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SURGICAL PRIMARY

SAMPLE QUESTIONS

ANATOMY

PHYSIOLOGY

PATHOLOGY

ANATOMY

QUESTIONS 1 TO 61

- 1 During development of the midgut:
 - a) a loop of gut enters the extra-embryonic coelom of the umbilical cord
 - b) clockwise rotation occurs
 - c) rotation occurs around the axis of the coeliac trunk
 - d) a persistent vitelline (yolk) duct at the apex of the loop results in a Meckel's diverticulum
 - e) the caecum is the last midgut structure to enter the abdomen.

- 2 The right colic flexure (hepatic flexure):
 - a) is related to the renal fascia of the right kidney
 - b) forms part of the boundaries of the hepatorenal pouch
 - c) is related to the horizontal (third) part of the duodenum
 - d) is related to the right ureter
 - e) is related to the neck of the gall bladder.

- 3 Concerning mesenteries and other peritoneal folds
 - a) The left ureter is related to the sigmoid mesocolon.
 - b) The root of the mesentery (of the small intestine) crosses the second (descending) part of the duodenum.
 - c) The lower obliterated section of the lesser sac (omental bursa) lies between the two layers of the transverse mesocolon.
 - d) The paraduodenal fold contains an artery and a vein.
 - e) The ileocaecal fold (bloodless fold of Treves) lies behind the mesoappendix.

- 4 During a muscle splitting incision in the right iliac fossa for an appendicectomy the following structures will always be encountered
 - a) The membranous layer of superficial fascia.
 - b) The rectus abdominis muscle.
 - c) The aponeurosis of the external oblique.
 - d) The ilioinguinal nerve.
 - e) Peritoneum.

- 5 The thymus:
 - a) develops from the second pharyngeal pouch
 - b) receives a blood supply directly from the subclavian artery
 - c) has a supporting framework of strong collagenous tissue for lymphocytes within its lobules
 - d) contains Hassal's corpuscles in the medulla of its lobules
 - e) may be closely related to the inferior parathyroid in the adult.

- 6 The oesophageal opening in the diaphragm:
- conducts anastomotic vessels between gastric and oesophageal venous systems
 - is strengthened by muscle fibres from the right crus
 - conducts the phrenic nerves
 - is usually found on CT at the vertebral level of L1
 - conducts the vena azygos.
- 7 During its course through the thorax the right vagus nerve:
- lies against the trachea
 - runs in front of the right lung root
 - contains fibres from the nucleus \square ubernacu destined for abdominal viscera
 - gives branches to the pulmonary plexus
 - takes part in the formation of an oesophageal plexus.
- 8 During thyroidectomy
- The middle thyroid vein is found running in front of the common carotid artery.
 - The sternohyoid and sternothyroid muscles may be divided transversely in their upper ends to avoid injury to their nerve supply.
 - The recurrent laryngeal nerve may be located behind the cricothyroid joint.
 - Damage to the external laryngeal nerve is most likely to occur when exposing the inferior thyroid artery.
 - A remnant of the thyroglossal duct may be found attached to the isthmus.
- 9 If the ulnar nerve is damaged behind the medial epicondyle:
- there will be loss of sweating from the skin of the hypothenar eminence
 - there will be loss of sensation in the skin on the dorsum of the fifth metacarpal
 - a 'trick' movement will be required to oppose the thumb to the index finger
 - slight 'clawing' will be noted in the fourth and fifth digits
 - adductor pollicis is paralysed.
- 10 A needle and catheter used for supraclavicular approach to the **left** subclavian vein:
- pierces the platysma
 - may encounter a valve in the vein
 - pierces scalenus anterior before entering the vein
 - should enter the vein at its junction with the internal jugular vein
 - will encounter the apex of the pleura before entering the vein.<![endif]>
- 11 In a transverse lower abdominal incision for access to the pelvis (Pfannenstiel's incision):
- an incision is made through the anterior rectus sheath
 - tendinous intersections of the rectus must be separated from the posterior rectus sheath
 - the posterior layer of the rectus sheath must be divided
 - the inferior epigastric vessels may be exposed if the rectus muscles are divided transversely
 - the peritoneum must be incised in order to approach the prostate retropubically.

- 12 Ligaments or peritoneal folds having an attachment to the ovary include:
- the round ligament of the uterus
 - the transverse cervical ligament (Mackenrodt)
 - the anterior leaf of the broad ligament
 - the uterosacral ligament
 - a remnant of the □ubernaculum.
- 13 The gall bladder:
- is related posteriorly to the superior (1st) part of the duodenum
 - receives its arterial blood supply most commonly from the left hepatic artery
 - is drained by a vein which ends in a hepatic vein
 - has a fundus whose surface marking is where the lateral edge of the right rectus sheath meets the costal margin
 - has a lining epithelium containing many goblet cells.
- 14 During surgical removal of a **left** submandibular gland:
- injury to the cervical branch of the facial nerve would result in loss of sensation over the angle of the mandible
 - injury to the marginal mandibular branch of the facial nerve would result in drooping of the left angle of the mouth
 - injury to the hypoglossal nerve will result in a deviation of the tongue to the right when the patient attempts to protrude it
 - injury to the lingual nerve would result in loss of taste on the left anterior two-thirds of the tongue
 - the great auricular nerve is at risk.
- 15 Posterior relations of the rectum include:
- peritoneum
 - the promontory of the sacrum
 - the sympathetic trunks
 - the median sacral artery
 - the fascia of Denonvilliers.
- 16 The prostatic part of the urethra:
- receives the ducts of the bulbourethral glands (Cowper)
 - is the narrowest part of the urethra
 - is lined with stratified columnar epithelium
 - contains branching mucous glands (of Littre)
 - receives the openings of the ducts of the seminal vesicles.

- 17 During surgical exposure of the right kidney through the lumbar approach below the twelfth rib, structures exposed may include:
- pleura
 - lateral cutaneous nerve of thigh
 - the posterior edge of the external oblique
 - pararenal fascia
 - perirenal fat.
- 18 During a barium swallow, the following statements about the oesophagus are true:
- the oesophagus begins at the level of the 4th cervical vertebra
 - the lumen appears to be narrowed at the level of the arch of the aorta
 - the lumen appears to be narrowed at the level of the 10th thoracic vertebra
 - the lumen appears to be narrowed at the gastro-oesophageal junction
 - when measured the normal oesophagus is 25 cm long.
- 19 The sympathetic nervous system supplies:
- dilatator fibres to the coronary arteries
 - constrictor fibres to the smooth muscle of the bronchial tree
 - grey rami communicantes to the thoracic spinal nerves
 - cholinergic secretomotor fibres to sweat glands
 - fibres which cause the pupil to constrict.
- 20 During an axillary clearance for axillary lymph nodes the following structures could be damaged:
- the long thoracic nerve (nerve to serratus anterior muscle)
 - the suprascapular nerve
 - the axillary vein
 - the axillary nerve
 - the radial nerve.
- 21 During a rectal examination the following structures may be palpated:
- the middle lobe of the prostate
 - the cervix
 - the uterine body
 - the seminal vesicles
 - the coccyx.
- 22 The left coronary artery:
- gives off an anterior interventricular branch
 - has no anastomoses with the right coronary artery
 - gives off a circumflex branch which lies in the coronary (atrioventricular) sulcus
 - usually gives off the posterior interventricular branch
 - usually supplies the atrioventricular node.

- 23 If the median nerve is cut just above the wrist
- Flexion at the interphalangeal joint of the thumb is lost.
 - The movement of opposition is lost.
 - There is loss of sensation in the nail bed of the index finger.
 - There is a loss of sensation in the skin over the thenar eminence.
 - There is a loss of abduction at the carpo-metacarpal joint of the thumb.
- 24 In the posterior mediastinum
- The upper three left posterior intercostal veins go to the left brachiocephalic vein.
 - The left lower posterior intercostal veins form the hemiazygos (inferior hemiazygos) vein.
 - The azygos vein joins the inferior vena cava.
 - The sympathetic trunk is posterior to the posterior intercostal veins.
 - The hemiazygos veins are posterior to the descending thoracic aorta.
- 25 During the exposure of the femoral artery the following statements are true
- The skin incision starts at the mid point of the inguinal ligament and runs downwards and medially.
 - The profunda femoris arises from the medial side of the artery.
 - The artery is crossed by sartorius.
 - The artery lies on adductor longus.
 - It is intimately related to the saphenous nerve.
- 26 Each of the following correctly describes the common bile duct EXCEPT:
- the posterior superior pancreaticoduodenal artery and vein spiral around the pancreatic portion of the duct
 - it lies to the right of the proper hepatic artery in the right free margin of the hepatoduodenal ligament
 - the common bile duct and pancreatic duct pass together through the wall of the second part of the duodenum
 - descending posterior to the first part of the duodenum, it crosses the posterior surface of the head of the pancreas
 - in the lesser omentum, it lies posterior to the portal vein.
- 27 In the popliteal fossa
- The biceps femoris muscle forms its upper lateral boundary.
 - The tibial (medial popliteal) nerve is deep to the popliteal artery.
 - The common peroneal (lateral popliteal) nerve is superficial to the lateral head of the gastrocnemius muscle.
 - The popliteal fascia forms part of the floor.
 - The popliteal vein is deep to the popliteal artery.

- 28 Damage to the lower trunk of the brachial plexus will result in the following clinical features:
- paralysis of the intrinsic muscles of the hand
 - lack of abduction of the shoulder
 - loss of sensation on the ulnar side of the forearm
 - loss of sensation on the radial side of the forearm
 - a Horner's syndrome.
- 29 The inguinal canal in the female:
- has a floor formed by the inguinal ligament
 - has the lacunar ligament in its floor laterally
 - has the remains of the gubernaculum ovarii passing through it
 - has the internal oblique in its roof
 - has the conjoint tendon (falx inguinalis) in its posterior wall laterally.
- 30 The following structures are derived from the midgut
- The vermiform appendix.
 - The proximal third of the descending colon.
 - A persistent vitello-intestinal duct (or its remains).
 - The distal third of the ascending colon.
 - The first part of the duodenum.
- 31 The right atrium:
- is related to the central tendon of the diaphragm at the level of the 8th thoracic vertebra
 - has a thin anterior endocardial fold "guarding" the superior vena cava
 - has an auricle situated superolaterally
 - has the coronary sinus opening situated between the fossa ovalis and the opening of the inferior vena cava.
 - Has a fossa ovalis on the atrioventricular wall.
- 32 The right ventricle:
- forms most of the inferior surface of the heart
 - is normally oval in cross section
 - has a tricuspid valve in its inflow tract
 - usually contains three conical papillary muscles
 - possesses a pulmonary orifice guarded by a tricuspid valve.
- 33 The mitral valve:
- possesses two cusps
 - 'guards' the right atrioventricular orifice
 - is closely related to the aortic valve
 - has no papillary muscle attachments
 - lies on the posterior wall of the left ventricle.

- 34 The coronary arteries:
- a) arise from the inferior aspect of the aortic arch
 - b) each gives atrial and ventricular branches
 - c) anastomose extensively with each other
 - d) supply the conducting system of the heart
 - e) supply the papillary muscles of the mitral and tricuspid valves.
- 35 The arch of the aorta:
- a) arches posteriorly over the root of the right lung
 - b) is related, on its left side, to mediastinal pleura
 - c) is connected to the right pulmonary artery
 - d) is related to the left brachiocephalic vein superiorly
 - e) is related anteriorly to the manubrium sternum.
- 36 The azygos vein:
- a) originates in the abdomen
 - b) leaves the abdomen by the oesophageal opening
 - c) drains into the right atrium directly
 - d) receives both right bronchial and right posterior intercostal tributaries
 - e) receives small pulmonary tributaries.
- 37 The left phrenic nerve:
- a) arises from the dorsal rami of the 3rd, 4th and 5th cervical nerves
 - b) descends through the thorax in the left pleural cavity
 - c) receives sensory branches from the mediastinal and diaphragmatic pleura and from the diaphragmatic peritoneum
 - d) passes through the caval opening of the diaphragm
 - e) descends in the thorax posterior to the lung root.
- 38 The right vagus nerve during its course in the thorax:
- a) lies posterolateral to the right brachiocephalic artery
 - b) is separated from the mediastinal pleura by the trachea
 - c) contributes to the pulmonary plexus
 - d) contributes to the oesophageal plexus
 - e) gives off the right recurrent laryngeal nerve.
- 39 The gastric nerves:
- a) both arise from the oesophageal plexus
 - b) contain only fibres from the right and left vagi
 - c) supply branches to the liver
 - d) supply branches to the coeliac plexus
 - e) supply branches to the pancreas.

- 40 The thoracic oesophagus:
- a) lies posterior to the trachea
 - b) is directly related to the vertebral column throughout its course
 - c) is related to the left atrium
 - d) pierces the central tendon of the diaphragm at the level of the 8th thoracic vertebra
 - e) is crossed by the left bronchus.
- 41 The abdominal oesophagus:
- a) enters the abdomen between the right and left crus of the diaphragm
 - b) is enveloped by peritoneum
 - c) is closely related to both the anterior and posterior gastric nerves
 - d) is closely related to the left lobe of the liver
 - e) is surrounded by an external oesophageal sphincter.
- 42 The stomach:
- a) is supplied in part by arteries arising from the splenic artery
 - b) is supplied by arteries which each arise from branches of the coeliac trunk
 - c) has a venous drainage passing equally to the portal and systemic venous systems
 - d) is lined by columnar and squamous epithelium
 - e) is totally covered by serosa (peritoneum).
- 43 The caecum:
- a) is completely invested in peritoneum
 - b) possesses a longitudinal muscle coat but no taeniae coli
 - c) lies on the right psoas muscle
 - d) has an ileocaecal orifice opening inferiorly
 - e) lies adjacent to the right femoral nerve.
- 44 The sigmoid colon:
- a) extends from the pelvic brim to the third sacral segment
 - b) is closely tethered by its peritoneal covering
 - c) lies in close proximity to both ureters
 - d) lies adjacent to the bladder in both sexes
 - e) is supplied by branches of the inferior mesenteric artery.
- 45 The inferior mesenteric artery:
- a) supplies the large bowel from the left part of the transverse colon to the upper anal canal
 - b) continues as the inferior rectal artery in the pelvis
 - c) anastomoses with branches of the internal iliac artery
 - d) is crossed over by the left ureter
 - e) contributes to the marginal artery of the bowel.

- 46 The liver:
- a) drains by hepatic veins into the inferior vena cava
 - b) has a lymph drainage to both the mediastinal and porta hepatis nodes
 - c) is supplied by the phrenic nerves
 - d) is directly related to the right suprarenal gland
 - e) gains an arterial supply from the coeliac axis.
- 47 The pancreas:
- a) is completely invested in peritoneum
 - b) usually has two major ducts
 - c) is related to both the greater sac of peritoneum and the omental bursa
 - d) lies anterior to the right and left renal veins
 - e) is closely related to the bile duct.
- 48 The left kidney:
- a) is separated from the psoas major muscle by the quadratus lumborum muscle
 - b) is crossed posteriorly by the body of the pancreas
 - c) has cubial epithelium with a brush border lining the proximal convoluted tubule
 - d) develops from the pronephros
 - e) is closely related to the splenic vessels.
- 49 The ureters:
- a) have an abdominal course which is different in each sex
 - b) lie anterior to branches of the lumbar plexus and posterior to the anterior branches of the aorta
 - c) have a pelvic course which is different in each sex
 - d) turn medially over levator ani at the level of the ischial spine
 - e)
- 50 The pudendal nerve:
- a) arises from the lumbar plexus
 - b) traverses the greater sciatic foramen
 - c) traverses the lesser sciatic foramen
 - d) supplies levator ani and perianal skin
 - e) supplies sensory fibres to the penis.
- 51 The common iliac arteries:
- a) arise in front of the promontory of the sacrum
 - b) have no branches other than the terminal internal and external iliac arteries
 - c) lie in front and to the right of the internal iliac veins
 - d) are closely related to the inferior vena cava
 - e) are crossed at their origin by the ureters.

- 52 The cisterna chyli:
- a) drains directly into the left jugular vein
 - b) lies between the right crus of the diaphragm and the aorta
 - c) receives the right and left lumbar lymph trunks
 - d) receives lymph (chyle) from the abdominal alimentary tract
 - e) receives all the lymph from the anterior abdominal wall.
- 53 The scapula has a:
- a) palpable inferior angle which overlies the seventh rib
 - b) lateral border giving rise to the serratus anterior muscle
 - c) costal surface divided by a projecting spine into supraspinous and infraspinous fossae
 - d) coracoid process giving attachment to the biceps muscle
 - e) glenoid cavity, below which the long head of the triceps muscle is attached.
- 54 In the humerus the:
- a) subscapularis muscle is attached to the greater tuberosity
 - b) greater tuberosity is separated from the lesser tuberosity by the intertubercular groove
 - c) upper end has a V-shape tuberosity for the attachment of the deltoid muscle
 - d) olecranon fossa gives attachment to the medial head of the triceps muscle
 - e) axillary nerve lies medial to the anatomical neck.
- 55 An injury of the lateral spinothalamic tract would be expected to result in loss of pain and temperature sensation:
- a) one segment below the level of the lesion on the ipsilateral side
 - b) one segment below the level of the lesion on the contralateral side
 - c) gradually over several segments below the level of the lesion on the contralateral side
 - d) two segments below the level of the lesion on the ipsilateral side
 - e) two segments below the level of the lesion on the contralateral side.
- 56 Which one of these peritoneal ligaments is incorrectly matched with the blood vessel it contains?
- a) gastrocolic ligament – left gastroepiploic artery
 - b) lesser omentum – right gastric artery
 - c) gastrophrenic ligament - splenic artery
 - d) transverse mesocolon – middle colic artery
 - e) gastroligament – left gastroepiploic artery.
- 57 The musculocutaneous nerve:
- a) is a terminal branch of the posterior cord of the brachial plexus
 - b) descends in the arm between biceps and brachialis
 - c) supplies coracobrachialis
 - d) supplies cutaneous branches to the radial side of the forearm
 - e) ends up as the medial cutaneous nerve of the forearm.

- 58 The radial nerve:
- a) is a terminal branch of the posterior cord of the brachial plexus
 - b) lies posterior to the humerus between the medial and lateral heads of triceps
 - c) passes anterior to the elbow joint
 - d) supplies the skin of the medial and anterior aspect of the forearm
 - e) supplies the supinator muscle.
- 59 The ulnar nerve:
- a) is a terminal branch of the medial cord of the brachial plexus
 - b) descends to the elbow in the anterior compartment of the arm
 - c) descends with the long head of the triceps
 - d) lies behind the medial epicondyle
 - e) supplies branches to coracobrachialis.
- 60 The ulna:
- a) gives attachment to the brachialis muscle
 - b) possesses a styloid process on the anteromedial surface of its lower end
 - c) articulates at its lower end with an articular disc
 - d) is palpable over the whole length of its posterior border
 - e) is related inferiorly to the extensor carpi radialis muscle.
- 61 The proximal radio-ulnar joint:
- a) is of the condyloid variety
 - b) occurs between the head of the radius and the radial notch of the ulna
 - c) is stabilised mainly by the surrounding capsular ligament of the elbow joint
 - d) owes its stability mainly to the annular ligament
 - e) is separated from the elbow joint by a fibrocartilaginous disc.

END OF ANATOMY QUESTIONS

PHYSIOLOGY

- 1 Blood group antigens (agglutinogens) are:
 - a) carried on the haemoglobin molecule
 - b) beta globulins
 - c) equally immunogenic
 - d) present in foetal blood
 - e) inherited as recessive Mendelian characteristics.

- 2 A person with group A blood:
 - a) has anti-B antibody in the plasma
 - b) may have the genotype AB
 - c) may have a parent with group O blood
 - d) may have children with group A or group O blood only
 - e) whose partner is also A can only have children of group A or O.

- 3 Blood platelets assist in arresting bleeding by:
 - a) releasing factors promoting blood clotting
 - b) adhering together to form plugs when exposed to collagen
 - c) liberating high concentrations of calcium
 - d) releasing factors causing vasoconstriction
 - e) inhibiting fibrinolysis by blocking the conversion of plasminogen to plasmin.

- 4 Plasma bilirubin:
 - a) is a steroid pigment
 - b) is converted to biliverdin in the liver
 - c) does not normally cross cerebral capillary walls
 - d) is freely filtered in the renal glomerulus
 - e) is sensitive to light.

- 5 Circulating red blood cells:
 - a) are about 1% nucleated
 - b) may show an intracellular network pattern if appropriately stained
 - c) are distributed evenly across the blood stream in large blood vessels
 - d) travel at slower velocity in venules than in capillaries
 - e) deform as they pass through the capillaries.

- 6 Normal blood clotting requires:
 - a) inactivation of heparin
 - b) inactivation of plasmin (fibrinolysin)
 - c) calcium ions
 - d) an adequate intake of vitamin K
 - e) an adequate intake of vitamin C.

- 7 The conversion of fibrinogen to fibrin:
- is effected by prothrombin
 - involves the disruption of certain peptide linkages by a proteolytic enzyme
 - is followed by polymerisation of fibrin monomers
 - is inhibited by heparin
 - is reversed by plasmin (fibrinolysin).
- 8 In investigating a patient's acid-base status
- Venous rather than arterial blood should be studied.
 - Blood samples may be stored for up to 12 hours at room temperature before analysis.
 - pH can be calculated if $[\text{HCO}_3^-]$ and P_{CO_2} are known.
 - Raised urinary ammonium salts suggest renal compensation for respiratory acidosis.
 - An early fall in $[\text{HCO}_3^-]$ suggests that the acid-base disturbance is respiratory in origin.
- 9 Sodium depletion differs from sodium retention in that it causes a reduction in:
- central venous pressure
 - renin production
 - the specific gravity of the blood
 - intracellular fluid volume
 - total body mass.
- 10 Sodium depletion differs from water depletion in that:
- cardiovascular changes are less pronounced
 - intracellular fluid volume is less affected
 - the haematocrit increases
 - thirst is more severe
 - antidiuretic hormone levels are higher.
- 11 Myocardial blood flow to the left ventricle increases during:
- early systole
 - myocardial hypoxia
 - adenosine infusions
 - stimulation of sympathetic nerves to the heart
 - arterial hypertension.
- 12 The pressure:
- drop along large veins is similar to that along large arteries
 - drop across the hepatic portal bed is similar to that across the splenic vascular bed
 - in the hepatic portal vein exceeds that in the inferior vena cava
 - drop across the vascular bed in the foot is greater when a subject is in the vertical than when he is in the horizontal position
 - in foot veins is lower when walking than when standing still.

- 13 Pulmonary vascular resistance is:
- less than one-third that offered by the systemic circuit
 - decreased when alveolar oxygen pressure falls
 - expressed in units of volume flow per unit time per unit pressure gradient
 - decreased during exercise
 - regulated reflexly to regulate the rate of pulmonary blood flow.
- 14 Ventricular filling:
- depends mainly on atrial contraction
 - begins during isometric ventricular relaxation
 - gives rise to a third heart sound in some healthy people
 - can occur only when atrial pressure is greater than atmospheric pressure
 - is most rapid in the first half of diastole.
- 15 Veins:
- contain most of the blood volume
 - have a sympathetic vasoconstrictor innervation
 - receive nutrition from vasa vasorum arising from their lumen
 - respond to distension by contraction of their smooth muscle
 - undergo smooth muscle hypertrophy when exposed to arterial pressure through an arteriovenous fistula.
- 16 In an adult subject standing quietly at rest, venous pressure in the:
- foot is approximately equal to arterial pressure at heart level
 - thorax decreases when the subject inhales
 - hand is subatmospheric when the hand is raised above the head
 - venous sinuses of the skull is subatmospheric
 - superior vena cava is an index of cardiac filling pressure.
- 17 The velocity of blood flow:
- in capillaries is low because they offer high resistance to flow
 - in veins is greater than in venules
 - can fall to zero in the ascending aorta during diastole
 - is greater towards the centre of large blood vessels than at the periphery
 - in the circulation falls at the haematocrit falls.
- 18 In the brachial artery:
- pulse waves travel at the same velocity as blood
 - pulse pressure falls with decreasing elasticity of the wall
 - pressure rises markedly when the artery is occluded distally
 - pressure falls when the arm is raised above head level
 - pulse pressures have a smaller amplitude than aortic pulse pressures.

- 19 With increasing distance from the heart, arterial:
- walls contain more smooth muscle than elastic tissue
 - flow has a greater tendency to be turbulent
 - mean pressure tends to rise slightly
 - pulse pressure tends to increase slightly
 - P_{O_2} falls appreciably.
- 20 In a person breathing normally at rest with an environmental temperature of 25°C, the partial pressure of:
- CO_2 in alveolar air is about twice that in room air
 - water vapour pressure in alveolar air is less than half the alveolar PCO_2 level
 - water vapour pressure in alveolar air is greater than that in room air even at 100% humidity
 - O_2 in expired air is greater than in alveolar air
 - CO_2 in mixed venous blood is greater than in alveolar air.
- 21 The carotid bodies:
- are stretch receptors in the walls of the internal carotid arteries
 - have a blood flow per unit volume similar to that in the brain
 - are influenced more by blood P_{O_2} than by its oxygen content
 - generate more afferent impulses when blood H^+ ion concentration rises
 - and the aortic bodies are mainly responsible for the increased ventilation in hypoxia.
- 22 As people age, there is usually a decrease in their:
- ratio of lung residual volume to vital capacity
 - percentage of vital capacity expelled in 1 s
 - lung volume level at which small airways start to close during expiration
 - lung elasticity
 - resting arterial blood P_{O_2} .
- 23 In normal lungs
- The rate of alveolar ventilation at rest exceeds the rate of alveolar capillary perfusion.
 - The ventilation/perfusion (V/P) ratio exceeds 2.0 during maximal exercise.
 - The V/P ratio is higher at the apex than at the base of the lungs when a person is standing.
 - Oxygen transfer can be explained by passive diffusion.
 - Dead space increases during inspiration.
- 24 Alveolar ventilation is increased by breathing:
- 21% O_2 and 79% N_2
 - 17% O_2 and 83% N_2
 - 2% CO_2 and 98% O_2
 - 10% CO_2 and 90% O_2
 - A gas mixture which raises arterial PCO_2 by 10%.

- 25 Compliance of the lungs is greater
- when they are expanded above their normal tidal volume range
 - in adults than in infants
 - than the compliance of the lungs and thorax together
 - when they are filled with normal saline than when they are filled with air
 - in standing than in recumbent subjects.
- 26 At a high altitude where atmospheric pressure is halved, there is an increase in:
- pulmonary ventilation
 - alveolar H₂O vapour pressure
 - arterial P_{O₂}
 - arterial pH
 - cerebral blood flow.
- 27 A rise in arterial P_{CO₂} leads to an increase in:
- ventilation due to stimulation of peripheral chemoreceptors
 - ventilation due to stimulation of central chemoreceptors
 - arterial pressure
 - cerebral blood flow
 - the plasma bicarbonate level.
- 28 Ventilation is increased during:
- periods when cerebrospinal fluid pH is reduced
 - chronic renal failure
 - periods when plasma bicarbonate level is raised
 - deep sleep
 - exercise because of the ensuing fall in arterial P_{O₂}.
- 29 A diver breathing air at a depth of 30 m under water:
- is exposed to a pressure of about four times that at the surface
 - has a raised pressure of nitrogen in the alveoli
 - has a four-fold increase in the oxygen content of blood
 - has a four-fold increase in alveolar water vapour pressure
 - expends less energy than normal on the work of breathing.
- 30 Intestinal secretions contain:
- potassium in a concentration similar to that in extracellular fluid
 - enzymes which are released when the vagus nerve is stimulated
 - enzymes which hydrolyse disaccharides
 - enzymes which hydrolyse monosaccharides
 - enzymes which activate pancreatic proteolytic enzymes.

- 31 In sensory receptors:
- stimulus energy is converted into a local depolarisation
 - the generator potential is graded and self-propagating
 - a generator potential can be produced by only one form of energy
 - the frequency of action potentials generated doubles when the strength of the stimulus doubles
 - serving touch sensation, constant suprathreshold stimulation causes action potentials to be generated at a constant rate.
- 32 Sympathetic:
- ganglionic transmission is mediated by acetylcholine
 - neuromuscular transmission at the heart is mediated by adrenaline
 - neuromuscular transmission in skin arterioles is mediated by acetylcholine
 - neuroglandular transmission at sweat glands is mediated by noradrenaline
 - neuromuscular transmission at the iris is mediated by noradrenaline.
- 33 Nerve fibres continue to conduct impulses when:
- extracellular sodium is replaced by potassium
 - extracellular sodium is replaced by a non-diffusible cation
 - temperature is lowered from 37 to 30°C
 - temperature is lowered to below 0°C provided freezing does not occur
 - the sodium-potassium pump is inactivated.
- 34 In fluid in the distal part of the proximal convoluted tubule:
- urea concentration is higher than in Bowman's capsule
 - pH is less than 6 when the kidneys are excreting an acid urine
 - glucose concentration is similar to that in plasma
 - osmolality is about 25% that of glomerular filtrate
 - bicarbonate concentration is lower than in plasma.
- 35 The proximal convoluted tubules:
- reabsorb most of the sodium ions in glomerular filtrate
 - reabsorb most of the chloride ions in glomerular filtrate
 - reabsorb most of the potassium ions in glomerular filtrate
 - contain juxtaglomerular cells which secrete renin
 - contain the main target cells for antidiuretic hormone.
- 36 Aldosterone:
- is a steroid hormone secreted by the adrenal medulla
 - production ceases following removal of the kidneys and their juxtaglomerular cells
 - production decreases in treatment with drugs which block angiotensin converting enzyme
 - secretion results in increased potassium reabsorption by the nephron
 - secretion results in a fall in urinary pH.

37 Secretion of renin:

- a) occurs in the stomach mucosa during infancy
- b) is stimulated by the hormone angiotensin I
- c) leads to raised levels of angiotensin II in the blood
- d) is stimulated by a fall in extracellular fluid volume
- e) inhibits ACTH secretion by the pituitary gland.

END OF PHYSIOLOGY QUESTIONS

PATHOLOGY

- 1 Patients with moderate to severe anaemia have a reduced:
 - a) cardiac output
 - b) incidence of vascular bruits
 - c) 2:3-diphosphoglycerate blood level
 - d) arterial P_{O_2}
 - e) capacity to raise oxygen consumption in exercise.

- 2 Iron deficiency:
 - a) frequently follows persistent loss of blood from the body
 - b) is more common in men than in women
 - c) may cause anaemia by inhibiting the rate of multiplication of RBC stem cells
 - d) may cause large pale erythrocytes to appear in peripheral blood
 - e) anaemia should normally be treated by injections of iron.

- 3 Vitamin B₁₂ deficiency may:
 - a) result from disease of the terminal part of the ileum
 - b) result in anaemia with small RBCs well filled with haemoglobin
 - c) cause wasting (atrophy) of the gastric mucosa
 - d) cause a reduction in the circulating platelet level
 - e) cause pathological changes in the central nervous system.

- 4 A patient with partly compensated respiratory acidosis:
 - a) must have a raised PCO_2
 - b) may have a reduced hydrogen ion concentration $[H^+]$
 - c) must have a raised bicarbonate concentration $[HCO_3^-]$
 - d) may have evidence of renal compensation
 - e) may have respiratory failure due to hypoventilation.

- 5 Deficiency of factor VIII (antihæmophilic globulin):
 - a) increases the bleeding time
 - b) is due to an abnormal gene on the Y chromosome
 - c) to 75% of its normal value results in excessive bleeding after tooth extraction
 - d) causes small (petechial) hæmorrhages into the skin to cause purpura
 - e) affects the extrinsic, rather than the intrinsic, pathway for blood coagulation.

- 6 A raised level of calcium in the blood (hypercalcaemia):
 - a) may occur when parathyroid activity decreases
 - b) may occur when the plasma protein level falls
 - c) may occur in chronic renal failure
 - d) causes increased excitability of nerve and muscle
 - e) increases the risk of stone formation in the urinary tract.

- 7 Haemoglobinuria occurs:
- in blackwater fever
 - following the excessive ingestion of beetroot
 - in any cause of haematuria when the specific gravity of the urine is above 1007
 - in blood transfusion
 - in strenuous exercise.
- 8 The blood urea is elevated in the following conditions
- Severe dehydration.
 - Pregnancy.
 - Tubular necrosis.
 - Diabetes insipidus.
 - Cortical necrosis.
- 9 The metabolic effects following a severe injury include:
- respiratory alkalosis
 - accelerated gluconeogenesis
 - mobilisation of fat stores
 - decreased aldosterone secretion
 - protein anabolism.
- 10 Post operative infection delays wound healing because
- the wound becomes packed with leucocytes
 - many of the organisms involved produce spreading factors which may destroy the intercellular ground substance
 - collagen is destroyed
 - capillary loops fail to develop
 - fibroblasts are diminished in number.
- 11 The Zollinger-Ellison syndrome is associated with
- β -cell tumours of the pancreas
 - chronic duodenal ulceration
 - cholereiform diarrhoea
 - parathyroid adenomata
 - phaeochromocytoma.
- 12 Abnormal aggregation of lymphocytes occurs in the thyroid in the following pathological conditions:
- follicular carcinoma
 - medullary carcinoma
 - lymphadenoid goitre
 - Reidel's struma
 - primary thyrotoxicosis.

- 13 Urinary hydroxyproline excretion may be increased in
- Paget's disease of bone
 - Cushing's syndrome
 - hypopituitarism in children
 - hyperthyroidism
 - extensive fractures.
- 14 The following bacteria are commonly found in infected wounds following colonic operations
- Escherichia coli*
 - Neisseriae meningitidis*
 - Streptococcus pyogenes*
 - Streptococcus faecalis*
 - Bacteroides fragilis*.
- 15 Gall stones are associated with the following diseases:
- viral hepatitis
 - cirrhosis of the liver
 - haemolytic jaundice
 - obesity
 - raised serum triglycerides.
- 16 Antibiotics which inhibit the synthesis of mucopeptide in the wall of a bacterium include:
- cycloserine
 - cephalosporins
 - neomycin
 - penicillin and its semisynthetic derivatives
 - erythromycin.
- 17 Severe pyloric stenosis is accompanied by the following biochemical changes:
- a fall in the effective blood volume
 - a fall in the concentration of plasma sodium
 - a rise in $p\text{CO}_2$
 - hypotonic urine
 - hyperkalaemia.
- 18 Secondary amyloidosis occurs in the following conditions:
- familial Mediterranean fever
 - thalassaemia
 - sickle-cell disease
 - multiple myeloma
 - rheumatoid arthritis.

- 19 Increased amounts of erythropoietin are found in the plasma:
- a) in pernicious anaemia
 - b) in iron deficiency anaemia
 - c) following bleeding
 - d) in erythroblastosis foetalis
 - e) in kwashiorkor.
- 20 *Streptococcus faecalis*:
- a) is a common inhabitant of the gastrointestinal tract
 - b) grows in long chains
 - c) flourishes in bile-salt lactose media
 - d) is concerned in the aetiology of periodontal disease
 - e) is an opportunistic rather than a true pathogen.
- 21 The incidence of tumours is increased in:
- a) sarcoidosis
 - b) Wiskott-Aldrich syndrome
 - c) ataxia telangiectasis
 - d) patients treated over long periods with corticosteroids
 - e) patients receiving azathioprine.
- 22 The 'doubling time' of a malignant tumour is affected by a number of factors including:
- a) tumour necrosis
 - b) exfoliation
 - c) the percentage of cells in the resting phase
 - d) the oxygen content of the tumour cells environment
 - e) nuclear size.
- 23 Idiopathic haemochromatosis is associated with:
- a) an excessive production of melanin
 - b) decreased absorption of iron from the gut
 - c) the deposition of haemosiderin in the liver
 - d) diabetes
 - e) females.
- 24 The following pathological conditions can be regarded as precancerous:
- a) Paget's disease of bone
 - b) leukoplakia
 - c) fibroadenosis of the breast
 - d) duodenal ulceration
 - e) cervical erosions.

- 25 Ischaemic necrosis is a recognised complication of fractures of the following bones:
- talus
 - calcaneum
 - scaphoid
 - pisiform
 - femoral head.
- 26 The incidence of postoperative infection can be reduced by the use of the following measures
- The use of negative pressure ventilation in the operating theatre.
 - The use of filtered air in the operating theatre, pore size 10 μ m.
 - Showering by the surgeon and all attendants prior to embarking upon the operation.
 - The administration of prophylactic antibiotics.
 - Disinfection of the patient's skin prior to operation.
- 27 Platelets contribute to haemostasis by liberating:
- 5-hydroxytryptamine (serotonin)
 - phospholipids
 - plasminogen
 - bradykinin
 - calcitonin.
- 28 Ionising radiation:
- increases DNA synthesis
 - increased H₂O₂ in the tissues
 - breaks disulphide bonds
 - causes atrophy of the seminiferous tubules of the testis
 - causes pathological fractures.
- 29 Primary hyperparathyroidism is associated with:
- bone cysts
 - carcinoma of the parathyroid glands
 - dystrophic calcification
 - hypertension
 - anorexia.
- 30 The following conditions are associated with a polyclonal gammopathy:
- Waldenström's macroglobulinaemia
 - rheumatoid arthritis
 - Down's syndrome
 - Wiskott-Aldrich syndrome
 - cirrhosis of the liver.

- 31 Hyperkalaemia commonly occurs:
- a) following severe burns
 - b) in Conn's syndrome
 - c) following glomerular necrosis
 - d) in the Zollinger-Ellison syndrome
 - e) in the carcinoid syndrome.
- 32 Blood which is to be used for transfusion:
- a) should be stored at -4°C
 - b) may need to be irradiated (1000r)
 - c) needs to be tested for complement content
 - d) may be used after storage for platelet replacement
 - e) should be stored in an acid anticoagulant.
- 33 An immediate reaction to a blood transfusion may be caused by the following:
- a) hypercalcaemia
 - b) air embolus
 - c) bacterial endotoxins
 - d) anaphylaxis
 - e) hypokalaemia.
- 34 Ionising radiation:
- a) does not affect the eyes
 - b) affects renal function
 - c) does not affect the lungs
 - d) affects the brain
 - e) does not affect the skin.
- 35 The chief pathological and physiological changes in 'shock lung' include:
- a) intra-alveolar oedema and extravasation of erythrocytes into the alveoli
 - b) increased pulmonary compliance
 - c) infection
 - d) alkalosis
 - e) patchy opacities on the plain X-ray of the chest.
- 36 Autosomal dominant diseases that are important to surgeons include:
- a) hereditary spherocytosis
 - b) haemophilia
 - c) Von Recklinghausen's disease
 - d) familial agammaglobulinaemia
 - e) mucoviscidosis.

END OF PATHOLOGY QUESTIONS

ANATOMY

ANSWERS TP QUESTIONS 1 TO 61

1. During development of the midgut: **A,D,E**
2. The right colic flexure (hepatic flexure): **A,B**
3. Concerning mesenteries and other peritoneal folds **A,D**
4. During a muscle splitting incision in the right iliac fossa for an appendicectomy the following structures will always be encountered **A,C,E**
5. The thymus: **D,E**
6. The oesophageal opening in the diaphragm: **A,B**
7. During its course through the thorax the right vagus nerve: **A,D,E**
8. During thyroidectomy **A,B,C,E**
9. If the ulnar nerve is damaged behind the medial epicondyle: **A,B,D,E**
10. A needle and catheter used for supraclavicular approach to the **left** subclavian vein: **A,B**
11. In a transverse lower abdominal incision for access to the pelvis (Pfannenstiel's incision): **A,D**
12. Ligaments or peritoneal folds having an attachment to the ovary include: **E**
13. The gall bladder: **A,D**
14. During surgical removal of a **left** submandibular gland: **B,D**
15. Posterior relations of the rectum include: **C,D**
16. The prostatic part of the urethra: **Nil**
17. During surgical exposure of the right kidney through the lumbar approach below the twelfth rib, structures exposed may include: **A,C,D,E**
18. During a barium swallow, the following statements about the oesophagus are true: **B,C,E**
19. The sympathetic nervous system supplies: **A,C,D**
20. During an axillary clearance for axillary lymph nodes the following structures could be damaged: **A,C**
21. During a rectal examination the following structures may be palpated: **B,D,E**

22. The left coronary artery: **A,C**
23. If the median nerve is cut just above the wrist **B,C**
24. In the posterior mediastinum **B,E**
25. During the exposure of the femoral artery the following statements are true **C,D,E**
26. Each of the following correctly describes the common bile duct EXCEPT: **E**
27. In the popliteal fossa **A,C,D**
28. Damage to the lower trunk of the brachial plexus will result in the following clinical features: **A,C,E**
29. The inguinal canal in the female: **A,C,D**
30. The following structures are derived from the midgut **A,C,D**
31. The right atrium: **A**
32. The right ventricle: **A,C,E**
33. The mitral valve: **A,C,E**
34. The coronary arteries: **B,C,D,E**
35. The arch of the aorta: **B,D,E**
36. The azygos vein: **A,D**
37. The left phrenic nerve: **C**
38. The right vagus nerve during its course in the thorax: **A,C,D**
39. The gastric nerves: **A,C,D,E**
40. The thoracic oesophagus: **A,C,E**
41. The abdominal oesophagus: **C,D**
42. The stomach: **A,B,E**
43. The caecum: **A,C,E**
44. The sigmoid colon: **A,D,E**
45. The inferior mesenteric artery: **A,C,E**
46. The liver: **A,B,D,E**
47. The pancreas: **B,C,D,E**

48. The left kidney: **A,B,C,E**
49. The ureters: **B,C,D,E**
50. The pudendal nerve: **B,C,D,E**
51. The common iliac arteries: **B,D**
52. The cisterna chyli: **B,C,D**
53. The scapula has a: **A,D,E**
54. In the humerus the: **B**
55. An injury of the lateral spinothalamic tract would be expected to result in loss of pain and temperature sensation: **B**
56. Which one of these peritoneal ligaments is incorrectly matched with the blood vessel it contains? **C**
57. The musculocutaneous nerve: **B,C,D**
58. The radial nerve: **A,B,C**
59. The ulnar nerve: **A,D**
60. The ulna: **A,C,D**
61. The proximal radio-ulnar joint: **B,D**

END OF ANATOMY ANSWERS

PHYSIOLOGY**ANSWERS TO QUESTIONS 1 TO 37**

1. Blood group antigens (agglutinogens) are: **D**
2. A person with group A blood: **A,C,E**
3. Blood platelets assist in arresting bleeding by: **A,B,D**
4. Plasma bilirubin: **C,E**
5. Circulating red blood cells: **B,E**
6. Normal blood clotting requires: **C,D**
7. The conversion of fibrinogen to fibrin: **B,C,D**
8. In investigating a patient's acid-base status **C,D**
9. Sodium depletion differs from sodium retention in that it causes a reduction in: **A,E**
10. Sodium depletion differs from water depletion in that: **B**
11. Myocardial blood flow to the left ventricle increases during: **B,C,D,E**
12. The pressure: **A,C,E**
13. Pulmonary vascular resistance is: **A,D**
14. Ventricular filling: **C,E**
15. Veins: **A,B,D,E**
16. In an adult subject standing quietly at rest, venous pressure in the: **A,B,D,E**
17. The velocity of blood flow: **B,C,D**
18. In the brachial artery: **D**
19. With increasing distance from the heart, arterial: **A,D**
20. In a person breathing normally at rest with an environmental temperature of 25°C, the partial pressure of: **C,D,E**
21. The carotid bodies: **C,D,E**
22. As people age, there is usually a decrease in their: **B,D,E**
23. In normal lungs **B,C,D,E**

24. Alveolar ventilation is increased by breathing: **C,E**
25. Compliance of the lungs is greater **B,C,D,E**
26. At a high altitude where atmospheric pressure is halved, there is an increase in: **A,D**
27. A rise in arterial PCO₂ leads to an increase in: **A,B,C,D,E**
28. Ventilation is increased during: **A,B**
29. A diver breathing air at a depth of 30 m under water: **A,B**
30. Intestinal secretions contain: **C,E**
31. In sensory receptors: **A**
32. Sympathetic: **A,E**
33. Nerve fibres continue to conduct impulses when: **C,E**
34. In fluid in the distal part of the proximal convoluted tubule: **A,E**
35. The proximal convoluted tubules: **A,B,C**
36. Aldosterone: **C,E**
37. Secretion of renin: **C,D**

END OF PHYSIOLOGY ANSWERS

PATHOLOGY**ANSWERS TO QUESTIONS 1 TO 36**

- | | | |
|----|---|----------------|
| 1 | Patients with moderate to severe anaemia have a reduced: | E |
| 2 | Iron deficiency: | A |
| 3 | Vitamin B ₁₂ deficiency may: | A,D,E |
| 4 | A patient with partly compensated respiratory acidosis: | A,C,D,E |
| 5 | Deficiency of factor VIII (antihæmophilic globulin): | Nil |
| 6 | A raised level of calcium in the blood (hypercalcaemia): | E |
| 7 | Haemoglobinuria occurs: | A,E |
| 8 | The blood urea is elevated in the following conditions | A,C,E |
| 9 | The metabolic effects following a severe injury include: | A,B,C |
| 10 | Post operative infection delays wound healing because | C |
| 11 | The Zollinger-Ellison syndrome is associated with | B,C,D |
| 12 | Abnormal aggregation of lymphocytes occurs in the thyroid in the following pathological conditions: | C,E |
| 13 | Urinary hydroxyproline excretion may be increased in | A,D,E |
| 14 | The following bacteria are commonly found in infected wounds following colonic operations | A,C,D,E |
| 15 | Gall stones are associated with the following diseases: | C,D,E |
| 16 | Antibiotics which inhibit the synthesis of mucopeptide in the wall of a bacterium include: | A,B,D |
| 17 | Severe pyloric stenosis is accompanied by the following biochemical changes: | A,C |
| 18 | Secondary amyloidosis occurs in the following conditions: | A,D,E |
| 19 | Increased amounts of erythropoietin are found in the plasma: | A,B,C,D |
| 20 | Streptococcus faecalis: | A,C,D,E |
| 21 | The incidence of tumours is increased in: | B,C,E |
| 22 | The 'doubling time' of a malignant tumour is affected by a number of factors including: | A,B,C,D |

- 23 Idiopathic haemochromatosis is associated with: **A,C,D**
- 24 The following pathological conditions can be regarded as precancerous: **A, B**
- 25 Ischaemic necrosis is a recognised complication of fractures of the following bones: **A, C, E**
- 26 The incidence of postoperative infection can be reduced by the use of the following measures **D,E**
- 27 Platelets contribute to haemostasis by liberating: **A,B**
- 28 Ionising radiation: **B,D,E**
- 29 Primary hyperparathyroidism is associated with: **A,B,D,E**
- 30 The following conditions are associated with a polyclonal gammopathy: **B,E**
- 31 Hyperkalaemia commonly occurs: **A,C**
- 32 Blood which is to be used for transfusion: **B,E**
- 33 An immediate reaction to a blood transfusion may be caused by the following: **A,C,D**
- 34 Ionising radiation: **B,D**
- 35 The chief pathological and physiological changes in 'shock lung' include: **A,C,E**
- 36 Autosomal dominant diseases that are important to surgeons include: **A,C**

END OF PATHOLOGY ANSWERS