

# The Function of the Nucleus within the Cell

Textbook pages 122–135

## Before You Read

Which parts of the cell bring in food and get rid of waste? Which parts of a cell control its ability to grow, develop, and make new cells? Record your ideas on the lines below.

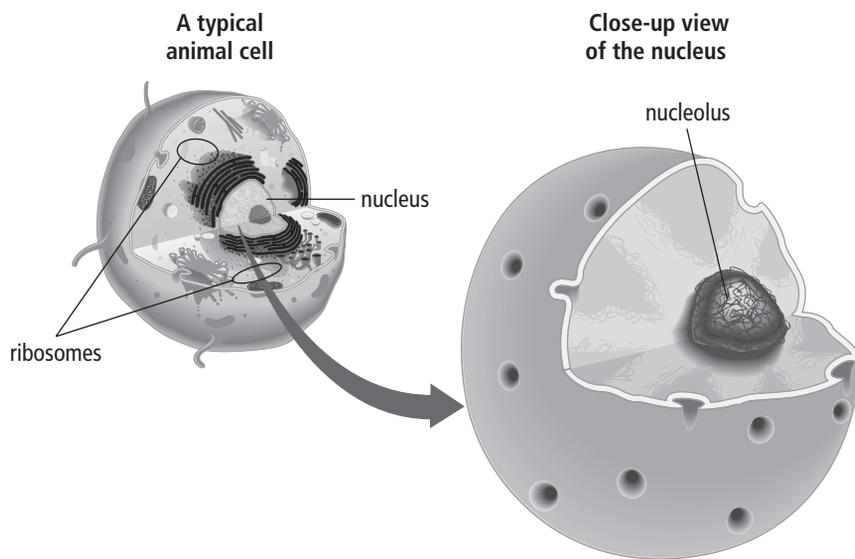
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### Create an Outline

Make an outline of the information in this section. Use the headings in the reading and the labels in the diagrams to help you. Include the boldface terms and any other terms that you think are important.



### What does the cell nucleus do?

The **nucleus** is the control centre of the cell. This means that the nucleus directs and controls all of the cell's activities. These activities include the ability of the cell to grow, develop, and replicate (make copies of itself).

### How does the nucleus perform its job?

In the nucleus, the instructions for how to perform all cell activities are carried in molecules of **DNA**. DNA is a long, two-stranded molecule with a shape like a ladder that has been twisted into a spiral. DNA stores instructions for how to form cells, for the chemicals and structures that cells must make, and for everything that the cell does. DNA also stores genetic material—information that is passed on from one generation to another when organisms reproduce. ✓

### ✓ Reading Check

1. What are the functions of DNA?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**How is DNA related to chromosomes and genes?**

Strands of DNA are packaged tightly into structures called **chromosomes**. Each type of organism has a specific number of chromosomes. For example, humans have 46 chromosomes that are arranged in 23 pairs. One of these pairs helps determine if a person will be born as a male or a female.

Genes are found at specific places on a chromosome. **Genes** are small segments of DNA that carry instructions for making proteins. **Proteins** are molecules that all the cells of the body need in order to work properly. Some proteins carry out cell functions. Other proteins are parts of cell structures. There are as many as 100 000 proteins in the human body. ✓

**Where are proteins made?**

Proteins are made in the cell by **ribosomes**. Ribosomes are made by a large structure in the nucleus called the **nucleolus**.

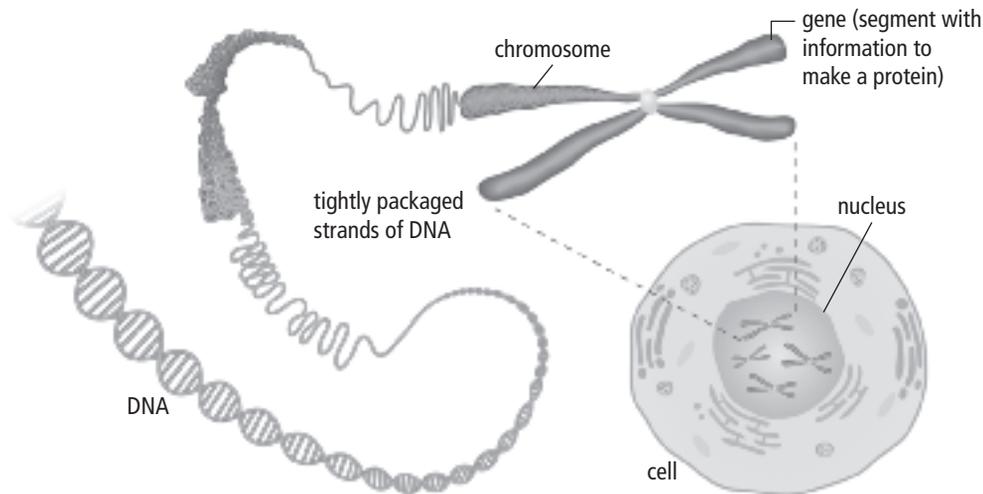
✓ **Reading Check**

2. Why are proteins important to cells?

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This illustration shows DNA packaged in a chromosome, and the chromosome in the nucleus.

Use with textbook pages 123–129.

## Inside the nucleus

### Vocabulary

23	nucleolus
46	nucleus
chromosomes	number
DNA	proteins
genes	ribosomes
genetic	type
molecule	

Use the terms in the vocabulary box to fill in the blanks. Each term may be used more than once. You will not need to use every term.

- The \_\_\_\_\_ directs and controls the ability of the cell to grow, develop, and replicate (make copies of itself).
- The instructions for how to carry out all cell activities are carried in \_\_\_\_\_, which is a long, two-stranded \_\_\_\_\_ with a shape like a ladder that has been twisted into a spiral shape.
- \_\_\_\_\_ stores instructions for everything that the cell does. It also stores \_\_\_\_\_ material—information that is passed on from one generation to another when organisms reproduce.
- Strands of DNA are packaged tightly into structures called \_\_\_\_\_.
- Each type of organism has a specific \_\_\_\_\_ of chromosomes.
- Humans have \_\_\_\_\_ chromosomes that are arranged in \_\_\_\_\_ pairs. One of these pairs helps determine if a person will be born as a male or a female.
- \_\_\_\_\_ are small segments of DNA that carry instructions for making proteins. They are found at specific places on \_\_\_\_\_.
- Proteins are a type of \_\_\_\_\_ that all the cells of the body need in order to work properly.
- Proteins are made in the cell by \_\_\_\_\_, which are made by a large structure in the nucleus called the \_\_\_\_\_.

Use with textbook pages 125–130.

## The control centre of the cell

Use the diagram to help you answer question 1.



1. Describe the structure of DNA.

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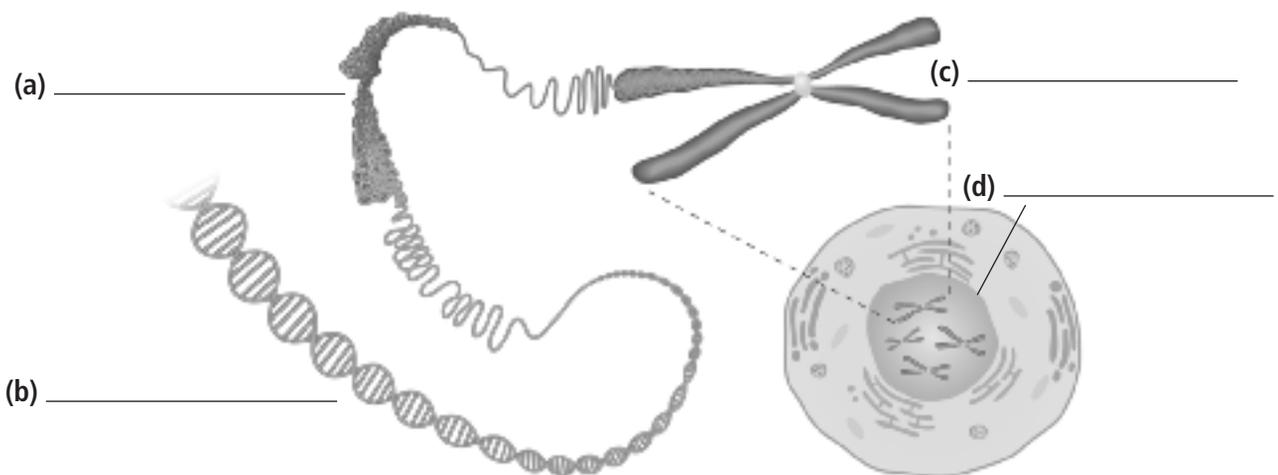
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Fill in the blanks with the correct terms. Then use your answers to questions 2–5 to label the diagram below.

2. The control centre of the cell \_\_\_\_\_
3. Molecule containing instructions for everything the cell does \_\_\_\_\_
4. Tightly packaged structures of DNA \_\_\_\_\_
5. Segment with information to make a protein \_\_\_\_\_



Use with textbook pages 131–132.

## True or false?

Read the statements given below. If the statement is true, write “T” on the line in front of the statement. If it is false, write “F” and rewrite the statement to make it true.

1. \_\_\_\_\_ The nucleolus directs and controls all of the cell’s activities.

\_\_\_\_\_

2. \_\_\_\_\_ Instructions for how to carry out all cell activities are carried in molecules of DNA.

\_\_\_\_\_

\_\_\_\_\_

3. \_\_\_\_\_ DNA stores information that is passed on from one generation to another when organisms reproduce.

\_\_\_\_\_

\_\_\_\_\_

4. \_\_\_\_\_ Humans have 46 pairs of chromosomes.

\_\_\_\_\_

5. \_\_\_\_\_ One pair of ribosomes helps determine if a person will be born as a male or female.

\_\_\_\_\_

\_\_\_\_\_

6. \_\_\_\_\_ The nucleolus makes ribosomes.

\_\_\_\_\_

7. \_\_\_\_\_ Ribosomes make proteins.

\_\_\_\_\_

8. \_\_\_\_\_ Genes make chromosomes.

\_\_\_\_\_

Use with textbook pages 121–132.

## The function of the nucleus within the cell

Match each Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.

Term	Descriptor
1. _____ chromosome	<b>A.</b> segment of DNA located at a specific place on a chromosome
2. _____ DNA	<b>B.</b> controls all the activities within a cell
3. _____ gene	<b>C.</b> a molecule found in the cell nucleus that carries genetic information
4. _____ nucleolus	<b>D.</b> essential materials needed to carry out cell activities
5. _____ nucleus	<b>E.</b> makes proteins
6. _____ proteins	<b>F.</b> makes ribosomes
	<b>G.</b> tightly packed structure of DNA

Circle the letter of the best answer.

7. Proteins are made by
- A. the ribosomes
  - B. the chromosomes
  - C. the DNA
  - D. the nucleolus
8. Approximately how many proteins are in the human body?
- A. 100
  - B. 1000
  - C. 10 000
  - D. 100 000

9. Which of the following are functions of proteins?

I.	carry out cell functions
II.	form parts of cell structures
III.	control all of the cells functions

- A. I and II only
  - B. I and III only
  - C. II and III only
  - D. I, II, and III
10. What instructions do genes carry?
- A. to make proteins
  - B. to determine whether a person will be born male or female
  - C. to pass information from one generation to the next
  - D. to store genetic material
11. How many chromosomes do humans have?
- A. chromosomes are too small to be counted
  - B. between 90 000 and 100 000
  - C. 92 arranged in 46 pairs
  - D. 46 arranged in 23 pairs
12. Which of the following best describes DNA?

I.	twisted in a spiral shape
II.	shaped like a ladder
III.	long, two-stranded molecule

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II, and III