MAINIDEA

Cells grow until they reach their size limit, then they either stop growing or divide.

K *What I Know*	**W** *What I Want to Find Out*	**L** *What I Learned*

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Essential Questions

- Why are cells relatively small?
- What are the primary stages of the cell cycle?
- What are the stages of interphase?

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Vocabulary

Review

- selective permeability

New

- cell cycle
- interphase
- mitosis
- cytokinesis
- chromosome
- chromatin

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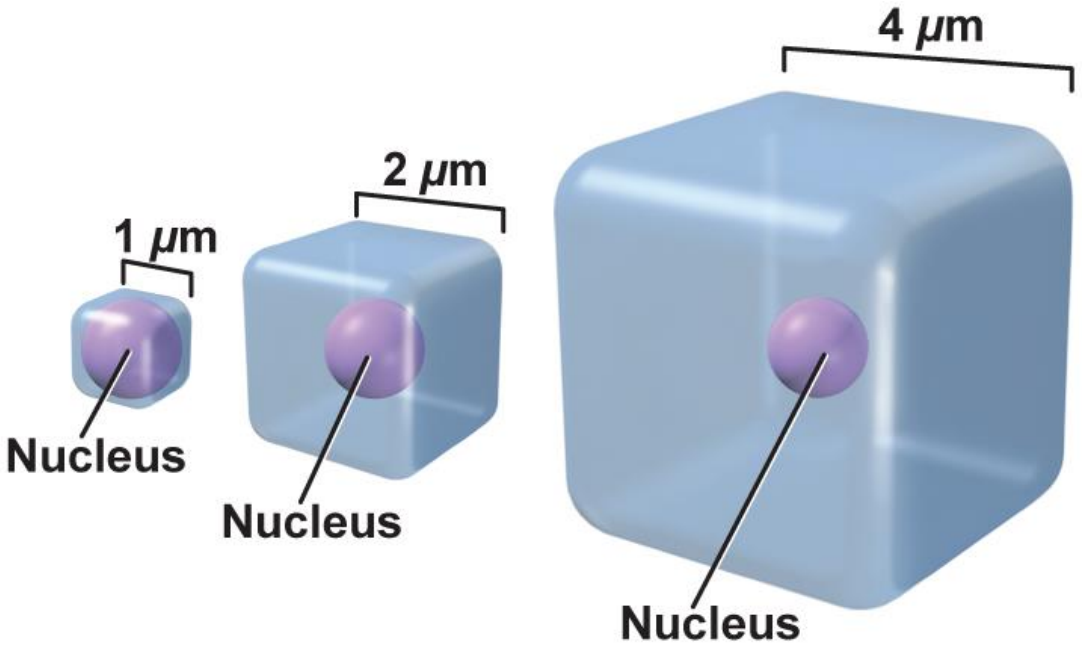
Cell Size Limitations

Ratio of surface area to volume

- Several factors influence cell size.
- Surface area is the area covered by the plasma membrane.
- Volume is the space taken up by the inner contents of the cell.
- Cells with a higher surface area: volume ratios can sustain themselves more easily.



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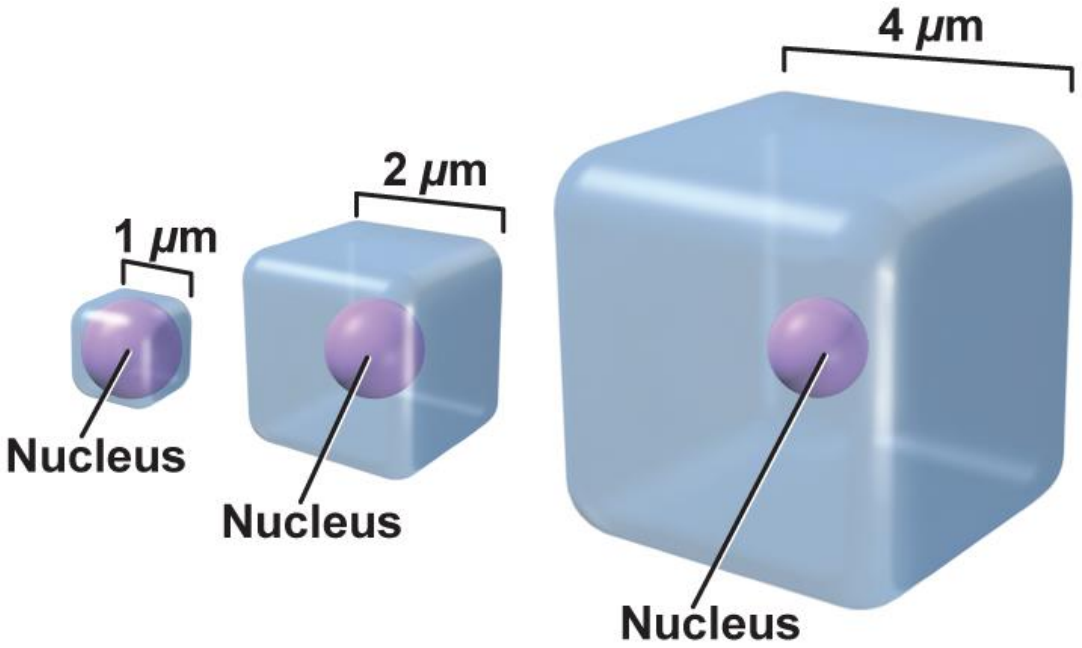
Cell Size Limitations

Ratio of surface area to volume

- Smaller cells can transport substances more easily
  - Diffusion is inefficient over longer distances
  - Cytoskeleton less efficient when cells are larger
- Cellular communication more efficient in smaller cells



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The Cell Cycle

- Once a cell reaches its size limit it must either stop growing or divide.
- Cells reproduce by a cycle of growing and dividing called the cell cycle.
- Each time a cell goes through one complete cycle, it becomes two cells.
- Three main stages of the cell cycle:
  - Interphase: stage during which the cells grows, carries out cellular functions, and replicates its DNA.
  - Mitosis: the cell's nucleus and nuclear material divide; has four substages.
  - Cytokinesis: cell's cytoplasm divides, creating two new cells.

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Mitosis

BrainPOP

FPO

Add link to BrainPOP from page 246 here.

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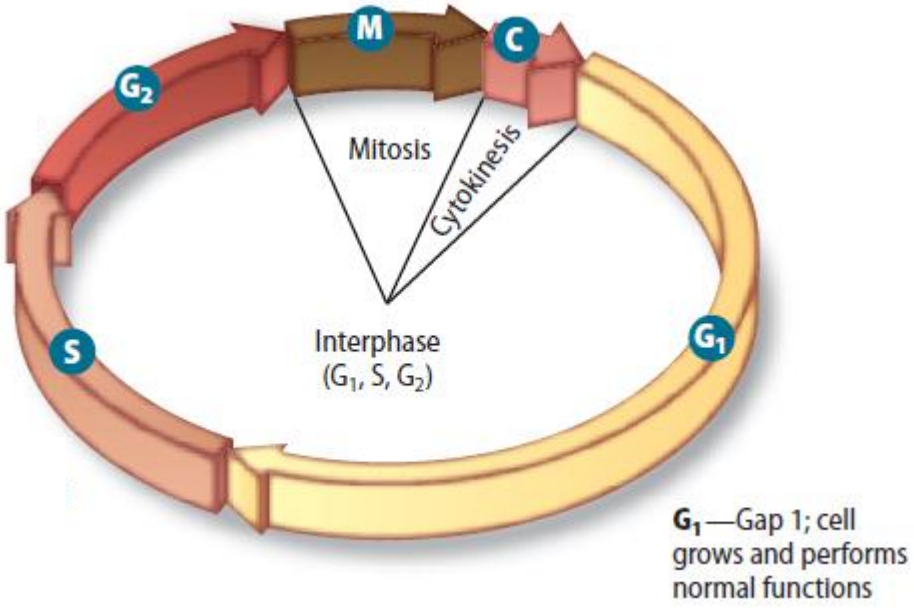
The Cell Cycle

The stages of interphase

- Interphase has three substages: G_1, S, and G_2 .
- During G_1, the cell is growing and carrying out normal cellular functions.



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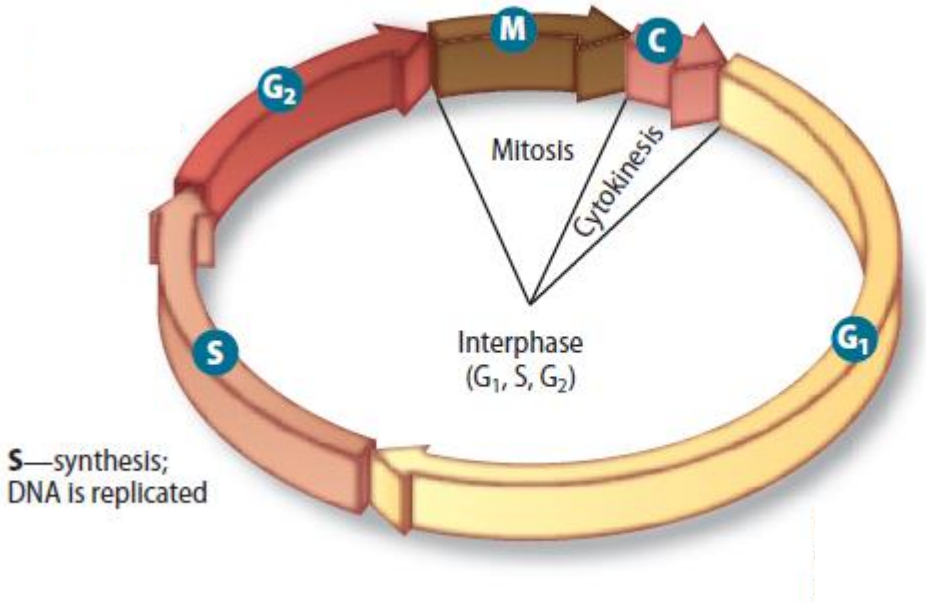
The Cell Cycle

The stages of interphase

- During S, the cell copies its DNA in preparation for cell division.
  - Chromosomes are the structures that contain the genetic material.
  - Chromatin is the relaxed form of DNA in the cell's nucleus.



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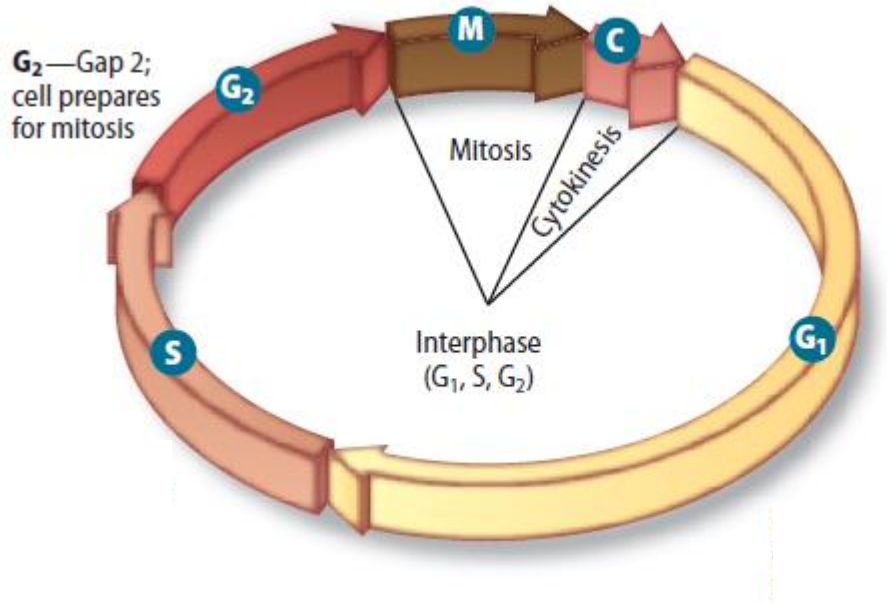
The Cell Cycle

The stages of interphase

- The G_2 stage follows the S stage and is the period when the cell prepares for the division of its nucleus.



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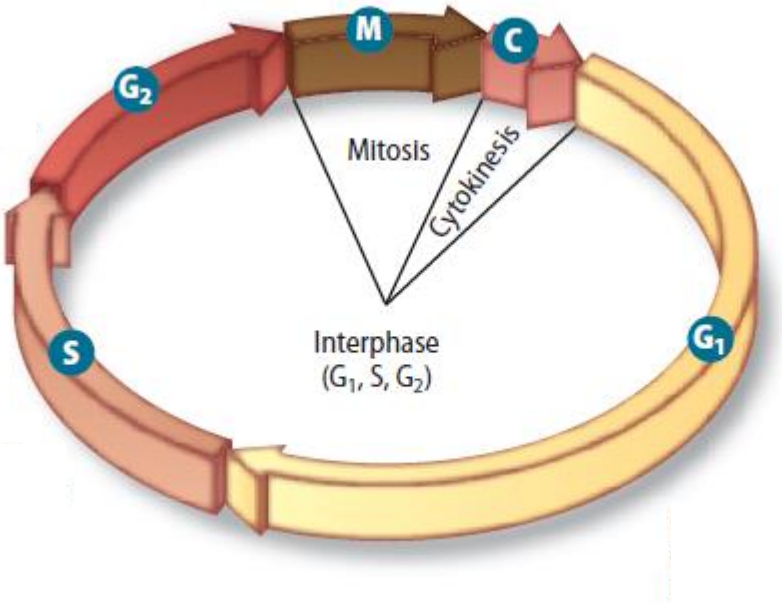
The Cell Cycle

Mitosis and cytokinesis

- During mitosis, a cell's nuclear material divides and separates into opposite sides of the cell.
- During cytokinesis, the cell divides into two daughter cells.



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The Cell Cycle

Prokaryotic cell division

- Eukaryotic cells divide via the cell cycle.
- Prokaryotic cells divide via binary fission.

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Review

Essential Questions

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- chromosome
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