-(i), c-(iii), d-(iv)
- (C) a-(ii), b-(iii), c-(v), d-(iv)
- (D) a-(i), b-(ii), c-(v), d-(iv)

19. A somatic cell that has just completed the S phase of its cell cycle, as compared to gamete of the same species, has:

- (A) four times the number of chromosomes and twice the amount of DNA
- (B) twice the number of chromosomes and twice the amount of DNA
- (C) same number of chromosomes but twice the amount of DNA
- (D) twice the number of chromosomes and four times the amount of DNA

20. In 'S' phase of the cell cycle:

- (A) amount of DNA remains same in each cell
- (B) chromosome number is increased
- (C) amount of DNA is reduced to half in each cell
- (D) amount of DNA doubles in each cell

AIPMT 2014

21. The enzyme recombinase is required at which stage of meiosis:

- (A) Zygotene
- (B) Diplotene
- (C) Diakinesis
- (D) Pachytene

AIPMT 2014

22. During which phase(s) of cell cycle, amount of DNA in a cell remains at 4C level if the initial amount is denoted as 2C?

- (A) G₁ and S
- (B) Only G₂
- (C) G₂ and M
- (D) G₀ and G₁

NEET 2013

23. The complex formed by a pair of synapsed homologous chromosomes is called

- (A) Equatorial plate
- (B) Kinetochore
- (C) Bivalent
- (D) Axoneme

NEET 2013

24. Meiosis takes place in

- (A) Meiocyte
- (B) Conidia
- (C) Gemmule
- (D) Megaspore

AIPMT 2012 Mains

25. Identify the meiotic stage in which the homologous chromosomes separate while the sister chromatids remain associated at their centromeres :

- (A) Metaphase I
- (B) Metaphase II
- (C) Anaphase I
- (D) Anaphase II

AIPMT 2012 Prelims

26. During gamete formation, the enzyme recombinase participates during

- (A) Prophase-II
- (B) Metaphase-I
- (C) Anaphase-II
- (D) Prophase-I

AIPMT 2011 Prelims

27. Select the correct option with respect to mitosis

- (A) Chromosomes move to the spindle equator and get aligned along equatorial plate in metaphase
- (B) Chromatids separate but remain in the centre of the cell in anaphase
- (C) Chromatids start moving towards opposite poles in telophase
- (D) Golgi complex and endoplasmic reticulum are still visible at the end of prophase

AIPMT 2009 Prelims · Q87

28. Synapsis occurs between:

- (A) mRNA and ribosomes
- (B) spindle fibres and centromere
- (C) two homologous chromosomes
- (D) a male and a female gamete

29. At what stage of the cell cycle are histone proteins synthesized in a eukaryotic cell ?

- (A) During entire prophase
- (B) During telophase
- (C) During S-phase
- (D) During G₂ stage of prophase

30. Centromere is required for :

- (A) transcription
- (B) crossing over
- (C) cytoplasmic cleavage
- (D) movement of chromosomes towards poles

Answer key and explanations

1. Answer: (C) Anaphase II

In meiosis the centromere splits only at anaphase II, letting the sister chromatids move to opposite poles. At anaphase I the homologous chromosomes separate while each centromere stays intact.

2. Answer: (C) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

S phase is when DNA replicates, G₂ is when proteins needed for mitosis are made, the quiescent stage (G₀) is an inactive phase, and G₁ is the interval between mitosis and the start of DNA replication. Hence (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii).

3. Answer: (A) 8

In S phase the DNA content doubles but the chromosome number does not change, because each chromosome simply comes to have two sister chromatids. So a cell with 8 chromosomes in G₁ still has 8 after S phase; 16 is the count of chromatids, not chromosomes.

4. Answer: (C) Diakinesis

Terminalisation of chiasmata, the movement of chiasmata toward the chromosome ends, is the distinctive feature of diakinesis, the last stage of prophase I. Crossing over takes place in pachytene and synapsis in zygotene.

5. Answer: (A) S-phase

In animal cells, as DNA replicates in the nucleus during S phase, the centriole duplicates in the cytoplasm. By prophase the duplicated centrioles are already moving to the poles.

6. Answer: (C) Cell is metabolically active, grows but does not replicate its DNA.

G₁ is the interval between mitosis and the start of DNA replication: the cell is metabolically active and keeps growing but does not copy its DNA. DNA replication happens in S phase and nuclear division in M phase.

7. Answer: (B) (a)-iv, (b)-iii, (c)-ii, (d)-i

Synapsis of homologues occurs in zygotene, crossing over in pachytene, chiasmata become visible in diplotene, and terminalisation of chiasmata takes place in diakinesis. Hence synapsis, crossing over, chiasmata, terminalisation is correct.

8. Answer: (C) Diplotene

In diplotene the synaptonemal complex formed in zygotene dissolves and the homologues start to separate, except at the chiasmata. It forms in zygotene, is present through pachytene, and has not formed in leptotene.

9. Answer: (D) G₁ → S → G₂ → M

Interphase runs G₁ (growth), then S (DNA synthesis), then G₂ (preparation for division), followed by the M phase. DNA synthesis comes between the two gap phases, not after G₂.

10. Answer: (A) exit the cell cycle

Cells that stop dividing exit G₁ and enter the inactive G₀ (quiescent) stage, where they stay metabolically active but no longer proliferate unless called on. They have not entered or permanently ended the cycle; NCERT describes this as exiting.

11. Answer: (B) Diplotene

In diplotene the synaptonemal complex dissolves and the homologous chromosomes of each bivalent begin to separate, remaining joined only at the chiasmata. Pairing (synapsis) occurs in zygotene and crossing over in pachytene, while in diakinesis the chiasmata terminalise.

12. Answer: (C) Anaphase I

In anaphase I the homologous chromosomes of each bivalent separate and move to opposite poles while sister chromatids stay together. In anaphase II it is the sister chromatids that separate.

13. Answer: (C) Nerve cells in adult human are in G₀ state

Adult nerve cells have exited the cycle and stay in the quiescent G₀ stage, remaining metabolically active without dividing. DNA doubles in S phase, so a G₂ cell has twice the DNA of a G₁ cell, and chromosomes have two chromatids only after S phase.

14. Answer: (A) S phase

DNA replication happens in the S (synthesis) phase of interphase, doubling the DNA content from 2C to 4C. G₁ and G₂ are growth phases in which the cell makes proteins and organelles but does not replicate DNA, and M phase is division.

15. Answer: (A) a-(iii), b-(iv), c-(ii), d-(i)

Crossing over occurs in pachytene, bivalents align at the equator in metaphase I, chiasmata terminalise in diakinesis and homologues pair (synapsis) in zygotene. Only one code gives all four of these pairs.

16. Answer: (B) Kinetochore of the chromosome

Spindle fibres attach to kinetochores, the disc-shaped protein structures that form on the centromere of each chromatid. The centromere is the constriction carrying the kinetochore; a kinetosome is a basal body of cilia, and telomeres are chromosome ends.

17. Answer: (D) Synapsis

Synapsis, the pairing of homologous chromosomes, occurs only in zygotene of meiosis I. Spindle formation, disappearance of the nucleolus and chromosome movement all occur during mitosis.

18. Answer: (C) a-(ii), b-(iii), c-(v), d-(iv)

Synapsis of homologues occurs in zygotene, RNA and protein synthesis happen in the G₂ phase, recombinase acts during crossing over in pachytene, and in anaphase I centromeres do not split, so the two chromatids of each chromosome move together to one pole.

19. Answer: (D) twice the number of chromosomes and four times the amount of DNA

A gamete is haploid with n chromosomes and C amount of DNA. A somatic cell after S phase still has 2n chromosomes but its DNA has doubled from 2C to 4C, so it has twice the chromosomes and four times the DNA of the gamete.

20. Answer: (D) amount of DNA doubles in each cell

DNA replicates during the S (synthesis) phase, so the DNA content of the cell doubles (2C to 4C). The chromosome number does not increase because each chromosome simply comes to have two sister chromatids joined at the centromere.

21. Answer: (D) Pachytene

Crossing over between non-sister chromatids of homologous chromosomes takes place in pachytene, and it is catalysed by the enzyme recombinase. Synapsis occurs in zygotene, chiasmata become visible in diplotene and terminalisation occurs in diakinesis.

22. Answer: (C) G₂ and M

DNA is 2C in G₁, rises to 4C during S, and stays 4C through G₂ and M until the cell divides into two 2C cells. G₁ and G₀ are 2C, and S is only partly 4C, so the phases that stay at 4C are G₂ and M.

23. Answer: (C) Bivalent

During zygotene the homologous chromosomes pair (synapsis), and each synapsed pair is called a bivalent or tetrad. A kinetochore is the disc on the centromere for spindle attachment, not a chromosome pair.

24. Answer: (A) Meiocyte

Meiosis occurs in specialised diploid cells called meiocytes (e.g. microspore and megaspore mother cells). A megaspore is itself a haploid product of meiosis, and conidia and gemmules are asexual structures.

25. Answer: (C) Anaphase I

In anaphase I the homologous chromosomes move apart while each still has two sister chromatids joined at the centromere. The sister chromatids separate only in anaphase II.

26. Answer: (D) Prophase-I

Recombinase catalyses crossing over between non-sister chromatids of homologous chromosomes during pachytene of prophase I of meiosis. There is no crossing over in metaphase I or in meiosis II.

27. Answer: (A) Chromosomes move to the spindle equator and get aligned along equatorial plate in metaphase

In metaphase the chromosomes move to the spindle equator and line up along the metaphase plate. Chromatids separate and move to opposite poles in anaphase, not telophase, and the Golgi complex and ER are no longer visible at the end of prophase.

28. Answer: (C) two homologous chromosomes

Synapsis is the pairing of homologous chromosomes during zygotene of prophase I of meiosis, aided by the synaptonemal complex. Spindle fibres attach to kinetochores, which is a different event.

29. Answer: (C) During S-phase

Histones are made in the S phase, at the same time as DNA replication, so the newly copied DNA can be packed into nucleosomes straight away. Prophase and telophase are stages of mitosis, and G2 is not part of prophase.

30. Answer: (D) movement of chromosomes towards poles

The centromere carries the kinetochores, where spindle fibres attach. This lets chromatids or chromosomes be pulled towards the poles during anaphase. It has no role in transcription or cytokinesis.

Questions as set in the AIPMT/NEET papers conducted by CBSE and NTA. Answers checked and explanations written by the RankUp team. RankUp is not affiliated with CBSE or NTA.