What is the Nucleus?

Worksheet

The nucleus is the cell's control center - a double-membraned organelle that stores DNA as chromatin, wrapped around histone proteins, and condenses it into chromosomes during cell division.

Questions

1. What is the main function of the nucleus?

A) Produce ATP
B) Store and protect DNA
C) Photosynthesis
D) Digest waste

2. What are histones?

A) Sugars that build chromosomes
B) Proteins that DNA wraps around
C) A type of RNA
D) Enzymes that cut DNA

3. When is DNA most tightly condensed?

A) During interphase
B) During cell division
C) When the cell is resting
D) Never - it stays loose

4. What allows RNA and proteins to pass through the nuclear envelope?

A) Ribosomes
B) Mitochondria
C) Nuclear pores
D) Cell wall gaps

5. A cell is not dividing (interphase). In what form is most of its DNA, and why?

6. A cell is about to divide. What happens to its chromatin, and why is this necessary?

7. Explain why the nucleus has pores in its membrane.

8. Define: What does the nucleus store?

9. Define: What is chromatin?

10. Define: What is a chromosome?

Answer Key

1. B) Store and protect DNA - The nucleus houses and organizes the cell's genetic material.

2. B) Proteins that DNA wraps around - Histones are proteins; DNA coils around them to form nucleosomes.

3. B) During cell division - Chromatin condenses into compact chromosomes for accurate separation during division.

4. C) Nuclear pores - Nuclear pores regulate traffic in and out of the nucleus.

5. During interphase, genes must be accessible so they can be transcribed into RNA. DNA stays as loosely packed chromatin, wound around histones but not tightly coiled. This loose form lets enzymes reach the genes that are currently needed.

6. Chromatin condenses tightly into visible chromosomes. Condensed, compact chromosomes are easier to separate accurately without tangling or breaking. This ensures each daughter cell receives a complete, correct set of DNA.

7. DNA cannot leave the nucleus, but its instructions (mRNA) and needed proteins must cross. Nuclear pores let RNA, ribosomal subunits, and regulatory proteins pass in and out. This lets the nucleus control gene expression while still protecting the DNA itself.

8. A eukaryotic cell's DNA (genetic material).

9. DNA loosely wound around histone proteins; the everyday storage form of DNA.

10. A tightly condensed, coiled form of chromatin visible during cell division.