

# PTS Phase 1 Mock SBA 2023

## Paper 1 – [Questions]



### Examiner Instructions:

- Time allocated for examination: 2 hours.
- You are **not permitted** to leave the examination hall in the first 90 minutes and last 10 minutes.
- You are permitted to use a Sheffield University approved calculator should you wish.
- The use of mobile phones or other electronic devices is **strictly prohibited** in this exam and should be handed in or switched off for the duration of the exam.
- Please complete all 90 questions
- The paper consists of 90 marks total.

### Disclaimer:

The following paper has been written **for students by students** and bears no reflection on the real exam. This is a learning tool that has not been reviewed by the University of Sheffield and therefore the use of this paper for learning are at the student's discretion.

### Chief Exam Editor:

**Raneem Alhalabi**

### **Any questions:**

[ralhalabi1@sheffield.ac.uk](mailto:ralhalabi1@sheffield.ac.uk)

[peerteaching@sheffield.ac.uk](mailto:peerteaching@sheffield.ac.uk)

1. Which one of these organs are NOT retroperitoneal?
  - A- Kidneys
  - B- Transverse Colon
  - C- Oesophagus
  - D- Ureters
  - E- Rectum
  
2. Which of the following cell types are not present in bone?
  - A- Macrophage
  - B- Osteoclast
  - C- Osteocloid
  - D- Osteoblast
  - E- Osteocyte
  
3. Cardiac output is.....
  - A-Mean blood pressure \* systemic resistance
  - B-Mean blood pressure \* stroke volume
  - C-Heart rate \* mean blood pressure
  - D-Heart rate \* stroke volume
  - E-Stroke volume \* systemic resistance
  
4. Which artery most frequently supplies the AVN?
  - A- L coronary artery
  - B-R coronary artery
  - C-L circumflex artery
  - D-Posterior descending artery
  - E-LAD
  
5. Which of the following tracts provides pain, pin prick, and temperature sensation?
  - A- Spinocerebellar
  - B- Corticospinal
  - C- Dorsal Column medial pathway
  - D- Rubrospinal
  - E- Spinothalamic

6. Which of the following does not form part of the fallopian tubes?
- A - Fimbriae
  - B - Infundibulum
  - C - Fundus
  - D - Ampulla
  - E - Isthmus
7. Which layer of the skin prevents dehydration?
- A - Dermis
  - B - Stratum spinosum
  - C - Stratum basale
  - D - Stratum granulosum
  - E - Stratum corneum
8. During phase 3 of ventricular cardiomyocyte action potential, the cells repolarise. Which of the following best explains how this repolarisation occurs?
- A - Influx of K<sup>+</sup> ions
  - B - Efflux of K<sup>+</sup> ions
  - C - Influx of Na<sup>+</sup> ions
  - D - Influx of Ca<sup>2+</sup> ions
  - E - Efflux of Na<sup>+</sup> ions
9. Which adrenoreceptor is most sensitive to adrenaline compared to noradrenaline?
- A -  $\alpha$ 1 receptor
  - B -  $\alpha$ 2 receptor
  - C -  $\beta$ 1 receptor
  - D -  $\beta$ 2 receptor
  - E -  $\beta$ 3 receptor
10. Where does capacitation occur in spermatogenesis?
- A - Seminiferous tubule
  - B - Epididymis
  - C - Rete testis
  - D - Female reproductive tract
  - E - Sertoli cells

11. Which coagulation factors are vitamin K dependent?
- A - Factors II, VII, X and XII
  - B - Factors V, VIII, XI AND XII
  - C - Factors II, VII, IX and X
  - D - Factors I, IX, XI and XII
  - E - Factors III, IV, VIII and X
12. Which artery does the right gastric artery arise from?
- A - Common hepatic artery
  - B - Proper hepatic artery
  - C - Splenic artery
  - D - Abdominal aorta
  - E - Gastroduodenal artery
13. Which these muscles is NOT in the rotator cuff?
- A- Subscapularis
  - B- Infraspinatus
  - C- Teres major
  - D- Teres minor
  - E- Supraspinatus
14. Which cell in the stomach secretes pepsinogen?
- A- Goblet cells
  - B- D cells
  - C- G cells
  - D- Parietal cells
  - E- Chief cells
15. Where does fertilisation usually occur in the Fallopian tubes?
- A- Isthmus
  - B- Infundibulum
  - C- Perineum
  - D- Fimbriae
  - E- Ampulla
16. What two structures does the ductus venosus connect in the fetus?
- A. IVC and the portal vein
  - B. Aorta and the IVC
  - C. IVC and the umbilical vein
  - D. Umbilical vein and aorta
  - E. Umbilical artery and portal vein

17. Within 3 weeks of birth, what does the ductus arteriosus turn into?

- A. Ligamentum arteriosum
- B. Fossa ovalis
- C. Foramen ovale
- D. Ligamentum venosum
- E. Bulbus cordis

18. What activates the renin-angiotensin-aldosterone system?

- A. Low blood pressure
- B. High blood pressure
- C. High sodium
- D. Low glucose
- E. Glucagon

19. What is not an effect of cholecystokinin?

- A. It causes gallbladder contraction.
- B. It inhibits gastric emptying.
- C. Increases pancreatic enzyme secretion
- D. Increases the rate of gastric emptying
- E. Decreases pancreatic enzyme secretion

20. What type of epithelium is the ectocervix covered by?

- A. Transitional epithelium
- B. Stratified squamous non-keratinised epithelium
- C. Stratified columnar keratinised epithelium
- D. Stratified squamous keratinised epithelium
- E. Simple columnar kertainised epithelium

21. In which area is a lumbar puncture performed?

- A. Subarachnoid space
- B. Nucleus pulposus
- C. Intervertebral disc
- D. Extradural space
- E. Intraventricular space

**22. What nerve supplies the pericardium?**

- A. Trigeminal nerve**
- B. Phrenic nerve**
- C. Laryngeal nerve**
- D. Sacral plexus**
- E. Intercostal nerve**

**23. Which statement about peristalsis is true?**

- A. Peristalsis only occurs in the stomach and small intestine**
- B. Peristalsis is a voluntary muscle movement**
- C. Longitudinal muscles propels the food bolus through the oesophagus**
- D. Circular smooth muscle contracts in front of the food bolus**
- E. Chyme turns into bolus**

**24. Which blood vessels supplies approximately 1/3rd of the blood supply to the liver?**

- A. Hepatic artery proper**
- B. Hepatic portal vein**
- C. Inferior phrenic artery**
- D. Superior mesenteric artery**
- E. Inferior mesenteric artery**

**25. Which structure forms the lateral border of the femoral triangle?**

- A. Inguinal ligament**
- B. Adductor longus**
- C. Femoral nerve**
- D. Femoral canal**
- E. Sartorius**

**26. Collagen is an abundant structural protein found in the body. Which type of collagen is found in the basement membrane?**

- A. Type I**
- B. Type II**
- C. Type III**
- D. Type IV**
- E. Type V**

**27. What is the main blood supply to the foregut?**

- A. Superior mesenteric artery**
- B. Coeliac trunk**
- C. Renal artery**
- D. Inferior mesenteric artery**
- E. Femoral artery**

**28. A 52 year old man has a suspected brain tumour. He is experiencing vision loss in his temporal visual fields. Where is the most likely site of damage?**

- A. Optic tract**
- B. Right Meyer's loop**
- C. Optic chiasm**
- D. Right Baum's loop**
- E. Left Baum's loop**

**29. The stomach mucosa contains different cell types with different functions and secretions. Which cells in the stomach mucosa release somatostatin?**

- a) Chief cells**
- b) D cells**
- c) Enterochromaffin-like cells**
- d) G cells**
- e) Parietal cells**

**30. Which of the following structures does not pass through the cavernous sinus?**

- A. Oculomotor nerve**
- B. Abducens nerve**
- C. Trochlear nerve**
- D. Trigeminal nerve V3**
- E. Trigeminal nerve V2**

**31. What is the function of the medial golgi body?**

- A) Synthesis of proteins**
- B) Protein phosphorylation**
- C) Proteolysis of peptides and sorting molecules into vesicles**
- D) Modifies products by adding sugars forming oligosaccharides**
- E) Synthesis of lipids**

**32. What is a desmosome?**

- A) Seals neighbouring cells together in an epithelial sheet**
- B) Joins an actin bundles in one cell to an actin bundle in a neighbouring cell**
- C) Anchor intermediate filaments in a cell to the basal lamina**
- D) Joins intermediate filaments in one cell to those in a neighbouring cell**
- E) Joins the actin filaments of one cell to the intermediate filaments of another cell**

**33. Which step is rate limiting in glycolysis?**

- A) Phosphoenol pyruvate to pyruvate**
- B) Glucose to glucose-6-phosphate**
- C) Fructose-6-phosphate to fructose-1,6-bisphosphate**
- D) 3-phosphoglucerate to 2-phosphoglycerate**
- E) Fructose-1,6-bisphosphate to glyceraldehyde-3-phosphate**

**34. Which is the blood and nerve supply to the foregut?**

- A. Coeliac trunk, greater splanchnic T5-T9**
- B. Coeliac trunk, greater splanchnic T6-T10**
- C. Coeliac trunk, lesser splanchnic nerve T6-T11**
- D. SMA, lesser splanchnic nerve T10-T11**
- E. IMA. Least splanchnic nerve T12**



**35. Which ion causes depolarisation in the pacemaker cells of the heart?**

- A) Na<sup>+</sup>
- B) K<sup>+</sup>
- C) Cl<sup>-</sup>
- D) Ca<sup>2+</sup>
- E) I<sup>-</sup>

**36. Which nerve supplies sensation in the frontal sinuses?**

- A) Trigeminal nerve
- B) Oculomotor nerve
- C) Trochlear nerve
- D) Ophthalmic division of the trigeminal nerve
- E) Maxillary division of the trigeminal nerve

**37. What is the correct definition for Vital capacity?**

- A) Maximum volume of air the lungs can contain
- B) Volume of air in excess tidal inspiration that can be inhaled with maximum effort
- C) Volume of air that can be exhaled with maximum effort after maximum inspiration
- D) Volume of air that can be inhaled or exhaled in one breath
- E) Volume of air that can be exhaled with maximum effort after tidal inspiration

**38. Which of the following statements regarding bilirubin metabolism is false?**

- A) Reticuloendothelial cells metabolise haemoglobin
- B) Urobilinogen is oxidised into urobilin in the kidneys, then excreted into the urine
- C) Biliverdin is reduced to create unconjugated bilirubin
- D) Around 20% of urobilinogen is reabsorbed into the bloodstream as part of enterohepatic circulation
- E) Bilirubin is converted into urobilinogen in the liver

39. Which of these is not part of the ureteric bud?

- A) Ureter
- B) Nephrons
- C) Renal pelvis
- D) Major and minor calyces
- E) Collecting tubules

40. Which of the following statements regarding water distribution in an average 70kg male is true?

- A) Intracellular fluid equals 14 litres
- B) Interstitial fluid equals 3 litres
- C) Plasma equals 11 litres
- D) Extracellular fluid equals 14 litres
- E) Total body water equals 28 litres

41. Which of these is not a feature of the small bowel?

- A) Contains plicae circulares
- B) Has villi
- C) Has no taenia coli
- D) Has epiploic
- E) Has simple columnar epithelium

42. What exits through the foramen spinosum?

- A) Maxillary branch of trigeminal nerve
- B) Internal carotid artery
- C) Mandibular branch of trigeminal nerve
- D) Middle meningeal artery
- E) Lacrimal nerve

43. Which bone in the wrist is most commonly fractured?

- A) Hamate

- B) Scaphoid
- C) Trapezium
- D) Capitate
- E) Trapezoid

44. What is Barrett's metaplasia?

- A) Stratified squamous to simple columnar
- B) Simple squamous to stratified columnar
- C) Stratified squamous to stratified columnar
- D) Simple squamous to simple cuboidal

45. How much protein would a 70kg man need in a day?

- A) 1050g
- B) 560g
- C) 35g
- D) 56g
- E) 700g

46. What is the rate limiting enzyme of the Krebs cycle?

- A) Citrate synthase
- B) Malate dehydrogenase
- C) Succinyl-CoA synthetase
- D) Isocitrate dehydrogenase
- E) Succinate dehydrogenase

47. A patient comes in struggling to breath. They have an ABG done which shows a pH of 7.25, a low PaO<sub>2</sub>, a high PaCO<sub>2</sub> and a high bicarbonate. What is wrong with this patient?

- A) Partially compensated metabolic alkalosis
- B) Type 1 respiratory failure
- C) Fully compensated respiratory acidosis
- D) Uncompensated respiratory acidosis
- E) Partially compensated respiratory acidosis

48. What is not a function of angiotensin II?

- A) Increases blood pressure
- B) Increases aldosterone release

- C) Increases sodium retention
- D) Increases potassium retention
- E) Increases water retention

49. What is not an action of PTH?

- A) Increases osteoclast activity
- B) Increases phosphate excretion
- C) Increases osteoblast activity
- D) Increases 1-alpha hydroxylation of 25-OH vitamin D
- E) Increases calcium reabsorption in the small intestine

50. Which of the following cranial nerves does not contain parasympathetic fibres?

- A) III
- B) XII
- C) VII
- D) X
- E) IX

51. Which of these does not decreased metabolism?

- A. Increasing age
- B. Hyperthyroidism
- C. Female compared to male
- D. Hypothyroidism
- E. Starvation

52. What enzyme is inhibited by NSAIDs in the formation of peptic ulcers?

- A) Cyclo-oxygenase
- B) Pepsin
- C) Mono-oxygenase
- D) Endothelin converting enzyme 1
- E) Phospholipase A2

53. What enzyme splits DNA strands apart in the process of DNA replication?

- A) Ligase
- B) Primase
- C) DNA polymerase

- D) Endonucleases
- E) Helicase

54. What vessel does the left testicular vein drain into?

- A) Inferior Vena Cava
- B) Left Femoral vein
- C) Pampiniform plexus
- D) Left Renal Vein
- E) Internal Iliac Vein

55. How many calories are there in one unit of alcohol?

- A) 48 kcal
- B) 52 kcal
- C) 56 kcal
- D) 64 kcal
- E) 70 kcal

56. A 79 year woman is admitted to A & E. She is found to be severely dehydrated. Which of the below is the correct distribution of fluid in the body?

- a) 28L intracellular, 10L transcellular, 1L interstitial, 3L plasma
- b) 28L intracellular, 1L transcellular, 10L interstitial, 3L plasma
- c) 28L intracellular, 10L transcellular, 3L interstitial, 1L plasma
- d) 28L intracellular, 1L transcellular, 3L interstitial, 10L plasma
- e) 10L intracellular, 3L transcellular, 28L interstitial, 1L plasma

57. Which of the following tracts would have sensory pathology contralaterally 1-2 levels below the lesion?

- A. DCML – cuneatus
- B. DCML – gracilis
- C. Spinothalamic
- D. Corticospinal
- E. Corticobulbar

**58. An analysis of the sensitivity and specificity of COVID-19 tests is carried out. What is the sensitivity of a test?**

- a) A test of the probability of a person with the disease obtaining a positive test result**
- b) A test of the probability of a person without the disease testing negative**
- c) The proportion of people with a positive test result who actually have the disease**
- d) The proportion of people without the disease who are correctly excluded by the test**
- e) Number of existing cases at a particular point in time**

**59. A baby boy is born prematurely at 30 weeks. His parents are worried about his lung development. At what stage of embryonic development do the primitive alveoli begin to form**

- a) 4-5 weeks**
- b) 5-16 weeks**
- c) 16-26 weeks**
- d) From 26 weeks**
- e) From 34 weeks**

**60. A 42 year old woman attends A&E with severe pain in her right upper quadrant. After investigation of her biliary tract and gall bladder she is diagnosed with gallstones.**

**What type of epithelium lines the gallbladder?**

- a) Simple columnar**
- b) Simple columnar with poorly developed brush border**
- c) Simple squamous**
- d) Pseudostratified columnar with goblet cells**
- e) Simple columnar with crypts**

**61. A 34 year old lady is being seen by her general practitioner. She complains of weight gain, increased appetite and feeling cold all the time. She has thyroid function test which reveal she has hypothyroidism.**

**What is the name given to the structure that unites the right and left lobes of the thyroid?**

- a) Follicle**
- b) Thyroid tree**

- c) Larynx
- d) Isthmus
- e) Parathyroid

62. A 29-year-old man and his partner have been referred to a fertility clinic. Investigations find it is most likely a male factor due to a blockage in the sperm pathway. Where do the sperm travel to after passing through the epididymis?

- a) Seminiferous tubules
- b) Vas deferens
- c) Ejaculatory duct
- d) Urethra
- e) Penile urethra

63. A 28 year old woman is on the labour ward about to give birth to her first child, after 35 weeks in utero.

Which of the following embryonic germ layers is correctly matched up to a structure it will become?

- a. Endoderm + sweat glands
- b. Endoderm + urogenital system
- c. Mesoderm + the muscular walls of the bowel
- d. Ectoderm + thyroid gland
- e. Ectoderm + liver

64. Which of the following is NOT a common determining factor of glomerular filtration rate?

- A. Size of the molecule
- B. Pressure gradients
- C. Rate of blood flow
- D. Blood CO<sub>2</sub> levels
- E. Binding to plasma proteins

65. Which of the following causes an increase in insertion of aquaporin 2 in collecting duct, increasing water retention?

- A. Angiotensin 2
- B. Vasopressin
- C. Aldosterone
- D. Parathyroid hormone
- E. Atrial Natriuretic Peptide

**66. Where is ACTH released?**

- A. Hypothalamus**
- B. Adrenal medulla**
- C. Thyroid gland**
- D. Adrenal cortex**
- E. Anterior pituitary**

**67. What is the average volume of air breathed in normal tidal volume?**

- A. 0.5L**
- B. 1L**
- C. 1.5L**
- D. 2L**
- E. 2.5L**

**68. What is alveolar dead space?**

- A. Volume of air remaining in lungs after quiet expiration**
- B. Volume of air remaining in lungs after maximum expiration**
- C. Volume breathed in from quiet expiration to maximum inspiration**
- D. Volume of air that never reaches alveoli and so never participates in respiration**
- E. Volume of air that reaches alveoli but never participates in respiration**

**69. What is respiratory epithelium?**

- A. Stratified cuboidal epithelium.**
- B. Simple ciliated columnar epithelium.**
- C. Pseudostratified ciliated columnar epithelium with interspersed goblet cells.**
- D. Pseudostratified squamous epithelium with interspersed goblet cells.**
- E. Stratified ciliated columnar epithelium with interspersed goblet cells.**



**70. Thinking about the heart, which is incorrect with regards to the parasympathetic nervous system?**

- A. It has a positive inotropic effect.**
- B. It has a negative chronotropic effect.**
- C. Acetylcholine acts on muscarinic receptors.**
- D. Less calcium enters the myocyte.**
- E. There is a decreased number of triggered action potentials.**

**71. Which clotting factor is not produced by the liver?**

- A. VII**
- B. X**
- C. V**
- D. II**
- E. VIII**

**72. Which of these is a characteristic symptom of depression?**

- A. Self-worth.**
- B. Loss of interest.**
- C. Sleeping a lot.**
- D. Eating more.**
- E. Hyperactivity.**

**73. Which of the following is not associated with movement of the vertebral column?**

- A. Splenius capitis.**
- B. Rotatores.**
- C. Longissimus.**
- D. Latissimus.**
- E. Spinalis.**

**74. In which lobe of the brain is Broca's area?**

- A. Parietal**
- B. Frontal**
- C. Occipital**
- D. Temporal**
- E. Vestibulocochlear**

**75. A pregnant woman with a history of Osteogenesis Imperfecta Type I has just given birth. Her baby was diagnosed antenatally with the same condition which causes a reduction in the amount of type I collagen produced. Which of the following is one of the main sites of type I collagen production?**

- a) Tendons**
- b) Hyaline cartilage**
- c) Reticular fibres**
- d) Basal lamina**
- e) Cell surfaces**

**75. What vertebral level is the Carina found at?**

- A. L1**
- B. C5**
- C. T2**
- D. T4**
- E. C7**

**76. What is the normal structure of adult Haemoglobin (HB)?**

- A. 2 Alpha Chains, 2 Gamma Chains**
- B. 2 Alpha Chains, 2 Beta Chains**
- C. 2 Beta Chains, 2 Gamma Chains**
- D. 3 Beta Chains, 1 Alpha Chain**
- E. 3 Alpha Chains, 1 Beta Chain**

77. Which hormone stimulates the release of LH and FSH from the anterior pituitary gland?

- A) CRH
- B) TSH
- C) ACTH
- D) GnRH
- E) Progesterone

78. What is the optimal blood pressure?

- A) 125/50
- B) 140/70
- C) 120/80
- D) 110/90
- E) 160/60

79. What type of inheritance is responsible in cystic fibrosis?

- A) X- linked
- B) Autosomal recessive
- C) Mutation
- D) Multi factorial
- E) Autosomal dominant

80. What does McBurney's point indicate the location of?

- A) Lungs
- B) Kidney
- C) Heart
- D) Appendix
- E) Small intestine

81. What is the function of topoisomerase enzymes?

- A) Preventing damage to the DNA
- B) Assisting mRNA leaving the nucleus
- C) Relieving supercoiling
- D) Breaking hydrogen bonds
- E) Aiding ribosomes

**82. What is the function of tight junctions?**

- A) Binds cells together to prevent leakage of molecules in between them.**
- B) Conduct electrical signals**
- C) Attach cells via the intermediate filaments**
- D) Transports and stores materials. These are membrane-bound organelles**
- E) Regulates the movement of ions**

**83. How much energy do lipids provide?**

- A) 4kcal/g**
- B) 9 kcal/g**
- C) 7kcal/g**
- D) 3 kcal/g**
- E) 2 kcal/g**

**84. Which of these is karyotype of Turners syndrome?**

- A) 40, Y**
- B) 45, X Y**
- C) 45, X**
- D) 46, X Y**
- E) 46, X X**

**85. Where is angiotensin produced?**

- A) Kidney**
- B) Spleen**
- C) Liver**
- D) Stomach**
- E) Pancreas**

**86. At what spinal level is the transpyloric plane located?**

- A) L1**
- B) T2**
- C) L4**
- D) T12**
- E) C7**

**87. What are chondrocytes?**

- A) Cells that secrete extracellular matrix components of bone**
- B) Cells that secrete extracellular matrix components of cartilage**
- C) Cells that are star-shaped, regulate blood flow and can phagocytose synapses**
- D) Cells that secrete extracellular matrix components of collagen and elastin**
- E) Cells that line the sinusoids of the liver and are involved in the breakdown of red blood cells**

**88. What term is used to describe 'the increase in the size of a tissue due to an increase in the number of cells'**

- A) Atrophy**
- B) Hypertrophy**
- C) Dysplasia**
- D) Hyperplasia**
- E) Metaplasia**

**89. How many essential amino acids are there?**

- A) 20**
- B) 7**
- C) 12**
- D) 9**
- E) 3**

**90. Mr X is a 15-year-old boy who has just been diagnosed with a coagulopathy. Which of the following is the clotting factor involved in the common blood coagulation pathway that converts prothrombin into thrombin?**

- a) Factor I**
- b) Factor II**
- c) Factor IIa**
- d) Factor X**
- e) Factor Xa**

