**Instructor’s Manual**

***to accompany***

***Martin’s Human Anatomy and Physiology***

***Laboratory Manual,* Main, Cat, and Fetal Pig Versions**

**Fourth Edition**

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# CONTENTS

**Fundamentals of Human Anatomy and Physiology**

Laboratory Exercise 1 – Scientific Method and Measurement……………………………………………………………………………………………….. 5

Laboratory Exercise 2 – Body Organization, Membranes, and Terminology…………………………………………………………………………… 6

Laboratory Exercise 3 – Chemistry of Life………………………………………………………………………………………………………………………………. 8

Laboratory Exercise 4 – Care and Use of the Microscope………………………………………………………………………………………………………. 9

**Cells**

Laboratory Exercise 5 – Cell Structure and Function……………………………………………………………………………………………………………… 10

Laboratory Exercise 6 – Movements Through Membranes…………………………………………………………………………………………….……… 11

Laboratory Exercise 7 – Cell Cycle………………………………………………………………………………………………………………………………………….. 13

**Tissues**

Laboratory Exercise 8 – Epithelial Tissues………………………………………………………………………………………………………………………….….. 14

Laboratory Exercise 9 – Connective Tissues…………………………………………………………………………………………………………………………… 15

Laboratory Exercise 10 – Muscle and Nervous Tissues………………………………………………………………………………………………………….. 16

**Integumentary System**

Laboratory Exercise 11 – Integumentary System…………………………………………………………………………………………………………………… 17

**Skeletal System**

Laboratory Exercise 12 – Bone Structure and Classification…………………………………………………………………………………………………… 19

Laboratory Exercise 13 – Organization of the Skeleton………………………………………………………………………………………………….………. 21

Laboratory Exercise 14 – Skull……………………………………………………………………………………………………………………………………………….. 22

Laboratory Exercise 15 – Vertebral Column and Thoracic Cage……………………………………………………………………………………………… 24

Laboratory Exercise 16 – Pectoral Girdle and Upper Limb……………………………………………………………………………………………………… 26

Laboratory Exercise 17 – Pelvic Girdle and Lower Limb…………………………………………………………………………………………………………. 28

Laboratory Exercise 18 – Fetal Skeleton………………………………………………………………………………………………………………………………… 30

Laboratory Exercise 19 – Joint Structure and Movements…………………………………………………………………………………………………….. 32

**Muscular System**

Laboratory Exercise 20 – Skeletal Muscle Structure and Function…………………………………………………………………………………………. 34

Laboratory Exercise 21 – Electromyography: BIOPACExercise……………………………………………………………………………………………… 35

Laboratory Exercise 22 – Muscles of the Head and Neck…………………………………………………………………………………………………….... 36

Laboratory Exercise 23 – Muscles of the Chest, Shoulder, and Upper Limb…………………………………………………………………………… 37

Laboratory Exercise 24 – Muscles of the Vertebral Column, Abdominal Wall, and Pelvic Floor…………………………………………….. 39

Laboratory Exercise 25 – Muscles of the Hip and Lower Limb………………………………………………………………………………………………. 40

**Surface Anatomy**

Laboratory Exercise 26 – Surface Anatomy………………………………………………………………………………………………………………………….. 42

**Nervous System**

Laboratory Exercise 27 – Nervous Tissue and Nerves………………………………………………………………………………………………………….. 43

Laboratory Exercise 28 – Meninges, Spinal Cord, and Spinal Nerves…………………………………………………………………………………….. 44

Laboratory Exercise 29 – Reflex Arc and Somatic Reflexes……………………………………………………………………………………………………. 45

Laboratory Exercise 30 – Brain and Cranial Nerves……………………………………………………………………………………………………………….. 46

Laboratory Exercise 31A – Reaction Time: BIOPAC Exercise……………………………………………………………….………………………………… 48

Laboratory Exercise 31B – Electroencephalography: BIOPAC Exercise…………………………………………………………………………………. 49

Laboratory Exercise 32 – Dissection of the Sheep Brain………………………………………………………………………………………………...……… 50

**General and Special Senses**

Laboratory Exercise 33 – General Senses………………………………………………………………………………………………………………………………. 51

Laboratory Exercise 34 – Smell and Taste……………………………………………………………………………………………………………………………… 52

Laboratory Exercise 35 – Eye Structure…………………………………………………………………………………………………………………………………. 53

Laboratory Exercise 36 – Visual Tests and Demonstrations…………………………………………………………………………………………………… 54

Laboratory Exercise 37 – Ear and Hearing…………………………………………………………………………………………………………………………….. 55

Laboratory Exercise 38 – Ear and Equilibrium………………………………………………………………………………………………………………………. 56

**Endocrine System**

Laboratory Exercise 39 – Endocrine Structure and Function………………………………………………………………………………………………… 57

Laboratory Exercise 40 – Diabetic Physiology………………………………………………………………………………………………………………………. 58

**Cardiovascular System**

Laboratory Exercise 41 – Blood Cells……………………………………………………………………………………………………………………………………. 60

Laboratory Exercise 42 – Blood Testing………………………………………………………………………………………………………………………………… 61

Laboratory Exercise 43 – Blood Typing……………………………………………………………………………………………………………………………….... 62

Laboratory Exercise 44 – Heart Structure……………………………………………………………………………………………………………………………… 63

Laboratory Exercise 45 – Cardiac Cycle…………………………………………………………………………………………………………………………………. 65

Laboratory Exercise 46 – Electrocardiography: BIOPAC Exercise………………………………………………………………………………………….. 67

Laboratory Exercise 47 – Blood Vessel Structure, Arteries, and Veins…………………………………………………………………………………… 68

Laboratory Exercise 48 – Pulse Rate and Blood Pressure…………………………….………………………………………………………………………… 69

**Lymphatic System**

Laboratory Exercise 49 – Lymphatic System…………………………………………………………………………………………………………………………. 70

**Respiratory System**

Laboratory Exercise 50 – Respiratory Organs……………………………………………………………………………………………………………………….. 71

Laboratory Exercise 51 – Breathing and Respiratory Volumes………………………………………………………………………………………………. 72

Laboratory Exercise 52 – Spirometry: BIOPAC Exercise………………………………………………………………………………………………………… 73

Laboratory Exercise 53 – Control of Breathing……………………………………………………………………………………………………………………… 74

**Digestive System**

Laboratory Exercise 54 – Digestive Organs…………………………………………………………………………………………………………………………… 75

Laboratory Exercise 55 – Action of a Digestive Enzyme……………………………………………………………………………………………………….. 77

Laboratory Exercise 56 – Metabolism………………………………………………………………………………………………………………………………….. 78

**Urinary System**

Laboratory Exercise 57 – Urinary Organs……………………………………………………………………………………………………………………………… 79

Laboratory Exercise 58 – Urinalysis………………………………………………………………………………………….…………………………………………… 81

**Reproductive Systems and Development**

Laboratory Exercise 59 – Male Reproductive System……………………………………………………………………………………………………………. 82

Laboratory Exercise 60 – Female Reproductive System………………………………………………………………………………………………………… 83

Laboratory Exercise 61 – Meiosis, Fertilization, and Early Development………………………………………………………………………………. 84

Laboratory Exercise 62 – Genetics………………………………………………………………………………………………………………………………………… 85

**Cat or Fetal Pig Dissection**

Laboratory Exercise 63 – Cat (or Fetal Pig) Dissection: Musculature……………………………………………………………………………………… 87

Laboratory Exercise 64 – Cat (or Fetal Pig) Dissection: Cardiovascular System………………………………………………………………………. 89

Laboratory Exercise 65 – Cat (or Fetal Pig) Dissection: Respiratory System……………………………………………………………………………. 92

Laboratory Exercise 66 – Cat (or Fetal Pig) Dissection: Digestive System……………………………………………………………………………….. 94

Laboratory Exercise 67 – Cat (or Fetal Pig) Dissection: Urinary System………………………………………………………………………………….. 96

Laboratory Exercise 68 – Cat (or Fetal Pig) Dissection: Reproductive Systems……………………………………………………………………….. 98

**Supplemental Laboratory Exercises (these laboratory exercises are available online)**

Laboratory Exercise S-1 – Skeletal Muscle Contraction………………………………………………………………………………………………………….100

Laboratory Exercise S-2 – Nerve Impulse Stimulation…………………………………………………………………………………………………………….101

Laboratory Exercise S-3 – Factors Affecting the Cardiac Cycle………………………………………………………………………………………………..102

**Laboratory Exercise 1**

**Scientific Method and Measurements**

**Pre-Lab Answers**

1. a 4. b 7. b
2. c 5. c 8. a
3. d 6. c

**Laboratory Assessments Answers**

Part A: Assessments

1. (experimental results)
2. (experimental results)
3. Answers will vary; however, many students will conclude that the data will support their original hypothesis.

Part B: Assessments

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.
4. Answers will vary.
5. Answers will vary.
6. Answers will vary.

**Laboratory Exercise 2**

**Body Organization, Membranes, and Terminology**

**Pre-Lab Answers**

1. c 4. c 7. d 10. a
2. a 5. c 8. d
3. d 6. b 9. b

**Laboratory Assessments Answers**

Part A: Assessments

1. Matching:

1. a 4. a 7. c 10. a
2. d 5. b 8. e
3. a 6. c 9. d

2. Fig. 2.10:

1. Cranial; brain

2. Vertebral canal; spinal cord

3. Thoracic; lung

4. Abdominal; gallbladder

5. Pelvic; urethra

3. Fig. 2.11:

1. Parietal pericardium

2. Pericardial cavity

3. Visceral pericardium (epicardium)

Part B: Assessments

1. c 4. g 7. e 10. b
2. d 5. j 8. f 11. a
3. h 6. i 9. k

Part C: Assessments

1. Inferior 4. Anterior 7. Distal 10. Posterior
2. (Correct) 5. (Correct) 8. (Correct) 11. Deep
3. (Correct) 6. (Correct) 9. (Correct) 12. (Correct)

Part D: Assessments

Critical Thinking Assessment:

1. LUQ 4. RUQ
2. RLQ 5. LUQ or LLQ
3. any or all quadrants 6. LUQ

Part E: Assessments

Fig. 2.12:

1. Sagittal (median; midsagittal)
2. Frontal (coronal)
3. Transverse (horizontal)

Fig. 2.13 – Anterior view:

1. Cephalic 4. Sternal 7. Antecubital 10. Carpal 13. Crural

1. Otic 5. Pectoral 8. Antebrachial 11. Femoral 14. Tarsal
2. Cervical 6. Brachial 9. Inguinal 12. Patellar

Fig. 2.13 – Posterior view:

1. Occipital 4. Gluteal 7. Plantar

1. Otic 5. Manus
2. Lumbar 6. Popliteal

Critical Thinking Assessment:

A – Thoracic cavity; pleural cavity – Left lung

B – Abdominal cavity; abdominopelvic cavity – Liver; gallbladder; small intestine; large intestine

C – Pelvic cavity; abdominopelvic cavity – Small intestine; large intestine; left ureter

**Broyles: Workbook to Accompany**

**Anatomy and Physiology Revealed 3.2**

**Module 1 Body Orientation**

**EXERCISE 1.1 Body Position**

1. Supine
2. Anatomical Position
3. Prone

**CHECK POINT: Body Position**

1. Standing erect with arms at sides, palms facing forward with fingers pointing downward, feet parallel to each other and flat on the floor, and eyes directed forward
2. Position of the body when lying face down
3. Position of the body when lying face up

**Layer 1**

1. Anatomical position

**Layer 2**

1. Supine position

**Layer 3**

1. Prone position

**EXERCISE 1.2 Planes of Section**

1. Oblique plane
2. Transverse plane
3. Coronal plane
4. Sagittal plane
5. Midsagittal plane

**Layer 1**

1. Coronal plane
2. Oblique plane
3. Midsagittal plane
4. Sagittal plane
5. Transverse plane

**CHECK POINT: Planes of Section**

1. Coronal plane
2. Transverse plane
3. Sagittal plane
4. Midsagittal plane

**IN REVIEW**

**What Have I Learned?**

1. A plane that passes side-to-side through the body, dividing it into anterior and posterior portions
2. A plane that passes from front to back through the midline of the body dividing it into right and left halves
3. A slanted plane (i.e. not horizontal or vertical) that passes through the body.
4. A plane that passes from front to back through the body dividing it into right and left portions
5. A plane that passes perpendicular to the long axis of the body, dividing it into superior and inferior portions

**EXERCISE 1.3 Directional Terms**

1. Proximal
2. Inferior
3. Anterior
4. Distal
5. Deep
6. Superior
7. Posterior
8. Medial
9. Superficial
10. Lateral

**Layer 1**

1. Posterior
2. Anterior

**Layer 2**

1. Superior
2. Proximal
3. Lateral
4. Medial
5. Distal
6. Inferior

**Layer 3**

1. Deep
2. Superficial

**CHECK POINT: Directional Terms**

1. Posterior
2. Inferior
3. Anterior
4. Superior

**IN REVIEW**

**What Have I Learned?**

1. Toward the front of the body (e.g. The sternum is anterior to the heart)
2. Away from the surface of the body (e.g. in the kidney, the medulla is deep to the cortex)
3. Farther from the trunk or origin of a structure (e.g. the wrist is distal to the elbow).
4. Downward or below (e.g. the diaphragm is inferior to the heart)
5. Away form the midline of the body (e.g. the lungs are lateral to the heart)
6. Toward form the midline of the body (e.g. the heart is medial to the lungs)
7. Toward the back of the body or relating to the back (e.g. the heart is posterior to the sternum)
8. Closer to trunk or origin of a structure (e.g. the elbow is proximal to the wrist)
9. Toward the surface of the body (e.g. in the kidney, the cortex is superficial to the medulla)
10. Upward or above (e.g. the heart is superior to the diaphragm)

**EXERCISE 1.4 Body Regions**

**Abdomen and pelvis**

1. Abdominopelvic region
2. Abdominal cavity
3. Pelvic cavity
4. Epigastric / umbilical region / pubic region
5. Left hypochondriac region
6. Right flank region
7. Right inguinal region
8. Right hypochondriac region
9. Left flank region
10. Pubic region
11. Left inguinal region
12. Epigastric region
13. Left upper quadrant
14. Right lower quadrant
15. Right upper quadrant
16. Left lower quadrant

**CHECK POINT: Body Regions: Abdomen & Pelvis**

1. Abdominal and pelvic cavities
2. Epigastric region, pubic region, umbilical region, left flank region, right flank region, left hypochondriac region, right hypochondriac region, left inguinal region, right inguinal region
3. Left upper quadrant, Right upper quadrant, Left lower quadrant, Left lower quadrant
4. Stomach, intestines, liver, gallbladder, spleen, pancreas, kidney and ureters, suprarenal glands, aorta, inferior vena cava, lumber nerve plexus
5. Urinary bladder, loops of small intestine, inferior part of sigmoid colon, rectum, reproductive organs (ovaries, uterus, vagina in females; prostate and seminal glands in males)

**Back**

1. Triangle of auscultation: small, triangular gap between trapezius and latissimus dorsi muscles and inferior part of medial scapular border. Floor of triangle formed by rhombdoid major muscle and thoracolumbar fascia.
2. Back
3. Sacral region
4. Vertebral region
5. Scapular region
6. Lumbar region

**CHECK POINT: Back**

1. Intrinsic muscles act on the vertebral column and head; extrinsic muscles act on the upper limbs
2. Lumbar region
3. Small, triangular gap between trapezius and latissimus dorsi muscles and inferior part of medial scapular border. Floor of triangle formed by rhombdoid major muscle and thoracolumbar fascia.
4. Cervical, thoracic, lumbar, sacral, coccygeal vertebrae

**Head**

1. Cranial region
2. Frontal region
3. Nasal region
4. Orbital region
5. Auricular region
6. Occipital region
7. Parotid region
8. Parietal region
9. Zygomatic region
10. Temporal region
11. Buccal region
12. Facial region
13. Oral region
14. Head
15. Mental region

**CHECK POINT: Head**

1. Cranial region
2. Buccal, nasal, mental, oral, orbital, and parotid
3. Frontal/maxilla
4. anterior aspect of mandible
5. parotid

**Lower Limb**

1. Anterior leg region
2. Dorsal aspect of foot (i.e., directed superiorly in anatomical position)
3. Gluteal region
4. Knee region
5. Femoral region
6. Hip region
7. Lower limb
8. Ankle region
9. Popliteal region
10. Heel region
11. Sole foot
12. Foot region
13. Posterior leg region
14. Digits of foot

**CHECK POINT: Lower Limb**

1. Ankle region
2. Gluteal region
3. Heel region
4. Lower limb region
5. Popliteal region
6. Posterior leg region

**Neck**

1. Neck
2. Sternocleidomastoid region
3. Anterior cervical region
4. Posterior cervical region (posterior cervical triangle)
5. Lateral cervical region

**CHECK POINT: Neck**

1. Anterior cervical region
2. Lateral cervical region
3. Posterior cervical region
4. Sternocleidomastoid region

**Perineum**

1. Between proximal thigh, from coccyx to pubic symphysis; inferior to pelvic diaphragm

**Thoracic**

1. Deltopectoral triangle
2. Presternal region
3. Axillary region
4. Pectoral region
5. Thoracic region

**CHECK POINT: Thoracic**

1. Axillary region
2. Deltopectoral triangle
3. Heart and great vessels, lungs, thymus, distal part of trachea, most of esophagus, thoracic duct

**Upper Limb**

1. Brachial region
2. Deltoid region
3. Carpal region
4. Digits of the hand
5. Palmar region
6. Dorsum of hand
7. Hand region
8. Antebrachial region
9. Upper limb
10. Cubital region

**CHECK POINT: Upper Limb**

1. Antebrachial region
2. Brachial region
3. Carpal region
4. Deltoid region
5. Digits of hand
6. Upper limb

**LABEL**

1. Cranial region
2. Frontal region
3. Temporal region
4. Head
5. Zygomatic region
6. Orbital region
7. Nasal region
8. Auricular region
9. Buccal region
10. Facial region
11. Oral region
12. Parotid region
13. Mental region
14. Lateral cervical region
15. Anterior cervical region
16. Neck
17. Sternocleidomastoid region
18. Parietal region
19. Occipital region
20. Posterior cervical region
21. Deltopectoral triangle
22. Axillary region
23. Deltoid region
24. Thoracic region
25. Presternal region
26. Pectoral region
27. Brachial region
28. Epigastric region
29. Cubital region
30. Right hypogastric region
31. Abdominal cavity
32. Left upper quadrant
33. Left hypogastric region
34. Right upper quadrant
35. Right flank region
36. Antebrachial region
37. Right inguinal region
38. Umbilical region
39. Abdominopelvic region
40. Left flank region
41. Left inguinal region
42. Hip region
43. Left lower quadrant
44. Pelvic region
45. Pubic region
46. Right lower quadrant
47. Carpal region
48. Hand region
49. Perineal region
50. Palmar region
51. Digits of hand
52. Femoral region
53. Knee region
54. Anterior leg region
55. Ankle region
56. Foot region
57. Dorsum of foot
58. Digits of foot
59. Parietal region
60. Occipital region
61. Posterior cervical region
62. Scapular region
63. Back region
64. Triangle of auscultation
65. Upper limb
66. Vertebral region
67. Lumbar region
68. Sacral region
69. Gluteal region
70. Dorsum of hand
71. Lower limb
72. Popliteal fossa
73. Posterior leg region
74. Heel region
75. Sole of foot

**IN REVIEW**

**What Have I Learned?**

1. Bounded by abdominal walls, thoracic diaphragm (superior), and pelvic brim (inferior). Major organs include: Stomach, intestines, liver, gallbladder, spleen, pancreas, kidney and ureters, suprarenal glands, aorta, inferior vena cava, lumbar nerve plexus.
2. Location: trunk, inferior to thoracic region. Composed of the abdominal cavity and pelvic cavity. Abdominal cavity contains stomach, most of the intestines, liver, gallbladder, spleen, pancreas, kidneys and ureters, suprarenal glands, and inferior vena cava. Greater (false) pelvic cavity (the inferior part of abdominal cavity) is located between iliac fossae, superior to pelvic inlet. Lesser (true) pelvic cavity is located between pelvic inlet (superiorly) and pelvic outlet (inferiorly). It contains urinary bladder and reproductive organs (e.g., ovaries, uterus, vagina in female, and prostate and seminal vesicles in male), loops of ileum, sigmoid colon, and rectum.
3. Location: pelvic region. Bounded by pelvic inlet (superiorly) and pelvic outlet (inferiorly). Major organs include: Urinary bladder, loops of small intestine, inferior part of sigmoid colon, rectum, and reproductive organs (ovaries, uterus, vagina in female; prostate and seminal glands in males). Continuous superiorly with abdominal cavity.
4. Location: head (lateral cranial region). Region of external ear.
5. Location: head (lateral face). Region of cheek.
6. Location: head (anterior inferior part). Region of face, including: eyes, nose, mouth, cheeks, and chin.
7. Location: head (anterior inferior part of facial region). Region of chin; related to anterior aspect of mandible.
8. Location: head (anterior). Region of eye; related to the orbits, the bony cavity that contain the eyes and accessory structures.
9. Location: head (lateral); superior to zygomatic arch and auricular region. Part of cranial region related to temporal bone.
10. Location: head (lateral); inferior to orbital region; superior to buccal region. Part of cranial region related to zygomatic bone.
11. Location: between proximal thighs, from coccyx to pubic symphysis; inferior to pelvic diaphragm. Subdivision of trunk. Forms diamond-shaped area when thighs abducted. Anterior boundary: mons pubis; Lateral boundary: medial surface of thigh; Posterior boundary: gluteal folds and superior end of intergluteal (natal) cleft. Subdivided into anal and urogenital triangles. Contents of anal triangle: anus. Contents of urogenital triangle: clitoris, external urethral and vaginal orifices (female); penis, scrotum and its contents (male).
12. Location: thoracic region (inferior to shoulder joint); between upper arm and lateral thoracic wall. Subdivision of thoracic region that includes axilla. Axilla is a pyramidal space. Anterior boundary: pectoralis muscles and clavipectoral fascia; Posterior boundary: scapula and subscapularis, teres major, and latissimus dorsi muscles; Medial boundary: serratus anterior and upper lateral thoracic wall (ribs 1-4 and intercostal muscles); Lateral boundary: humerus (intertubercular sulcus). Base: skin, subcutaneous tissue, and axillary (deep) fascia. Apex: passage between neck and upper limb (cervicoaxillary canal) formed by rib 1, clavicle, and superior border of scapula. Contents of axilla: axillary artery, vein, and lymph nodes; infraclavicular part of brachial plexus; and areolar tissue.
13. Location: superior part of trunk; between neck and abdomen. Thoracic cavity contains heart and great vessels, lungs, thymus, distal part of trachea, most of esophagus, and thoracic duct.
14. Location: upper limb (distal); between elbow and wrist joints.
15. Location: upper limb (proximal); between glenohumeral (shoulder) and elbow joints.
16. Location: upper limb; anterior and posterior aspects of elbow.

**EXERCISE 1.5 Body Cavities**

**Cranial Cavity**

1. Skull
2. Brain, meninges, cerebrospinal fluid (CSF)
3. Frontal, occipital sphenoid, ethmoid, parietal, and temporal bones

**Vertebral Canal**

1. Vertebral column
2. Vertebral foramina
3. Spinal cord, meninges, spinal nerve roots, blood vessels, and fat

**Ventral Cavity**

1. Diaphragm
2. Mediastinum
3. Abdominopelvic cavity
4. Abdominal cavity
5. Pelvic cavity
6. Thoracic cavity
7. Abdominal cavity
8. Pulmonary cavity
9. Thoracic cavity
10. Abdominal cavity
11. Pulmonary cavity
12. Pelvic cavity
13. Diaphragm
14. Mediastinum

**CHECK POINT: Ventral Cavity**

1. Decreases intra-thoracic pressure; increases intra-abdominal pressure
2. Mediastinum
3. Pelvic cavity
4. Lungs and pleurae
5. Thoracic cavity
6. Sternum, ribs and costal cartilages, intercostal muscles, thoracic vertebrae, and

diaphragm

**Layer 1**

1. Cranial cavity.
2. Vertebral canal.
3. Thoracic cavity.
4. Abdominal cavity.
5. Mediastinum
6. Pulmonary cavity.
7. Diaphragm.
8. Abdominal pelvic cavity.
9. Pelvic cavity

**IN REVIEW**

**What Have I Learned?**

1. Location: skull. Space in skull that contains: brain, meninges, cerebrospinal fluid (CSF). Formed by frontal, occipital sphenoid, ethmoid, parietal, temporal bones.
2. Location: Vertebral column. Canal formed by combined vertebral foramina. Contains spinal cord, meninges, spinal nerve roots, blood vessels, and fat.
3. Dome of diaphragm flattens during inhalation; contraction increases vertical dimension of thoracic cavity.
4. Location: middle region of thorax; lies between sternum and thoracic vertebral bodies. Separates right and left pulmonary cavities. Divided into superior and inferior parts. Inferior mediastinum subdivided into middle posterior and anterior parts.
5. Bilateral subdivisions of the thoracic cavity (separated by mediastinum). Contain lungs and pleurae. Lined by parietal pleurae.

**EXERCISE 1.6 Abdominal Quadrants and Regions**

**Abdominal Surface Quadrants**

1. Left lower quadrant
2. Right lower quadrant
3. Left upper quadrant
4. Right upper quadrant

**CHECK POINT: Abdominal Surface Quadrants**

1. Right lower quadrant
2. Left upper quadrant
3. Right upper quadrant
4. Left lower quadrant

**Abdominal Surface Regions**

1. Right inguinal region
2. Epigastric region
3. Left hypochondriac region
4. Right flank region
5. Umbilical region
6. Right hypochondriac region
7. Left flank region
8. Pubic region
9. Left inguinal region

**CHECK POINT: Abdominal surface Regions**

1. Abdominal regions delineated by the midclavicular planes (sagittal planes that pass through the midpoint of the clavicle's and the midinguinal points) and the sub-costal and transtubercular planes
2. Used in clinical practice to describe the location of abdominal organs
3. Left flank region
4. Hypochondriac
5. Pubic region

**Layer 1**

1. Right upper quadrant
2. Left upper quadrant
3. Right lower quadrant
4. Left lower quadrant

**Layer 2**

1. Right hypochondriac region
2. Hypogastric region
3. Left hypochondriac region
4. Right flank region
5. Umbilical region
6. Left flank region
7. Right inguinal region
8. Left inguinal region
9. Pubic region

**IN REVIEW**

**What Have I Learned?**

1. Parts of small intestine, large intestine, urinary bladder (when distended and), left uterine tube and ovary.
2. Spleen, left kidney and suprarenal gland, parts of the liver, stomach, pancreas, small intestine, large intestine.
3. Parts of small intestine, large intestine, (including cecum, and vermiform appendix and parentheses, urinary bladder (when distended), and right uterine tube and ovary.
4. Right kidney and suprarenal gland, gallbladder, and parts of a liver, stomach, pancreas, and small and large intestines.
5. Suprarenal glands, parts of stomach, large intestine, liver and gallbladder, and pancreas.
6. Parts of small and large intestines, and left kidney.
7. Spleen, parts of stomach, large intestine, pancreas (tail), left kidney.
8. Parts of small and large intestines.
9. Urinary bladder (when distended), and parts of small and large intestines.
10. Parts of small and large intestines, and right kidney.
11. Parts of large intestine, liver, gallbladder, and right kidney.
12. Parts of small and large intestine (including cecum and vermiform appendix).
13. Parts of small and large intestines.

**Pleura & Pericardium**

1. Visceral layer of serous pericardium
2. Parietal layer of serous pericardium
3. Pericardial cavity

**Pleura**

1. Parietal pleura

2. Visceral pleura

3. Pleural cavity

**CHECK POINT: Pleura & Pericardium**

1. Visceral and parietal layers of serous pericardium
2. Fused to the surface of the heart, inner limit of pericardial cavity
3. Fused to inner aspect of fibrous pericardium; outer limit of pericardial cavity
4. Myocardium
5. Visceral layer of serous pericardium
6. Parietal and visceral layers of pleura
7. Mediastinum them and bilateral pulmonary cavities

**Cardiovascular: Heart**

1. Thorax (middle mediastinum)
2. Conical, muscular organ with four chambers: two atria and two ventricles
3. Pumps blood to body; modified cardiac muscle cells in right atrium secrete the hormone atriopeptin (atrial natriuretic peptide) in response to distension (stretching) of the atrial wall; atriopeptin reduces blood volume by causing water loss and sodium excretion into urine (with less blood volume, blood pressure is reduced)

**Respiratory: Lungs**

1. Pulmonary cavity (in lateral thoracic cavity); surrounded by pleural cavity
2. Diaphragm
3. Left = two: superior and inferior; right = three: superior, middle, inferior
4. Primary organ of respiration

**Respiratory: Trachea and main bronchi**

1. Series of C-shaped cartilaginous rings
2. Fibroelastic trachealis muscle
3. Main or primary bronchi
4. Primary bronchus

**Layer 1**

1. Visceral pleura
2. Parietal pleura
3. Visceral layer of serous pericardium
4. Parietal layer of serous pericardium
5. Plural cavity
6. Pericardial cavity
7. Trachea and main bronchi
8. Lungs
9. Heart

**IN REVIEW**

**What Have I Learned?**

1. Thin serous membrane; lines pleural cavity; fused to internal walls of thoracic cavity and lateral surface of mediastinum; continuous with visceral pleura at root of lung; regions include mediastinal, cervical, diaphragmatic, and costal.
2. Potential space between parietal and visceral layers of serous pericardium.
3. Thin, serous membrane fused to surface of heart (myocardium); inner limit of pericardial cavity; continuous with parietal layer of serous pericardium.
4. Thin serous membrane; lines of pulmonary cavity; fused to internal walls of thoracic cavity and lateral surface of mediastinum; continuous with visceral pleura at root of lung; regions include mediastinal, cervical, diaphragmatic, and costal.
5. Bilateral potential spaces between parietal and visceral layers of the pleura.
6. Thin serous membrane; fused to surface of lung; continuous with parietal pleura, at root of lung; separated from parietal pleura by pleural cavity.

**EXERCISE 1.7 Peritoneum**

1. Mesentery of small intestine
2. Lesser omentum; hepatoduodenal ligament
3. Parietal peritoneum
4. Visceral peritoneum
5. Peritoneal cavity
6. Greater omentum
7. Lesser omentum
8. Greater omentum
9. Visceral peritoneum; parietal peritoneum
10. Mesentery small intestine

**CHECK POINT: Peritoneum**

1. Greater omentum
2. Lesser omentum; hepatic artery proper, bile duct and hepatic portal vein
3. Support for small intestine; contains blood, nerve, and lymphatic supply for small intestine
4. Secrete and absorb serous fluid within peritoneal cavity
5. Visceral layer of peritoneum coats surface of some abdominal organs (e.g. stomach, spleen, liver, and parts of small and large intestines); parietal layer lines walls of abdominal cavities
6. Secrete and absorb serous fluid within peritoneal cavity

**Digestive**

1. Rectum and transverse colon
2. Liver
3. transverse colon
4. Small intestine
5. Stomach
6. Retroperitoneal organs
7. Pancreas
8. Transverse mesocolon
9. Stomach
10. Liver
11. Transverse mesocolon
12. Small intestine
13. Rectum
14. Liver
15. Pancreas
16. Small intestine
17. Retroperitoneal organs
18. Liver
19. Rectum, transverse colon
20. Stomach
21. Pancreas
22. Liver

**Skeletal**

1. Vertebral column.
2. Pubic symphysis
3. Vertebral column
4. Pubic symphysis.

**IN REVIEW**

**What Have I Learned?**

1. Double-layered fold of peritoneum; suspended apron-like from greater curvature stomach; attached to anterior surface of transverse colon.
2. Double layer of peritoneum. Two parts: hepatogastric and hepatoduodental ligaments
3. Double layer of peritoneum.
4. Lines wall of abdomen; single layer of serous membrane with surface epithelium (mesothelium).
5. Potential space the parietal and visceral layers of peritoneum.
6. Coats outer surface of many abdominal organs; single later of serous membrane with surface epithelium (mesothelium).

**EXERCISE 1.8 Organ Systems**

**Cardiovascular**

1. Cardiovascular system
2. Veins, specifically venules
3. Arteries
4. Veins
5. Heart
6. Veins
7. Arteries
8. Heart
9. Cardiovascular system
10. Veins
11. Arteries
12. Heart
13. Arteries
14. Veins

**Layer 6: Cardiovascular**

1. Cardiovascular system
2. Heart
3. Veins
4. Arteries

**CHECK POINT: Cardiovascular**

1. Elastic, muscular, arterioles
2. Capillaries
3. Pulmonary arteries: deoxygenated blood; the systemic arteries: oxygenated blood
4. Systemic, pulmonary
5. Systemic: movement of blood between the heart, and peripheral tissues; pulmonary: movement of blood between the heart and lungs
6. Distension (stretching) of the atrial wall
7. Reduces blood volume by causing water loss and sodium excretion into urine (with less blood volume, blood pressure is reduced)
8. Large, medium-small, venules
9. Pulmonary veins: carry oxygenated blood; systemic veins: carry deoxygenated blood

**IN REVIEW: Cardiovascular**

**What Have I Learned?**

1. Arteries
2. Veins
3. Cardiovascular system
4. Capillaries
5. Systemic, pulmonary

**Digestive**

1. Stomach
2. Liver
3. Teeth
4. Pharynx
5. Large intestine
6. Accessory digestive organs
7. Oral cavity
8. Liver
9. Oral cavity
10. esophagus
11. Pancreas
12. digestive system
13. Gallbladder
14. Digestive system
15. Liver
16. Pancreas
17. Gastrointestinal tract
18. Salivary glands
19. Small intestine
20. Large intestine
21. tongue
22. Liver
23. Small intestine
24. Gastrointestinal tract
25. Large intestine
26. Salivary glands
27. Oral cavity
28. Gallbladder
29. Liver
30. Small intestine
31. Large intestine
32. Teeth
33. Stomach
34. Esophagus
35. Tongue
36. Small intestine
37. Oral cavity
38. Salivary glands
39. Pancreas
40. Gastrointestinal tract
41. Liver
42. Gallbladder
43. Esophagus
44. Large intestine
45. Oral cavity
46. Stomach
47. Digestive system and gastrointestinal tract
48. Pancreas

**Layer 1: Digestive**

1. Salivary glands
2. Oral cavity
3. Tongue
4. Teeth
5. Pharynx
6. Esophagus
7. Gastrointestinal tract
8. Accessory digestive organs
9. Liver
10. Pancreas
11. Stomach
12. Gallbladder
13. Large intestine
14. Digestive system
15. Small intestine

**CHECK POINT: Digestive**

1. Teeth, tongue, the salivary glands, liver, gallbladder, pancreas
2. Alimentary canal
3. Oral cavity, pharynx, esophagus, stomach, small intestine, large intestine
4. Reflux esophagitis: regurgitation of stomach contents
5. Cecum, colon (ascending, transverse, descending, sigmoid), rectum, and anal canal
6. Alcoholism, drug abuse, liver disease
7. Nasopharynx, oropharynx, laryngopharynx
8. Parotid, submandibular, sublingual
9. Duodenum, jejunum, and ileum
10. Cardia, fundus, body, pyloric part
11. Mastication
12. Mandible: 4 incisors, 2 canines, 4 premolars, 6 molars; maxilla: 4 incisors, 2 canines, 4 premolars, 6 molars

**IN REVIEW: Digestive**

**What Have I Learned?**

1. Pharynx
2. Large intestine
3. Accessory digestive organs
4. Gallbladder
5. tongue
6. Liver
7. Small intestine
8. Large intestine
9. Small intestine
10. Liver
11. Liver
12. Chewing
13. Swallowing
14. Production of speech sounds

**Endocrine**

1. Hypothalamus
2. Ovary
3. Thymus
4. Pituitary gland
5. Kidney
6. Endocrine system
7. Pancreas
8. Parathyroid gland
9. Ovary
10. Hypothalamus
11. Testes
12. Pineal gland
13. Kidney
14. suprarenal gland
15. Pancreas
16. Thymus
17. Endocrine system
18. Pituitary gland
19. Thyroid gland
20. Hypothalamus
21. Thymus
22. Testis
23. Kidney
24. Parathyroid gland
25. Pancreas
26. Thyroid gland
27. Hypothalamus
28. Ovary
29. suprarenal gland
30. Thyroid
31. Endocrine glands
32. Pancreas
33. endocrine system
34. Hypothalamus
35. Thyroid
36. pituitary gland
37. Kidney
38. Testes
39. Thymus
40. pineal gland
41. Ovary

**Layer 5: Endocrine**

A. Pituitary gland

B. Pineal gland

C. Hypothalamus

D. parathyroid

E. Thyroid

F. Thymus

G. Endocrine system

H. Suprarenal gland

I. Pancreas

J. Kidney

K. Testis

L. Ovary

**CHECK POINT: Endocrine**

1. Hypothalamus, pituitary gland, pineal gland, thyroid gland, parathyroid gland, thymus, heart, pancreas, suprarenal gland, G.I. tract, kidneys, ovaries, testes
2. kidney; stimulates uptake of calcium and phosphate by intestinal cells
3. Kidney – increase increased production and maturation of erythrocytes
4. Kidney – involved in blood pressure regulation and water (fluid) balance
5. Parathyroid hormone – stimulate release of calcium into blood stream
6. Anterior lobe of pituitary; posterior lobe of pituitary
7. Secrete thymopoietin and thymosins that stimulates and promote differentiation growth and maturation of T-lymphocytes. Site for maturation and differentiation of T-lymphocytes (primarily in young individuals)
8. large, bilobed gland in children, atrophies during adolescence, remnant in adults consists primarily of fibrous and adipose tissue

**IN REVIEW: Endocrine**

**What Have I Learned?**

1. Endocrine system
2. Endocrine system
3. Hypothalamus
4. Thymus
5. Pancreas
6. Hypothalamus
7. Pineal gland
8. Thymus
9. Hypothalamus
10. Hypothalamus
11. Hypothalamus
12. Pineal gland
13. Anterior pituitary; posterior pituitary
14. Corticosteroids, androgens
15. Catecholamines - epinephrine and norepinephrine

**Female Reproductive**

1. Ovary
2. Breast
3. Vagina
4. ampulla of uterine tube
5. Female reproductive system
6. Uterine tube
7. Uterus
8. Ovary
9. Vagina
10. Uterine tube
11. Uterus
12. Breast
13. Vagina
14. Uterine tube
15. Uterus
16. Uterine tube
17. Ovary
18. Breast

**Layer 12 Female Reproductive**

1. Female reproductive system
2. Breast
3. Uterine tube
4. Uterus
5. Ovary
6. Vagina

**CHECK POINT: Female Reproductive**

1. Oocytes, ovaries, uterine (fallopian) tubes, uterus, vagina, external genitalia, mammary glands
2. Area between thighs that includes anus, external urethral and vaginal orifices, clitoris, labia minora and majora, and perineal muscles
3. Position varies with fullness of urinary bladder and rectum; contacts diaphragm in late pregnancy
4. Urogenital triangle

**IN REVIEW Female Reproductive**

**What Have I Learned?**

1. Female reproductive system
2. Vagina
3. ampulla of uterine tube
4. Uterus
5. Uterus
6. Vagina
7. Uterine tube
8. Uterine tube
9. Ovary
10. Breast
11. Finger – like processes of infundibulum of uterine tube
12. Urogenital triangle

**Integumentary**

1. Exocrine glands of skin
2. Hair
3. Hair
4. Epidermis
5. Hair follicle
6. Hair
7. Hair root
8. Exocrine glands of skin
9. Dermis
10. Hair follicle
11. Integumentary system
12. Hair
13. Subcutaneous tissue or superficial fascia
14. dermis
15. Hair root
16. Integumentary system
17. Epidermis
18. Hair root
19. Subcutaneous tissue
20. Dermis
21. Integumentary system
22. Hair; hair shaft
23. subcutaneous tissue
24. Epidermis
25. Exocrine glands of skin
26. Integumentary system
27. Hair follicle

**Layer 1 Integumentary**

1. Hair shaft
2. Epidermis
3. Integumentary system
4. Hair
5. Hair root
6. Exocrine glands of skin
7. Dermis
8. Hair follicle
9. Subcutaneous tissues

**CHECK POINT: Integumentary**

1. Merocrine sweat glands: most numerous (3-4 million in the adult) and widely distributed sweat gland; apocrine sweat glands: hair follicles of axillae (armpits), areolae (nipples), and the pubic and anal regions; sebaceous glands are associated with hair follicles
2. Merocrine sweat glands have coiled, tubular secretory part in dermis or subcutaneous tissue, and a duct that carries secretion to epithelial surface. Apocrine sweat glands have coiled, tubular secretory part in dermis or subcutaneous tissue, and a duct that carries secretion into hair follicle. Sebaceous glands are acinar (grape shaped) and have short duct that open into hair follicle. Merocrine sweat glands secretion (99% water) functions in thermoregulation, secretion (excess water and electrolytes), and protection. Apocrine sweat glands secretion is a viscous cloudy liquid that contains proteins and lipids; when secretion acted upon by bacteria it produces a distinct odor that may function in signaling and communication. Sebaceous glands secrete sebum, an oily substance that waterproofs and lubricates hair shaft
3. Ceruminous glands in the external acoustic meatus that produce earwax; mammary glands, which are modified apocrine sweat glands that produce milk
4. Dermis; may extend into hypodermis
5. Tube that surrounds hair root. Courses obliquely through dermis. Two coats: epidermic (inner) and dermic (outer). Characteristic parts include: dermal papilla, bulb, hair shaft, cuticle layer, internal follicular sheath, and external follicular sheath. Associated with hair receptors and arrector muscle of the hair

Function: hair formation and growth

1. develops as invagination from epidermis
2. A sebaceous gland, arrector muscle of the hair, and an apocrine gland
3. Deep portion of hair follicle between hair bulb and hair shaft
4. Portion of hair within follicle deep to surface of skin

Function: site for hair elongation

**IN REVIEW Integumentary**

**What Have I Learned?**

1. Exocrine glands of skin
2. Hair
3. Hair shaft
4. Epidermis
5. Hair follicle
6. Dermis
7. Hair follicle
8. integumentary system
9. Subcutaneous tissue
10. dermis
11. Hair root
12. Integumentary system
13. Epidermis
14. Integumentary system
15. Hair follicle
16. Muscle associated with hair follicle
17. Thin skin
18. Thick skin of palm (hands) or soles (feet)
19. Genetic and hormonal factors
20. External surface of body
21. Skin has two distinct layers (superficial to deep): epidermis and dermis; Protection (prevents trauma); Immune defense (prevents infection); Barrier function (prevents water loss); Secretion (sweat, sebum); Thermoregulation. Vitamin D synthesis. Cutaneous sensation. Social function (facial expression)
22. Surface of the epidermis
23. Filamentous, pigmented, keratinized structure; projects from epidermal surface, i.e., extends beyond skin surface (length varies by body region) Protection (i.e. from sunburn); Heat retention (especially on scalp); Cutaneous sensation. Dispersion of chemical signals. Facial recognition/visual identification

**Lymphatic**

1. Lymphatic system
2. Cisterna chyli
3. Spleen
4. Lymph nodes
5. Bone marrow
6. Lymph vessels
7. lymph nodes, MALT
8. Lymphatic system
9. Thoracic duct
10. Spleen
11. Thymus
12. Cisterna chyli
13. Tonsil
14. Mucosa-associated lymphatic tissue or MALT
15. Spleen
16. Lymph nodes
17. Thymus
18. Lymphatic vessels
19. Right lymphatic duct
20. Bone marrow
21. Tonsils
22. Spleen
23. Thymus
24. Spleen
25. Right lymphatic duct
26. MALT; large collections of lymphatic nodules, collectively called mucosa-associated lymphatic tissue (MALT); prominent in ileum of small intestine, where they are known as Peyer patches; detect antigens and initiate immune response
27. Tonsils
28. Spleen
29. Lymph nodes
30. Lymphatic system

**Layer 7 Lymphatic**

1. tonsils
2. Thymus
3. Lymph nodes
4. Lymphatic system
5. Thoracic duct
6. Spleen
7. Lymphatic vessels
8. Cisterna chili
9. Mucosa – associated lymphoid tissue (MALT)
10. Bone marrow

**CHECK POINT: Lymphatic**

1. Central (marrow or medullary) cavities of all bones
2. Located along pathways of lymphatic vessels throughout body (except brain and spinal cord)
3. When cancerous cells, white blood cells, or infectious agents become trapped
4. Throughout body except brain and spinal cord
5. At the junction of the internal jugular and subclavian veins
6. Veins
7. Left upper abdominal quadrant; left hypochondriac region
8. thorax (posterior mediastinum) between thoracic aorta and azygous vein; neck (left inferior
9. Anterior and superior mediastinum; can extend into inferior neck

**IN REVIEW Lymphatic**

**What Have I Learned?**

1. Lymphatic system
2. Lymph nodes
3. Bone marrow
4. Lymphatic vessels
5. Lymphatic system
6. Thoracic duct
7. Spleen
8. Thymus
9. Thymus
10. Lymphatic vessels
11. Right lymphatic duct
12. Thymus
13. Spleen
14. Soft pulpy tissue. Two forms: red and yellow. Function red marrow: site of hematopoiesis, yellow marrow: contains predominately adipose tissue and blood vessels
15. After about five years of age, red marrow gradually replaced by yellow marrow. In early 20s, red marrow found only in vertebra, ribs, sternum, clavicle’s, scapula, pelvis, cranial bones, and proximal end of femur and humerus
16. Fluid within lymphatic vessels: originates as fluid forced from blood into interstitial space between cells
17. Along pathways of lymphatic vessels throughout the body except brain and spinal cord.
18. Lymph nodes: filter lymph; spleen: filters blood
19. Lymphatic system cells: macrophages, T- and B-lymphocytes, and natural killer (NK) cells; red bone marrow is site of origin of lymphocyte precursors; their site of maturation differs; lymph vasculature (smallest to largest diameter): lymphatic capillaries, lymph vessels, lymphatic trunks and ducts; lymphatic nodules: clusters of lymphatic cells (usually not surrounded by connective tissue capsule), mucosa-associated lymphatic tissue (MALT), and tonsils (palatine tonsils have a capsule); lymphatic organs: lymph nodes, thymus, and spleen (lymphatic cells surrounded by connective tissue capsule)

Function: Produces lymphocytes; Transports and filters lymph (lymphatic vessels and lymph nodes); Filters blood (spleen); Initiates immune responses

1. Small, round or oval (usually bean-shaped) lymphatic organ (1-25 mm in length); surrounded by connective tissue capsule; two regions: cortex (outer) that contains lymphoid nodules and medulla (inner) comprised of connective tissue cords lined by lymphatic cells; found in prominent clusters (e.g., in axillary, inguinal and cervical regions)

Function: Production of new lymphocytes; filtration of antigens and other foreign matter from lymph; initiation of immune responses

1. Infected/inflamed pharyngeal tonsils
2. Large bilobed gland in children. Atrophies during adolescence. Remnants in adults consist primarily of fibrous and adipose tissue

Function: secretes thymopoietin and thymosins that stimulate and promote differentiation, growth and maturation of T-lymphocytes; site for maturation and differentiation of T-lymphocytes (primarily in young individuals)

1. Lingual, palatine, and pharyngeal tonsils. Collections of lymphoid nodules in submucosal connective tissue. Not surrounded by connective tissue capsule

Function: trap foreign material and facilitate identification by lymphocytes; produce lymphocytes

1. Lamina propria of mucosa of gastrointestinal, respiratory, genital, and urinary tracts
2. Large collections of lymphatic nodules, collectively called mucosa-associated lymphatic tissue (MALT); MALT prominent in ileum of small intestine where they are known as Peyer patches

Function: detect antigens and initiate immune response

1. lymph, lymphatic cells, lymphatic vessels, lymphatic nodules, lymph nodes, thymus, spleen
2. Spleen: filters of blood; lymph nodes: filter lymph
3. Lymph vasculature (smallest to largest diameter): lymphatic capillaries, lymph vessels, lymphatic trunks and ducts; thoracic duct is the longest (38-45 cm) lymphatic vessel, extending from L2 vertebral level to base of neck

Function: transport lymph

**Male Reproductive**

1. seminal vesicle
2. Penis
3. Epididymis
4. Penis, urethra
5. Testis
6. Seminal vesicle
7. Prostate
8. Urethra
9. duct of seminal vesicle
10. Epididymis
11. Vas deferens
12. Penis
13. Urethra
14. Male reproductive system
15. Prostate
16. Testis
17. Epididymis
18. Vas deferens
19. Prostate
20. Vas deferens
21. Testis
22. Penis, urethra
23. Penis
24. Testis

**Layer 11 Male Reproductive**

1. Vas deferens
2. Male reproductive system
3. Seminal vesicle
4. Urethra
5. Penis
6. Prostate
7. Testis
8. Epididymis

**CHECK POINT: Male Reproductive**

1. Scrotum
2. Pelvis; perineum
3. Area between thighs that include anus, distal urethra, penis, scrotum, and perineal muscles
4. non-erect
5. Pelvis between bladder and rectum.
6. Ductus deferens

**IN REVIEW Male Reproductive**

**What Have I Learned?**

1. Male reproductive system
2. Epididymis
3. Seminal vesicle
4. Urethra
5. duct of seminal vesicle
6. Penis
7. Urethra
8. Male reproductive system
9. Prostate
10. Testis
11. Epididymis
12. Prostate
13. Vas deferens
14. Testes
15. Five to six weeks
16. Sperm, testis, epididymis, vas (ductus) deferens, spermatic cord, ejaculatory duct, accessory glands, and external genitalia
17. duct of seminal vesicle and vas deferens
18. Testis begins development near the kidney, and later descends along the posterior abdominal wall to the scrotum
19. Scrotal temperature -3° lower than body cavity
20. Regulated by distance from body cavity and heat exchange between testicular artery, and pampiniform venous plexus
21. Paired, oval, male gonad; dense outer capsule (tunica albuginea testis); interior divided into 200-300 lobules; each lobule contains up to three seminiferous tubules

Function: Produce sperm cells. Produce androgens (male sex hormones) such as testosterone

1. Gonads (testes). Accessory glands (e.g. prostate, seminal vesicles, and bulbourethral glands). External genitalia (penis and scrotum). Testes produce sperm (gametes or male sex cells) and components of semen. Produces testosterone (androgen or male sex hormone); transfers semen to an external urethral orifice of male
2. Attached part composed of erectile bodies (paired crura and unpaired bulb) covered by muscle. Unattached part (body of penis) composed of erectile bodies (paired corpora cavernosa and unpaired corporus spongiosum); extended distal end (tip) of corpus spongiosum forms glans

Function: Male organ of copulation; body of penis contains dense network of sensory nerve endings important in sexual response; transmits urine and semen

1. Benign prostate hyperplasia – common from middle age. Fibromuscular tube. Proximal end: internal urethral orifice of the urinary bladder. Distal end: external urethral orifice in perineum. Male (18 to 20 cm in length): preprostatic, prostatic, membranous, and spongy (penile) parts. Female (4 cm in length) not subdivided

Function: Male: transports semen and urine; female: transports urine

1. Stage of male sexual responses when components of semen are brought together in prostatic urethra
2. Bisection of scrotal part of the vas deferens

**Muscular System**

1. Sternocleidomastoid
2. Sartorius
3. Appendicular muscles
4. Deep fascia
5. Muscles of facial expression
6. Diaphragm and intercostal muscles
7. Tibialis anterior muscle
8. Deltoid muscle
9. Deep fascia
10. External abdominal oblique muscle
11. Deltoid muscle
12. Skeletal muscle
13. Biceps brachii muscle
14. Pectoralis major muscle
15. Muscles of facial expression
16. Deep fascia
17. Skeletal muscles
18. Appendicular muscles
19. Skeletal muscle
20. Quadriceps femoris - Rectus femoris muscle
21. Deltoid muscle
22. External abdominal oblique muscle; rectus abdominis
23. Deep fascia
24. Tibialis anterior muscle
25. Rectus abdominus, external obliques muscles
26. Deep fascia
27. Muscles of facial expression
28. Sartorius muscle
29. Sternocleidomastoid muscle
30. Origin: subcutaneous tissue (superficial fascia) or bones of skull; Insertion: subcutaneous tissue; four groups: (1) muscles of scalp, forehead, and eyebrows; (2) muscles of mouth, lips, and cheeks; (3) muscles of orbital opening; and (4) muscles of nose and ears
31. Muscular system
32. Skeletal muscle
33. Sternocleidomastoid muscle
34. Rectus abdominus muscle, external abdominal oblique
35. Axial muscles
36. Deep fascia
37. Biceps brachii muscle
38. quadriceps femoris muscle
39. Axial muscles
40. Axial muscles
41. Tibialis anterior muscle
42. Rectus abdominis muscle, external abdominal oblique
43. Skeletal muscle
44. Biceps brachii muscle
45. Deltoid muscle

**Layer 3 Muscular System**

1. Muscles of facial expression
2. Sternocleidomastoid muscle
3. Deltoid muscle
4. Pectoralis major muscle
5. Deep fascia
6. Biceps brachii muscle
7. External abdominal oblique muscle
8. Muscular system
9. Appendicular muscles
10. Axial muscles
11. Rectus abdominis muscle
12. Sartorius muscle
13. Skeletal muscle
14. Quadriceps femoris muscle
15. Tibialis anterior muscle

**CHECK POINT: Muscular System**

1. Back, thorax, and upper limb; posterior abdominal wall, gluteal region, and lower limb
2. Axial skeleton
3. Underlies hypodermis (superficial fascia or subcutaneous tissue); around muscles and some organs
4. Connective tissue that can be seen with the naked eye
5. Includes 23 muscles. Innervated by facial nerve cranial nerve VII
6. Skeletal muscle: voluntary control. Cardiac and smooth muscle: involuntary control
7. Vastus lateralis, vastus intermedius, vastus medialis, rectus femoris; flexion of thigh: rectus femoris only
8. Sartorius muscle
9. Axial and appendicular skeleton
10. Striated; voluntary
11. Approximately 600

**IN REVIEW Muscular System**

**What Have I Learned?**

1. Sternocleidomastoid muscle
2. Sartorius muscle
3. appendicular muscles
4. Deep fascia
5. Deltoid muscle
6. Skeletal muscle
7. Rectus abdominis, external abdominal oblique
8. Rectus abdominus and external abdominal oblique
9. Deep fascia
10. Deep fascia
11. Quadriceps femoris muscle
12. Skeletal muscle
13. 23
14. Upper limb: muscles that move scapula, glenohumoral and elbow joints, sternoclavicular, and joints of the hand. Lower limb: muscles that move hip, knee, ankle, and foot.

Function: movement of pectoral girdle and upper limb; movement of pelvic girdle and limb.

1. Muscles with origin and in insertion on axial skeleton. Axial skill muscles include intrinsic back muscles, muscles of the head and neck, primary respiratory muscles, and muscles of the pharynx, abdominal wall, and pelvic floor.

Function: movement of head and vertebral column (intrinsic back muscles). Communication (muscles of facial expression). Eye movement (extrinsic eye muscles). Mastication (chewing). Speaking, chewing, food manipulation and swallowing (intrinsic and extrinsic tongue muscles). Swallowing (pharyngeal muscles); respiration (diaphragm and intercostal muscles); compression of abdominal wall (muscles of abdominal wall); support of pelvic viscera, evacuation of contents of digestive, urinary, and reproductive tracts (muscles of pelvic floor).

1. Layer of dense irregular connective tissue. Devoid of fat. Extensions of deep fascia, called at epimysium (or investing fascia), surround individual muscles. Forms intramuscular septae that separate muscles into functional groups (e.g. flexor compartment of arm). Forms retinacula (e.g. flexor retinaculum of hand). Forms fibrous capsule (e.g., around parotid gland).

Function: Separates and supports individual muscles and neurovascular bundles. Retinacula hold tendons close to joints. Encapsulates and defines shape of some organs.

1. Origin: subcutaneous tissue (superficial fascia) or bones of skull. Insertion: subcutaneous tissue. Four groups: (1) muscles of scalp, forehead, and eyebrows, (2) muscles of mouth, lips and cheeks; (3) muscles of orbital opening and (4) muscles of nose and ears.

Function: Nonverbal communication (i.e. control muscles of skin and face). Verbal communication (i.e. oral muscles modulate mouth opening).

1. Three types of muscle tissue: skeletal/striated, cardiac, and smooth. Skeletal muscles divided into axial and appendicular. Cardiac muscle found in walls of heart. Smooth muscle found in walls of hollow organs (e.g., gastrointestinal tract, blood vessels); and iris and ciliary body of eye.

Functions: movement of body. Maintenance of posture. Communication (especially muscles of facial expression). Body functions including respiration, circulation, digestion, defecation, urination, childbirth. Temperature regulation.

1. Composed of multiple muscle fascicles (bundles). Muscle fascicles formed by multiple muscle fibers. Muscle fibers are elongated, unbranched, cylindrical contractile cells. Each skeletal muscle contains multiple nuclei located at regular intervals. Arrangement of contractile elements gives appearance of cross-striations (stripes).

Functions: movement (e.g., walking), maintenance of posture, communication (e.g., facial expression), body functions including respiration, circulation, digestion, defecation, urination, and childbirth; and temperature regulation (e.g., up to 85% of body heat from skeletal muscle).

**Nervous System**

1. The sympathetic trunk
2. Central nervous system
3. Peripheral nervous system; central nervous system
4. Cerebrum
5. Brain
6. Nervous system
7. cerebellum
8. Brachial plexus
9. Cervical plexus
10. Spinal cord
11. brainstem
12. Sympathetic trunk
13. Cerebrum
14. Brain
15. Nervous system
16. Eye
17. Spinal cord
18. Cerebellum
19. Cerebrum
20. brainstem
21. Lumbosacral plexus
22. Spinal cord
23. Central nervous system
24. Eye
25. Peripheral nervous system
26. Brainstem
27. Lumbosacral plexus
28. Cerebellum
29. Spinal cord
30. Brachial plexus
31. Cervical plexus
32. Lumbosacral plexus
33. Nervous system
34. Brain
35. Eye
36. Cranial nerves
37. Central nervous system
38. Sympathetic trunk
39. Cervical plexus
40. Brachial plexus
41. Eye
42. Peripheral nervous system

**Layer 4 Nervous System**

1. Cerebrum
2. Brain
3. Cerebellum
4. Eye
5. Brainstem
6. Cranial nerves
7. Cervical plexus
8. Brachial plexus
9. Central nervous system
10. Spinal cord
11. Nervous system
12. Sympathetic trunk
13. Lumbosacral plexus
14. Peripheral nervous system

**CHECK POINT: Nervous System**

1. Inferior neck, axilla, shoulder, upper limb
2. Ventral rami of spinal nerves C5 – T1
3. Cranial cavity
4. Caudal portion of brain
5. Cranial cavity (brain) and vertebral canal (spinal cord)
6. Dorsal to brainstem
7. Rostral part of brain
8. Neck
9. Head, neck, and thoracic and abdominal cavities
10. Abdominal wall (posterior) and pelvic wall (posterior)
11. Central nervous system: within cranial cavity and vertebral canal. Peripheral nervous system: throughout body
12. Outside cranial cavity and vertebral canal
13. Vertebral canal
14. Adjacent to vertebral bodies, from base of skull to coccyx

**IN REVIEW Nervous System**

**What Have I Learned?**

1. Sympathetic trunk
2. Central nervous system
3. cerebellum
4. Brachial plexus
5. Cervical plexus
6. Spinal cord
7. Brainstem
8. Cerebrum
9. Brain
10. Nervous system
11. Eye
12. Spinal cord
13. Cerebellum
14. Cerebrum
15. Brainstem
16. Spinal cord
17. Central nervous system
18. Lumbosacral plexus
19. Cerebellum
20. Spinal cord
21. Cranial nerves
22. Central nervous system
23. Sympathetic trunk
24. Cervical plexus
25. Peripheral nervous system
26. A network of nerves, blood vessels, or lymphatic vessels
27. Innervation of skeletal muscle
28. Innervation of cardiac or smooth muscle, and glands
29. Brain, spinal cord, nerves, ganglia
30. The junction in the intervertebral foramin between dorsal and ventral roots, and the dorsal and ventral rami; however, some use this term to describe all nerves derived from the spinal cord
31. Nerves derived from brachial plexus distribute to the muscles of upper limb
32. Nerves distributed from brachial plexus distribute to the skin of the upper limb
33. Roots (C5 to T1), trunks (upper, middle, and lower), divisions (anterior, posterior), and cords (medial, lateral, posterior)
34. 16; five terminal branches (musculocutaneous, median, ulnar, radial, axillary)
35. Major organ of central nervous system; composed of neurons and glia. Considered the seat of consciousness, intelligence, learning, emotion and memory
36. Vertical stalk–like portion of the brain; includes midbrain, pons, and medulla oblongata.
37. Division of the nervous system that includes brain and spinal cord.

Function: integrates and processes nervous information. Brain considered the seat of consciousness, intelligence, learning, emotion, and memory. Control center (i.e. hypothalamus) for endocrine system. Spinal cord provides a pathway for sensory and motor impulses, and mediates some reflexes

1. Toward the nose
2. Ventral rami of C1-4 spinal nerves
3. Phrenic (C3-5) supplies diaphragm. Ansa cervicalis (C1-C3) supplies infrahyoid muscles (sternohyoid, omohyoid, and sternohyoid). Other nerves supply rhomboids (dorsal scapular nerve), serratus anterior (long thoracic nerve) and prevertebral muscles
4. Nerves derived from cervical plexus, (esp. C2-4) distribute to skin over shoulder, anterior and lateral neck, and parts of head (auricle and posterior scalp)
5. Part of the peripheral nervous system. 12 pair of nerves: most connected to brainstem and pass through foramina in skull. Designated by Roman numeral and common name: I – Olfactory; II – optic; III – Oculomotor; IV – Trochlear; V – Trigeminal; VI – Abducens; VII – facial; VIII – Vestibulocochlear; IX – Glossopharyngeal; X – Vagus; XI – Accessory; XII – Hypoglossal
6. Temperature, pain, touch, stretch, and pressure
7. Olfaction, vision, gustation, equilibrium, and hearing
8. Includes to large cerebral hemispheres, separated by longitudinal fissure. Hemispheres connected by corpus callosum. Surface gray matter of each hemisphere is known as cerebral cortex. Within each hemisphere is a core of white matter. Additional masses of gray matter located within cerebrum include basal nuclei
9. Ventral rami of L1-S4
10. Iliohypogastric, Ilioinguinal, lateral cutaneous nerve of thigh, femoral, genitofemoral, obturator, superior gluteal, inferior gluteal, pudendal, common fibular (part of sciatic), tibial (part of sciatic), posterior cutaneous nerve of the thigh, muscular
11. All of the muscles of pelvic floor, perineum, and lower limb. Skin on lower anterior abdominal wall, lower back, perineum and lower limb
12. Structural divisions: CNS and PNS. The CNS includes a brain and spinal cord. PNS includes nerves that extend from brain and spinal cord and ganglia. Functional divisions: afferent (sensory) and efferent (motor)

Function: Primary communication and control system for body; afferent division receives sensory information from receptors and transmits to CNS; efferent division transmits motor impulses from CNS to muscles or glands; afferent and efferent divisions have somatic (related to structures of the body wall such as skeletal muscle, skin, and mucous membranes) and visceral or autonomic (related to smooth muscle, glands of internal organs, and blood vessels) parts

1. Afferens; efferens
2. Cranial nerves. Spinal nerves and their branches. Autonomic nerves (sympathetic and parasympathetic) and their plexuses. Ganglia, including the sympathetic, parasympathetic, and sensory (dorsal root). Transmits information to, and receives information from, central nervous system. Functional divisions: sensory (afferent) and motor (efferent). Mediates some reflexes
3. Foramen magnum
4. Long cylindrical portion of central nervous system. Ends at L2 vertebra in adults. Composed of the inner core of gray matter and outer coat of white matter (opposite of brain). Divided, from superior to inferior, into cervical, thoracic, lumbar, sacral, and coccygeal regions. Functions: provides a pathway for sensory and motor impulses and mediates some reflexes
5. 31 pairs of spinal nerves
6. Nerve trunk composed of axons connecting sympathetic (paravertebral) ganglia. Sympathetic ganglia contain postganglionic nerve cell bodies. branches include gray and white rami communicans, and splanchnic nerves
7. Sympathetic chain; sympathetic chain ganglion
8. Ganglia

**Respiratory**

1. Pharynx
2. Lungs
3. Upper respiratory tract
4. Lower respiratory tract
5. Respiratory system
6. Larynx
7. Paranasal sinuses
8. Lung
9. Trachea
10. Bronchi
11. Nasal cavity
12. Paranasal sinuses
13. Lungs
14. Pharynx
15. Paranasal sinuses
16. Larynx
17. Nasal cavity
18. Bronchi
19. Lung
20. Trachea
21. Nasal cavity
22. Lungs
23. Bronchi
24. Pharynx
25. Larynx

**Layer 8 Respiratory**

1. Paranasal sinuses
2. Nasal cavity
3. Upper respiratory tract
4. Larynx
5. Pharynx
6. Respiratory tract
7. Trachea
8. Lungs
9. Bronchi
10. Lower respiratory tract

**CHECK POINT: Respiratory**

1. Thorax (mediastinum), lungs
2. neck, between pharynx and trachea
3. Pulmonary cavity (in lateral thoracic cavity), surrounded by pleural cavity
4. Between hard palate and base of skull
5. Head (around nasal cavity)
6. Head, neck
7. Head, neck, thorax
8. Neck, thoracic cavity (mediastinum), between larynx and tracheal bifurcation
9. Head, neck

**IN REVIEW Respiratory**

**What Have I Learned?**

1. Respiratory system
2. Lungs
3. Upper respiratory tract
4. Lower respiratory tract
5. Nasal cavity
6. Larynx
7. Paranasal sinuses
8. Paranasal sinuses
9. Lungs
10. Pharynx
11. Paranasal sinuses
12. Lungs
13. Bronchi
14. Lungs
15. Paired: arytenoid, corniculate, and cuneiform cartilages; unpaired: thyroid, cricoid, and epiglottic cartilages
16. Mediastinum, right and left pulmonary cavities
17. Continuation of trachea into right and left lungs. Bifurcation from trachea called main bronchi. Each main bronchus branches sequentially into lobar (secondary), and segmental (tertiary) bronchi, followed by smaller branches that end in bronchioles Terminal bronchioles form respiratory bronchioles that lead eventually to alveoli Function: conduct air between trachea and lungs
18. Skeleton formed by nine cartilages. Contains vocal cords. Mucous membrane-lined cavity. Superior end of lower respiratory tract

Function: conducts air to and from lower respiratory tract

Sound production (voice box). Prevent swallowed food from entering lower respiratory tract

1. Larynx is the mucous membrane lined cartilaginous passageway between pharynx and trachea. Trachea is a tube with C-shaped cartilaginous plates. Bronchi are continuations from trachea to lungs. Lungs in right and left pulmonary cavities Function: larynx conducts air between pharynx and trachea; it is also involved in sound production (phonation). Trachea conducts air to and from bronchi, which enter the lungs. Longs are primary organs of respiration. Acid – base balance
2. Cone shaped with dome shaped apex and convex base (rests on diaphragm). Left lung has two lobes: upper (or superior) and lower (or inferior), separated by oblique fissure. Right lung has three lobes: upper (or superior), middle, and lower (or inferior), separated by two fissures (oblique and horizontal). Two lung surfaces: costal (anterior, lateral, and posterior) and mediastinal (medial). Medial surface has hilum with airway and pulmonary vessels. Surface of lung covered with visceral pleura

Function: primary organ of respiration

1. Paired cavities separated by nasal septum. Irregular space with mucus membrane lining. Anterior openings (nares). Posterior openings (choanae). Concha on lateral wall. Function: warm, filter, and humidify inhaled air. Olfaction (smell)
2. Hollow cavities within some skull bones. Paired frontal, ethmoidal, sphenoidal, and maxillary sinuses. Communicate with nasal cavity via ducts

Function: warm and humidify air. Decrease weight of anterior skull. Contribute to voice resonance

1. Named for the bones in which they are found
2. Muscular tube continuous with nasal cavity, oral cavity and larynx
3. Nasophaynx, oropharynx, laryngopharynx
4. Nose, paranasal sinuses, pharynx, larynx, trachea, bronchi, lungs
5. Upper respiratory tract: nose (external nose and nasal cavitiy), paranasal sinuses, and pharynx. Lower respiratory tract: larynx, trachea, bronchi and lungs.

Function: air passes through nasal cavity, pharynx, larynx, trachea, bronchi and lungs. Air is cleaned, warmed and humidified. Phonation. Lungs are primary organs of respiration (gas exchange). Acid – base balance

1. Rigid tube held open by a series of C-shaped cartilaginous rings (open end of rings directed posteriorly). Cartilaginous rings connected by anular ligaments of trachea Posterior aspect of tracheal rings closed by fiberoelastic trachealis muscle
2. Surgical procedure to open trachea in neck to bypass and airway obstruction
3. External nose, nasal cavity, paranasal sinuses (paired frontal, ethmoidal, sphenoidal and maxillary sinuses), pharynx (nas0- oro- and laryngopharynx). Function: air passes through nasal cavity, pharynx, larynx, trachea, bronchi, and lungs. Air is clean, warmed and humidified. Phonation

**Skeletal**

1. Skeletal system
2. Skeleton of lower limb
3. Skeletal system
4. Skull
5. Appendicular skeleton
6. Skeletal system
7. Vertebral column
8. Skeletal system
9. Vertebral column
10. Appendicular skeleton
11. Axial skeleton
12. Vertebral column
13. Skeletal system
14. Thoracic cage
15. Skull
16. Axial skeleton
17. Skeletal system
18. Thoracic cage
19. Skeleton of the upper limb
20. Skeletal system
21. Skeletal system

**Layer 2 Skeletal**

1. Skull
2. Thoracic cage
3. Axial skeleton
4. Skeleton of upper limb
5. Skeletal system
6. Vertebral column
7. Appendicular skeleton
8. Skeleton of lower limb

**CHECK POINT: Skeletal**

1. Limbs, shoulder, pelvis
2. Head, neck, trunk
3. Hip, thigh, leg, foot
4. Shoulder, arm, forearm, hand (including wrist)
5. Thorax
6. Thoracic vertebrae
7. Posterior midline of axial skeleton

**IN REVIEW Skeletal**

**What Have I Learned?**

1. Skeletal system
2. Skeletal system
3. Vertebral column
4. Axial skeleton
5. Appendicular skeleton
6. Vertebral column
7. Ribs 1-7
8. Ribs 8-10
9. Ribs 11-12
10. Upper limb includes humerus, radius, ulna, carpal bones, metacarpals, and phalanges of fingers. Pectoral girdle includes scapula and clavicle. Lower limb includes hip bone, femur, patellar, tibia, fibula, tarsal bones, metatarsals, and phalanges of toes. Pelvic girdle includes hip bones and sacrum.
11. Skull-cranial cavity bones: frontal, sphenoid, ethmoid, parietal (2), occipital, and temporal (2). Skull-facial bones: maxilla (2), mandible, vomer, inferior nasal concha (2), nasal (2), lacrimal (2), palatine (2) and zygomatic (2) Vertebral column bones: vertebrae (cervical, thoracic, lumbar, sacrum, coccyx). Thoracic cage bones: ribs and sternum
12. Comprised of axial and appendicular skeleton. Axial skill formed by skull and associated bones (e.g. hyoid bone), vertebral column, and thoracic cage. Appendicular skeleton formed by bones of the upper limb and pectoral girdle, and lower limb and pelvic girdle. Function: support for, and protection of body. Provides site of attachment for muscles. Movement of body via joints. Hemopoiesis. Storage of calcium and phosphorus.
13. Includes clavicle, scapula, humerus, radius, ulna, carpal bones, metacarpals, and phalanges and fingers
14. Includes hip bone, femur, patellar, tibia, fibula, tarsal bones, metatarsals, and phalanges of toes.
15. Paired and unpaired bones divided into cranial and facial groups. Cranial group: frontal, sphenoid, ethmoid, parietal (2), occipital, and temporal bones (2). Facial group: maxilla, mandible, vomer, nasal (2) lacrimal (2), and zygomatic bones (2).
16. Skeleton framework of chest. 12 pairs of ribs and sternum. All ribs: articulate with thoracic vertebra. True ribs (ribs 1-7): attach directly to sternum by costal cartilages. False ribs (ribs 8-10): attach indirectly to sternum via shared costal cartilages. Floating ribs (ribs 11-12): not associated with costal cartilages and thus not attach to sternum. Alternate definitions: some include floating ribs, 11 – 12 as subcategory of false ribs.
17. Composed of 33 vertebrae and intervertebral discs (C2–S1), distributed in five regions. Seven cervical (C) vertebra, 12 thoracic (T) vertebra, five lumbar (L) vertebra, five sacral (S) vertebra fused into single bone (sacrum), and 3-5 coccygeal (Co) vertebrae, variably fused. Has series of curvatures along length.
18. Spinal column, spine, or backbone.

**Urinary**

1. Urinary bladder
2. Ureter
3. Urinary system
4. Urethra
5. Kidney
6. Urinary bladder
7. Urethra
8. Ureter
9. Kidney
10. Kidney
11. Urinary system
12. Urethra
13. Kidney
14. Kidney
15. Urinary bladder

**Layer 10 Urinary**

1. Kidney
2. Urinary system
3. Ureter
4. Urinary bladder
5. Urethra

**CHECK POINT: Urinary**

1. Abdomen (posterior wall), retroperitoneal, left kidney higher than right
2. Abdominal cavity (posterior abdominal wall), lateral pelvis
3. Pelvis, perineum
4. Pelvis, when distended extends into lower abdominal quadrants; in pubic region
5. Abdomen (posterior wall), pelvis, perineum

**IN REVIEW Urinary**

**What Have I Learned?**

1. Urinary bladder
2. Ureter
3. Urinary system
4. Kidney
5. Urinary bladder
6. Kidney
7. Collecting duct – renal papilla – minor calyx – major calyx – renal pelvis – ureter – urinary bladder – urethra
8. Kidneys, ureters, urinary bladder, urethra
9. Shorter urethra and proximity to anus
10. Paired bean-shaped organ. Concave medial border is point at the entrance/exit of renal vessels and ureter. Contains cortex, medulla, and renal sinus.

Function: removes excess water, electrolytes, and wastes of protein metabolism from blood. Urine formation. Synthesizes calcitriol, a form of vitamin D, which stimulates uptake of calcium and phosphorus by intestinal cells. Release erythropoietin (EPO) in response to low blood oxygen (EPO causes increased production and maturation of erythrocytes). Produces renin, an enzyme that helps form angiotensin II, a hormone involved in blood pressure regulation and water (fluid) balance.

1. layers of connective tissues and fat.
2. Muscular tube. 25 to 30 cm in length. Begins at hilum in the kidney. Enters the base of urinary bladder as ureteric orifice. Function: transport urine from kidney to urinary bladder.
3. Fibromuscular tube. Proximal end: internal urethral orifice of the urinary bladder. Distal end: external urethral orifice in perineum. Male (18-20 cm in length): preprostatic, prostatic, membranous, and spongy (penile) parts. Female (4 cm in length) not subdivided. Function: male: transports semen and urine. Female: transport urine.
4. Hollow organ with smooth muscle wall (detrusor muscle). Three openings define trigone of bladder: two ureteric and one urethral. Superior aspect covered by peritoneum.

Function: storage of urine. Micturition (urination).

1. Varies with volume of urine
2. Volume of urine affects position of surrounding organs, especially the uterus.
3. Kidneys, ureter, urinary bladder, urethra. Function: kidneys filter blood to remove waste products and concentrate waste products in urine. Ureters transport urine from kidneys to urinary bladder. Urinary bladder stores and, with urethra, expels urine from body.