

MULTIPLE CHOICE

1. Mitochondria produce which chemical for intracellular energy?
- ADP
 - ATP
 - RNA
 - DNA

ANS: B

	Feedback
A	Mitochondria generate energy through ATP, not ADP, production.
B	Correct. Mitochondria produce energy via ATP.
C	Mitochondria generate energy through ATP, not RNA, production.
D	Mitochondria generate energy through ATP, not DNA, production.

DIF: Recall REF: pp. 2-3 OBJ: 1

2. Each tissue originates from mesoderm, EXCEPT one. Which is the EXCEPTION?
- Bone
 - Liver
 - Blood
 - Muscle

ANS: B

	Feedback
A	Bone tissue develops from mesodermal cells.
B	Correct. Liver tissue is produced by endodermal cells.
C	Blood develops from mesodermal cells.
D	Muscle tissue develops from mesodermal cells.

DIF: Recall REF: p. 6 OBJ: 3

3. Which chemical is called the second messenger?
- aDNA
 - mRNA
 - dGMP
 - cAMP

ANS: D

	Feedback
A	cAMP is the second messenger; aDNA is not.
B	cAMP is the second messenger; mRNA is not.
C	cAMP is the second messenger; dGMP is not.
D	Correct. cAMP transmits information to the intracellular organelles when activated by surface receptors on the plasma membrane.

DIF: Recall REF: p. 3 OBJ: 3

4. Which cellular component facilitates protein synthesis?
- Ribosomes
 - Lysosomes
 - Mitochondria
 - Plasmalemma

ANS: A

	Feedback
A	Correct. Ribosomes synthesize protein.
B	Lysosomes facilitate the breakdown of intracellular and extracellular substances.
C	Mitochondria generate energy.
D	The plasmalemma provides a protective barrier and regulates the transport of substances to and from the cell.

DIF: Comprehension REF: p. 2 OBJ: 1

5. Which organelle produces microtubules?

- a. Nucleus
- b. Centriole
- c. Golgi apparatus
- d. Endoplasmic reticulum

ANS: B

	Feedback
A	Centrioles generate microtubules; the nucleus does not.
B	Correct. Centrioles produce microtubules.
C	Centrioles generate microtubules; the Golgi apparatus does not.
D	Centrioles generate microtubules; the endoplasmic reticulum does not.

DIF: Recall REF: p. 3 OBJ: 1

6. Which phase of the cell cycle is characterized as the initial resting stage?

- a. S phase
- b. G1 phase
- c. G2 phase
- d. Prophase

ANS: B

	Feedback
A	The S phase is characterized as the stage in which DNA synthesis is complete.
B	Correct. The G1 phase is the initial resting stage.
C	The G2 phase is characterized by post-DNA duplication.
D	Prophase is characterized by four specific structural changes.

DIF: Recall REF: p. 4 OBJ: 1

7. Posttranslational modifications to proteins produced by the rough endoplasmic reticulum are accomplished by _____.

- a. mitochondria
- b. Golgi apparatus
- c. messenger RNA
- d. smooth endoplasmic reticulum

ANS: B

	Feedback
A	The Golgi apparatus is responsible for posttranslational alterations; mitochondria are not.
B	Correct. The Golgi apparatus makes alterations to proteins produced by the rough endoplasmic reticulum.
C	The Golgi apparatus is responsible for posttranslational alterations; mRNA is not.
D	The Golgi apparatus is responsible for posttranslational alterations; the smooth endoplasmic reticulum is not.

DIF: Recall REF: p. 2 OBJ: 1

8. The _____ provides an ideal environment for the implantation and growth of the embryo.

- a. ovary
- b. uterine tube
- c. myometrium
- d. endometrium

ANS: D

	Feedback
A	The ovary is the female reproductive organ, in which the ova or eggs are produced.
B	The uterine tube conducts the egg from the ovary to the uterus.
C	The myometrium is the smooth muscle that lines the uterus.
D	Correct. The endometrium provides the ovum with the nourishment necessary for implantation and growth.

DIF: Comprehension REF: pp. 6-9 OBJ: 3

9. Intercalated disks are present in which type of muscle?

- a. Cardiac
- b. Smooth
- c. Skeletal
- d. Voluntary

ANS: A

	Feedback
A	Correct. Cardiac is the only type of muscle tissue with intercalated disks.
B	Intercalated disks are not present in smooth muscle.
C	Intercalated disks are not present in skeletal muscle.
D	Intercalated disks facilitate the involuntary contractions of cardiac muscle.

DIF: Recall REF: p. 15 OBJ: 4

10. Developmental abnormalities are not associated with which number of chromosomes?

- a. 44
- b. 45
- c. 46
- d. 47

ANS: C

	Feedback
A	Developmental abnormalities are associated with less than the normal number of chromosomes (46).
B	Developmental abnormalities are associated with less than the normal number of chromosomes (46).
C	Correct. The normal human cell has 46 total chromosomes.
D	Developmental abnormalities are associated with more than the normal number of chromosomes (46).

DIF: Comprehension REF: p. 16 OBJ: 4

11. Which best describes diapedesis?

- a. Programmed cell death and fragmentation
- b. A protective mechanism in the immunologic defense of the body
- c. The development of a cartilage disk in the neck of each long bone
- d. The migration of leukocytes between endothelial cells to the site of infection

ANS: D

	Feedback
A	Apoptosis is cell death and fragmentation into membrane-bound particles.
B	The lymphatic system is an immunologic defense mechanism.
C	The epiphyseal plate is a developmental disk of cartilage.
D	Correct. Diapedesis is a process whereby leukocytes migrate between endothelial cells to the site of infection.

DIF: Comprehension REF: p. 12 OBJ: 4

12. T cells, B cells, NK cells, and macrophages are produced in the _____.

- a. spleen
- b. cerebellum
- c. lymph nodes
- d. bone marrow

ANS: D

	Feedback
A	Immune system cells (T cells, B cells, NK cells, and macrophages) are produced in the bone marrow, not the spleen.
B	Immune system cells (T cells, B cells, NK cells, and macrophages) are produced in the bone marrow, not the cerebellum.
C	Immune system cells (T cells, B cells, NK cells, and macrophages) are produced in the bone marrow, not the lymph nodes.
D	Correct. Bone marrow is the site of formation for T cells, B cells, NK cells, and macrophages.

DIF: Recall REF: p. 12 OBJ: 4

13. Which represent the first change in shape of the embryo's body from a flat sheet of cells?
- Formation of the embryonic disk.
 - Formation of neural folds.
 - Formation of cartilage.
 - Migration of myoblasts from the myotome.

ANS: B

Feedback	
A	The embryonic disk forms from a small inner cell mass within the blastocyst. This occurs prior to the formation of the three primordial layers, long before the embryo acquires a three-dimensional shape.
B	Correct. The neural folds can be seen during the third prenatal week. The lateral edges of the neural plate begin to elevate as folds arise dorsally.
C	Cartilage first appears in the fifth week.
D	Muscle cells have begun migrating from the myotome by the 10th prenatal week.

DIF: Comprehension

REF: pp. 10-11

OBJ: 3

14. Myotome produces which of the following types of tissue?
- Connective
 - Muscle
 - Nerve
 - Epithelial

ANS: B

Feedback	
A	Connective tissue develops from somites as fibroblasts migrating from either side of the neural tube.
B	Correct. Myoblasts have begun migrating from the myotome by the 10th prenatal week. They gradually differentiate into elongated, multinucleated muscle fibers.
C	Nerve is derived from both the cranial and trunk neural crest. When the anterior neural tube closes, it shows three dilations that form the primary brain vesicles.
D	Skin has an epidermis, a surface cell layer that develops from the surface of ectodermal cells, and a dermis, which arises from the underlying mesoderm.

DIF: Comprehension

REF: p. 15

OBJ: 3

15. Which type of bone formation occurs through a tight matrix of collagen fibers, which slowly calcify into bone?
- Endochondral
 - Intramembranous
 - Epiphyseal
 - Interstitial growth

ANS: B

Feedback	
A	Bone replaces cartilage during endochondral bone development. A small blood vessel enters the cartilage shaft, the cartilage calcifies and disintegrates in the center, and a marrow space is formed.
B	Correct. Intramembranous bone formation is the direct transformation of connective tissue into bone. It is much simpler for bone cells to organize in this manner and to form spicules of bone through coalescence with neighboring spicules until a bony plate is formed.
C	The epiphyseal plate is a developing cartilage disk that remains in the neck of each long bone and bone forms on either side. It will remain as long as the bone is forming.
D	Cartilage develops and expands by interstitial growth, which is growth within the cartilage matrix by each cartilage cell enlarging and forming matrix around each cell.

DIF: Comprehension

REF: p. 14

OBJ: 4

16. Blood cells arise from cells called

- a. neuroblasts.
- b. fibroblasts.
- c. osteoblasts.
- d. angioblasts.

ANS: D

Feedback	
A	Neuroblasts are primitive nerve cells that develop into adult neurons.
B	Connective tissue develops from the somites as fibroblasts migrating from either side of the neural tube.
C	Osteoblasts will form bone.
D	Correct. The cardiovascular system originates from cells termed angioblasts, which arise from angiogenic clusters from the visceral mesoderm located in the walls of the yolk sac during the third week. The outer cells organize into a series of elongating tubes and the inner cells become blood cells.

DIF: Recall REF: p. 15 OBJ: 3

17. Each of the following is a derivative of ectoderm EXCEPT one. Which is the EXCEPTION?

- a. Tooth enamel
- b. Tooth dentin
- c. Epidermis
- d. Nervous system

ANS: B

Feedback	
A	Tooth enamel is derived from ectoderm.
B	Correct. Tooth dentin is derived from mesoderm. Muscle and connective tissue derivatives such as: bone, cartilage, blood, pulp, cementum, and the periodontal ligament are also derived from mesoderm.
C	The epidermis, hair, and nails are derived from ectoderm.
D	The nervous system, sensory epithelium of the eye, ear, and nose, and epithelium of the sinuses, oral and nasal cavities, and intraoral glands are all derived from epithelium.

DIF: Comprehension REF: p. 9 OBJ: 3

18. Which hormone is produced by the placenta?

- a. Follicle-stimulating hormone (FSH)
- b. Prolactin
- c. Progesterone
- d. Adrenocorticotrophic hormone (ACTH)

ANS: C

Feedback	
A	Follicle-stimulating hormone (FSH) is secreted by the anterior lobe of the pituitary gland.
B	Prolactin is produced by the anterior lobe of the pituitary gland.
C	Correct. The placenta produces hormones such as human chorionic gonadotropin, placental growth factor, human placental lactogen, and progesterone and estrogen.
D	Adrenocorticotrophic hormone (ACTH) is produced by the anterior lobe of the pituitary gland.

DIF: Comprehension REF: p. 16 OBJ: 4

TRUE/FALSE

1. The ovum contains twice as many chromosomes as its parent cell.

ANS: F DIF: Comprehension REF: p. 4
OBJ: 1

2. The cell may contain more than one nucleolus.

ANS: T DIF: Recall REF: p. 2 OBJ: 1

3. The information in mRNA is translated by ribosomes located on the surface of the rough endoplasmic reticulum.

ANS: T DIF: Comprehension REF: p. 2
OBJ: 1

4. Spindles present during mitosis are attached to centromeres.

ANS: F DIF: Comprehension REF: p. 4
OBJ: 1

5. DNA replication takes place during the G1 phase of the cell cycle.

ANS: F DIF: Comprehension REF: p. 4
OBJ: 1

6. Fertilization takes place in the distal part of the uterine tube.

ANS: T DIF: Recall REF: p. 7 OBJ: 3

7. Endoderm and ectoderm are the first two germ layers to develop.

ANS: T DIF: Comprehension REF: p. 6 | p. 9
OBJ: 3

8. Melanocytes are responsible for skin pigment.

ANS: T DIF: Recall REF: p. 10 OBJ: 1

9. The embryonic skeleton first forms as bone.

ANS: F DIF: Comprehension REF: p. 12
OBJ: 3

10. The umbilical system carries oxygenated blood.

ANS: T DIF: Comprehension REF: p. 15
OBJ: 4

11. The foramen ovale closes during the third week of prenatal life.

ANS: F DIF: Comprehension REF: p. 15
OBJ: 4

12. Before the development of the vascular system, the vitelline system provides nutrients to the embryo.

ANS: T DIF: Comprehension REF: p. 15
OBJ: 4

13. Smooth muscle is consciously controlled.

ANS: F DIF: Comprehension REF: p. 15
OBJ: 4

14. The cardiovascular system originates from chondroblasts.

ANS: F DIF: Comprehension REF: p. 15
OBJ: 4

15. Tissues are most susceptible to teratogens during the proliferative period.

ANS: F DIF: Recall REF: p. 17 OBJ: 4

16. The foramen ovale is an opening between the right and left atria of the heart.

ANS: T DIF: Comprehension REF: p. 15
OBJ: 4