

FMGE Anatomy Sample Paper – 1

Duration: 60 Minutes

Maximum Marks: 40

Instructions

- This paper contains **40 Multiple Choice Questions** modelled on the **Anatomy** section of FMGE.
- Each correct answer carries **+1 mark**. There is **no negative marking** – attempt all questions.
- Questions follow the clinically integrated pattern of the FMGE examination.
- Click a question number in the answer key to navigate to its solution.

FMGE Anatomy – Q1 to Q40

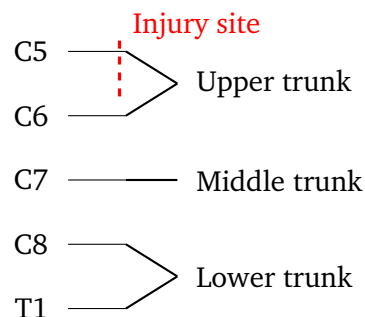
- Q1.** A 35-year-old man presents with a band-like pain around his abdomen at the level of the umbilicus following a herpes zoster infection. The dermatome that corresponds to the level of the umbilicus is:
- (A) T8
(B) T9
(C) T10
(D) T12
- Q2.** A sports physiologist is comparing the characteristics of muscle fiber types in a trained marathon runner versus a sprinter. Which of the following correctly describes **Type I (slow-twitch)** muscle fibers?
- (A) High myoglobin content, fatigue-resistant, aerobic metabolism
(B) Low myoglobin content, fast fatigue, anaerobic metabolism
(C) Large diameter, high glycolytic activity, white appearance
(D) Sparse mitochondria, fast contraction, high glycogen stores



- Q3.** A 55-year-old woman with rheumatoid arthritis undergoes joint aspiration of her knee. The fluid is found in the joint cavity. Which of the following is a defining feature of a synovial joint that allows the presence of this fluid?
- (A) Presence of a fibrocartilaginous disc at the joint surface
 - (B) A joint cavity lined by synovial membrane secreting synovial fluid
 - (C) Direct union of bones by hyaline cartilage without a cavity
 - (D) Fibrous union with interosseous ligament between articulating bones
- Q4.** A 22-year-old footballer sustains a crush injury to his leg. Six hours later he develops severe pain on passive dorsiflexion of the toes, tense swelling of the leg, and paresthesia in the first web space. This is consistent with compartment syndrome. How many osteofascial compartments does the leg contain, and which compartment is most commonly affected?
- (A) Two compartments; posterior compartment most commonly affected
 - (B) Three compartments; lateral compartment most commonly affected
 - (C) Three compartments; anterior compartment most commonly affected
 - (D) Four compartments; anterior compartment most commonly affected
- Q5.** A surgical resident is counselling a patient about the risk of lymphedema following axillary lymph node dissection for breast cancer. Which of the following statements best describes a general principle of lymphatic drainage?
- (A) Lymph flows from peripheral tissues toward the venous angle (junction of internal jugular and subclavian veins)
 - (B) Lymph flows from the thoracic duct directly into the right subclavian vein
 - (C) All lymph from the body drains through the right lymphatic duct
 - (D) Lymphatic capillaries are impermeable to large proteins and cells



Q6. A newborn baby is delivered by difficult shoulder dystocia with traction applied to the head. Examination reveals the right arm hanging limply in adduction and internal rotation, with the forearm pronated (“waiter’s tip” deformity). The injury involves which roots of the brachial plexus?



- (A) C8 and T1 (Klumpke’s palsy)
- (B) C5 and C6 (Erb’s palsy)
- (C) C5, C6, and C7
- (D) C7 and C8
- Q7.** A 48-year-old cricket bowler presents with inability to initiate abduction of the shoulder. MRI reveals a full-thickness tear of the most commonly injured rotator cuff muscle. Which four muscles comprise the rotator cuff, and which is most commonly torn?
- (A) Deltoid, teres major, teres minor, subscapularis; deltoid is most commonly torn
- (B) Supraspinatus, infraspinatus, teres major, subscapularis; infraspinatus is most commonly torn
- (C) Supraspinatus, infraspinatus, teres minor, subscapularis; supraspinatus is most commonly torn
- (D) Supraspinatus, deltoid, teres minor, subscapularis; subscapularis is most commonly torn
- Q8.** During a modified radical mastectomy, the surgeon identifies the axillary artery and its relations within the axilla. Which of the following correctly describes the boundaries and contents of the axilla?



- (A) Apex is formed by clavipectoral fascia; the axillary vein lies lateral to the axillary artery
- (B) Base is formed by the clavicle; floor is the serratus anterior muscle
- (C) Medial wall is formed by pectoralis major; lateral wall by the humerus
- (D) Apex is between clavicle, first rib, and scapula; medial wall is serratus anterior; floor is axillary fascia and skin

Q9. A 40-year-old cyclist complains of weakness of intrinsic hand muscles and numbness over the little finger and medial half of the ring finger. Examination reveals wasting of hypothenar muscles. Nerve conduction studies confirm ulnar nerve compression at the wrist. Which structure transmits the ulnar nerve at the wrist?

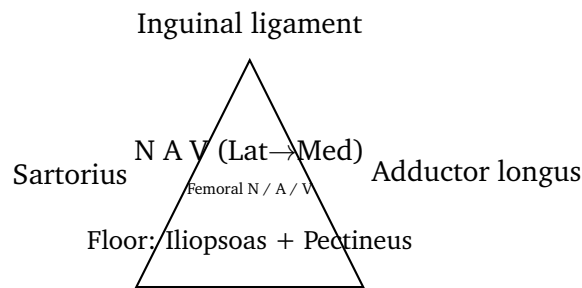
- (A) Guyon's canal (ulnar canal), between the pisiform and hamate
- (B) Carpal tunnel, deep to the flexor retinaculum
- (C) Cubital tunnel, posterior to the medial epicondyle
- (D) Arcade of Frohse, beneath the supinator muscle

Q10. A vascular surgeon ligates the brachial artery above the elbow following a traumatic injury. Blood supply to the forearm is maintained through collateral vessels. Which anastomosis is responsible for collateral circulation around the elbow joint?

- (A) Cruciate anastomosis at the back of the hip joint
- (B) Anastomosis between profunda brachii branches and radial/ulnar recurrent arteries around the elbow
- (C) Anastomosis between anterior and posterior circumflex humeral arteries
- (D) Scapular anastomosis between suprascapular and circumflex scapular arteries

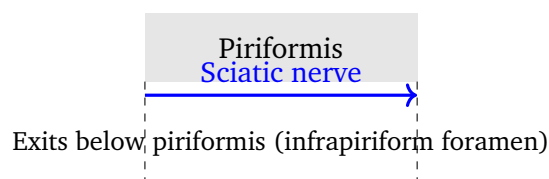
Q11. A femoral hernia passes through the femoral canal, medial to the femoral vein in the femoral sheath. Examine the diagram of the femoral triangle below and identify the correct boundaries and floor contents.





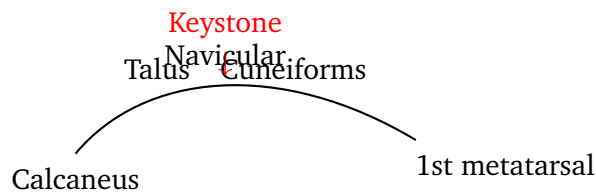
- (A) Bounded by inguinal ligament, sartorius, and adductor magnus; floor is quadriceps
- (B) Bounded by inguinal ligament, rectus femoris, and pectineus; floor is iliopsoas only
- (C) Bounded by inguinal ligament (superiorly), sartorius (laterally), and adductor longus (medially); floor is iliopsoas and pectineus; contents are femoral nerve, artery, and vein (lateral to medial)
- (D) Bounded by inguinal ligament, sartorius, and gracilis; floor is adductor longus

Q12. A 50-year-old man receives a misplaced intramuscular injection in the gluteal region and develops foot drop with inability to evert the foot. The sciatic nerve was injured. Which statement about the course of the sciatic nerve in the gluteal region is correct?



- (A) Sciatic nerve exits the pelvis through the greater sciatic foramen above piriformis
- (B) Sciatic nerve passes through the lesser sciatic foramen
- (C) Sciatic nerve enters the gluteal region through the obturator foramen
- (D) Sciatic nerve exits the greater sciatic foramen below piriformis (infrapiriform foramen) and descends between the greater trochanter and ischial tuberosity

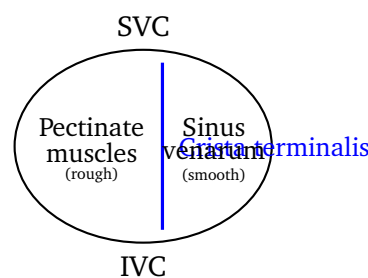
Q13. A 30-year-old flat-footed army recruit presents with medial foot pain after long marches. The medial longitudinal arch has collapsed. Which bones form the medial longitudinal arch, and which bone acts as the “keystone”?



- (A) Calcaneus, talus, navicular, three cuneiforms, and first three metatarsals; talus is the keystone
- (B) Calcaneus, cuboid, and lateral two metatarsals; cuboid is the keystone
- (C) Calcaneus, navicular, cuboid, cuneiforms; navicular is the keystone
- (D) Calcaneus, talus, navicular, cuboid; navicular is the keystone
- Q14.** A 65-year-old man presents with a painless swelling behind the knee (Baker’s cyst). During clinical examination the popliteal fossa is assessed. Which of the following correctly describes the boundaries of the popliteal fossa?
- (A) Roof: popliteal fascia and skin; floor: femur, oblique popliteal ligament, popliteus; superolateral: biceps femoris; superomedial: gracilis; inferolateral and inferomedial: gastrocnemius heads
- (B) Roof: popliteal fascia and skin; floor: femur, knee joint capsule, and popliteus; superolateral: biceps femoris; superomedial: semimembranosus and semitendinosus; inferolateral and inferomedial: two heads of gastrocnemius
- (C) Roof: hamstring muscles; floor: soleus; superolateral: lateral head of gastrocnemius; superomedial: sartorius
- (D) Roof: tibial nerve; floor: popliteal vessels; superolateral: plantaris; superomedial: semimembranosus



- Q15.** A femoral artery aneurysm is identified in the adductor canal during a vascular surgery. Which of the following correctly lists the contents of the adductor canal and names the muscle that forms its roof?
- (A) Contents: femoral artery, femoral vein, saphenous nerve, nerve to vastus medialis; roof: sartorius
- (B) Contents: femoral artery, femoral vein, sciatic nerve; roof: adductor longus
- (C) Contents: popliteal artery, common peroneal nerve; roof: gracilis
- (D) Contents: femoral artery, obturator nerve, saphenous nerve; roof: rectus femoris
- Q16.** During cardiac catheterization, a cardiologist advances a catheter from the superior vena cava into the right atrium. Which structure demarcates the smooth-walled sinus venarum from the roughened muscular part (containing pectinate muscles) of the right atrium?



- (A) Moderator band
- (B) Fossa ovalis
- (C) Conus arteriosus
- (D) Crista terminalis (and its internal counterpart, the sulcus terminalis externally)
- Q17.** A CT scan of the chest reveals an enlarging mass in the superior mediastinum causing compression of the superior vena cava and producing facial swelling and distended neck veins (SVC syndrome). Which of the following structures are contained in the superior mediastinum?
- (A) Heart, aortic root, pulmonary trunk, and azygos vein



- (B) Arch of aorta, brachiocephalic veins, trachea, esophagus, thoracic duct, thymus, and phrenic and vagus nerves
- (C) Descending thoracic aorta, sympathetic chain, thoracic duct, and heart
- (D) Pericardium, bronchi, pulmonary veins, and esophagus

Q18. A patient undergoes a chest drain insertion for pneumothorax. The pleura is pierced and the patient reports sharp pain. Which statement correctly describes the nerve supply to the pleura?

- (A) Both visceral and parietal pleura are supplied by intercostal nerves and are pain-sensitive
- (B) Visceral pleura is supplied by the phrenic nerve and is exquisitely pain-sensitive
- (C) Visceral pleura is supplied by autonomic nerves (insensitive to pain); parietal pleura is supplied by intercostal nerves (costal and peripheral diaphragmatic parts) and phrenic nerve (central diaphragmatic and mediastinal parts), and is pain-sensitive
- (D) Parietal pleura is insensitive; visceral pleura carries pain via the vagus nerve

Q19. During coronary angiography, a 60-year-old man is found to have right coronary artery (RCA) dominance. In this pattern, which artery supplies the sinoatrial (SA) node, and what does “dominance” refer to?

- (A) In RCA dominance (present in ~60% of people), the SA node artery arises from the RCA; dominance refers to which artery gives the posterior interventricular (descending) artery
- (B) RCA dominance means the RCA is larger; the SA node artery arises from the left circumflex in all individuals
- (C) Dominance refers to which artery supplies the left ventricle; the SA node is always supplied by the left anterior descending artery
- (D) In RCA dominance, the atrioventricular node is supplied by the left circumflex artery



- Q20.** A radiologist reviewing an aortogram identifies the three branches of the arch of the aorta in their correct order from proximal (right side) to distal (left side). Which option lists them correctly?
- (A) Left common carotid, brachiocephalic trunk, left subclavian
 - (B) Left subclavian, left common carotid, brachiocephalic trunk
 - (C) Brachiocephalic trunk, left subclavian, left common carotid
 - (D) Brachiocephalic trunk, left common carotid, left subclavian
- Q21.** A surgeon performing a laparotomy identifies which abdominal organs are retroperitoneal. Which of the following lists correctly classifies organs as **secondarily** (not primarily) retroperitoneal?
- (A) Kidneys, ureters, adrenal glands (they are primarily retroperitoneal)
 - (B) Descending colon, ascending colon, duodenum (2nd, 3rd, 4th parts), and pancreas (except tail)
 - (C) Small intestine, stomach, liver (they are intraperitoneal)
 - (D) Spleen, appendix, transverse colon (they are primarily retroperitoneal)
- Q22.** A 25-year-old man presents with a reducible inguinal hernia. During herniorrhaphy, the surgeon identifies the contents of the spermatic cord within the inguinal canal. Which of the following correctly lists the contents of the spermatic cord?
- (A) Testicular artery, pampiniform plexus, cremasteric artery, obturator nerve, vas deferens, lymphatics
 - (B) Testicular artery, femoral nerve, genitofemoral nerve (both divisions), lymphatics
 - (C) Testicular artery, pampiniform plexus of veins, vas deferens, cremasteric artery, artery to vas deferens, ilioinguinal nerve (outside cord), genital branch of genitofemoral nerve, lymphatics
 - (D) Testicular artery, saphenous vein, vas deferens, ilioinguinal nerve inside the cord, lymphatics



- Q23.** A newborn infant presents with bilious vomiting and abdominal distension. Imaging reveals malrotation of the gut. During normal development, the midgut loop undergoes rotation around the superior mesenteric artery. Which statement correctly describes normal midgut rotation?
- (A) The midgut rotates 270° counterclockwise (anticlockwise) around the superior mesenteric artery axis during herniation and re-entry into the abdomen
 - (B) The midgut rotates 90° clockwise around the inferior mesenteric artery
 - (C) The midgut rotates 180° clockwise around the celiac artery
 - (D) The midgut rotates 270° clockwise around the aorta
- Q24.** During an upper gastrointestinal bleed, a gastroenterologist is planning embolization of a vessel arising from the celiac artery. The celiac trunk (artery of the foregut) arises from the aorta at the T12–L1 level. Which of the following correctly lists the three primary branches of the celiac artery?
- (A) Superior mesenteric, inferior mesenteric, left gastric arteries
 - (B) Left gastric, right hepatic, splenic arteries
 - (C) Left gastric, common hepatic, inferior mesenteric arteries
 - (D) Left gastric, common hepatic, splenic arteries
- Q25.** During laparoscopy, the surgeon inserts a finger through the epiploic foramen (foramen of Winslow) to compress the hepatic pedicle (Pringle manoeuvre). Which structures form the boundaries of the epiploic foramen?
- (A) Anteriorly: lesser omentum (hepatoduodenal ligament); posteriorly: right kidney; superiorly: diaphragm; inferiorly: stomach
 - (B) Anteriorly: hepatoduodenal ligament (free edge of lesser omentum); posteriorly: inferior vena cava; superiorly: caudate lobe of liver; inferiorly: first part of duodenum



- (C) Anteriorly: falciform ligament; posteriorly: aorta; superiorly: left lobe of liver; inferiorly: transverse colon
- (D) Anteriorly: greater omentum; posteriorly: aorta; superiorly: pancreas; inferiorly: jejunum

Q26. A patient develops Ludwig's angina (infection of the floor of the mouth) that spreads into the neck. The pretracheal layer of cervical fascia is an important pathway for spread of infection. Which of the following correctly describes the pretracheal fascia?

- (A) Surrounds the carotid sheath; extends from base of skull to diaphragm
- (B) Surrounds the trapezius and sternocleidomastoid muscles; attaches to the clavicle inferiorly
- (C) Encloses the thyroid gland, trachea, and esophagus; blends with the pericardium inferiorly and attaches to the thyroid and cricoid cartilages superiorly
- (D) Lines the inner surface of the cervical vertebrae; forms the floor of the posterior triangle

Q27. A 38-year-old man undergoes superficial parotidectomy for a pleomorphic adenoma. The facial nerve (CN VII) divides within the parotid gland into its terminal branches. Which sequence correctly lists the terminal branches of the facial nerve?

- (A) Temporal, zygomatic, buccal, marginal mandibular, cervical (mnemonic: Ten Zebras Bit My Cat)
- (B) Temporal, ophthalmic, maxillary, mandibular, cervical
- (C) Frontal, parietal, occipital, mastoid, cervical
- (D) Temporal, zygomatic, buccal, lingual, cervical

Q28. A surgeon performing total thyroidectomy must identify and preserve the parathyroid glands and the recurrent laryngeal nerve. Which of the following is correct regarding thyroid blood supply and parathyroid relations?



- (A) The thyroid is supplied by the superior thyroid artery (branch of the external carotid) and the inferior thyroid artery (branch of the external carotid); parathyroids lie anterior to the thyroid capsule
- (B) The superior thyroid artery is a branch of the subclavian artery; inferior parathyroids lie at the upper poles
- (C) Both superior and inferior thyroid arteries arise from the internal carotid artery; parathyroids receive no distinct blood supply
- (D) Superior thyroid artery is the first branch of the external carotid artery; inferior thyroid artery arises from the thyrocervical trunk (subclavian); superior parathyroids lie at the posterior surface of the upper thyroid pole and inferior parathyroids near the inferior pole; the inferior thyroid artery is the main blood supply to parathyroids

Q29. A 55-year-old hypertensive patient undergoes carotid endarterectomy for severe internal carotid stenosis. The surgical approach is through the carotid triangle. Which of the following correctly describes the boundaries of the carotid triangle?

- (A) Superior: digastric (anterior belly); inferior: omohyoid; lateral: trapezius
- (B) Superior: digastric (posterior belly) and stylohyoid; inferiorly: superior belly of omohyoid; laterally: sternocleidomastoid
- (C) Superior: mylohyoid; inferior: hyoid bone; lateral: hyoglossus
- (D) Superior: stylohyoid; inferior: thyrohyoid; lateral: platysma

Q30. A patient presents with a calculus (sialolith) obstructing the submandibular duct. During examination, the duct opens onto the floor of the mouth at the sublingual papilla. Which nerve has an important relationship with Wharton's duct in the submandibular region?

- (A) The lingual nerve first passes lateral (above) the duct, then winds below and then medial (under) to it as it travels anteriorly, hooking around the duct



- (B) The hypoglossal nerve passes directly through the submandibular duct
- (C) The inferior alveolar nerve crosses superior to the duct and is enclosed within it
- (D) The glossopharyngeal nerve wraps around the parotid duct, not the submandibular duct

Q31. A 65-year-old man presents with resting tremor, bradykinesia, and rigidity (Parkinson's disease), attributed to degeneration of the substantia nigra. Which structures form the corpus striatum (part of the basal ganglia)?

- (A) Caudate nucleus, putamen, globus pallidus, subthalamic nucleus, and substantia nigra
- (B) Caudate nucleus, amygdala, and claustrum
- (C) Caudate nucleus and putamen (together = striatum); putamen and globus pallidus (together = lentiform nucleus); globus pallidus is divided into internal and external segments
- (D) Putamen, globus pallidus, and hippocampus

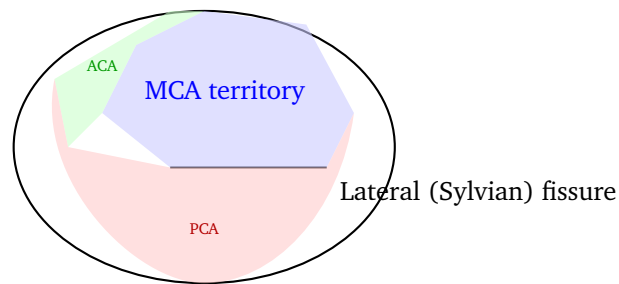
Q32. A neonate is diagnosed with obstructive hydrocephalus due to stenosis of the cerebral aqueduct (aqueduct of Sylvius). This prevents normal flow of cerebrospinal fluid (CSF). Which pathway correctly describes normal CSF circulation?

- (A) Lateral ventricles → third ventricle → cerebral aqueduct → fourth ventricle → central canal of spinal cord only
- (B) Choroid plexus of fourth ventricle → third ventricle → lateral ventricles → subarachnoid space
- (C) Subarachnoid space → arachnoid granulations → ventricles → dural sinuses
- (D) Choroid plexus (mainly in lateral ventricles) → lateral ventricles → interventricular foramina (Monro) → third ventricle → cerebral aqueduct → fourth ventricle → foramina of Luschka and Magendie



→ subarachnoid space → arachnoid granulations → dural venous sinuses

Q33. A 70-year-old right-handed patient presents with sudden onset left-sided hemiplegia, hemianesthesia, and homonymous hemianopia with left-sided neglect. Imaging confirms a large right middle cerebral artery (MCA) territory infarct. Identify the territory of the MCA in the diagram.



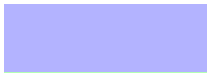
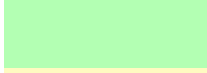
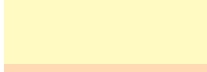
- (A) Lateral cortex (frontal, parietal, temporal lobes), internal capsule, basal ganglia — the largest territory of the three cerebral arteries
- (B) Medial cortex (frontal and parietal lobes, cingulate gyrus) — supplied by the anterior cerebral artery
- (C) Occipital lobe, inferior temporal lobe, thalamus, and midbrain — supplied by the posterior cerebral artery
- (D) Cerebellum and pons — supplied by PICA and AICA

Q34. A 55-year-old patient with a lacunar infarct in the anterior limb of the internal capsule presents with changes in cognition and frontal lobe connectivity. Which of the following fibers pass through the **anterior limb** of the internal capsule?

- (A) Corticospinal and corticobulbar (pyramidal) tracts
- (B) Frontopontine fibers (anterior thalamic radiations) and thalamocortical fibers from the anterior and medial thalamic nuclei
- (C) Optic radiation (geniculocalcarine tract) and auditory radiation
- (D) Sensory fibers from the thalamus to the somatosensory cortex (posterior thalamic radiation)



Q35. A student is reviewing the derivatives of the pharyngeal arches in embryology. The diagram below represents the pharyngeal arches. Which structures are correctly attributed to the **first pharyngeal arch (mandibular arch)**?

Arch 1		➤ CN V (Trigeminal)
Arch 2		➤ CN VII (Facial)
Arch 3		➤ CN IX (Glossopharyngeal)
Arch 4		➤ CN X (Vagus – superior laryngeal)

- (A) Muscles of facial expression (nerve: CN VII)
- (B) Stylopharyngeus muscle (nerve: CN IX)
- (C) Muscles of the larynx (nerve: CN X superior laryngeal branch)
- (D) Muscles of mastication (temporalis, masseter, medial and lateral pterygoids), mylohyoid, anterior belly of digastric, tensor tympani, tensor veli palatini (nerve: CN V — trigeminal); skeletal derivatives: malleus and incus

Q36. During echocardiography, a 6-month-old infant is found to have a ventricular septal defect (VSD). The defect is located in the membranous (perimembranous) part of the interventricular septum. Which embryological structure(s) normally contribute to closing the membranous interventricular septum?

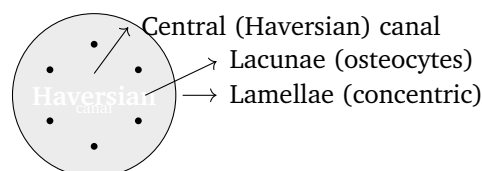
- (A) The membranous septum forms from the aorticopulmonary septum, endocardial cushion tissue, and the muscular part of the interventricular septum growing toward each other; failure of fusion of these three components leads to membranous VSD
- (B) The membranous septum is derived entirely from the neural crest cells alone
- (C) The muscular part of the ventricular septum proliferates and directly forms the membranous septum without any contribution from the aorticopulmonary septum

- (D) Membranous VSD results from failure of the primum septum to fuse with the endocardial cushions

Q37. A 12-year-old child presents with a midline neck swelling that moves upward on swallowing and on tongue protrusion. This is consistent with a thyroglossal duct cyst. Which statement correctly describes the thyroglossal duct and its remnant cysts?

- (A) The thyroid gland descends from the tip of the tongue (apex) and the thyroglossal duct passes lateral to the hyoid bone
- (B) Thyroglossal duct cysts are always located below the thyroid cartilage
- (C) The thyroid gland descends from the foramen cecum at the base (dorsum) of the tongue; the thyroglossal duct passes through or anterior to the body of the hyoid bone; remnant cysts can occur anywhere along this tract (most common at or below hyoid level), and they elevate on tongue protrusion because of the fibrous tract connection to the foramen cecum
- (D) The thyroglossal duct passes posterior to the hyoid bone and remnant cysts are always suprahyoid

Q38. A medical student is examining a cross-section of cortical (compact) bone under the microscope. She identifies concentric lamellae surrounding a central canal. This unit is the osteon (Haversian system). Which diagram correctly represents a Haversian system, and which statement about it is true?



- (A) Haversian canals run transversely across bone; each Haversian system contains 20–30 concentric lamellae
- (B) Each osteon (Haversian system) consists of concentric lamellae of bone surrounding a central Haversian canal carrying blood vessels



and nerves; osteocytes lie in lacunae and communicate via canaliculi; Volkmann's canals run transversely connecting adjacent Haversian canals

- (C) Cancellous (trabecular) bone is composed of dense Haversian systems identical to compact bone
- (D) Haversian canals carry only lymphatics; blood supply to bone comes entirely from periosteum

Q39. A pathologist is reviewing a biopsy of the urinary bladder. She identifies a stratified epithelium with the ability to change shape when distended (from dome-shaped to flat superficial cells). What is this epithelium called, and where else is it found?

- (A) Simple columnar epithelium; found in the stomach, small intestine, and gallbladder
- (B) Stratified squamous epithelium; found in the skin, oral cavity, and esophagus
- (C) Pseudostratified ciliated columnar epithelium; found in the trachea and bronchi
- (D) Transitional epithelium (urothelium); found exclusively in the urinary tract — renal pelvis, ureters, urinary bladder, and upper part of the urethra

Q40. A pharmacology student is reviewing the mechanism of contraction of smooth muscle in vascular walls compared to skeletal muscle. Which of the following correctly distinguishes smooth muscle from skeletal muscle histologically and functionally?

- (A) Smooth muscle is involuntary, uninucleate (single central nucleus per cell), non-striated, contains actin and myosin but lacks organized sarcomeres/Z-discs, contracts via calmodulin-dependent myosin light chain kinase (MLCK), and is supplied by autonomic nerves
- (B) Smooth muscle is striated, multinucleated, and contracts via troponin-tropomyosin mechanism like skeletal muscle



- (C) Smooth muscle cells have T-tubules and well-developed sarcoplasmic reticulum identical to skeletal muscle
- (D) Smooth muscle is voluntary and controlled by somatic motor neurons at neuromuscular junctions (NMJs)



Detailed Solutions

Q1.

Solution

Concept — Dermatomes: A dermatome is an area of skin supplied by a single spinal nerve root. Surface landmarks help remember key dermatomes for clinical examinations.

Step 1 — Dermatome landmarks:

- T4 – nipple line
- T10 – umbilicus
- T12/L1 – inguinal ligament
- L1 – scrotum/labia

Why other options are wrong:

- Option A (T8): supplies epigastric region, above the umbilicus.
- Option B (T9): supplies the area just above the umbilicus.
- Option D (T12): supplies the inguinal/suprapubic region.

Final Answer: Dermatome of the umbilicus is T10 $\Rightarrow$ C

Answer: (C) [Go Back to Q 1](#)

Q2.

Solution

Concept — Muscle fiber types: Skeletal muscle fibers are broadly classified into Type I (slow-twitch, oxidative) and Type II (fast-twitch, glycolytic). These differ in metabolism, fatigability, and myoglobin content.

Step 1 — Type I (slow-twitch) characteristics:

- High myoglobin content (red color), numerous mitochondria
- Aerobic (oxidative) metabolism; fatigue-resistant
- Suited for endurance activities (marathon running)

Why other options are wrong:

- Option B: Describes Type II fibers (low myoglobin, fast fatigue, anaerobic).
- Option C: Large diameter and white appearance describe Type IIb fibers.



- Option D: Sparse mitochondria and high glycogen describe fast-twitch glycolytic (Type IIx) fibers.

Final Answer: Type I fibers are high-myoglobin, aerobic, fatigue-resistant ⇒ A

Answer: (A) [Go Back to Q 2](#)

Q3.

Solution

Concept — Synovial joint features: Synovial joints are the most mobile type of joint in the body, defined by the presence of a fluid-filled joint cavity lined by synovial membrane.

Step 1 — Defining features of synovial joints:

- Joint cavity: a potential space filled with synovial fluid
- Synovial membrane: lines the inner surface of the fibrous joint capsule; produces synovial fluid
- Articular surfaces are covered by hyaline cartilage (not by synovial membrane)

Why other options are wrong:

- Option A: Fibrocartilaginous discs (menisci) are secondary/accessory structures, not defining features.
- Option C: Describes synchondrosis (cartilaginous joint with no cavity).
- Option D: Describes syndesmosis (fibrous joint).

Final Answer: Synovial joint is defined by a synovial membrane-lined cavity ⇒ B

Answer: (B) [Go Back to Q 3](#)



Q4.

Solution

Concept — Compartments of the leg: The leg has four osteofascial compartments separated by deep fascia and intermuscular septa. Increased pressure in a closed compartment causes compartment syndrome.

Step 1 — Four compartments of the leg:

- **Anterior:** tibialis anterior, EDL, EHL, peroneus tertius; anterior tibial vessels, deep peroneal nerve
- **Lateral:** peroneus longus and brevis; superficial peroneal nerve
- **Superficial posterior:** gastrocnemius, soleus, plantaris
- **Deep posterior:** tibialis posterior, FDL, FHL; tibial nerve, posterior tibial vessels

Step 2 — Most commonly affected: The **anterior compartment** is most vulnerable because it is tightly enclosed and has least capacity; first web space sensory loss is from the deep peroneal nerve.

Why other options are wrong:

- Option A: There are four compartments, not two.
- Option B: There are four compartments, not three; lateral is not most common.
- Option C: Correct compartment count is four, not three.

Final Answer: Four compartments; anterior compartment most commonly affected ⇒

Answer: (D) [Go Back to Q 4](#)

Q5.

Solution

Concept — Lymphatic drainage principles: Lymph is a one-way drainage system from peripheral tissues back to the venous circulation. Understanding its direction is essential for cancer staging and lymphedema.

Step 1 — General principles:

- Lymph flows from peripheral capillaries → collecting vessels → lymph nodes → lymph trunks → thoracic duct (or right lymphatic duct) → venous angle



- The **venous angle** = junction of the internal jugular vein and subclavian vein (left side: thoracic duct; right side: right lymphatic duct)
- The thoracic duct drains *left* lymph and returns to the *left* venous angle

Why other options are wrong:

- Option B: The thoracic duct drains into the left venous angle (left subclavian + internal jugular junction), not right subclavian.
- Option C: The *right* lymphatic duct drains only the right upper body; the thoracic duct drains the rest.
- Option D: Lymphatic capillaries are highly permeable to large proteins, cells, and lipids — this is their advantage over blood capillaries.

Final Answer: Lymph flows toward the venous angle bilaterally ⇒ A

Answer: (A) [Go Back to Q 5](#)

Q6.

Solution

Concept — Erb's palsy (C5–C6 injury): Injury to the upper trunk of the brachial plexus (C5–C6) results in the classic “waiter's tip” deformity — adduction, internal rotation, forearm pronation — due to paralysis of abductors, external rotators, and supinators.

Step 1 — Muscles affected in C5–C6 injury:

- C5: deltoid (abduction), teres minor/infraspinatus (external rotation), biceps (supination)
- C6: biceps, brachioradialis, supinator
- Result: arm falls into adduction (deltoid paralysed), internal rotation (external rotators lost), pronation (supinators lost) — “waiter's tip”

Why other options are wrong:

- Option A (C8–T1): Klumpke's palsy — claw hand deformity, intrinsic hand muscle weakness.
- Option C (C5–C7): Extended Erb's palsy affects wrist extensors additionally but not the classic presentation.
- Option D (C7–C8): Would cause wrist/finger flexor and extensor weakness, not the classic waiter's tip.



Final Answer: Waiter's tip deformity from C5–C6 injury = Erb's palsy $\Rightarrow$ **B**

Answer: (B) [Go Back to Q 6](#)

Q7.

Solution

Concept — Rotator cuff: The rotator cuff stabilizes the glenohumeral joint and consists of four muscles. Supraspinatus tears are the most common rotator cuff injuries.

Step 1 — SITS mnemonic:

- **Supraspinatus:** abduction (initiates 0–15°), inserts superior facet of greater tubercle
- **Infraspinatus:** external rotation, middle facet
- **Teres minor:** external rotation, inferior facet
- **Subscapularis:** internal rotation, lesser tubercle

Step 2 — Most commonly torn: **Supraspinatus** is most commonly torn (at its insertion on the greater tubercle), causing inability to initiate abduction ("painful arc" 60–120°).

Why other options are wrong:

- Option A: Deltoid and teres major are NOT rotator cuff muscles.
- Option B: Teres major is not part of the rotator cuff.
- Option D: Deltoid is not a rotator cuff muscle.

Final Answer: Rotator cuff = SITS; supraspinatus is most commonly torn $\Rightarrow$ **C**

Answer: (C) [Go Back to Q 7](#)

Q8.

Solution

Concept — Axilla boundaries: The axilla is a pyramidal space between the arm and chest wall. Its apex (gateway to the neck) and walls are clinically important for axillary dissection.

Step 1 — Boundaries of the axilla:

- **Apex:** between clavicle (anteriorly), first rib (medially), superior border of



scapula (posteriorly)

- **Base:** axillary fascia and skin of armpit
- **Anterior wall:** pectoralis major and minor, subclavius
- **Posterior wall:** subscapularis, teres major, latissimus dorsi
- **Medial wall:** serratus anterior overlying ribs 1–4
- **Lateral wall:** intertubercular groove of humerus

Why other options are wrong:

- Option A: Axillary vein lies medial (not lateral) to axillary artery.
- Option B: The base (not apex) is the axillary fascia; the floor of the axilla is the axillary fascia and skin.
- Option C: Medial wall is serratus anterior; lateral wall is the humerus (correct for lateral, wrong for medial).

Final Answer: Apex between clavicle, first rib, and scapula; medial wall is serratus anterior ⇒

Answer: (D) [Go Back to Q 8](#)

Q9.

Solution

Concept — Ulnar nerve at the wrist: The ulnar nerve can be compressed at multiple sites. At the wrist, it passes through Guyon's canal (ulnar canal), producing symptoms distinct from cubital tunnel syndrome.

Step 1 — Guyon's canal anatomy:

- Lies between the **pisiform** (medially) and the **hook of hamate** (laterally)
- Roof: palmar carpal ligament; floor: flexor retinaculum and pisohamate ligament
- Contents: ulnar nerve and ulnar artery
- Compression here spares the dorsal cutaneous branch of the ulnar nerve (branches proximal to the canal) — so dorsum of hand sensation is preserved

Why other options are wrong:

- Option B: Carpal tunnel transmits the *median nerve* (not ulnar nerve) and nine flexor tendons.
- Option C: Cubital tunnel is at the elbow; compression there would cause additional dorsal hand sensory loss.



- Option D: Arcade of Frohse is the site of radial nerve (posterior interosseous nerve) compression.

Final Answer: Ulnar nerve at wrist passes through Guyon's canal (pisiform to hamate) ⇒

Answer: (A) [Go Back to Q 9](#)

Q10.

Solution

Concept — Collateral circulation at the elbow: The periarticular anastomosis around the elbow is the relevant collateral network when the brachial artery is ligated above the elbow.

Step 1 — Elbow anastomosis:

- Descending vessels: anterior and posterior branches of the profunda brachii (deep brachial), superior and inferior ulnar collateral arteries
- Ascending vessels: radial recurrent, anterior and posterior ulnar recurrent arteries
- These connect across the elbow to maintain forearm perfusion

Why other options are wrong:

- Option A: Cruciate anastomosis is at the *back of the hip* (gluteal/femoral region), not the elbow.
- Option C: Circumflex humeral anastomosis supplies the shoulder, not the forearm.
- Option D: Scapular anastomosis bypasses the axillary artery, not the brachial artery.

Final Answer: Elbow anastomosis between profunda brachii branches and radial/ulnar recurrent arteries ⇒

Answer: (B) [Go Back to Q 10](#)



Q11.

Solution

Concept — Femoral triangle: The femoral triangle is a subfascial space in the upper medial thigh, clinically important for femoral hernia, femoral artery catheterization, and lymph node dissection.

Step 1 — Boundaries and contents (NAVEL: lateral to medial):

- **Superiorly:** inguinal ligament
- **Laterally:** medial border of sartorius
- **Medially:** medial border of adductor longus
- **Floor:** iliopsoas (lateral) and pectineus (medial)
- **Roof:** fascia lata with saphenous opening
- **Contents (lateral to medial):** Femoral Nerve | Femoral Artery | Femoral Vein | Lymphatics (femoral canal)

Why other options are wrong:

- Option A: Adductor magnus is not a boundary; floor includes pectineus, not just iliopsoas.
- Option B: Rectus femoris is not a boundary.
- Option D: Gracilis is not a boundary of the femoral triangle.

Final Answer: Inguinal ligament (superior), sartorius (lateral), adductor longus (medial); floor: iliopsoas + pectineus ⇒ **C**

Answer: (C) [Go Back to Q 11](#)

Q12.

Solution

Concept — Sciatic nerve gluteal course: The sciatic nerve is the largest nerve in the body; its course through the gluteal region and its relation to piriformis is critical to understand for safe IM injections and surgical approaches.

Step 1 — Course of sciatic nerve:

- Exits the pelvis through the **greater sciatic foramen**, below the piriformis (infrapiriform foramen)
- Passes between the greater trochanter and ischial tuberosity (midpoint = safe injection site in the upper outer quadrant of the buttock)
- The nerve may pierce piriformis (anatomical variant in ~15% of people),



explaining piriformis syndrome

Why other options are wrong:

- Option A: The sciatic nerve exits *below* piriformis, not above.
- Option B: The lesser sciatic foramen transmits the pudendal nerve and internal pudendal vessels.
- Option C: The obturator foramen transmits the obturator nerve and vessels, not the sciatic nerve.

Final Answer: Sciatic nerve exits greater sciatic foramen below piriformis (infrapiriform foramen) ⇒ D

Answer: (D) [Go Back to Q 12](#)

Q13.

Solution

Concept — Medial longitudinal arch: The medial longitudinal arch is the highest and most functionally important arch of the foot. Its keystone and supporting structures are frequently tested in FMGE.

Step 1 — Medial longitudinal arch structure:

- **Bones:** Calcaneus → talus (keystone/summit) → navicular → three cuneiforms → first three metatarsals
- The **talus** is the apex (keystone) — it receives the body weight from the tibia and distributes it between calcaneus and metatarsal heads
- Supported by: plantar calcaneonavicular (spring) ligament, plantar fascia (aponeurosis), tibialis posterior and tibialis anterior tendons

Why other options are wrong:

- Option B: Calcaneus, cuboid, and lateral two metatarsals form the *lateral* longitudinal arch.
- Option C: Does not represent the correct medial arch sequence.
- Option D: Cuboid is in the lateral arch, not the medial arch.

Final Answer: Medial longitudinal arch: calcaneus, talus (keystone), navicular, cuneiforms, 1st–3rd metatarsals ⇒ A

Answer: (A) [Go Back to Q 13](#)



Q14.

Solution

Concept — Popliteal fossa: The popliteal fossa is the diamond-shaped space behind the knee joint. Knowledge of its boundaries is important for understanding Baker's cysts, popliteal aneurysms, and surgical approaches to the knee.

Step 1 — Boundaries (diamond shape):

- **Superolateral:** biceps femoris tendon
- **Superomedial:** semimembranosus and semitendinosus
- **Inferolateral:** lateral head of gastrocnemius (and plantaris)
- **Inferomedial:** medial head of gastrocnemius
- **Roof:** popliteal fascia (deep fascia) + skin
- **Floor** (from above downward): popliteal surface of femur, oblique popliteal ligament (back of knee joint capsule), popliteus muscle

Why other options are wrong:

- Option A: Floor description mentions only oblique popliteal ligament and popliteus, omitting the popliteal surface of the femur; inferolateral/inferomedial labels are missing gastrocnemius appropriately.
- Option C: Roof is NOT the hamstring muscles; hamstrings are boundaries not the roof.
- Option D: Tibial nerve is a *content*, not a boundary; the roof is popliteal fascia and skin.

Final Answer: Roof = popliteal fascia; floor = femur + knee capsule + popliteus; superolateral = biceps femoris; superomedial = semimembranosus + semitendinosus ⇒ **B**

Answer: (B) [Go Back to Q 14](#)

Q15.

Solution

Concept — Adductor canal (Hunter's canal): The adductor canal is a fascial tunnel in the middle third of the medial thigh, transmitting the femoral vessels from the femoral triangle to the popliteal fossa.

Step 1 — Contents and roof:

- **Contents:** femoral artery, femoral vein, saphenous nerve, nerve to vastus



medialis (from femoral nerve)

- **Roof:** sartorius (forms the fibrous fascial roof of the canal)
- **Walls:** vastus medialis (lateral), adductor longus then adductor magnus (medial/posterior)
- The canal extends from the apex of the femoral triangle to the adductor (femoral) hiatus

Why other options are wrong:

- Option B: The sciatic nerve does not enter the adductor canal; it is in the posterior thigh.
- Option C: Popliteal artery begins *after* passing through the adductor hiatus; common peroneal nerve is in the popliteal fossa.
- Option D: Obturator nerve does not travel in the adductor canal; rectus femoris is anterior, not a roof.

Final Answer: Adductor canal contents: femoral artery, vein, saphenous nerve, nerve to vastus medialis; roof: sartorius ⇒ A

Answer: (A) [Go Back to Q 15](#)

Q16.

Solution

Concept — Right atrium anatomy: The right atrium has two parts: the smooth-walled sinus venarum (derived from the right horn of the sinus venosus) and the rough-walled muscular part (containing pectinate muscles, from the original primitive atrium).

Step 1 — Crista terminalis:

- The **crista terminalis** is a smooth muscular ridge on the internal surface of the right atrium
- It represents the junction between the smooth sinus venarum (posterior, receives SVC and IVC) and the rough pectinate muscle-bearing part (anterior/auricle)
- Externally, it corresponds to the **sulcus terminalis** visible on the exterior of the right atrium
- The SA node lies in the crista terminalis (upper part, near the SVC opening)

Why other options are wrong:



- Option A: Moderator band (septomarginal trabecula) is in the right *ventricle* (carries right bundle branch).
- Option B: Fossa ovalis is the remnant of foramen ovale in the interatrial septum.
- Option C: Conus arteriosus (infundibulum) is the outflow tract of the right *ventricle*, not the atrium.

Final Answer: Crista terminalis demarcates smooth sinus venarum from rough pectinate part of right atrium ⇒ D

Answer: (D) [Go Back to Q 16](#)

Q17.

Solution

Concept — Superior mediastinum contents: The mediastinum is divided into superior and inferior (anterior, middle, posterior). The superior mediastinum contains major vascular and airway structures passing between neck and thorax.

Step 1 — Superior mediastinum (between thoracic inlet and sternal angle of Louis):

- **Vascular:** arch of aorta and its branches, brachiocephalic veins (forming SVC), internal thoracic vessels, arch of azygos vein
- **Airway:** trachea (bifurcates at carina at level of sternal angle)
- **Oesophagus:** passes posterior to trachea
- **Nerves:** phrenic nerves (bilaterally), vagus nerves, recurrent laryngeal nerve (left)
- **Lymphatics:** thoracic duct (upper portion)
- **Thymus:** in children (involuting in adults)

Why other options are wrong:

- Option A: The heart and aortic root are in the *middle* mediastinum, not superior.
- Option C: Descending thoracic aorta and sympathetic chain are in the *posterior* mediastinum.
- Option D: Pericardium and bronchi are in the *middle* mediastinum; pulmonary veins enter the heart in the middle mediastinum.

Final Answer: Superior mediastinum contains arch of aorta, brachiocephalic veins, trachea, esophagus, thymus, thoracic duct, phrenic and vagus nerves ⇒

B



Answer: (B) [Go Back to Q 17](#)

Q18.

Solution

Concept — Pleural nerve supply: The distinction between visceral and parietal pleura nerve supply is critical for understanding why pleuritis causes localised pain while visceral pleural disease causes referred pain.

Step 1 — Nerve supply:

- **Visceral pleura:** supplied by the *pulmonary autonomic plexus* (sympathetic and parasympathetic via vagus); **insensitive to pain** (no somatic fibers)
- **Parietal pleura:**
 - Costal part and peripheral diaphragmatic: **intercostal nerves** (T1–T11) — pain felt at chest wall dermatomally
 - Central diaphragmatic and mediastinal: **phrenic nerve** (C3–C5) — pain referred to shoulder tip
- Parietal pleura is **pain-sensitive** (somatic supply)

Why other options are wrong:

- Option A: Visceral pleura is NOT pain-sensitive; intercostal nerves supply the costal parietal pleura, not the visceral pleura.
- Option B: Visceral pleura is supplied by autonomic nerves (not phrenic) and is pain-insensitive.
- Option D: Parietal pleura is pain-sensitive (not insensitive); visceral pleura is NOT supplied by the vagus in a pain-sensitive manner.

Final Answer: Visceral pleura = autonomic (pain-insensitive); parietal = intercostal + phrenic (pain-sensitive) ⇒ **C**

Answer: (C) [Go Back to Q 18](#)



Q19.

Solution

Concept — Coronary artery dominance: Coronary artery dominance determines the blood supply to the posterior heart and has critical implications in myocardial infarction territory.

Step 1 — Definitions:

- **Dominance** = which artery gives the **posterior interventricular (descending) artery** and typically supplies the AV node
- **RCA dominance** (~60–70% of people): RCA gives the posterior descending artery (PDA/PIA)
- **SA node artery** arises from the RCA in ~60% of people (from the left circumflex in ~40%)
- **AV node artery:** from the dominant artery (usually RCA in right dominant hearts)

Why other options are wrong:

- Option B: SA node artery arises from the RCA in RCA dominant hearts (not always from LCx); dominance is not about size.
- Option C: Dominance refers to who gives the posterior interventricular artery, not who supplies the IV; LAD does not supply the SA node.
- Option D: In RCA dominance, the AV node is typically supplied by the RCA (not left circumflex).

Final Answer: RCA dominance: SA node artery from RCA; dominance = which vessel gives posterior descending artery ⇒ **A**

Answer: (A) [Go Back to Q 19](#)

Q20.

Solution

Concept — Branches of the arch of the aorta: Three major branches arise from the arch of the aorta in a specific order, supplying the head, neck, and upper limbs.

Step 1 — Order of branches (proximal/right to distal/left):

- Brachiocephalic (innominate) trunk:** divides into right common carotid and right subclavian
- Left common carotid artery**



(c) **Left subclavian artery**

Mnemonic: “*BrachioCephalic, Left Common, Left Sub*” or “*Branches Come Left Side*”

Why other options are wrong:

- Option A: Lists left common carotid first — incorrect; brachiocephalic is the most proximal branch.
- Option B: Reverses the correct order completely.
- Option C: Places left subclavian before left common carotid — incorrect.

Final Answer: Arch branches: brachiocephalic trunk, left common carotid, left subclavian (proximal to distal) ⇒ D

Answer: (D) [Go Back to Q 20](#)

Q21.

Solution

Concept — Retroperitoneal organs: Organs can be primarily retroperitoneal (never had a mesentery) or secondarily retroperitoneal (initially intraperitoneal but fused to the posterior abdominal wall during development).

Step 1 — Classification:

- **Primarily retroperitoneal:** kidneys, ureters, suprarenal glands, abdominal aorta, IVC, gonads
- **Secondarily retroperitoneal** (mnemonic: *SAD PUCKER*): Suprarenal (no – already primary), Ascending colon, Descending colon, Pancreas (body and head), Uterus (no), duodenum (2nd–4th parts), Kidneys (no – primary), Esophagus (lower thoracic), Rectum (upper part)
- **Simpler: D-A-P-D** = Duodenum (2nd–4th), Ascending colon, Pancreas (except tail), Descending colon are *secondarily* retroperitoneal

Why other options are wrong:

- Option A: Kidneys ARE primarily retroperitoneal (never had peritoneum), not secondarily.
- Option C: Small intestine, stomach, liver are intraperitoneal — this is a correct statement about them, but the question asks for secondarily retroperitoneal structures.



- Option D: Spleen and transverse colon are intraperitoneal; appendix is also intraperitoneal.

Final Answer: Secondly retroperitoneal = ascending colon, descending colon, duodenum (2nd–4th parts), pancreas (except tail) ⇒ **B**

Answer: (B) [Go Back to Q 21](#)

Q22.

Solution

Concept — Contents of the spermatic cord: The spermatic cord transmits all structures going to or returning from the testis. The ilioinguinal nerve runs alongside but outside the cord.

Step 1 — Contents of spermatic cord (3 arteries, 3 layers, 3 other):

- **Arteries:** testicular artery, cremasteric artery (from inferior epigastric), artery to vas deferens (from superior vesical)
- **Veins:** pampiniform plexus of veins (drains into testicular vein)
- **Nerves:** genital branch of genitofemoral nerve (motor to cremaster, sensory to scrotum), sympathetic nerves
- **Lymphatics:** drain to para-aortic nodes (not inguinal)
- **Vas deferens** (ductus deferens)
- The **ilioinguinal nerve** travels *outside* the cord (in the inguinal canal)

Why other options are wrong:

- Option A: Obturator nerve does NOT pass through the spermatic cord.
- Option B: Femoral nerve does NOT enter the spermatic cord.
- Option D: Saphenous vein is a lower limb superficial vein and is NOT in the spermatic cord; ilioinguinal nerve is outside the cord.

Final Answer: Spermatic cord contains testicular artery, pampiniform plexus, vas deferens, cremasteric artery, artery to vas, genital branch of genitofemoral nerve, lymphatics ⇒ **C**

Answer: (C) [Go Back to Q 22](#)



Q23.

Solution

Concept — Gut rotation: Normal intestinal (midgut) rotation during fetal development explains the final anatomical position of the bowel. Failure or reversal causes malrotation, which predisposes to midgut volvulus.

Step 1 — Normal midgut rotation:

- Around week 6, the midgut herniates into the umbilical cord (physiological herniation)
- The midgut loop rotates 270° **counterclockwise** (anticlockwise) around the superior mesenteric artery (SMA) axis
- **First 90° :** during herniation (outside abdomen)
- **Remaining 180° :** during reduction back into the abdomen (weeks 10–12)
- Result: duodenojejunal flexure (DJ flexure) on the left; cecum in the right iliac fossa

Why other options are wrong:

- Option B: Rotation is around the *SMA* (not *IMA*), and it is counterclockwise (not clockwise), and 270° (not 90°).
- Option C: Rotation is around the *SMA* (not celiac artery); 180° is incorrect.
- Option D: Rotation is counterclockwise (not clockwise) and around the *SMA* (not aorta).

Final Answer: Midgut rotates 270° counterclockwise around the superior mesenteric artery $\Rightarrow$ A

Answer: (A) [Go Back to Q 23](#)

Q24.

Solution

Concept — Celiac artery branches: The celiac trunk (T12/L1) is the artery of the foregut, supplying structures from the lower esophagus to the second part of the duodenum, including the liver, stomach, spleen, and pancreas.

Step 1 — Three primary branches of celiac trunk (mnemonic: *Left Hepatic Screams*):

- (a) **Left gastric artery:** smallest branch; supplies lesser curve of stomach and lower esophagus



- (b) **Common hepatic artery:** gives right gastric, gastroduodenal arteries; continues as proper hepatic artery
- (c) **Splenic artery:** largest and most tortuous; supplies spleen, pancreas, and greater curve of stomach (short gastric, left gastroepiploic)

Why other options are wrong:

- Option A: Superior mesenteric and inferior mesenteric arteries arise directly from the aorta (midgut and hindgut arteries, respectively), NOT from the celiac trunk.
- Option B: “Right hepatic artery” is not a primary celiac branch; it arises from the proper hepatic artery (a secondary branch).
- Option C: Inferior mesenteric is an aortic branch for the hindgut, not a celiac branch.

Final Answer: Celiac artery branches: left gastric, common hepatic, splenic arteries ⇒ D

Answer: (D) [Go Back to Q 24](#)

Q25.

Solution

Concept — Epiploic foramen (foramen of Winslow): The epiploic foramen is the entrance to the lesser sac (omental bursa). Surgeons compress the hepatoduodenal ligament through it (Pringle manoeuvre) to control hepatic bleeding.

Step 1 — Boundaries of the epiploic foramen:

- **Anteriorly:** free edge of lesser omentum = hepatoduodenal ligament (contains: portal vein posteriorly, hepatic artery on left, common bile duct on right — “VAN” from posterior to anterior)
- **Posteriorly:** inferior vena cava (IVC) covered by peritoneum
- **Superiorly:** caudate lobe (process) of the liver
- **Inferiorly:** first part of the duodenum (superior duodenum)

Why other options are wrong:

- Option A: Right kidney is behind the IVC — not an immediate boundary; stomach is NOT inferior to the foramen.
- Option C: Falciform ligament is on the anterior surface of the liver, not the foramen.



- Option D: Greater omentum, jejunum, and pancreas are not boundaries of the epiploic foramen.

Final Answer: Epiploic foramen: anteriorly = hepatoduodenal ligament; posteriorly = IVC; superiorly = caudate lobe; inferiorly = 1st part duodenum ⇒ **B**

Answer: (B) [Go Back to Q 25](#)

Q26.

Solution

Concept — Cervical fascial layers: The cervical fascia forms compartments in the neck that guide the spread of infection. The pretracheal fascia encloses the viscera of the neck and communicates with the thorax.

Step 1 — Pretracheal (visceral) fascia:

- Encloses: thyroid gland, trachea, esophagus (larynx and pharynx superiorly)
- **Superior attachment:** thyroid cartilage and cricoid cartilage (also hyoid bone)
- **Inferior extension:** blends with the **fibrous pericardium** in the thorax (hence infections can spread to mediastinum — descending necrotising mediastinitis)
- Also called the *middle layer of deep cervical fascia*

Why other options are wrong:

- Option A: Describes the *carotid sheath* (investing fascia); carotid sheath extends from skull base to thorax.
- Option B: Describes the *investing layer* of deep cervical fascia (encloses trapezius and SCM).
- Option D: Describes the *prevertebral fascia* (lines vertebrae, forms floor of posterior triangle).

Final Answer: Pretracheal fascia encloses thyroid, trachea, esophagus; attaches to thyroid/cricoid cartilages; blends with pericardium below ⇒ **C**

Answer: (C) [Go Back to Q 26](#)



Q27.

Solution

Concept — Facial nerve (CN VII) terminal branches: The facial nerve divides within the parotid gland (parotid plexus) into five terminal branches that supply all muscles of facial expression.

Step 1 — Five terminal branches (distal to pes anserinus):

- Temporal: frontalis, orbicularis oculi (upper), corrugator supercilii
- Zygomatic: orbicularis oculi (lower)
- Buccal: buccinator, orbicularis oris, zygomaticus major/minor
- Marginal mandibular: depressor anguli oris, depressor labii, mentalis
- Cervical: platysma
- **Mnemonic:** *Ten Zebras Bit My Cat* (T, Z, B, M, C)

Why other options are wrong:

- Option B: Ophthalmic, maxillary, mandibular are branches of CN V (trigeminal nerve), not CN VII.
- Option C: Frontal, parietal, occipital, mastoid are not CN VII branches.
- Option D: Lingual nerve is a branch of the *trigeminal* (V3), not the facial nerve; CN VII does not have a lingual branch.

Final Answer: CN VII terminal branches: temporal, zygomatic, buccal, marginal mandibular, cervical ⇒ A

Answer: (A) [Go Back to Q 27](#)

Q28.

Solution

Concept — Thyroid blood supply and parathyroid gland relations: During thyroid surgery, preserving parathyroid glands and the recurrent laryngeal nerve are critical; both relate anatomically to thyroid blood supply.

Step 1 — Thyroid blood supply:

- **Superior thyroid artery:** first branch of the **external carotid artery**; supplies upper pole; runs with the *external laryngeal nerve*
- **Inferior thyroid artery:** branch of the **thyrocervical trunk** (from subclavian artery); supplies lower pole; crosses the recurrent laryngeal nerve
- Thyroidea ima (occasional): from aorta/brachiocephalic



Step 2 — Parathyroid relations:

- **Superior parathyroids (P4):** posterior surface of upper thyroid pole (relatively constant)
- **Inferior parathyroids (P3):** near inferior pole (variable position, may be in thymus)
- **Blood supply:** mainly from the **inferior thyroid artery** (main supply to both superior and inferior parathyroids)

Why other options are wrong:

- Option A: Both arteries are not from the external carotid; inferior thyroid is from the subclavian (thyrocervical trunk). Parathyroids do not lie anterior.
- Option B: Superior thyroid artery is from the external carotid (not subclavian); inferior parathyroids are at lower poles.
- Option C: Neither arises from internal carotid; parathyroids have distinct blood supply (inferior thyroid artery).

Final Answer: Superior thyroid artery = 1st branch of external carotid; inferior thyroid artery = thyrocervical trunk; inferior thyroid is main parathyroid blood supply ⇒ **D**

Answer: (D) [Go Back to Q 28](#)

Q29.

Solution

Concept — Carotid triangle of the neck: The carotid triangle is a subdivision of the anterior triangle of the neck, containing the carotid bifurcation, jugular vein, and several cranial nerves.

Step 1 — Boundaries of the carotid triangle:

- **Superiorly:** posterior belly of digastric and stylohyoid
- **Inferiorly (anteriorly):** superior belly of omohyoid
- **Laterally:** anterior border of sternocleidomastoid (SCM)
- **Contents:** common carotid artery (bifurcation), internal and external carotid arteries, internal jugular vein, CN X (vagus), CN XI (accessory, crossing), CN XII (hypoglossal), ansa cervicalis

Why other options are wrong:

- Option A: Anterior belly of digastric forms the boundary of the *submental* triangle, not the carotid triangle; trapezius is lateral boundary of the *posterior* triangle.
- Option C: Mylohyoid and hyoglossus are boundaries of the *submandibular* triangle (digastric triangle).
- Option D: Thyrohyoid and platysma are not boundaries of the carotid triangle.

Final Answer: Carotid triangle: superiorly = posterior belly digastric + stylohyoid; inferiorly = omohyoid; laterally = SCM $\Rightarrow$ **B**

Answer: (B) [Go Back to Q 29](#)

Q30.

Solution

Concept — Lingual nerve and Wharton's duct: The lingual nerve (branch of V3/mandibular nerve) and the submandibular duct (Wharton's duct) have an intimate anatomical relationship in the floor of the mouth, important in submandibular gland surgery.

Step 1 — Anatomical relationship:

- The lingual nerve initially runs **lateral and superior** (above) to Wharton's duct posteriorly in the floor of the mouth
- As both travel anteriorly, the lingual nerve **hooks around below** the duct and then passes **medial and inferior** to it
- This creates a "hook" or "spiral" relationship: lingual nerve wraps around the duct twice ("*the nerve hooks below the duct like a sling*")
- Clinical significance: in submandibular gland excision, care must be taken not to divide the lingual nerve when ligating the duct

Why other options are wrong:

- Option B: Hypoglossal nerve (CN XII) runs deep to the mylohyoid and does not pass through the submandibular duct.
- Option C: Inferior alveolar nerve remains in the mandibular canal; it has no relation to Wharton's duct.
- Option D: Glossopharyngeal nerve relates to the *parotid gland* (parasympathetic secretomotor via auriculotemporal nerve), not submandibular duct.

Final Answer: Lingual nerve hooks around Wharton's duct — lateral then below then medial (hooks under the duct) $\Rightarrow$ **A**



Answer: (A) [Go Back to Q 30](#)

Q31.

Solution

Concept — Basal ganglia nomenclature: The basal ganglia is a complex of deep cerebral nuclei. Understanding the terminology (striatum, lentiform nucleus, corpus striatum) is frequently tested.

Step 1 — Basal ganglia nomenclature:

- **Striatum** = caudate nucleus + putamen (connected by gray bridges crossing the internal capsule)
- **Lentiform nucleus** = putamen + globus pallidus (together, lens-shaped on coronal section)
- **Corpus striatum** = caudate + lentiform nucleus (= caudate + putamen + globus pallidus)
- Globus pallidus = external (GPe) + internal (GPi) segments
- **Subthalamic nucleus** and **substantia nigra** are functionally part of the basal ganglia circuit but anatomically distinct structures

Why other options are wrong:

- Option A: This lists all structures of the basal ganglia circuit but is not the definition of *corpus striatum* alone.
- Option B: Amygdala and claustrum are NOT part of the corpus striatum (amygdala is limbic; claustrum is of uncertain function).
- Option D: Hippocampus is a limbic structure (allocortex), not a basal ganglia component.

Final Answer: Corpus striatum = caudate + putamen (striatum) + globus pallidus (lentiform nucleus); GP has internal and external segments ⇒ **C**

Answer: (C) [Go Back to Q 31](#)



Q32.

Solution

Concept — CSF circulation: CSF is produced by choroid plexuses (mainly in the lateral ventricles) and flows through a specific pathway to be absorbed into the dural venous sinuses.

Step 1 — CSF production and circulation:

- **Production:** choroid plexus (mainly in lateral ventricles, also in 3rd and 4th)
- **Lateral ventricles** $\xrightarrow{\text{foramina of Monro}}$ **3rd ventricle** $\xrightarrow{\text{cerebral aqueduct (Sylvius)}}$ **4th ventricle**
- From 4th ventricle: exits via **2 lateral foramina of Luschka + 1 median foramen of Magendie** → subarachnoid space
- **Absorption:** arachnoid granulations (Pacchionian bodies) → dural venous sinuses (superior sagittal sinus)

Why other options are wrong:

- Option A: CSF does not flow only into the central canal; that is a minor pathway.
- Option B: Reverses the direction; CSF flows from lateral ventricles to 3rd ventricle, not the other way.
- Option C: Reverses the direction; CSF does not flow from subarachnoid space into ventricles.

Final Answer: Choroid plexus → lateral ventricles → Monro → 3rd ventricle → aqueduct → 4th ventricle → Luschka/Magendie → subarachnoid space → arachnoid granulations → dural sinuses ⇒ **D**

Answer: (D) [Go Back to Q 32](#)

Q33.

Solution

Concept — Middle cerebral artery (MCA) territory: The MCA is the largest cerebral artery and supplies the majority of the lateral cerebral hemisphere, including motor and sensory cortex for the face and upper limb, Broca's and Wernicke's areas (dominant hemisphere), and the internal capsule/basal ganglia.

Step 1 — MCA territory:

- **Lateral frontal lobe:** primary motor cortex (face, UL), premotor cortex, Broca's area (dominant)
- **Lateral parietal lobe:** primary sensory cortex (face, UL), parietal association areas, angular/supramarginal gyri (Wernicke's area in dominant hemisphere)
- **Lateral temporal lobe:** superior temporal gyrus (auditory cortex)
- **Deep branches (lenticulostriate):** internal capsule, putamen, caudate head
- **Clinical:** contralateral hemiplegia + hemianesthesia (UL > LL), homonymous hemianopia, aphasia (dominant), neglect (non-dominant)

Why other options are wrong:

- Option B: Medial cortex (cingulate, paracentral lobule for LL representation) is the ACA territory.
- Option C: Occipital lobe, inferior temporal lobe, thalamus, midbrain = PCA territory.
- Option D: Cerebellum and pons = PICA and AICA territory (posterior circulation), not MCA.

Final Answer: MCA supplies lateral cortex (frontal, parietal, temporal) + internal capsule + basal ganglia; largest of the three cerebral artery territories ⇒ A

Answer: (A) [Go Back to Q 33](#)

Q34.

Solution

Concept — Internal capsule anatomy: The internal capsule is a band of white matter (projection fibers) connecting the cerebral cortex to subcortical structures. Its limbs carry different fiber types.

Step 1 — Fibers of the internal capsule limbs:

- **Anterior limb:** frontopontine fibers (cortex to pontine nuclei), anterior thalamic radiations (mediodorsal and anterior thalamic nuclei to prefrontal cortex)
- **Genu:** corticobulbar (corticonuclear) fibers for face
- **Posterior limb:** corticospinal tract (anterior 2/3), superior thalamic radiation (VPL/VPM nuclei to sensory cortex), corticorubral, corticopontine (posterior)
- **Retro-lenticular:** optic radiation (geniculocalcarine)
- **Sublenticular:** auditory radiation, temporo-pontine fibers



Why other options are wrong:

- Option A: Corticospinal and corticobulbar tracts pass through the *genu and posterior limb*, not the anterior limb.
- Option C: Optic and auditory radiations pass through the *retrolenticular and sublenticular* parts.
- Option D: Posterior thalamic radiation (sensory fibers from VPL to sensory cortex) is in the *posterior limb*.

Final Answer: Anterior limb of internal capsule contains frontopontine fibers and anterior thalamic radiations ⇒ **B**

Answer: (B) [Go Back to Q 34](#)

Q35.

Solution

Concept — First pharyngeal arch (mandibular arch) derivatives: Each pharyngeal arch contributes specific skeletal, muscular, arterial, and nerve components. Arch 1 (mandibular arch) derivatives are among the most tested in FMGE embryology.

Step 1 — First arch (Mandibular arch) derivatives:

- **Nerve:** CN V (trigeminal), specifically the mandibular division (V3) for muscles
- **Muscles:** muscles of mastication (masseter, temporalis, medial and lateral pterygoids), mylohyoid, anterior belly of digastric, tensor tympani, tensor veli palatini
- **Skeletal:** mandible (Meckel's cartilage), **malleus** and **incus** (ossicles of the middle ear from dorsal part of arch 1 cartilage)
- **Artery:** maxillary artery (part of arch 1 aortic arch)

Why other options are wrong:

- Option A: Muscles of facial expression are derived from *arch 2* (hyoid arch, nerve CN VII).
- Option B: Stylopharyngeus is derived from *arch 3* (nerve CN IX, glossopharyngeal).
- Option C: Muscles of the larynx (cricothyroid from arch 4; rest from arch 6, all via CN X).



Final Answer: First arch = muscles of mastication + malleus/incus; nerve = CN V $\Rightarrow$

Answer: (D) [Go Back to Q 35](#)

Q36.

Solution

Concept — Membranous VSD embryology: The interventricular septum develops from multiple sources; the membranous portion is the last to close and is the site of most VSDs.

Step 1 — Formation of the membranous IV septum:

- The muscular (trabecular) part grows upward from the floor of the primitive ventricle toward the endocardial cushions
- The **aorticopulmonary (conotruncal) septum** spirals and divides the out-flow tract
- The **endocardial cushion tissue** (from the AV cushions) contributes to the membranous septum
- Closure of the **interventricular foramen** requires fusion of: (1) muscular IV septum + (2) aorticopulmonary septum downgrowth + (3) endocardial cushion tissue
- Failure of these three to fuse $\rightarrow$ **membranous (perimembranous) VSD** — most common type (~80%)

Why other options are wrong:

- Option B: Neural crest cells do contribute to the aorticopulmonary septum, but they do not alone form the membranous septum.
- Option C: The membranous septum requires contributions from endocardial cushions and the aorticopulmonary septum — the muscular part alone cannot form it.
- Option D: Failure of the septum primum to fuse with endocardial cushions causes *atrial* septal defect (primum ASD), not VSD.

Final Answer: Membranous VSD = failure of fusion of aorticopulmonary septum + endocardial cushion + muscular IV septum $\Rightarrow$

Answer: (A) [Go Back to Q 36](#)



Q37.

Solution

Concept — Thyroglossal duct cyst: The thyroid develops from the foramen cecum and descends to its final position in the neck. Remnants of this descent form thyroglossal duct cysts.

Step 1 — Thyroglossal duct development:

- Thyroid bud arises from the **foramen cecum** (at the junction of the anterior two-thirds and posterior one-third of the tongue, on the dorsum)
- The thyroglossal duct descends, passing **through or in front of** (anterior to) the **body of the hyoid bone**
- Normally, the duct involutes; if it persists, a **thyroglossal duct cyst** forms
- Cysts can occur anywhere along the tract (from foramen cecum to thyroid isthmus)
- Most common location: at or just below the hyoid bone (60–80%)
- The cyst moves upward on **swallowing AND on tongue protrusion** (fibrous cord attached to foramen cecum)

Why other options are wrong:

- Option A: The thyroid descends from the *foramen cecum* (base of tongue), not the apex; the duct does NOT pass lateral to the hyoid.
- Option B: Cysts can occur anywhere along the tract, including above the hyoid.
- Option D: Duct passes *anterior to* (not posterior to) hyoid; cysts are not always suprahyoid.

Final Answer: Thyroid from foramen cecum; duct passes through/anterior to hyoid; cysts most common at/below hyoid; rises on tongue protrusion ⇒ **C**

Answer: (C)[Go Back to Q 37](#)

Q38.

Solution

Concept — Haversian system (osteon): Compact bone is organized into structural units called osteons (Haversian systems). Understanding this histological organization is fundamental to bone biology.

Step 1 — Structure of an osteon:

- **Central (Haversian) canal:** runs *longitudinally* along the bone; contains blood vessels (capillaries, arterioles), nerves, and loose connective tissue
- **Concentric lamellae:** typically 5–20 layers of mineralized collagen surrounding the Haversian canal
- **Lacunae:** small spaces between lamellae housing **osteocytes**
- **Canaliculi:** tiny channels connecting lacunae to each other and to the Haversian canal (for nutrient diffusion)
- **Volkman's (perforating) canals:** run *transversely* or obliquely, connecting adjacent Haversian canals to each other and to the periosteal/endosteal surfaces

Why other options are wrong:

- Option A: Haversian canals run *longitudinally* (not transversely); Volkman's canals are transverse. Each system has 5–20 (not 20–30) lamellae.
- Option C: Cancellous (trabecular/spongy) bone does NOT have Haversian systems; it has lamellae in irregular trabeculae with osteocytes nourished by diffusion from marrow.
- Option D: Haversian canals carry blood vessels AND nerves (not only lymphatics); blood supply to bone is not exclusively periosteal.

Final Answer: Osteon = concentric lamellae + central Haversian canal (vessels + nerves) + lacunae (osteocytes) + canaliculi; Volkman's canals connect Haversian canals transversely ⇒ **B**

Answer: (B) [Go Back to Q 38](#)



Q39.

Solution

Concept — Transitional epithelium (urothelium): Transitional epithelium is a specialized stratified epithelium that can change its appearance (thin when distended, thick when contracted), lining only the urinary tract.

Step 1 — Features of transitional epithelium:

- Stratified; 4–6 cell layers when contracted; 2–3 layers when distended
- Superficial cells (umbrella cells/facet cells): large, dome-shaped, may be binucleate; flatten on distension
- **Location:** renal pelvis and calyces, ureters, urinary bladder, upper urethra (proximal part of the urethra)
- Cells have **asymmetric unit membranes** (AUM) / uroplakins — specialized proteins that provide barrier function and impermeability

Why other options are wrong:

- Option A: Simple columnar epithelium lines the stomach, small intestine, gallbladder, and large intestine — not the urinary tract.
- Option B: Stratified squamous epithelium (non-keratinized) lines the oral cavity, esophagus, vagina; keratinized form lines the skin — not the urinary tract.
- Option C: Pseudostratified ciliated columnar epithelium (respiratory epithelium) lines the trachea, bronchi, and nasal cavity — not the urinary tract.

Final Answer: Transitional epithelium (urothelium) lines renal pelvis, ureters, bladder, and upper urethra exclusively ⇒ **D**

Answer: (D) [Go Back to Q 39](#)

Q40.

Solution

Concept — Smooth muscle vs skeletal muscle: Smooth and skeletal muscle differ fundamentally in their structure, innervation, and molecular mechanism of contraction.

Step 1 — Distinguishing features of smooth muscle:

- **Involuntary:** controlled by autonomic nervous system (sympathetic and parasympathetic)



- **Uninucleate:** one central nucleus per spindle-shaped cell (unlike skeletal: multinucleated peripherally)
- **Non-striated:** lacks sarcomeres, Z-discs, and organized myofilament array (though has actin and myosin)
- **Mechanism:** Ca^{2+} binds **calmodulin** → calmodulin- Ca^{2+} activates **MLCK** (myosin light chain kinase) → phosphorylates myosin → contraction (not troponin-tropomyosin mechanism)
- **No T-tubules;** sarcoplasmic reticulum is poorly developed compared to skeletal muscle; Ca^{2+} enters from both SR and extracellular space via L-type channels

Why other options are wrong:

- Option B: Smooth muscle is NOT striated and is NOT multinucleated; it does NOT use the troponin-tropomyosin mechanism (that is skeletal and cardiac muscle).
- Option C: Smooth muscle lacks T-tubules (these are present in skeletal and cardiac muscle); SR is less developed, not identical.
- Option D: Smooth muscle is involuntary and is NOT controlled by somatic motor neurons or NMJs; it receives autonomic innervation.

Final Answer: Smooth muscle = involuntary, uninucleate, non-striated, calmodulin/MLCK mechanism, autonomic innervation ⇒ A

Answer: (A) [Go Back to Q 40](#)



Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	C	2	A	3	B	4	D	5	A
6	B	7	C	8	D	9	A	10	B
11	C	12	D	13	A	14	B	15	A
16	D	17	B	18	C	19	A	20	D
21	B	22	C	23	A	24	D	25	B
26	C	27	A	28	D	29	B	30	A
31	C	32	D	33	A	34	B	35	D
36	A	37	C	38	B	39	D	40	A

