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Section 9.1 Cellular Growth (continued)

Main Idea

Cell Size Limitations

I found this information on page _____
 SE, pp. 244–246
 RE, pp. 93–94

Details

Analyze movement of nutrients and wastes as cell size increases. Accept all reasonable responses.

If a <u>cell</u> gets too <u>large</u> .	transport of <u>nutrients</u> and <u>wastes</u> by <u>diffusion</u> slows down.	Therefore, cells <u>divide</u> before <u>they become too large</u> .
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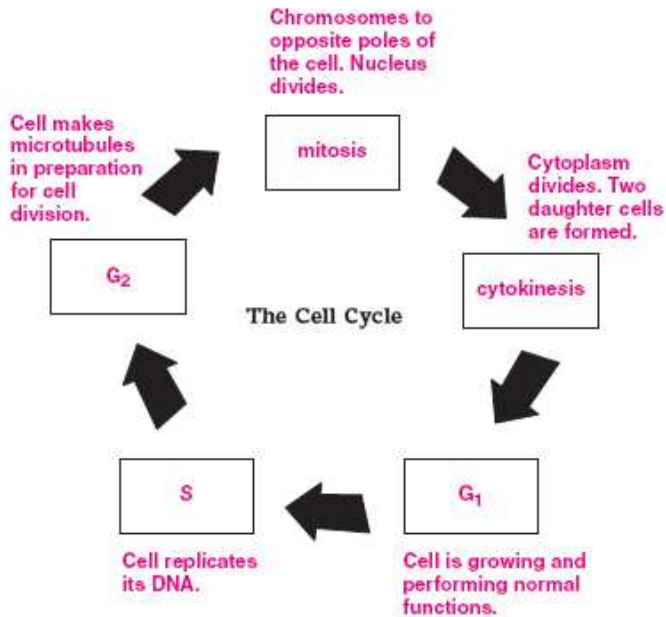
Describe how surface area-to-volume ratio relates to cell size by completing the sentence.

As a cell grows larger, its volume increases more rapidly than its surface area, thus surface area-to-volume ratio decreases.

The Cell Cycle

I found this information on page _____
 SE, pp. 246–247
 RE, pp. 94–95

Complete the diagram of the cell cycle. Describe the main events in each stage.



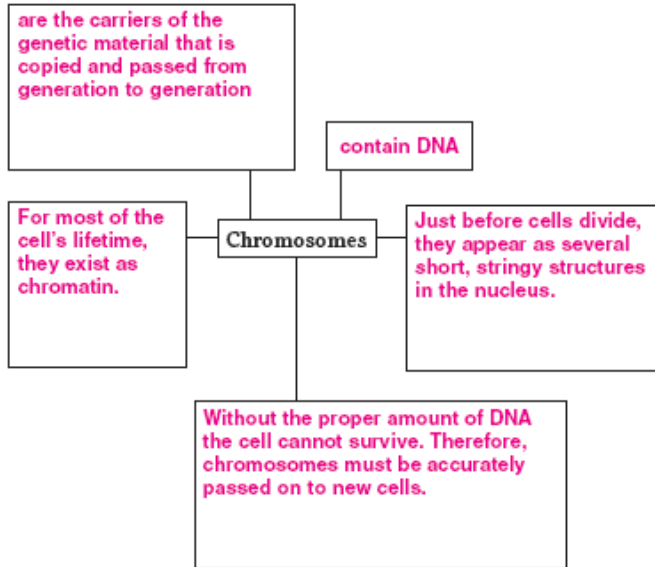
Section 9.1 Cellular Growth (continued)

Main Idea

I found this information on page _____
SE, pp. 246–247
RE, pp. 94–95

Details

Organize information about chromosomes in the concept web. Accept all reasonable responses.



Identify four events that occur in a cell during interphase.

1. cell grows
2. cell carries on metabolism
3. cell duplicates chromosomes
4. cell prepares for division

SUMMARIZE

Analyze the relationship between cell size and the stages of the cell cycle.

Cells must stay small to function properly. Cells use the cell cycle to stay small. Actively growing cells are in interphase. When a growing cell reaches its maximum size, it keeps itself small by entering mitosis and cytokinesis and dividing into two smaller daughter cells.

Cellular Reproduction

Section 9.2 Mitosis and Cytokinesis

Main Idea

Details

Scan Section 2 of the chapter. From the headings and illustrations list the four stages of mitosis.

1. **prophase** _____
2. **metaphase** _____
3. **anaphase** _____
4. **telophase** _____

Review Vocabulary

Use your book or dictionary to define life cycle.

life cycle

the sequence growth and development stages that an organism goes through during its life

New Vocabulary

Use your book or dictionary to define the following terms.

anaphase

the third stage of mitosis, during which the centromeres separate and the chromatids are pulled apart

centromere

structure at the center of the chromosome to which the sister chromatids attach

metaphase

the second stage of mitosis, during which the sister chromatids line up along the equator of the cell

prophase

the first stage of mitosis, during which the chromatid condenses into chromosomes

sister chromatid

structures in a chromosome containing identical copies of the DNA

spindle apparatus

structure that helps move and organize the chromosomes during mitosis; made of spindle fibers, centrioles, and aster fibers

telophase

the final stage of mitosis, during which the chromosomes migrate to the poles of the cell and then decondense

Name _____ Date _____

Section 9.2 Mitosis and Cytokinesis (continued)

Main Idea

Details

Mitosis

I found this information on page _____

SE, p. 248
RE, p. 96

The Stages of Mitosis

I found this information on page _____

SE, pp. 248–251
RE, pp. 96–98

Identify two functions of mitosis in animals.

Function of mitosis in animals

- wound repair
- growth of organism to adult size

Model the stages of mitosis and the process of cytokinesis. Draw and label a cell in each stage, name each stage, and describe what is happening. **Accept all reasonable responses.**

Name of Phase	Sketch of Cell	Description
prophase		chromatin coils to form chromosomes
metaphase		chromosomes move to the center of the cell
anaphase		centromeres split and sister chromatids are pulled to the opposite sides of the cell
telophase		two new nuclei are formed and a double membrane begins to form between them
cytokinesis		cell's cytoplasm divides and separates into two new identical cells

Summarize the similarities and differences of any two phases of mitosis.

Accept all reasonable responses.

Section 9.2 Mitosis and Cytokinesis (continued)

Main Idea

I found this information on page _____
 SE, pp. 248–251
 RE, pp. 96–98

Details

Summarize the function of each structure in mitosis.

centromeres: part of chromosome to which spindle apparatus attaches

microtubules: tube-like structures that shorten and pull the chromosomes to opposite poles of the cell

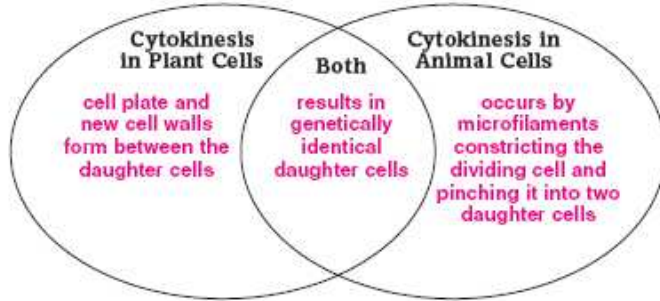
motor proteins: help microtubules pull chromosomes to poles of the cell

spindle apparatus: attaches to and moves the chromosomes

Cytokinesis

I found this information on page _____
 SE, p. 252
 RE, p. 99

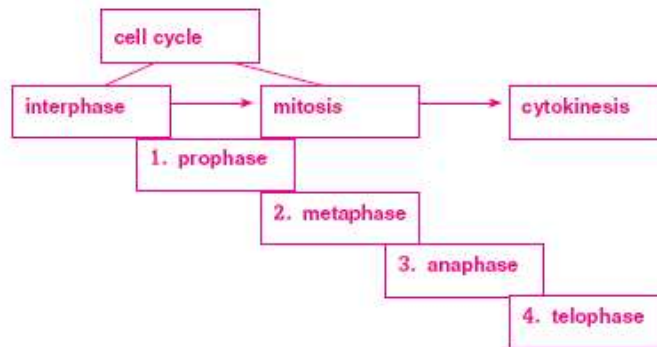
Compare and contrast cytokinesis in plant and animal cells.



SUMMARIZE

Create a concept map describing the stages of the cell cycle.

Accept all reasonable responses.



Cellular Reproduction

Section 9.3 Cell Cycle Regulation

Main Idea

Details

Scan the illustrations and read the captions in Section 3 of the chapter. Write three facts you discovered about stem cells.

1. **Accept all reasonable responses.** _____
2. _____
3. _____

Review Vocabulary

Use your book or dictionary to define nucleotide.

nucleotide

subunit that makes up RNA and DNA _____

New Vocabulary

Use your book or dictionary to define the following term.

apoptosis

process of programmed cell death _____

cancer

uncontrolled growth and division of cells; results from a failure of cell cycle regulation _____

carcinogen

substance known to cause cancer _____

cyclin

protein that binds to cyclin-dependent kinases to regulate the activities of the cell cycle _____

cyclin-dependent kinase

enzymes that are activated by cyclins and serve to regulate the activities of the cell cycle _____

stem cell

unspecialized cells that have the potential to develop into specialized cells _____

Name _____ Date _____

Section 9.3 Cell Cycle Regulation (continued)

Main Idea

Normal Cell Cycle

I found this information on page _____

SE, pp. 253–254
RE, pp. 100–101

Abnormal Cell Cycle

I found this information on page _____

SE, pp. 254–255
RE, pp. 101–102

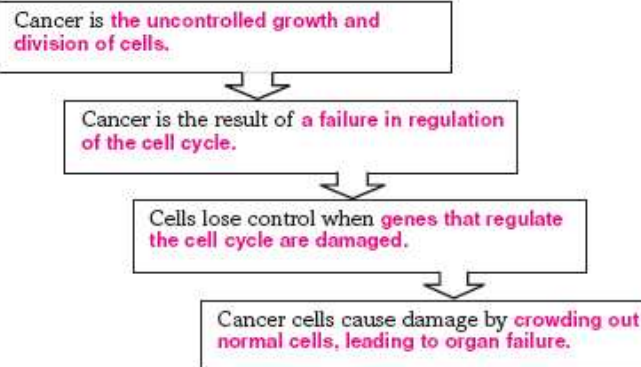
Details

Summarize how cells regulate the cell cycle. Choose from the list of words to complete the paragraph.

- checkpoints
- cyclin/CDK
- cyclins
- cyclin-dependent kinases
- cytokinesis
- G₁ stage
- G₂ stage
- mitosis
- S stage

Cells use cyclins and cyclin-dependent kinases to control the cell cycle. Different combinations of cyclin/CDK start the cell cycle at different checkpoints. The cell also uses cyclin/CDK to monitor the cycle for quality control. In G₁ stage, the cell checks the DNA for damage. If there is any damage, the cycle won't proceed to S stage. In mitosis, if the spindle apparatus is malfunctioning, the cycle won't proceed to cytokinesis.

Sequence the causes and effects of cancer by completing the flow chart below:



Identify four environmental factors that cause cancer.

1. cigarette smoke
2. asbestos
3. X rays
4. ultraviolet radiation

Name _____ Date _____

Section 9.3 Cell Cycle Regulation (continued)

Main Idea

Apoptosis

I found this information on page _____

SE, p. 256
RE, p. 102

Details

Summarize information about apoptosis.

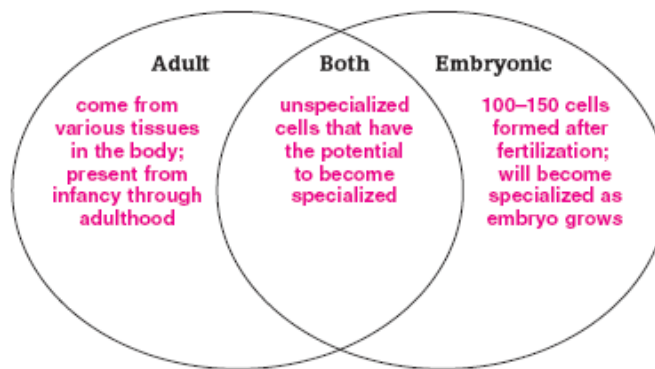
Apoptosis is a process of programmed cell death.	Organisms use apoptosis to destroy cells that are no longer needed.	Two processes that use apoptosis: 1. trees losing their leaves in autumn 2. development of hands and feet
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Stem Cells

I found this information on page _____

SE, pp. 256–257
RE, p. 102

Compare and contrast adult and embryonic stem cells by writing characteristics in the Venn diagram.



CONNECT

A classmate thinks that cancer and apoptosis are both harmful to organisms. Do you agree or disagree? Explain your reasoning.

Accept all reasonable responses. Only cancer is harmful to an organism. Apoptosis is a normal process in which cells that are not needed by an organism die in a controlled process.