

What is Chromosome Structure?

Worksheet

A chromosome is a single, long DNA molecule wound around histone proteins and condensed into a compact structure, with a centromere joining sister chromatids and telomeres protecting the ends.

Questions

1. What structure joins two sister chromatids?

- A) Telomere
- B) Centromere
- C) Nucleosome
- D) Chromatin loop

2. What protects the ends of a chromosome from degradation?

- A) Histones
- B) Centromere
- C) Telomeres
- D) Spindle fibers

3. How many chromosomes are in a typical human somatic cell?

- A) 23
- B) 46
- C) 44
- D) 92

4. What is the first level of DNA packaging around proteins?

- A) Chromatin fiber
- B) Condensed chromosome
- C) Nucleosome
- D) Chromatin loop

5. A normal human somatic cell has 46 chromosomes (23 pairs). How many chromosomes does a gamete contain after meiosis?

6. After DNA replication in S phase, each of the 46 chromosomes has two sister chromatids. How many total chromatids (DNA molecules) exist before mitosis begins?

7. A karyotype shows trisomy 21 (Down syndrome): three copies of chromosome 21 instead of the normal two. What is the total chromosome count?

8. Define: What is a centromere?

9. Define: What is a chromatid?

10. Define: What is a telomere?

Answer Key

1. B) Centromere - The centromere is the constriction point holding sister chromatids together.
2. C) Telomeres - Telomeres are repetitive DNA sequences that cap and protect chromosome ends.
3. B) 46 - Human somatic cells are diploid with 46 chromosomes (23 pairs).
4. C) Nucleosome - DNA first wraps around histone proteins to form nucleosomes, the 'beads on a string' structure.
5. Gametes are haploid: half the somatic number. $46 \div 2 = 23$ chromosomes
6. 46 chromosomes 2 chromatids each = 92 chromatids
7. Normal diploid number: 46 One extra chromosome 21: $46 + 1 = 47$ chromosomes
8. The constricted region joining two sister chromatids; it's also the attachment point for spindle fibers.
9. One of two identical copies of a chromosome formed after DNA replication, joined at the centromere.
10. A protective repetitive DNA sequence capping the end of a chromosome, preventing degradation.

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