

***Human Anatomy, 7e (Martini/Timmons/Tallitsch)***  
**Chapter 2 Foundations: The Cell**

2.1 Multiple-Choice Questions

- 1) The study of the structure and function of cells is
- A) biochemistry.
  - B) gross anatomy.
  - C) cytology.
  - D) electron microscopy.
  - E) phrenology.

Answer: C

Section Title: Introduction

Learning Outcome: 2.1

Bloom's Taxonomy: Knowledge

- 2) Which of the following shows the fine structure of a plasmalemma (cell membrane) and the details of intracellular structures?

- A) light microscopy
- B) transmission electron microscopy
- C) scanning electron microscopy
- D) ultrasound
- E) magnetic resonance imaging

Answer: B

Section Title: The Study of Cells

Learning Outcome: 2.2

Bloom's Taxonomy: Knowledge

- 3) Cells float in a watery medium called

- A) cytoplasm.
- B) extracellular fluid.
- C) cytosol.
- D) cellular fluid.
- E) None of the answers are correct.

Answer: B

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

4) Which of the following describes phospholipids in the plasmalemma?

- A) The lipid tails are hydrophobic.
- B) The lipid tails are hydrophilic.
- C) The phosphate heads are hydrophobic.
- D) The tails are at the surface.
- E) The heads are on the inside.

Answer: A

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

5) The viscous, superficial coating on the outer surface of the plasmalemma is called the

- A) glycocalyx.
- B) pseudopodia.
- C) inclusions.
- D) tubulin.
- E) cytosol.

Answer: A

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

6) How do peripheral proteins contribute to the structure of the plasmalemma?

- A) They form a structural element by being embedded in the plasmalemma.
- B) Some form channels to permit passage of water molecules, ions, and small water-soluble compounds into and out of the cell.
- C) Some may function as catalysts or receptor sites to signal through the plasmalemma.
- D) They are attached to only one side of the membrane.
- E) None of the answers are correct.

Answer: D

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Comprehension

7) Substances that enter the cell usually do so through the

- A) cholesterol.
- B) glycocalyx.
- C) glycolipids.
- D) integral proteins.
- E) peripheral proteins.

Answer: D

Section Title: Cellular Anatomy

Learning Outcome: 2.4

Bloom's Taxonomy: Knowledge

- 8) The general functions of the plasmalemma include
- A) physical isolation of the cell contents from the extracellular fluid.
  - B) regulation of exchange of materials with the environment.
  - C) sensitivity to changes in the extracellular fluid.
  - D) structural support of the cell.
  - E) All of the answers are correct.

Answer: E

Section Title: Cellular Anatomy

Learning Outcome: 2.4

Bloom's Taxonomy: Knowledge

- 9) Which statement describes how the plasmalemma is used in communication and sensitivity?
- A) It serves as a storage site for large amounts of proteins for future use by the cell.
  - B) It effectively isolates the cytoplasm from the surrounding fluid environment.
  - C) It contains gated channels that can be opened or closed to regulate the passage of materials.
  - D) It acts as a site for the attachment of glycoproteins and glycolipids, which act as receptors for molecules present in the extracellular fluid.
  - E) It provides for specialized connections between neighboring cells.

Answer: D

Section Title: Cellular Anatomy

Learning Outcome: 2.4

Bloom's Taxonomy: Comprehension

- 10) Because the plasmalemma blocks some substances and allows others through, it is referred to as being
- A) structurally rigid.
  - B) impermeable.
  - C) selectively permeable.
  - D) freely permeable.
  - E) both structurally rigid and selectively permeable.

Answer: D

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

- 11) Which of the following is a passive process for material movement across a plasmalemma?
- A) bulk flow
  - B) endocytosis
  - C) exocytosis
  - D) active transport
  - E) facilitated diffusion

Answer: E

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

12) An active process for transporting liquid across a plasmalemma is

- A) phagocytosis.
- B) pinocytosis.
- C) bulk flow.
- D) exchange pumps.
- E) None of the answers are correct.

Answer: B

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

13) Iron ions and cholesterol are brought into the cell by the process of

- A) pinocytosis.
- B) phagocytosis.
- C) receptor-mediated pinocytosis.
- D) bulk transport.
- E) None of the answers are correct.

Answer: C

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

14) How does oxygen pass through the plasmalemma?

- A) across the membrane's lipid portion
- B) through membrane channels
- C) always by passive processes
- D) always by active transport
- E) both through membrane channels and always by passive processes

Answer: A

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

15) Processes involved in the movement of substances across a membrane at the expense of ATP are classified as

- A) osmosis.
- B) diffusion.
- C) filtration.
- D) facilitated diffusion.
- E) active transport.

Answer: E

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

16) What is the term for water movement across a membrane from high concentration to low concentration?

- A) facilitated diffusion
- B) osmosis
- C) filtration
- D) active transport
- E) None of the answers are correct.

Answer: B

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

17) The two major cations in the body are

- A) calcium and sodium.
- B) chloride and bicarbonate.
- C) sodium and chloride.
- D) sodium and potassium.
- E) magnesium and chloride.

Answer: D

Section Title: Cellular Anatomy

Learning Outcome: 2.6

Bloom's Taxonomy: Knowledge

18) The extracellular fluid contains high amounts of

- A) potassium ions.
- B) dissolved and suspended proteins.
- C) amino acids.
- D) sodium ions.
- E) lipids.

Answer: D

Section Title: Cellular Anatomy

Learning Outcome: 2.6

Bloom's Taxonomy: Knowledge

19) Which of the following statements describes cytosol?

- A) The term encompasses all material inside the cell.
- B) The fluid content of the cell.
- C) It contains much less protein than the extracellular fluid.
- D) It contains large amounts of carbohydrates.
- E) It includes the intracellular structures known as organelles.

Answer: B

Section Title: Cellular Anatomy

Learning Outcome: 2.6

Bloom's Taxonomy: Knowledge

20) \_\_\_\_\_ are common inclusions in the cytosol of fat cells.

- A) Glycogen granules
- B) Suspended proteins
- C) Lipid droplets
- D) Dissolved proteins
- E) Metabolic enzymes

Answer: C

Section Title: Cellular Anatomy

Learning Outcome: 2.6

Bloom's Taxonomy: Knowledge

21) Which of the following is another name for cytosol?

- A) intracellular fluid
- B) gelatin
- C) interstitial fluid
- D) extracellular fluid
- E) cytoplasm

Answer: A

Section Title: Cellular Anatomy

Learning Outcome: 2.6

Bloom's Taxonomy: Knowledge

22) Protein producing organelles are the

- A) nucleus.
- B) Golgi apparatus.
- C) mitochondria.
- D) lysosomes.
- E) ribosomes.

Answer: E

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Knowledge

23) Which of the following is a nonmembranous organelle?

- A) Golgi apparatus
- B) microvilli
- C) nucleolus
- D) centriole
- E) All of the answers are correct.

Answer: D

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Knowledge

- 24) The functions of microtubules include
- A) holding open gated channels in the plasmalemma.
  - B) changing the shape of the cell.
  - C) moving organelles around the cell.
  - D) forming small, finger-shaped projections from the plasmalemma.
  - E) changing the shape of the cell and moving organelles around the cell.

Answer: E

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Knowledge

- 25) Which of the following is a function of microtubules?
- A) being part of the spindle apparatus
  - B) provide strength to the cell
  - C) stabilize position of organelles
  - D) attaches the plasmolemma to the underlying cytoplasm
  - E) assist in DNA replication

Answer: A

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Knowledge

- 26) Which of the following is located in the cytoplasm?
- A) DNA
  - B) chromatin
  - C) envelope
  - D) nucleolus
  - E) centriole

Answer: E

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Knowledge

- 27) What is the major function of ribosomes?
- A) manufacture proteins
  - B) produce ATP
  - C) package proteins
  - D) move through the extracellular fluid
  - E) reproduce themselves

Answer: A

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Knowledge

28) Thick filaments

- A) form intermediate filaments to stabilize organelle position.
- B) are stable structures that do not change once formed.
- C) are called neurofilaments in neurons.
- D) interact with actin to produce contractions.
- E) form the spindle apparatus during cell division.

Answer: D

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Comprehension

29) If a cell lacked centrioles, it would be unable to

- A) direct the movement of chromosomes during cell division.
- B) move through the surrounding fluid.
- C) replicate its own DNA.
- D) manufacture proteins.
- E) move fluids or solutes across the plasmalemma.

Answer: A

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Comprehension

30) Which statement describes cytoplasmic vesicles?

- A) They are formed by all types of endocytosis.
- B) Contents are toxic to the cell.
- C) They never contain extracellular fluids.
- D) They only contain solids.
- E) They have a membrane that is very different from the plasmalemma.

Answer: A

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

31) Which cellular operation occurs in the smooth endoplasmic reticulum?

- A) regulation of protein synthesis
- B) synthesis of RNA
- C) DNA replication leading to cell division
- D) manufacture of carbohydrates and lipids
- E) synthesis of ribosomes via nucleoli

Answer: D

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge



32) The nucleus of a cell

A) is completely enclosed with no way in or out.

B) contains only the DNA.

C) is surrounded by a double membrane.

D) it contains large proteins that form chromosomes and are the genetic material for the cell.

E) has all of the above attributes.

Answer: C

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

33) Which of the following is a vesicle?

A) communicating junction

B) lysosome

C) tight junction

D) anchoring junction

E) hyaluronan

Answer: B

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

34) Manufactured proteins from the rough endoplasmic reticulum are delivered to the Golgi apparatus by

A) cisternae.

B) bulk transport.

C) transport vesicles.

D) ribosomal RNA.

E) None of the answers are correct.

Answer: C

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

35) Recycling and changing the plasmalemma is the major function of which organelle?

A) lysosomes

B) Golgi apparatus

C) peroxisomes

D) mitochondria

E) cytoskeleton

Answer: B

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

36) Which organelle determines the structural and functional characteristics of the cell by controlling RNA and protein synthesis?

- A) endoplasmic reticulum
- B) Golgi apparatus
- C) ribosomes
- D) mitochondria
- E) nucleus

Answer: E

Section Title: Cellular Anatomy

Learning Outcome: 2.9

Bloom's Taxonomy: Knowledge

37) Which of the following allows the nucleus to produce ribosomes?

- A) nuclear envelope
- B) nuclear pore
- C) nucleoplasm
- D) nucleosome
- E) nucleolus

Answer: E

Section Title: Cellular Anatomy

Learning Outcome: 2.9

Bloom's Taxonomy: Knowledge

38) Communicating junctions are found in high quantities in the

- A) heart.
- B) brain.
- C) lungs.
- D) eyes.
- E) bones.

Answer: A

Section Title: Intercellular Attachment

Learning Outcome: 2.10

Bloom's Taxonomy: Knowledge

39) In correct order from beginning to end, cells undergoing mitosis pass through

- A) anaphase, prophase, interphase, and telophase.
- B) metaphase, prophase, telophase, and anaphase.
- C) interphase, telophase, metaphase, and prophase.
- D) prophase, metaphase, anaphase, and telophase.
- E) telophase, anaphase, metaphase, and prophase.

Answer: D

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

40) Cytokinesis

- A) usually begins after telophase.
- B) separates the daughter cells after mitosis.
- C) is the last phase of mitosis.
- D) completes the process of mitosis.
- E) All of the answers are correct.

Answer: B

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

41) Which of the following events occur during metaphase?

- A) Chromosomes align at the equator of the cell.
- B) Microtubules form the spindle apparatus.
- C) Daughter chromosomes move toward the opposite ends of the cell.
- D) Centrioles move apart.
- E) All of the answers are correct.

Answer: A

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

42) Which of the following processes occurs during interphase?

- A) Chromatid pairs separate.
- B) Chromatin condenses into chromosomes.
- C) DNA replicates.
- D) A cleavage furrow forms.
- E) The mitotic spindle forms.

Answer: C

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Comprehension

43) Which of the following is true of cell division?

- A) Its importance diminishes after an individual grows to maturity.
- B) It requires accurate duplication (replication) of the genetic material.
- C) Each dividing cell produces four cells at a time.
- D) It requires mitosis only to produce two daughter cells.
- E) Protein synthesis in preparation for division occurs during the S phase of interphase.

Answer: B

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Comprehension

- 44) Which sequence correctly traces the steps of DNA replication?
- (1) Weak bonds between nitrogenous bases of the DNA are disrupted.
  - (2) DNA strands unwind.
  - (3) DNA polymerase binds to exposed nitrogenous bases.
  - (4) Ligases link together short complementary chains of nucleotides.
  - (5) Nitrogenous bases of the DNA strand attract complementary nucleotides.
- A) 1, 2, 3, 4, 5  
B) 1, 2, 3, 5, 4  
C) 5, 4, 3, 2, 1  
D) 1, 3, 5, 2, 4  
E) 4, 2, 3, 1, 5

Answer: B

Section Title: Cellular Anatomy

Learning Outcome: 2.11

Bloom's Taxonomy: Comprehension

## 2.2 Fill-in-the-Blank Questions

- 1) The fundamental units of all plant and animal tissues are \_\_\_\_\_.

Answer: cells

Section Title: Introduction

Learning Outcome: 2.1

Bloom's Taxonomy: Knowledge

- 2) A plasmalemma separates the cell contents, or \_\_\_\_\_, from the extracellular fluid.

Answer: cytoplasm

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

- 3) Peripheral proteins are attached to the surface of the plasmalemma, while \_\_\_\_\_ proteins are embedded within the membrane.

Answer: integral

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

- 4) The membrane of a cell is composed of a \_\_\_\_\_ bilayer.

Answer: phospholipid

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

- 5) A phospholipid has two functionally different areas: hydrophilic heads and \_\_\_\_\_ tails.

Answer: hydrophobic

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

6) "Little organs" inside a cell that have specialized functions are called \_\_\_\_\_.

Answer: organelles

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

7) The main components of the plasmalemma include phospholipids, glycolipids, proteins, and \_\_\_\_\_.

Answer: cholesterol

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

8) The glycocalyx is made of mostly glycoproteins and \_\_\_\_\_.

Answer: glycolipids

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

9) Some integral proteins form \_\_\_\_\_ that let water molecules, ions, and small water-soluble compounds cross the membrane.

Answer: channels

Section Title: Cellular Anatomy

Learning Outcome: 2.4

Bloom's Taxonomy: Knowledge

10) Channels in the plasmalemma that can open or close to regulate the passage of water, small ions, and water-soluble molecules are called \_\_\_\_\_ channels.

Answer: gated

Section Title: Cellular Anatomy

Learning Outcome: 2.4

Bloom's Taxonomy: Knowledge

11) Substances that are able to pass directly through the phospholipid bilayer are lipids, lipid-soluble molecules, and \_\_\_\_\_, such as O<sub>2</sub> and CO<sub>2</sub>.

Answer: soluble gases

Section Title: Cellular Anatomy

Learning Outcome: 2.4

Bloom's Taxonomy: Knowledge

12) The term used to describe the property of being able to pass through the membrane is \_\_\_\_\_.

Answer: permeability

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

13) Because the plasmalemma is relatively permeable to water, the process of \_\_\_\_\_ keeps water concentration in the extracellular and intracellular fluids equal.

Answer: osmosis

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

14) Moving a solute or solvent across a membrane against a concentration gradient is a(n) \_\_\_\_\_ process that requires an expenditure of ATP.

Answer: active

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

15) A passive process that involves movement of substances from an area of higher concentration to an area of lower concentration is called \_\_\_\_\_.

Answer: diffusion

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

16) An active transport process that produces cytoplasmic vesicles filled with extracellular fluid is called \_\_\_\_\_.

Answer: pinocytosis

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

17) The process of engulfing solid objects that may be as large as the cell itself is called \_\_\_\_\_.

Answer: phagocytosis

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

18) Compared with extracellular fluid, a sample of \_\_\_\_\_ has a relatively high concentration of both potassium ions and dissolved or suspended proteins, but little carbohydrate.

Answer: cytosol or intracellular fluid

Section Title: Cellular Anatomy

Learning Outcome: 2.6

Bloom's Taxonomy: Knowledge

19) The cytosol contains a high concentration of potassium ions, while the extracellular fluid usually contains a high concentration of \_\_\_\_\_ ions.

Answer: sodium

Section Title: Cellular Anatomy

Learning Outcome: 2.6

Bloom's Taxonomy: Knowledge

20) Microfilaments are slender protein strands, usually composed of the protein \_\_\_\_\_.

Answer: actin

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Knowledge

21) Microtubules, intermediate filaments, and microfilaments are all part of the cell's \_\_\_\_\_.

Answer: cytoskeleton

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Knowledge

22) \_\_\_\_\_ filaments provide strength, stabilize the position of organelles, and transport materials within the cytoplasm; they are defined by their size rather than composition, which varies from cell to cell. (Note: Be sure the first letter of your answer is capitalized).

Answer: Intermediate

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Knowledge

23) Interaction between the \_\_\_\_\_ causes a waving or bending that results in the stiffening of microvilli and the cytoskeleton to which they are anchored.

Answer: microfilaments

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Knowledge

24) New membrane is being added continually by the \_\_\_\_\_, resulting in membrane turnover at the surface of the cell.

Answer: Golgi apparatus

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

25) Chemical communication between the nucleus and the cytosol occurs through \_\_\_\_\_.

Answer: nuclear pores

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

26) At intervals, DNA coiled around histones forms complexes called \_\_\_\_\_; these complexes may also coil around other histones.

Answer: nucleosomes

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

27) The \_\_\_\_\_ of the cell packages materials for exportation.

Answer: Golgi apparatus

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

28) The nucleus is separated from the cytosol by the \_\_\_\_\_.

Answer: nuclear envelope

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

29) The continual movement and exchange of vesicles to and from the plasmalemma is called \_\_\_\_\_.

Answer: membrane flow

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

30) In the nucleus, DNA strands form large complex structures known as \_\_\_\_\_.

Answer: chromosomes

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

31) The \_\_\_\_\_ serves as the control center for cellular functions.

Answer: nucleus

Section Title: Cellular Anatomy

Learning Outcome: 2.9

Bloom's Taxonomy: Knowledge

32) The nucleus contains all the information needed for the synthesis of about 100,000 \_\_\_\_\_.

Answer: proteins

Section Title: Cellular Anatomy

Learning Outcome: 2.9

Bloom's Taxonomy: Knowledge

33) Proteins called \_\_\_\_\_ are channel proteins that allow the passage of metabolites between neighboring cells.

Answer: communicating junctions

Section Title: Intercellular Attachment

Learning Outcome: 2.10

Bloom's Taxonomy: Knowledge



34) When skin cells are shed a few at a time, rather than in the usual large sheets, it can be hypothesized that the \_\_\_\_\_ junctions that hold them together might have broken down.

Answer: anchoring

Section Title: Intercellular Attachment

Learning Outcome: 2.10

Bloom's Taxonomy: Knowledge

35) Large areas of opposing plasmalemma may be interconnected by transmembrane proteins called \_\_\_\_\_ or CAMs.

Answer: cell adhesion molecules

Section Title: Intercellular Attachment

Learning Outcome: 2.10

Bloom's Taxonomy: Knowledge

36) A \_\_\_\_\_ is a cell junction that binds the cell membranes of neighboring cells tightly to one another preventing the passage of material between the cells.

Answer: tight junction or occluding junction

Section Title: Intercellular Attachment

Learning Outcome: 2.10

Bloom's Taxonomy: Knowledge

37) The process that involves the phases prophase, metaphase, anaphase, and telophase is called \_\_\_\_\_.

Answer: mitosis

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

38) During \_\_\_\_\_, chromatid pairs separate and the daughter chromosomes move toward opposite ends of the cell.

Answer: anaphase

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

39) Somatic cells spend the majority of their functional lives in the phase called \_\_\_\_\_.

Answer: interphase

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

40) In cells preparing for division, the phase of the life cycle that is most variable in length is \_\_\_\_\_ of interphase.

Answer: G<sub>1</sub>

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

### 2.3 True/False Questions

1) A passive process that allows passage of small inorganic ions and lipid-soluble materials in all cell types is called diffusion.

Answer: TRUE

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

2) A passive process that involves the movement of water (solvent) molecules toward solute concentrations across a membrane is called facilitated diffusion.

Answer: FALSE

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

3) A passive process wherein carrier molecules transport materials down concentration gradients across a membrane is called osmosis.

Answer: FALSE

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

4) Endocytosis is an energy-requiring process where vesicles containing fluid or solid materials from the extracellular environment are formed.

Answer: TRUE

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

5) Active transport is an energy-requiring process whereby ions and possibly other materials are moved across a membrane by carrier molecules, which work regardless of any concentration gradients.

Answer: TRUE

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Knowledge

6) Vesicles that contain oxidases and catalase are called peroxisomes.

Answer: TRUE

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

7) Structures responsible for essential cleanup and recycling functions inside the cell are called lysosomes.

Answer: TRUE

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

8) Organelles that produce most of the ATP required by the cell are called ribosomes.

Answer: FALSE

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

9) The endoplasmic reticulum is the organelle responsible for the synthesis of organic products and provides for intracellular storage and transport.

Answer: TRUE

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

10) The smooth endoplasmic reticulum is the organelle that packages secretory products and renews and modifies plasmalemmae.

Answer: FALSE

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

11) Small packages that move materials between cisternae in the Golgi apparatus are called lysosomes.

Answer: FALSE

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

12) The mitochondrion is enclosed by a double membrane with numerous folds, or cristae, in the inner membrane; the fluid matrix of these organelles contains important metabolic enzymes.

Answer: TRUE

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Knowledge

## 2.4 Essay Questions

1) Why is it potentially harmful to give a patient intravenous fluid that is pure water?

Answer: Body fluids are not pure water, they are a mixture of water and solutes. The addition of water without solutes causes an imbalance in the body between the amount of water compared to solute, which dilutes the body fluids.

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Evaluation

2) Solutions A and B are separated by a selectively permeable barrier. Over time, the level of fluid on side A increases. Which solution initially had the higher concentration of solute?

Answer: Side A had the higher solute concentration, as osmosis is drawing water to it and out of solution B.

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Evaluation

3) Explain why an animal cell without centrioles cannot divide.

Answer: Centrioles are a structure used during mitosis of cell division. During metaphase and anaphase the centrioles direct the movement of chromosomes to opposite ends of the cell so that cytokinesis will result in two daughter cells, each containing its own set of chromosomes.

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Application

4) Predict the consequences of non-functional cilia in the respiratory airways.

Answer: Cilia lining the respiratory tract beat in a synchronized manner to move sticky mucus and trapped dust particles toward the throat and away from delicate respiratory surfaces. This cleansing action is lost if the cilia are damaged or immobilized by heavy smoking or some metabolic problem, and the irritants will no longer be removed. As a result, chronic respiratory infections develop.

Section Title: Cellular Anatomy

Learning Outcome: 2.7

Bloom's Taxonomy: Synthesis

5) What is the role of the Golgi apparatus in cellular metabolism?

Answer: The Golgi apparatus contains enzymes that store, modify, and package the proteins and glycoproteins arriving from the RER via transport vesicles.

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Comprehension

6) How does the plasmalemma change either over time or in response to modifications in the extracellular fluid?

Answer: Membrane turnover is effected by the Golgi apparatus, which continually adds new membrane to the cell surface and can alter the membrane properties as required. In an actively secreting cell, the entire surface area of the plasmalemma may be replaced in as little as an hour.

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Comprehension

7) Distinguish between primary and secondary lysosomes; how do they function?

Answer: Primary lysosomes contain inactive enzymes; activation of these enzymes occurs when the lysosome fuses with the membrane of damaged organelles. This forms a secondary lysosome, which contains activated enzymes that act to break down the engulfed contents. These contents then either reenter the cytosol (if nutrients) or are eliminated by exocytosis (if toxins or wastes).

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Analysis

8) How do peroxisomes differ from lysosomes?

Answer: Peroxisomes are smaller than lysosomes, and they carry different groups of enzymes. Peroxisomes probably originate at the RER, whereas the Golgi apparatus packages enzymes into lysosomes. Peroxisomes absorb and break down fatty acids and other organic compounds; lysosomes perform essential intracellular cleanup, recycling, and defense, all by activating and/or releasing their digestive enzymes under appropriate circumstances.

Section Title: Cellular Anatomy

Learning Outcome: 2.8

Bloom's Taxonomy: Analysis

9) How does the structure of a tight junction differ from that of an anchoring junction?

Answer: At a tight junction the lipid portions of the opposing plasmalemmas are tightly bound together by interlocking membrane proteins, providing the strongest of intercellular connections; at an anchoring junction, the two plasmalemmas remain distinct but are powerfully attached by CAMs (cell adhesion molecules) and a layer of proteoglycans (intercellular cement), with a dense area of layered proteins inside each plasmalemma reinforcing the junction and binding it to the cell's cytoskeleton.

Section Title: Intercellular Attachment

Learning Outcome: 2.10

Bloom's Taxonomy: Analysis

10) What is cytokinesis? What is its role in the cell cycle?

Answer: Cytokinesis is the process by which daughter cells complete their physical separation at the end of mitosis. The completion of cytokinesis marks the end of cell division and the beginning of a new cell cycle.

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Comprehension

11) Explain why adult animals and plants replace many of their cells throughout their lifetimes.  
 Answer: Cells can be damaged by physical wear and tear, toxic chemicals, temperature changes, or other environmental hazards. Cells are also lost due to aging and must be replaced.

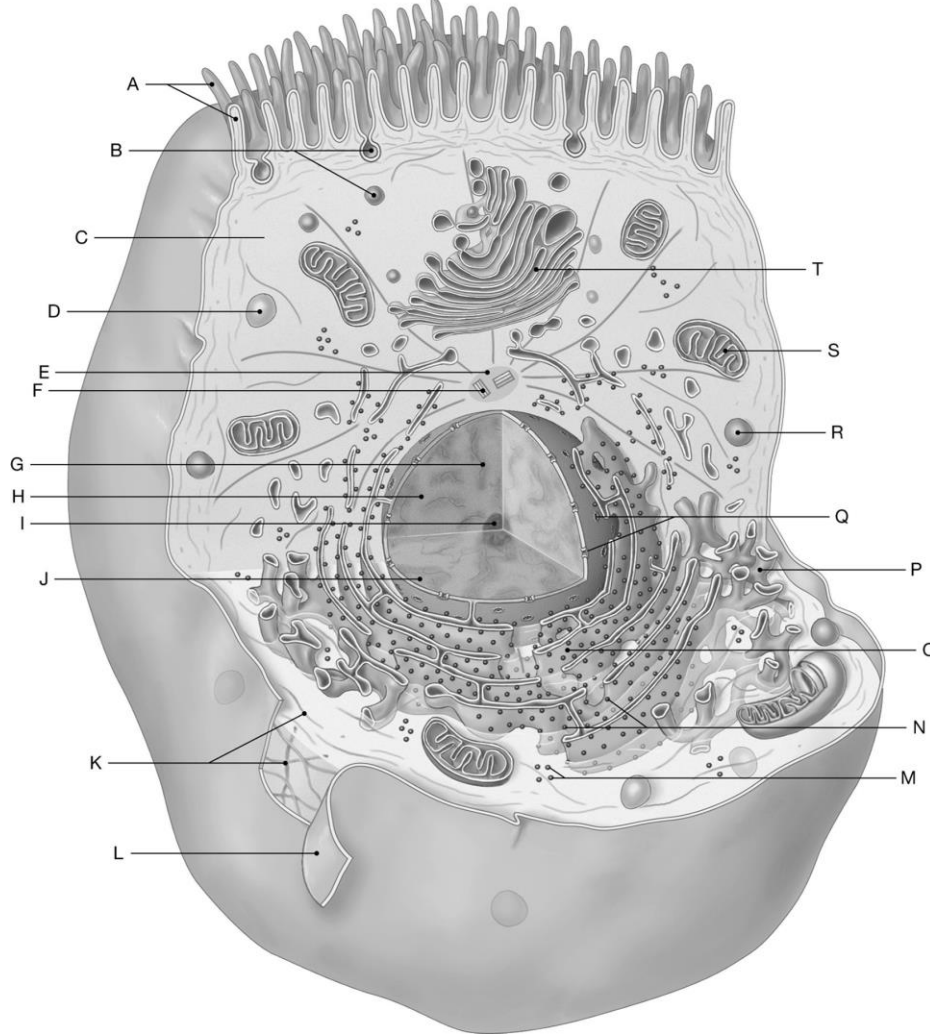
Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Application

## 2.5 Labeling Exercises

**Figure 2.1**



Using the figure above, identify the labeled part.

1) Label A: \_\_\_\_\_

Answer: Microvilli

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

2) Label B: \_\_\_\_\_

Answer: Secretory vesicles

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

3) Label C: \_\_\_\_\_

Answer: Cytosol

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

4) Label D: \_\_\_\_\_

Answer: Lysosome

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

5) Label E: \_\_\_\_\_

Answer: Centrosome

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

6) Label F: \_\_\_\_\_

Answer: Centriole

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

7) Label G: \_\_\_\_\_

Answer: Chromatin

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

8) Label H: \_\_\_\_\_

Answer: Nucleoplasm

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

9) Label I: \_\_\_\_\_

Answer: Nucleolus

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

10) Label J: \_\_\_\_\_

Answer: Nuclear envelope surrounding nucleus

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

11) Label K: \_\_\_\_\_

Answer: Cytoskeleton

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

12) Label L: \_\_\_\_\_

Answer: Plasmalemma

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

13) Label M: \_\_\_\_\_

Answer: Free ribosomes

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

14) Label N: \_\_\_\_\_

Answer: Fixed ribosomes

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

15) Label O: \_\_\_\_\_

Answer: Rough endoplasmic reticulum

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

16) Label P: \_\_\_\_\_

Answer: Smooth endoplasmic reticulum

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

17) Label Q: \_\_\_\_\_

Answer: Nuclear pores

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge



18) Label R: \_\_\_\_\_

Answer: Peroxisome

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

19) Label S: \_\_\_\_\_

Answer: Mitochondrion

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

20) Label T: \_\_\_\_\_

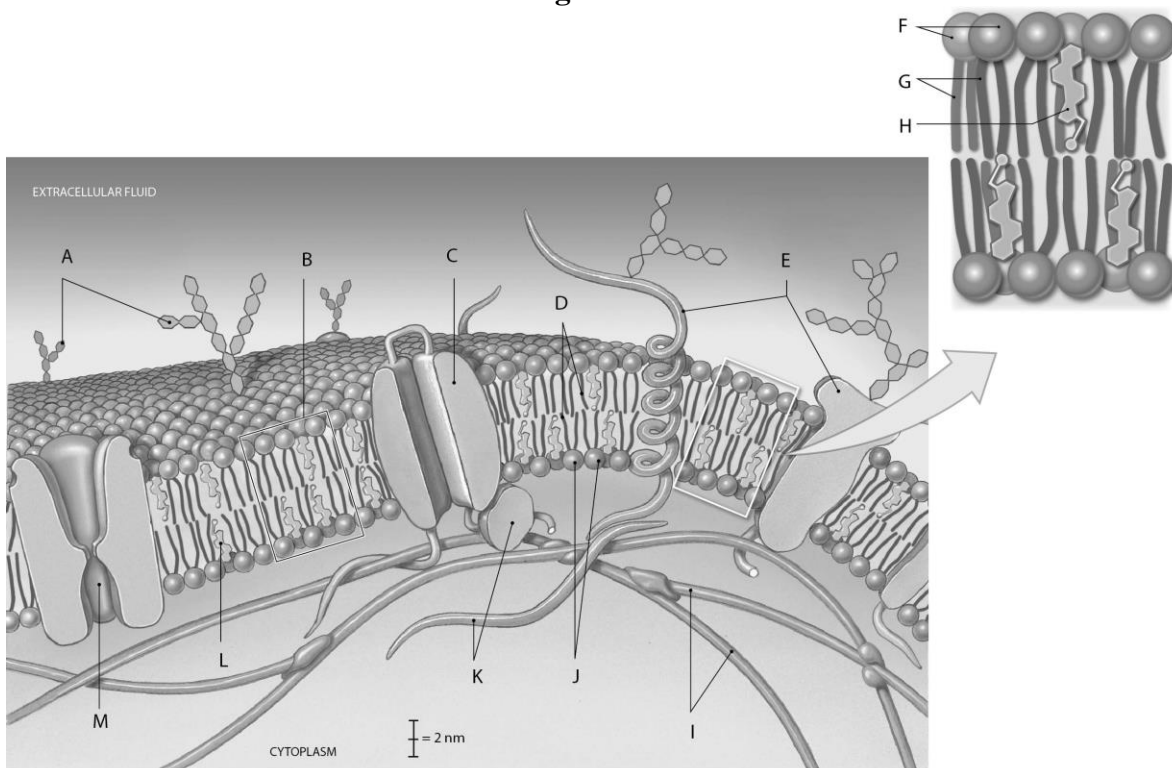
Answer: Golgi apparatus

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

**Figure 2.2**



*Using the figure above, identify the labeled parts.*

21) Label A: \_\_\_\_\_

Answer: Glycolipids of glycocalyx

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

22) Label B: \_\_\_\_\_

Answer: Phospholipid bilayer  
Section Title: Cellular Anatomy  
Learning Outcome: 2.3  
Bloom's Taxonomy: Knowledge

23) Label C: \_\_\_\_\_

Answer: Integral protein with channel  
Section Title: Cellular Anatomy  
Learning Outcome: 2.3  
Bloom's Taxonomy: Knowledge

24) Label D: \_\_\_\_\_

Answer: Hydrophobic tails  
Section Title: Cellular Anatomy  
Learning Outcome: 2.3  
Bloom's Taxonomy: Knowledge

25) Label E: \_\_\_\_\_

Answer: Integral glycoproteins  
Section Title: Cellular Anatomy  
Learning Outcome: 2.3  
Bloom's Taxonomy: Knowledge

26) Label F: \_\_\_\_\_

Answer: Hydrophilic heads  
Section Title: Cellular Anatomy  
Learning Outcome: 2.3  
Bloom's Taxonomy: Knowledge

27) Label G: \_\_\_\_\_

Answer: Hydrophobic tails  
Section Title: Cellular Anatomy  
Learning Outcome: 2.3  
Bloom's Taxonomy: Knowledge

28) Label H: \_\_\_\_\_

Answer: Cholesterol  
Section Title: Cellular Anatomy  
Learning Outcome: 2.3  
Bloom's Taxonomy: Knowledge

29) Label I: \_\_\_\_\_

Answer: Cytoskeleton (microfilaments)  
Section Title: Cellular Anatomy  
Learning Outcome: 2.3  
Bloom's Taxonomy: Knowledge

30) Label J: \_\_\_\_\_

Answer: Hydrophilic heads

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

31) Label K: \_\_\_\_\_

Answer: Peripheral proteins

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

32) Label L: \_\_\_\_\_

Answer: Cholesterol

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

33) Label M: \_\_\_\_\_

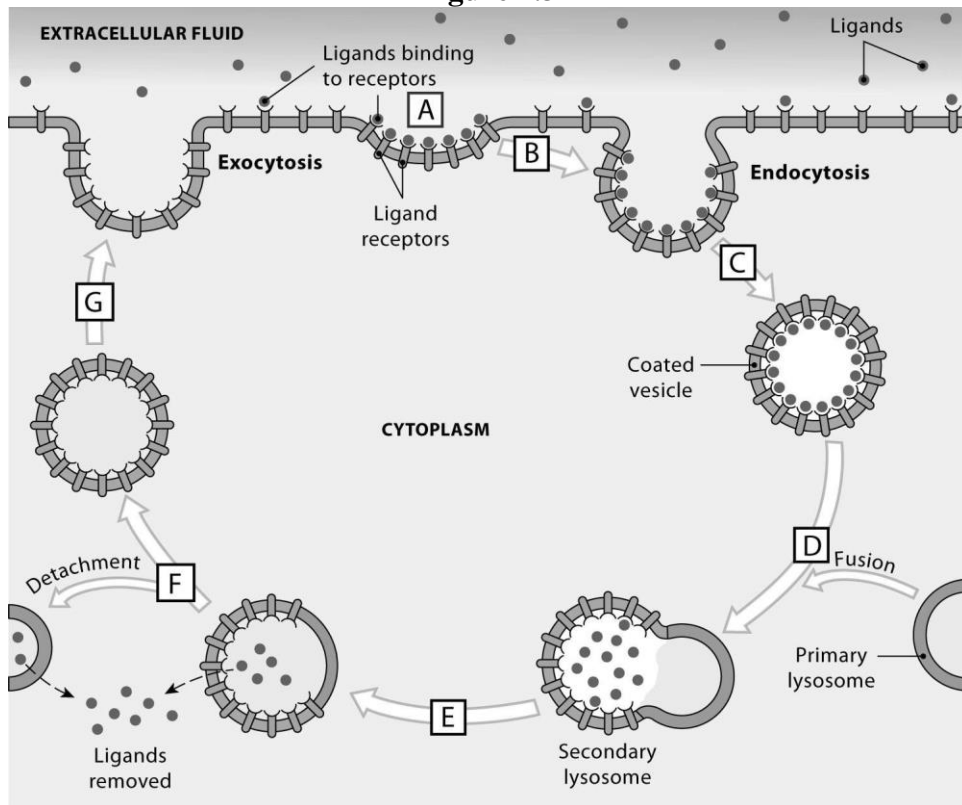
Answer: Gated channel

Section Title: Cellular Anatomy

Learning Outcome: 2.3

Bloom's Taxonomy: Knowledge

**Figure 2.3**



Using the figure above, identify the location where each process occurs.

34) Pockets pinch off, forming endosomes known as coated vesicles.

Answer: C

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Comprehension

35) Coated vesicles fuse with primary lysosomes to form secondary lysosomes.

Answer: D

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Comprehension

36) Target molecules (ligands) bind to receptors in plasmalemma.

Answer: A

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Comprehension

37) The endosome fuses with the plasmalemma, and the receptors are again available for ligand binding.

Answer: G

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Comprehension

38) The lysosomal and endosomal membranes separate.

Answer: F

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Comprehension

39) Areas coated with ligands form deep pockets in plasmalemma surface.

Answer: B

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Comprehension

40) Ligands are removed and absorbed into the cytoplasm.

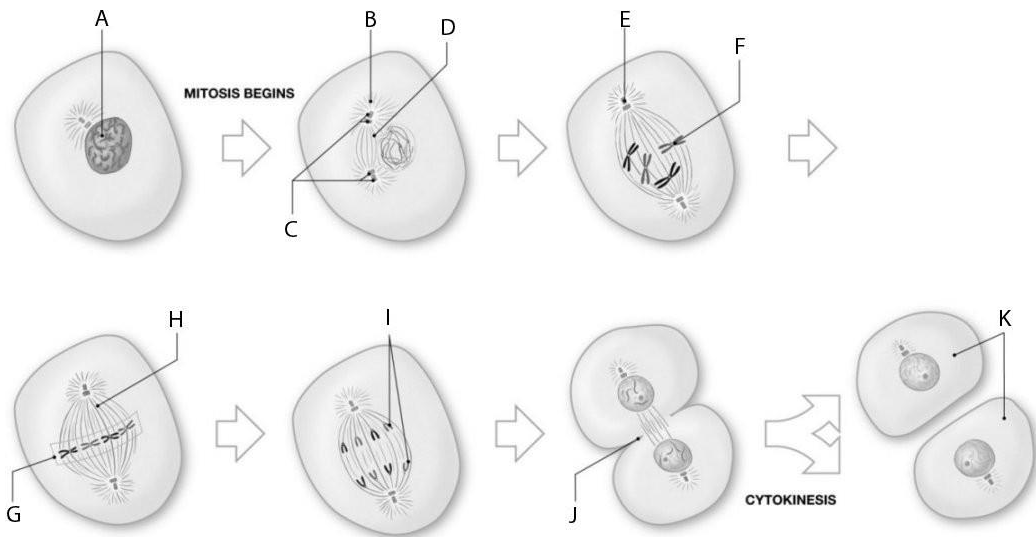
Answer: E

Section Title: Cellular Anatomy

Learning Outcome: 2.5

Bloom's Taxonomy: Comprehension

**Figure 2.4**



*Using the figure above, identify the labeled part.*

41) Label A: \_\_\_\_\_

Answer: Nucleus

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

42) Label B: \_\_\_\_\_

Answer: Astral rays

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

43) Label C: \_\_\_\_\_

Answer: Centrioles (two pairs)

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

44) Label D: \_\_\_\_\_

Answer: Spindle fibers

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

45) Label E: \_\_\_\_\_

Answer: Centriole

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

46) Label F: \_\_\_\_\_

Answer: Chromosome with two sister chromatids

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

47) Label G: \_\_\_\_\_

Answer: Metaphase plate

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

48) Label H: \_\_\_\_\_

Answer: Chromosomal microtubules

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

49) Label I: \_\_\_\_\_

Answer: Daughter chromosomes

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

50) Label J: \_\_\_\_\_

Answer: Cleavage furrow

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge

51) Label K: \_\_\_\_\_

Answer: Daughter cells

Section Title: The Cell Life Cycle

Learning Outcome: 2.11

Bloom's Taxonomy: Knowledge