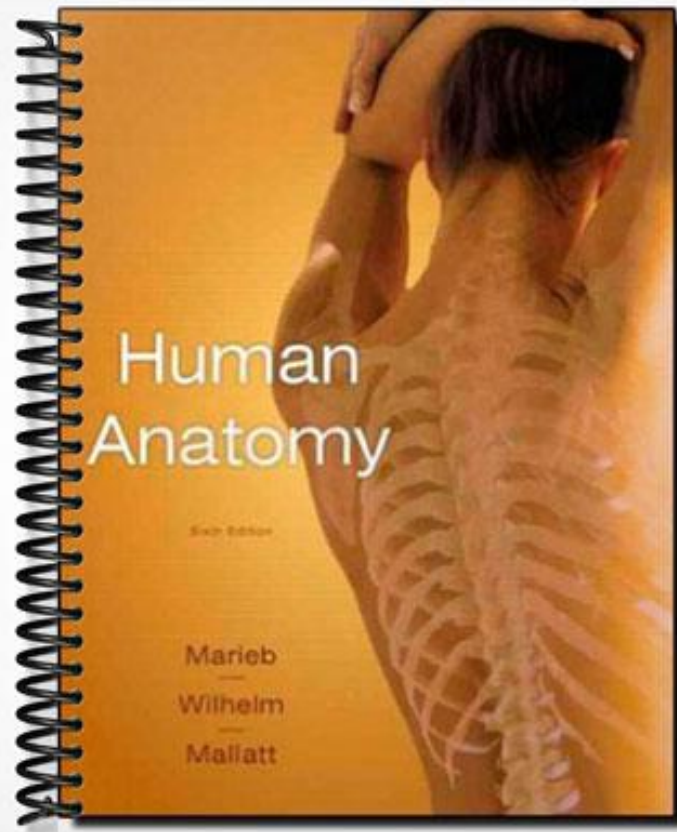


**TEST BANK**



Human  
Anatomy

Sixth Edition

Marieb  
—  
Wilhelm  
—  
Mallatt

Test Bank

# Human Anatomy

Sixth Edition

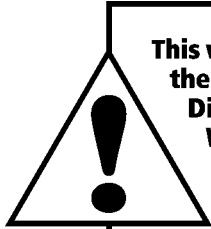
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# Preface

This Test Bank is written to accompany *Human Anatomy*, Sixth Edition, by Elaine N. Marieb, Patricia Brady Wilhelm, and Jon Mallatt. Each chapter includes a variety of question types, including figure, matching, true/false, multiple-choice, short answer, and essay questions. Each question is assigned a difficulty level ranging from 1 to 3, with 3 being the most difficult, and answers to questions as well as page references to the main text are provided for each question.

Although this printed Test Bank can be used alone, an electronic version of the Test Bank is available in TestGen 7.4 format (0-321-68316-1) and instructors can download the TestGen program, view tutorials, and get support from the Pearson TestGen website at [www.pearsoned.com/testgen](http://www.pearsoned.com/testgen) as well. This easy-to-use program allows instructors the flexibility to view, edit, and select questions to meet the individual course requirements.

The built-in Question Editor and Graphics Library features allow the user to add or modify questions and to import graphics, and multiple views and on-screen tools make it easy to transfer questions to tests and print them in a variety of formats.

Additional course management resources are available to instructors using *Human Anatomy*, Sixth Edition, including CourseCompass™, WebCT™, and Blackboard™. All of these programs are useful for online course management and for implementing distance learning courses; they are available stand-alone or can be packaged with the test. The content includes selections from the myA&P™ website as well as the entire computerized Test Bank. For more information concerning these or other instructor resources, go to [www.pearsonhighered.com](http://www.pearsonhighered.com), or contact your local Benjamin Cummings sales representative.

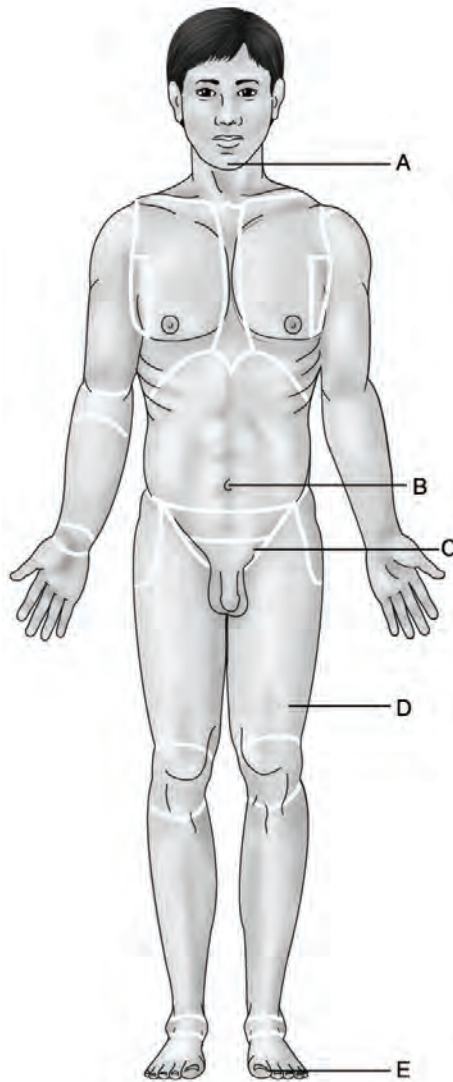
Comments and suggestions concerning this Test Bank are welcome and may be sent to the authors care of:

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# Chapter 1 The Human Body: An Orientation

---

## Matching Questions



**Figure 1.1**

*Using Figure 1.1, match the following:*

1) Mental

Answer: A

Diff: 2 Page Ref: 7

2) Umbilical

Answer: B

Diff: 2 Page Ref: 7

3) Hallux

Answer: E

Diff: 2 Page Ref: 7

4) Inguinal

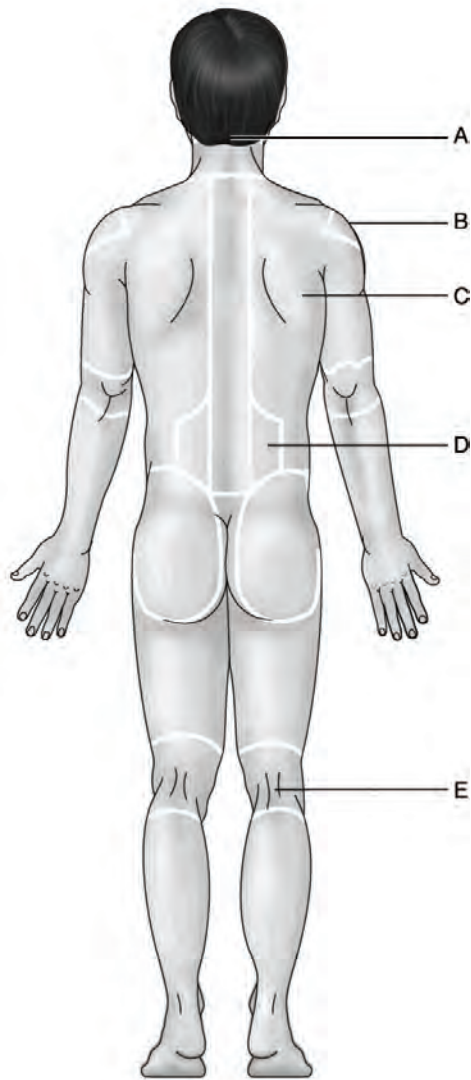
Answer: C

Diff: 2 Page Ref: 7

5) Femoral

Answer: D

Diff: 2 Page Ref: 7



**Figure 1.2**

*Using Figure 1.2, match the following:*

6) Lumbar

Answer: D

Diff: 2 Page Ref: 7

7) Acromial

Answer: B

Diff: 3 Page Ref: 7

8) Scapular

Answer: C

Diff: 2 Page Ref: 7



9) Popliteal

Answer: E

Diff: 2 Page Ref: 7

10) Occipital

Answer: A

Diff: 3 Page Ref: 7

*Match the following:*

- A. superior
- B. lateral
- C. anterior
- D. proximal
- E. deep

11) The chest is \_\_\_\_\_ to the abdomen.

Answer: superior

Diff: 2 Page Ref: 8

12) The sternal region is \_\_\_\_\_ to the scapular region.

Answer: anterior

Diff: 2 Page Ref: 7-8

13) The knee is \_\_\_\_\_ to the foot.

Answer: proximal

Diff: 3 Page Ref: 8

14) The brain is \_\_\_\_\_ to the skull.

Answer: deep

Diff: 2 Page Ref: 8

15) The thumb is \_\_\_\_\_ to the index finger.

Answer: lateral

Diff: 3 Page Ref: 8

16) Muscles are \_\_\_\_\_ to the skin.

Answer: deep

Diff: 1 Page Ref: 8

17) The axillary region is \_\_\_\_\_ to the sternum.

Answer: lateral

Diff: 2 Page Ref: 8

18) The lip is \_\_\_\_\_ to the chin.

Answer: superior

Diff: 2 Page Ref: 8

- 19) The eye is \_\_\_\_\_ to the occipital region.  
 Answer: anterior  
 Diff: 2 Page Ref: 7-8
- 20) The acromial region is \_\_\_\_\_ to the scapular region.  
 Answer: superior  
 Diff: 2 Page Ref: 7-8
- 21) The gluteal region is \_\_\_\_\_ to the popliteal region.  
 Answer: superior  
 Diff: 2 Page Ref: 7-8
- 22) The femoral region is \_\_\_\_\_ to the plantar region.  
 Answer: proximal  
 Diff: 2 Page Ref: 7-8
- 23) The heart is \_\_\_\_\_ to the sternum.  
 Answer: deep  
 Diff: 2 Page Ref: 8
- 24) The pubic area is \_\_\_\_\_ to the gluteal region.  
 Answer: anterior  
 Diff: 2 Page Ref: 7-8
- 25) The umbilical region is \_\_\_\_\_ to the lumbar region.  
 Answer: anterior  
 Diff: 2 Page Ref: 7-8

### True/False Questions

- 1) Serous cavities include the pleural cavity.  
 Answer: TRUE  
 Diff: 1 Page Ref: 12
- 2) Serous cavities contain air.  
 Answer: FALSE  
 Diff: 2 Page Ref: 12
- 3) The peritoneal cavity is a serous cavity.  
 Answer: TRUE  
 Diff: 2 Page Ref: 12
- 4) EM has much greater resolution than LM.  
 Answer: TRUE  
 Diff: 2 Page Ref: 14
- 5) The dorsal body cavity is subdivided into a cranial cavity and a vertebral cavity.  
 Answer: TRUE  
 Diff: 2 Page Ref: 11

6) Pathological anatomy deals with structural changes caused by disease.

Answer: TRUE

Diff: 2 Page Ref: 2

7) A CT scan produces an image of a transverse section of the body.

Answer: TRUE

Diff: 2 Page Ref: 16-17

8) MRI techniques can show only images that are hard and deflect the X rays.

Answer: FALSE

Diff: 2 Page Ref: 18

9) Ultrasound techniques are used to image a fetus because they are less damaging than other techniques.

Answer: TRUE

Diff: 2 Page Ref: 18

10) Angiography imaging is used primarily in the study of blood supply to the heart wall and brain.

Answer: TRUE

Diff: 2 Page Ref: 16

11) Most adults are between 1.5 and 2 meters tall.

Answer: TRUE

Diff: 3 Page Ref: 6

12) All vertebrate embryos have a dorsal hollow nerve cord.

Answer: TRUE

Diff: 2 Page Ref: 10

13) A transverse plane could cut the head off the body!

Answer: TRUE

Diff: 2 Page Ref: 9

14) In anatomical position, the palms of the hands face medially toward the thighs.

Answer: FALSE

Diff: 1 Page Ref: 6-7

15) The mediastinum contains the trachea and lungs.

Answer: FALSE

Diff: 2 Page Ref: 11

## Multiple Choice Questions

- 1) The smallest living unit is
- A) a cell.
  - B) an organ.
  - C) a human being.
  - D) a molecule.

Answer: A

Diff: 1 Page Ref: 3

- 2) Which branch of anatomy studies the structural changes that occur as one ages?
- A) developmental anatomy
  - B) pathological anatomy
  - C) regional anatomy
  - D) surface anatomy

Answer: A

Diff: 2 Page Ref: 2

- 3) Which organ system includes the pancreas, thymus, testes, and pituitary gland?
- A) integumentary
  - B) endocrine
  - C) reproductive
  - D) lymphatic

Answer: B

Diff: 2 Page Ref: 4-5

- 4) A coronal section through the human body can
- A) pass through both the nose and the occipital region.
  - B) pass through both ears.
  - C) provide mirror right and left images.
  - D) lie in a horizontal plane.

Answer: B

Diff: 2 Page Ref: 6

- 5) During the process of \_\_\_\_\_, noncellular artifacts can be introduced into histology samples.
- A) time
  - B) observation
  - C) staining
  - D) photography

Answer: C

Diff: 2 Page Ref: 14

- 6) The cervical region is the
- A) thigh.
  - B) calf.
  - C) neck.
  - D) head.

Answer: C

Diff: 1 Page Ref: 7

7) The "CT" in "CT scanning" stands for

- A) cut transversely.
- B) Charles Thorgaard, the inventor's name.
- C) correlated thickness.
- D) computed tomography.

Answer: D

Diff: 1 Page Ref: 16

8) What is the function of serous membranes?

- A) They act like wrapping paper to hold visceral organs together.
- B) They contain gland cells that secrete mucus.
- C) They halt the spread of infection.
- D) They reduce friction so that viscera move freely.

Answer: D

Diff: 2 Page Ref: 12

9) The dorsal hollow nerve cord

- A) develops into the brain and spinal cord.
- B) a primitive supporting rod.
- C) contains the notochord.
- D) is the same as the human backbone.

Answer: A

Diff: 2 Page Ref: 10

10) The main purpose of fixation is

- A) to preserve the tissue.
- B) to mend breaks in tissue sections.
- C) to make an organ easier to section.
- D) to stick tissue sections to a glass slide.

Answer: A

Diff: 2 Page Ref: 14

11) A histologist examines a specimen that has an epithelium overlying some smooth muscle. This specimen is part of

- A) a molecule.
- B) a cell.
- C) a tissue.
- D) an organ.

Answer: D

Diff: 2 Page Ref: 4

12) An example of a tissue in the body is

- A) the stomach.
- B) a muscle cell.
- C) epithelium.
- D) a macromolecule.

Answer: C

Diff: 2 Page Ref: 4

13) An example of an organ is

- A) a fat cell.
- B) the intestine.
- C) epithelium.
- D) the cardiovascular system (but not the circulatory system).

Answer: B

Diff: 1 Page Ref: 4

14) Which organ system consists of vessels that do not carry blood, but pick up fluids (and some cells) that are leaked from the blood?

- A) urinary
- B) endocrine
- C) integumentary
- D) lymphatic

Answer: D

Diff: 3 Page Ref: 4-5

15) Large molecules such as proteins are called

- A) cells.
- B) macromolecules.
- C) multi-atom units.
- D) cellular organelles.

Answer: B

Diff: 1 Page Ref: 3-4

16) Which organ system covers the external surface of the body, but not the internal surface of the mouth?

- A) lymphatic
- B) digestive
- C) integumentary
- D) cutaneous

Answer: C

Diff: 2 Page Ref: 4-5

17) Which organ system includes the spinal cord?

- A) skeletal
- B) muscular
- C) nervous
- D) integumentary

Answer: C

Diff: 1 Page Ref: 4-5

18) The height of an average person's trunk, from neck to perineum, is about

- A) 5 meters.
- B) 10 centimeters.
- C) 1000  $\mu\text{m}$ .
- D) 1 meter.

Answer: D

Diff: 3 Page Ref: 6

- 19) Which statement concerning the anatomical position is *false*?
- A) The palms face anteriorly.
  - B) The toes point anteriorly, but the fingers point inferiorly.
  - C) The knees, elbow, and neck are straight (not bent).
  - D) The person is lying down, as straight as possible.

Answer: D

Diff: 2 Page Ref: 6

- 20) Bilateral symmetry can apply to objects as well as to animal bodies. Which of the following capital letters of the alphabet is *not* bilaterally symmetrical?
- A) A
  - B) M
  - C) L
  - D) O

Answer: C

Diff: 2 Page Ref: 10

- 21) Which structure is *not* covered by visceral serosa?
- A) lungs
  - B) ribs
  - C) stomach
  - D) uterus

Answer: B

Diff: 2 Page Ref: 12

- 22) The femoral region is the
- A) buttocks.
  - B) hip.
  - C) thigh.
  - D) toes.

Answer: C

Diff: 1 Page Ref: 7

- 23) The inguinal region lies
- A) anterior to the elbow joint.
  - B) on the anterior neck.
  - C) where the thigh joins the trunk.
  - D) on the external genitals.

Answer: C

Diff: 2 Page Ref: 7

- 24) The perineal region is the
- A) side of the leg.
  - B) region between the external genitals and the anus.
  - C) point of the shoulder.
  - D) superior part of the gluteal region.

Answer: B

Diff: 2 Page Ref: 7

25) Which structure is *not* present in the mediastinum?

- A) esophagus
- B) heart
- C) lung
- D) trachea

Answer: C

Diff: 2 Page Ref: 11

26) A frontal plane is the same as a \_\_\_\_\_ plane.

- A) midsagittal
- B) transverse
- C) coronal
- D) sagittal

Answer: C

Diff: 2 Page Ref: 9

27) Another name for the midsagittal plane is

- A) parasagittal.
- B) oblique.
- C) coronal.
- D) median.

Answer: D

Diff: 2 Page Ref: 9

28) What point or structure in the body is located farthest laterally? (*Hint:* Questions always refer to the anatomical position.)

- A) the coxal region
- B) ear
- C) little toe
- D) tip of thumb

Answer: D

Diff: 3 Page Ref: 7-8

29) Although transmission electron microscopy is usually used for high-magnification viewing, it is certainly possible to use it at low magnification as well. That is, one can produce similar micrographs of tissues taken by light microscopy and electron microscopy at the same magnification. Even at the same magnification, however, you can easily tell the two kinds of micrographs apart. How?

- A) The image in the electron micrograph is still sharper.
- B) Tissue viewed by electron microscopy is colored, whereas light micrographs are always black and white (and shades of gray).
- C) Tissue for light microscopy cannot be fixed (no fixation).
- D) Tissue for electron microscopy cannot be sectioned.

Answer: A

Diff: 2 Page Ref: 14



30) What is the main advantage of MRI as a medical imaging technique?

- A) It is safe.
- B) The patient feels less pain during the procedure than with any other imaging technique.
- C) It is very inexpensive.
- D) It shows soft tissues very clearly.

Answer: D

Diff: 2 Page Ref: 18

31) The extremities are the same as

- A) the ears.
- B) the fingers and toes.
- C) the limbs.
- D) all structures in the head.

Answer: C

Diff: 2 Page Ref: 6

32) Which of the following pairs of organs/structures is located ipsilateral?

- A) cecum : sigmoid colon
- B) descending colon : spleen
- C) mouth : navel
- D) right lung : left lung

Answer: B

Diff: 3 Page Ref: 8

33) A physician viewing an injury to the back would look at the patient's \_\_\_\_\_ side.

- A) lateral
- B) posterior
- C) cranial
- D) ventral

Answer: B

Diff: 2 Page Ref: 7

34) The \_\_\_\_\_ body cavity contains the brain.

- A) dorsal
- B) ventral
- C) serous
- D) lateral

Answer: A

Diff: 2 Page Ref: 11

35) The roots of anatomical terminology lie mainly in

- A) German and French.
- B) Latin and Greek.
- C) Esperanto.
- D) Russian and Old English.

Answer: B

Diff: 2 Page Ref: 2

- 36) The \_\_\_\_\_ cavity contains the heart and lungs.
- A) abdominopelvic
  - B) dorsal
  - C) thoracic
  - D) lateral

Answer: C

Diff: 2 Page Ref: 11

- 37) Hormones are regulatory proteins that are secreted by the \_\_\_\_\_ system.
- A) urinary
  - B) endocrine
  - C) integumentary
  - D) lymphatic

Answer: B

Diff: 2 Page Ref: 4-5

- 38) Which organ system keeps blood constantly supplied with oxygen, removes carbon dioxide, and contains many air tubes?
- A) urinary
  - B) endocrine
  - C) integumentary
  - D) respiratory

Answer: D

Diff: 2 Page Ref: 4-5

- 39) The elimination of nitrogenous wastes from body fluids is regulated by the \_\_\_\_\_ system.
- A) urinary
  - B) endocrine
  - C) integumentary
  - D) lymphatic

Answer: A

Diff: 1 Page Ref: 4-5

- 40) Which structures are evidence of the vertebrate characteristic of segmentation?
- A) branches of the blood vessels
  - B) multiple joints of fingers
  - C) subdivisions of the gastrointestinal tract
  - D) vertebral column

Answer: D

Diff: 2 Page Ref: 10-11

- 41) Which statement about visceral serosa is *false*?
- A) It clings to the surface of organs.
  - B) It is continuous with the membrane that covers the outer body wall.
  - C) It is deep to the parietal serosa.
  - D) It lines the internal surface of hollow organs.

Answer: D

Diff: 2 Page Ref: 12

42) How many centimeters are there in a meter?

- A) 10
- B) 100
- C) 1,000
- D) 1,000,000

Answer: B

Diff: 3 Page Ref: 6

43) Which organ is *not* found in the ventral body cavity?

- A) heart
- B) liver
- C) spinal cord
- D) urinary bladder

Answer: C

Diff: 2 Page Ref: 11

44) The ankle lies \_\_\_\_\_ to the thigh.

- A) distal
- B) proximal
- C) lateral
- D) deep

Answer: A

Diff: 2 Page Ref: 9

45) The axillary artery is found in the region of the

- A) posterior surface of the knee.
- B) vertebral column.
- C) armpit.
- D) long axis of any limb.

Answer: C

Diff: 2 Page Ref: 7

46) As an anatomical region, *lumbar* refers to

- A) the loin of the back.
- B) part of the lower limb.
- C) the wrist.
- D) the breast.

Answer: A

Diff: 2 Page Ref: 7

47) The buccal region is the

- A) cheeks.
- B) waist.
- C) calf of the leg.
- D) underside of the foot.

Answer: A

Diff: 2 Page Ref: 7

- 48) The popliteal region is  
 A) the side of the leg.  
 B) in the cervical region.  
 C) the posterior surface of the knee.  
 D) the inferior part of the gluteal region.

Answer: C

Diff: 2 Page Ref: 7

- 49) The coxal region is  
 A) the same as the inguinal region.  
 B) the skin over the "tailbone."  
 C) the hip.  
 D) the posterior surface of the wrist.

Answer: C

Diff: 2 Page Ref: 7

- 50) Which abdominal structure is located in the right hypochondriac region?  
 A) appendix  
 B) gallbladder  
 C) spleen  
 D) stomach

Answer: B

Diff: 2 Page Ref: 13

### Short Answer Questions

- 1) Describe the difference between proximal and distal.

Answer: *Proximal* means closer to the point of attachment to the main part of the body; *distal* is further.

Diff: 2 Page Ref: 8

- 2) Describe the location of the thigh to the calf.

Answer: The thigh is proximal to the calf.

Diff: 2 Page Ref: 7-8

- 3) Describe the location of the upper arm to the fingertips.

Answer: The upper arm is proximal to the fingertips.

Diff: 2 Page Ref: 7-8

- 4) In humans, what term is synonymous with posterior?

Answer: dorsal

Diff: 2 Page Ref: 8

- 5) Clinicians refer to \_\_\_\_\_ anatomy when locating blood vessels to draw blood, feeling pulses, and avoiding nerves while giving injections.

Answer: surface

Diff: 1 Page Ref: 2

6) In humans, the region between the anus and the external genitals is the \_\_\_\_\_ region.

Answer: perineal

Diff: 2 Page Ref: 7

7) The olecranal region is posterior to what region?

Answer: antecubital

Diff: 2 Page Ref: 7

8) The head, neck, and trunk comprise the \_\_\_\_\_ region.

Answer: axial

Diff: 2 Page Ref: 7

9) What is the term for the thumb?

Answer: pollex

Diff: 2 Page Ref: 7

10) One could say that the forearm is \_\_\_\_\_ to the brachial region.

Answer: distal

Diff: 2 Page Ref: 7-8

11) Cutting the body along the median plane produces a \_\_\_\_\_ view.

Answer: sagittal

Diff: 1 Page Ref: 9

12) One could describe the scalp as being \_\_\_\_\_ to the skull.

Answer: superficial

Diff: 2 Page Ref: 7-8

13) A \_\_\_\_\_ plane separates the body into equal left and right halves.

Answer: midsagittal

Diff: 2 Page Ref: 9

14) The measurement typically used for structures within a cell is the \_\_\_\_\_.

Answer: micrometer

Diff: 3 Page Ref: 6

15) The \_\_\_\_\_ system is involved in immunity.

Answer: lymphatic

Diff: 3 Page Ref: 4-5

## Essay Questions

1) Identify what systems are found in the arm.

Answer: The arm contains elements of the skeletal, nervous, cardiovascular, muscular, lymphatic, and integumentary systems.

Diff: 3 Page Ref: 4-5

2) What organ systems would be found in the arm and *not* in the leg?

Answer: None

Diff: 3 Page Ref: 4-5

3) List the six unique features found in all vertebrates at some stage of their life.

Answer: Tube-within-a-tube body plan, bilateral symmetry, dorsal hollow nerve cord, notochord and vertebrae, segmentation, and pharyngeal pouches.

Diff: 3 Page Ref: 10

4) In adult humans, what remnants of segmentation remain?

Answer: The ribs and the vertebrae, with their segmental spinal nerves, are remnants of segmentation.

Diff: 3 Page Ref: 10-11

5) Select from the following techniques the best method for assessing brain function in a stroke patient: X-ray imaging, sonography, MRI. Explain why the other choices are not the best choice.

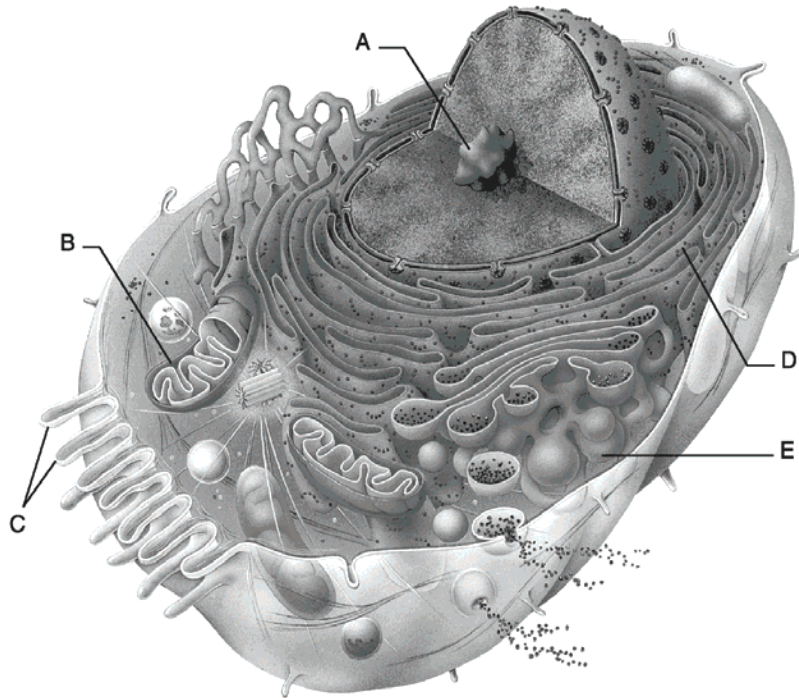
Answer: MRI is the best method of assessing brain function. X rays do not image soft tissues well or with high resolution. They also produce only two-dimensional images of a structure. Sonography cannot be used to study the brain because sound waves cannot pass through the body skull.

Diff: 3 Page Ref: 15-19

## Chapter 2 Cells: The Living Units

---

### Matching Questions



**Figure 2.1**

Using Figure 2.1, match the following:

- 1) Rough endoplasmic reticulum

Answer: D

Diff: 2 Page Ref: 24

- 2) Nucleolus

Answer: A

Diff: 2 Page Ref: 24

- 3) Microvilli

Answer: C

Diff: 2 Page Ref: 24

- 4) Mitochondrion

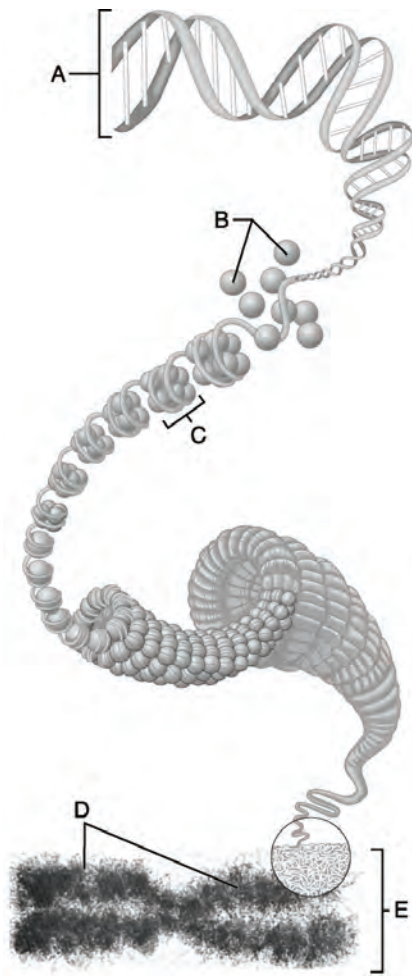
Answer: B

Diff: 2 Page Ref: 24

- 5) Golgi apparatus

Answer: E

Diff: 2 Page Ref: 24



**Figure 2.2**

Using Figure 2.2, match the following:

6) DNA molecule

Answer: A

Diff: 2 Page Ref: 38

7) Chromatid

Answer: D

Diff: 2 Page Ref: 38

8) Nucleosomes

Answer: C

Diff: 2 Page Ref: 38

9) Histones

Answer: B

Diff: 2 Page Ref: 38



10) Metaphase chromosome

Answer: E

Diff: 2 Page Ref: 38

*Match the following:*

- A. Golgi apparatus
- B. lysosome
- C. rough endoplasmic reticulum
- D. mitochondria
- E. peroxisome

11) This organelle is involved in production of cellular energy.

Answer: mitochondria

Diff: 1 Page Ref: 32-33

12) This structure is characterized by folded membranes called cristae.

Answer: mitochondria

Diff: 2 Page Ref: 32-33

13) When a cell ingests a foreign cell, the vesicle fuses with this organelle.

Answer: lysosome

Diff: 3 Page Ref: 32

14) This membranous structure is the site of protein synthesis.

Answer: rough endoplasmic reticulum

Diff: 2 Page Ref: 31

15) This structure detoxifies a number of toxic substances.

Answer: peroxisome

Diff: 2 Page Ref: 33-34

16) Cisternae of this structure are continuous with the nuclear envelope.

Answer: rough endoplasmic reticulum

Diff: 3 Page Ref: 31

17) This structure has both a cis and a trans face.

Answer: Golgi apparatus

Diff: 3 Page Ref: 31-32

18) This membranous structure contains oxidase enzymes.

Answer: peroxisome

Diff: 3 Page Ref: 33-34

19) These structures are often called the demolition crew of the cell.

Answer: lysosome

Diff: 2 Page Ref: 32

- 20) This structure primarily modifies products from the rough ER, and it is characterized by a flattened stack of membranes.  
Answer: Golgi apparatus  
Diff: 2 Page Ref: 31-32
- 21) This structure is primarily a sac of powerful enzymes.  
Answer: lysosome  
Diff: 2 Page Ref: 32
- 22) This structure is defective in the disorder Tay-Sachs disease.  
Answer: lysosome  
Diff: 2 Page Ref: 32
- 23) This structure is numerous in liver and kidney cells.  
Answer: peroxisome  
Diff: 2 Page Ref: 33-34
- 24) This structure produces ATP.  
Answer: mitochondria  
Diff: 2 Page Ref: 32-33
- 25) This structure contains its own DNA.  
Answer: mitochondria  
Diff: 2 Page Ref: 32-33

### True/False Questions

- 1) The smooth ER contains its own molecules of DNA.  
Answer: FALSE  
Diff: 3 Page Ref: 31
- 2) Hypercholesterolemia is an inherited disease in which the body's cells lack the protein receptors that bind to cholesterol-delivering LDLs.  
Answer: TRUE  
Diff: 3 Page Ref: 28
- 3) Ribosomes consist of two subunits, each surrounded by a membrane.  
Answer: FALSE  
Diff: 2 Page Ref: 30-31
- 4) Peroxisomes are important in detoxification of a number of toxic substances, for instance, hydrogen peroxide.  
Answer: TRUE  
Diff: 2 Page Ref: 33-34
- 5) The nucleolus serves as the cell's ribosome-producing machine.  
Answer: TRUE  
Diff: 2 Page Ref: 37

6) Microtubules are composed of actin.

Answer: FALSE

Diff: 2 Page Ref: 34–35

7) Chromatin is composed of DNA wound around proteins known as actin.

Answer: FALSE

Diff: 2 Page Ref: 37

8) An example of a type of cell with high rates of mitosis is a cell of the skin.

Answer: TRUE

Diff: 2 Page Ref: 39

9) During the S phase, cells are characterized by rapid growth.

Answer: FALSE

Diff: 2 Page Ref: 38

10) During the G<sub>1</sub> phase, DNA is replicated in the cytoplasm.

Answer: FALSE

Diff: 2 Page Ref: 38

11) Telomeres are structures that limit the maximum number of times cells can divide.

Answer: TRUE

Diff: 2 Page Ref: 43

12) Extended chromatin is tightly wound around histones.

Answer: FALSE

Diff: 2 Page Ref: 37

13) A mitotic spindle develops during early telophase of mitosis.

Answer: FALSE

Diff: 2 Page Ref: 40–41

14) During anaphase, the chromosomes are pulled toward the center of the cell.

Answer: FALSE

Diff: 2 Page Ref: 40–41

15) Cytokinesis is the physical division of the cells.

Answer: TRUE

Diff: 2 Page Ref: 40–41

## Multiple Choice

1) Mitosis refers only to nuclear division. Separation of the entire cell following mitosis is

A) meiosis.

B) karyokinesis.

C) cytokinesis.

D) telophase.

Answer: C

Diff: 2 Page Ref: 39

- 2) Phospholipids of the plasma membrane are arranged
- A) around a central layer of cholesterol.
  - B) in a single layer with polar heads facing outwards.
  - C) with their nonpolar tails sandwiched between the heads.
  - D) with their polar heads sandwiched between the tails.

Answer: C

Diff: 2 Page Ref: 26

- 3) Which of the following cytoskeleton elements are the thickest?
- A) microtubules
  - B) microfilaments
  - C) intermediate filaments
  - D) centrioles

Answer: A

Diff: 2 Page Ref: 34

- 4) Which of the following statements about integral proteins in the plasma membrane is *false*?
- A) Most extend all the way through the membrane.
  - B) Some attach to the glycocalyx.
  - C) They determine which molecules are transported through the membrane.
  - D) They are more abundant by volume than the membrane phospholipids.

Answer: D

Diff: 2 Page Ref: 26

- 5) Which type of endocytosis engulfs the most specific type of molecule or material?
- A) fluid-phase endocytosis
  - B) phagocytosis
  - C) pinocytosis
  - D) receptor-mediated endocytosis

Answer: D

Diff: 2 Page Ref: 27

- 6) Hormones are secreted by
- A) phagocytosis.
  - B) pinocytosis.
  - C) exocytosis.
  - D) osmosis.

Answer: C

Diff: 2 Page Ref: 27

- 7) Of the following, the only organelle that has a double membrane structure is the
- A) centriole.
  - B) Golgi apparatus.
  - C) endoplasmic reticulum.
  - D) mitochondrion.

Answer: D

Diff: 2 Page Ref: 32-33

- 8) Functions of the Golgi apparatus include all of the following *except*
- A) synthesis of lysosomes.
  - B) DNA replication.
  - C) plasma membrane formation.
  - D) production of secretory granules.

Answer: B

Diff: 3 Page Ref: 31-32

- 9) Which of the following statements about the rough endoplasmic reticulum is *false*?
- A) It consists of stacked envelopes called cisternae.
  - B) It makes the digestive enzymes contained in the lysosomes.
  - C) It produces secretory granules.
  - D) It makes the integral proteins of the cell membrane.

Answer: C

Diff: 2 Page Ref: 31

- 10) Which of the following is *not* a cytoskeleton element?
- A) microtubule
  - B) microfilament
  - C) intermediate filament
  - D) centriole

Answer: D

Diff: 1 Page Ref: 35

- 11) Which type of protein is required for exocytosis?
- A) caveolin
  - B) coatamer proteins
  - C) clathrin
  - D) SNARE

Answer: D

Diff: 3 Page Ref: 28

- 12) In chromatin, the DNA molecule wraps around proteins called
- A) nucleotides.
  - B) codons.
  - C) integral protein.
  - D) histones.

Answer: D

Diff: 1 Page Ref: 37

- 13) In the cell life cycle, DNA is replicated during
- A) interphase G<sub>1</sub>.
  - B) interphase S.
  - C) prophase I.
  - D) prophase II.

Answer: B

Diff: 2 Page Ref: 38

- 14) The longest arrays of microtubules that assemble on the centrioles during prophase form filaments called
- A) the mitotic spindle.
  - B) kinetochores.
  - C) asters.
  - D) the nuclear envelope.

Answer: A

Diff: 3 Page Ref: 40-41

- 15) During mitosis, contractions of the mitotic spindle serve to
- A) separate the chromatids at the centromere.
  - B) pull together the replicated chromosomal strands.
  - C) re-form the nuclear envelope.
  - D) form the aster.

Answer: A

Diff: 2 Page Ref: 40-41

- 16) The \_\_\_\_\_ face of the Golgi apparatus is \_\_\_\_\_ to receive spherical vesicles from the rough endoplasmic reticulum.
- A) cis; convex
  - B) trans; concave
  - C) cis; flattened
  - D) trans; convex

Answer: A

Diff: 3 Page Ref: 31-32

- 17) Which membranous organelle stores calcium and is considered the cell's membrane factory?
- A) Golgi apparatus
  - B) rough endoplasmic reticulum
  - C) mitochondrion
  - D) peroxisome

Answer: B

Diff: 3 Page Ref: 31

- 18) Which organelle is important in neutralizing free radicals?
- A) Golgi apparatus
  - B) lysosome
  - C) mitochondrion
  - D) peroxisome

Answer: D

Diff: 2 Page Ref: 33-34

- 19) Which of the following is the function of the nuclear envelope?
- A) separation of nucleoplasm and cytoplasm
  - B) regulation of passage of substances into and out of the cell membrane
  - C) transcription of DNA
  - D) protein synthesis

Answer: A

Diff: 3 Page Ref: 36-37

- 20) Peroxisomes function to
- A) form and degrade hydrogen peroxide.
  - B) store cellular free radicals.
  - C) produce pigments.
  - D) regulate membrane permeability.

Answer: A

Diff: 2 Page Ref: 33-34

- 21) Dyneins and kinesins
- A) enable a cell to send out and retract extensions called pseudopods.
  - B) move organelles along microtubules through the cytoplasm.
  - C) push and pull on chromosomes to align them during metaphase of mitosis.
  - D) resist pulling forces that are placed on cells.

Answer: B

Diff: 3 Page Ref: 35

- 22) Cell division is analogous to
- A) two buildings duplicating their parts and fusing.
  - B) a building duplicating its blueprint and then forming a new building by splitting in two.
  - C) a building forming another building by random accumulation of materials.
  - D) a building forming another building through a loss of some of its parts.

Answer: B

Diff: 2 Page Ref: 38

- 23) The plasma membrane is important for all the following reasons *except*
- A) it determines what substances enter and exit the cell.
  - B) it surrounds the cell contents.
  - C) it acts as a site for cell-to-cell interaction and recognition.
  - D) it is so thick and rigid that it offers some protection to the cell.

Answer: D

Diff: 3 Page Ref: 25-26

- 24) The plasma membrane is composed of all of the following *except*
- A) glycoproteins.
  - B) tubulin protein.
  - C) cholesterol.
  - D) phospholipids.

Answer: B

Diff: 2 Page Ref: 25-26

- 25) Materials that are to be exocytosed by cells are packed by the
- A) nucleosome.
  - B) ribosome.
  - C) Golgi apparatus.
  - D) mitochondrion.

Answer: C

Diff: 2 Page Ref: 31-32

- 26) Which of the following does *not* pass through nuclear pores?
- A) chromatin
  - B) messenger RNA
  - C) proteins
  - D) water and electrolytes

Answer: A

Diff: 2 Page Ref: 37

- 27) Which of the following is associated with protein synthesis?
- A) mitochondria
  - B) ribosomes
  - C) chloroplasts
  - D) smooth endoplasmic reticulum

Answer: B

Diff: 2 Page Ref: 30-31

- 28) Ribosomes may be either free within the cytoplasm or bound to a channeling system known as the
- A) Golgi apparatus.
  - B) microtubule organizing center.
  - C) cytoskeleton.
  - D) rough endoplasmic reticulum.

Answer: D

Diff: 2 Page Ref: 30-31

- 29) Which is *not* part of interphase?
- A) G<sub>1</sub>
  - B) G<sub>2</sub>
  - C) M
  - D) S

Answer: C

Diff: 1 Page Ref: 38

- 30) In the plasma membrane of cells, cholesterol acts to
- A) stabilize the membrane.
  - B) make the membrane more resistant to freezing.
  - C) destabilize the membrane, leading to heart attacks.
  - D) participate in pinocytosis.

Answer: A

Diff: 2 Page Ref: 25-26

- 31) The endocytotic process in which tiny packets of fluid are brought into the cell is called
- A) phagocytosis.
  - B) pinocytosis.
  - C) exocytosis.
  - D) xenocytosis.

Answer: B

Diff: 2 Page Ref: 27



32) The double membrane structure is unique to the

- A) lysosome.
- B) peroxisome.
- C) mitochondrion.
- D) nucleolus.

Answer: C

Diff: 2 Page Ref: 32-33

33) Peroxisomes

- A) are the toxic waste removal system of the cell.
- B) are involved in the production of ATP.
- C) contain some of the code necessary for their own duplication.
- D) synthesize proteins for use outside the cell.

Answer: C

Diff: 2 Page Ref: 33-34

34) The stiffest elements of the cytoskeleton, analogous to the bones of the human body, are

- A) microtubules.
- B) microfilaments.
- C) intermediate filaments.
- D) the cytosol.

Answer: A

Diff: 2 Page Ref: 34

35) The mitotic spindle forms from the

- A) nucleus.
- B) Golgi apparatus.
- C) centrioles.
- D) nucleolus.

Answer: C

Diff: 2 Page Ref: 40-41

36) The nuclear envelope is continuous with the rough ER, but it differs from the rough ER in that it

- A) is not associated with ribosomes.
- B) has unique pores.
- C) consists of two membranes separated by a space.
- D) consists of tubes, like the smooth ER.

Answer: B

Diff: 3 Page Ref: 36-37

37) Membrane-bound organelles have the same type of membrane as the plasma membrane *except*

- A) for the absence of a glycocalyx.
- B) for the absence of cholesterol.
- C) the nonpolar tails face outward.
- D) they are all covered with ribosomes.

Answer: A

Diff: 3 Page Ref: 30

- 38) In the process of phagocytosis, the organelles whose enzymes break down ingested foreign cells are the
- A) nucleoli.
  - B) smooth endoplasmic reticulum.
  - C) peroxisomes.
  - D) lysosomes.

Answer: D

Diff: 2 Page Ref: 32

- 39) During mitosis, the kinetochore microtubules of the mitotic spindle
- A) pull on the chromatids and align them at the metaphase plate.
  - B) push on the chromatids.
  - C) anchor the centriole to the cell membrane.
  - D) push the two poles of the cell apart.

Answer: A

Diff: 2 Page Ref: 40–41

- 40) The theory proposing that aging results from the effects of free radicals is primarily a theory of
- A) wear and tear.
  - B) genetically programmed aging.
  - C) progressive disorder of immunity.
  - D) cross-linking of glucose.

Answer: A

Diff: 2 Page Ref: 42

- 41) The cytoskeletal elements that are analogous to the muscles of the body in that they help generate contractile forces are
- A) microtubules.
  - B) microfilaments.
  - C) intermediate filaments.
  - D) integral proteins.

Answer: B

Diff: 2 Page Ref: 34–35

- 42) Transcription of DNA requires the presence of
- A) centrosomes.
  - B) extended chromatin.
  - C) histones.
  - D) nucleosomes.

Answer: B

Diff: 2 Page Ref: 37

- 43) The process of cellular aging may involve each of the following *except*
- A) accumulated damage by free radicals.
  - B) decreased production of lysosomes.
  - C) excessive metabolic rate.
  - D) progressive shortening of telomeres.

Answer: B

Diff: 3 Page Ref: 42

44) During what phase of mitosis does the mitotic spindle break down and disappear?

- A) metaphase
- B) anaphase
- C) telophase
- D) late prophase

Answer: C

Diff: 2 Page Ref: 40-41

45) The cytoskeletal elements that form a ring to "squeeze" the two daughter cells apart during cytokinesis are

- A) microtubules.
- B) microfilaments.
- C) intermediate filaments.
- D) the microtrabecular lattice.

Answer: B

Diff: 2 Page Ref: 39, 40-41

46) During what phase of the cell cycle is the DNA duplicated?

- A) metaphase
- B) anaphase
- C) interphase
- D) prophase

Answer: C

Diff: 2 Page Ref: 38

47) The plasma membrane is

- A) a single-layered membrane that surrounds the nucleus of the cell.
- B) a single-layered membrane enclosing the plasma.
- C) the membrane surrounding the cell.
- D) a membrane composed of tiny shelves or cristae.

Answer: C

Diff: 2 Page Ref: 25-26

48) The cell that gathers information and controls body functions is a

- A) macrophage
- B) fat cell
- C) sperm cell
- D) neuron

Answer: D

Diff: 2 Page Ref: 42

49) The temporary structures in the cytoplasm include all of the following *except*

- A) pigments
- B) glycosomes
- C) lipid droplets
- D) the Golgi apparatus.

Answer: D

Diff: 2 Page Ref: 35

50) Which of the following is an inclusion, *not* an organelle?

- A) lysosome
- B) microtubule
- C) mitochondrion
- D) glycogen

Answer: D

Diff: 2 Page Ref: 35

### Short Answer Questions

1) This phase is the physical division of two cells during mitosis.

Answer: cytokinesis

Diff: 2 Page Ref: 40–41

2) What is the mechanism by which substances move from the cytoplasm to the outside of the cell?

Answer: exocytosis

Diff: 3 Page Ref: 27

3) Cell aging may be related to production of what chemicals produced by the mitochondria?

Answer: radicals (free radicals)

Diff: 2 Page Ref: 42

4) This is the collective name for short carbohydrates on the extracellular surface of integral proteins, which help cells recognize each other.

Answer: glycocalyx

Diff: 2 Page Ref: 26

5) This is the name of a cluster of DNA wrapped around a group of eight histones.

Answer: nucleosome

Diff: 2 Page Ref: 38

6) This is the phase in which a cell grows and carries on all its usual activities except for division.

Answer: interphase

Diff: 1 Page Ref: 38

7) These are the smallest living units in the body.

Answer: cells

Diff: 2 Page Ref: 24

8) This is the outer physical boundary of a human cell.

Answer: plasma membrane (plasmalemma)

Diff: 1 Page Ref: 25–26

9) This is the name for the currently held theory describing the plasma membrane.

Answer: fluid mosaic model

Diff: 2 Page Ref: 26

10) The plasma membrane is primarily composed of this type of fat molecule.

Answer: phospholipid

Diff: 2 Page Ref: 26

11) This network of rods running throughout the cytosol acts as a cell's bones, muscles, and ligaments.

Answer: cytoskeleton

Diff: 2 Page Ref: 34

12) This is the mechanism by which large particles enter a cell.

Answer: endocytosis

Diff: 2 Page Ref: 27

13) This is the diffusion of water molecules across a membrane.

Answer: osmosis

Diff: 3 Page Ref: 27

14) This is the type of protein involved in transport mechanisms across the plasma membrane.

Answer: integral proteins

Diff: 3 Page Ref: 26

15) This is a genetic disease that leads to an accumulation of undigested glycolipids in the lysosomes.

Answer: Tay-Sachs disease

Diff: 2 Page Ref: 32

## Essay Questions

1) Differentiate phagocytosis from receptor-mediated endocytosis.

Answer: In phagocytosis, the cell extends pseudopods and engulfs the particle. In receptor-mediated endocytosis, the cell membrane forms in-pocketings called caveolae lined with the protein clathrin and binds to membrane receptors, causing it to be enveloped.

Diff: 2 Page Ref: 27-28

2) Describe the action of exocytosis and the SNAREs.

Answer: Exocytosis is the process by which a cell expels materials. These molecules are within a lipid-bound secretory vesicle with a vesicle SNARE, which binds to the plasma membrane SNARE, causing the vesicle phospholipid molecules to fuse with the plasma membrane phospholipid molecules. The molecules are expelled from the cell.

Diff: 3 Page Ref: 28

3) Describe the two checkpoints that occur during interphase.

Answer: The first checkpoint, G<sub>1</sub>, ensures that the cell has grown enough and replicated the necessary organelles and other structures to synthesize DNA. The second checkpoint, G<sub>2</sub>, checks to see whether errors occurred during DNA synthesis.

Diff: 3 Page Ref: 38

## 4) Describe the mitochondria.

Answer: These are long and thin organelles, contain their own DNA involved in their own replication, and move within the cell to sites where they are needed. They produce ATP molecules, which are the equivalent of cellular energy. They are bound by two membranes. The inner one is highly folded into cristae, where many of the critical molecules involved in energy production are imbedded.

Diff: 2 Page Ref: 32-33

## 5) Describe the three major types of cytoskeletal elements.

Answer: Microtubules are the largest and are formed by the protein tubulin. They are stiff, but bendable. Microfilaments are the thinnest. They are strands of the protein actin, are contractile, and are typically very labile. Intermediate filaments are of intermediate diameter. They are very stable and permanent, functioning as support structures as well as holding cells together.

Diff: 2 Page Ref: 34-35