1. Rhythmic contraction of the primitive heart tube commences on day

A. 19
B. 22
C. 30
D. 28
E. 16

2. Dextrocardia results from:

A. Failure of fusion of the primary heart fields
B. Failure of fusion of the secondary heart fields
C. Abnormal looping of the heart tube
D. Abnormal lateral body folding
E. None of the above

3. Endocardial cushions contribute to the formation of all EXCEPT:

D. Abnormal lateral body folding
E. None of the above

3. Endocardial cushions contribute to the formation of all EXCEPT:

A. Membranous portion of interventricular cushion
B. Right atrioventricular valve
C. Semilunar valves
D. Septum primum
E. Septation of truncus arteriosus

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4. Fallot's tetralogy consists of the following EXCEPT:

   A. Overriding aorta
   B. Left ventricular hypertrophy
   C. Pulmonary stenosis
   D. Right ventricular hypertrophy
   E. Ventricular septal defect

5. Cardiogenic precursors originate from the:

   A. Primitive node
   B. Middle third of the primitive streak
   C. Lower half of primitive streak
   D. Lower third of primitive streak
   E. Upper third of primitive streak

A. Primitive node
B. Middle third of the primitive streak
C. Lower half of primitive streak
D. Lower third of primitive streak
E. Upper third of primitive streak

6. All components in the wall of the respiratory tract listed below decrease in amount from the trachea to the alveoli EXCEPT:

A. Cartilage
B. Ciliated cells
C. Elastic fibres
D. Goblet cells
E. Mixed glands

7. Olfactory epithelium differs from respiratory epithelium in which of the following ways?

B. Absence of goblet cells
C. Presence of basal cells
D. Presence of tall columnar cells
E. Very thin basement membrane

8. What do swell bodies do? They:

A. Increase surface area for filtering inspired air
B. Occlude nasal cavities intermittently to prevent desiccation of respiratory epithelium
C. Occlude nasal cavities to prevent massive invasion by microorganisms
D. Warm inspired air
E. All of the above

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9. The secondary bronchus differs from the trachea in which of the following ways?

A. A complete ring of hyaline cartilage
B. A less amount of smooth muscle
C. The presence of pseudostratified columnar epithelium
D. The presence of mixed glands
E. The presence of dust cells

10. The components of blood-air barrier include the following EXCEPT:

A. Alveolar epithelium
B. Capillary endothelium
C. Fused basements of endothelial and alveolar cells
D. Interstitium

11. Type II pneumocytes:

A. Are not capable of cell division
B. Contain very few organelles
C. Have no microvilli
D. Have numerous microvilli enough to form a brush border
E. Occupy only 5-10% of the alveolar surface

12. Which of these vessels in the early circulatory system does not develop from vasculogenesis?

A. Dorsal aortae
B. Aortic arches
C. Vitelline arteries
D. Umbilical arteries
E. Endothelial heart tube

13. The arch of aorta develops from:

B. Aortic arches
C. Vitelline arteries
D. Umbilical arteries
E. Endothelial heart tube

13. The arch of aorta develops from:

A. Second right aortic arch artery
B. Aortic sac and left 4th aortic arch artery
C. Fused portion of right and left dorsal aortae
D. 4th right aortic arch artery
E. 6th left aortic arch artery

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14. In the adult humans there is an asymmetry in the positions of the right and left recurrent laryngeal nerves. Which of these regarding the development of blood vessels is responsible for this asymmetry?

A. Looping of the nerve around the most caudal aortic arch on each side
B. Looping of the nerve around the dorsal aortae
C. The descent of the heart
D. The development of cardinal veins
E. Looping of the nerve around the umbilical vein

15. Superior vena cava develops from which of these embryonic veins?

A. Looping of the nerve around the most caudal aortic arch on each side
B. Looping of the nerve around the dorsal aortae
C. The descent of the heart
D. The development of cardinal veins
E. Looping of the nerve around the umbilical vein

15. Superior vena cava develops from which of these embryonic veins?

A. Left anterior cardinal veins
B. Right posterior cardinal vein
C. Left posterior cardinal vein
★ Right anterior cardinal vein
E. Subcardinal veins

16. Which of these statements concerning the mediastinum is TRUE?

A. It is the space between the two pleural layers.
B. An imaginary line through the manubriosternal joint divides it into superior and

A. It is the space between the two pleural layers.
B. An imaginary line through the manubriosternal joint divides it into superior and inferior halves
C. It contains the lungs and the pericardium
D. The heart is located in its anterior half
E. The thyroid gland is the only endocrine gland located in it.

17. Which of these paired features are most palpable on the sternum and also serve as useful clinical landmarks?

A. Sternal angle and manubrium
B. Jugular notch and sternal angle
C. Jugular notch and manubrium
D. Xiphoid process and manubrium
E. Manubrium and body

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18. In a surgical operation involving the heart, in which of the following compartments of the thorax are you most likely to find the thymus if you intend to ligate and spare it in your manoeuvres?

A. Inferior mediastinum
B. Posterior mediastinum
C. Middle mediastinum
D. Anterior mediastinum
E. None of the above

19. In the posterior mediastinum, all the following structures may be important in the spread of infections EXCEPT:

A. Oesophagus
B. Thymus
C. Azygous vein

19. In the posterior mediastinum, all the following structures may be important in the spread of infections EXCEPT:

A. Oesophagus
B. Thymus
C. Azygous vein
D. Hemiazygous vein
E. Thoracic duct

20. The only somatic nerve most likely to be damaged during surgical operations involving the middle mediastinum is:

A. Vagus
B. Sympathetic trunk
C. Phrenic
D. Right recurrent laryngeal
E. Intercostobrachial

21. Which of these events is most likely to be taking place during the alveolar stage of the

A. Vagus
B. Sympathetic trunk
C. Phrenic
D. Right recurrent laryngeal
E. Intercostobrachial

21. Which of these events is most likely to be taking place during the alveolar stage of the terminal sac period of the lung development?

A. Formation of respiratory bronchioles
B. Vascularisation of mesoderm with respiratory bronchioles
C. Formation of type I squamous cells in the respiratory bronchioles
D. Formation of type II squamous (surfactant-secreting) cells
E. Formation of terminal sacs in a craniocaudal progression

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22. In a surface anatomy of the anterior thoracic wall, this structure is likely to be used as a landmark to represent the horizontal fissure that separates the upper and middle lobes of the right lung:

A. Sternal angle (Angle of Louis)
B. Second costal cartilage
C. Fourth rib and its costal cartilage
D. Sixth rib and its costal cartilage
E. Transverse process of T7 vertebra

23. Identification of the first thoracic vertebra (T1) is useful in the approximation of the positions of thoracic viscera. Which one of these features on the T1 vertebra is the single

D. Sixth rib and its costal cartilage
E. Transverse process of T7 vertebra

23. Identification of the first thoracic vertebra (T1) is useful in the approximation of the positions of thoracic viscera. Which one of these features on the T1 vertebra is the single most useful feature in surface anatomy?

A. Presence of a single facet on the body
B. Presence of a demi-facet on the body
C. Possession of a thick pedicle and lamina
D. Possession of a long downward and backwardly pointing spinous process
E. Presence of a tubercle on the transverse process

24. During a recent Outreach Programme organised by the 'MOMIC' team of the medical students' association, a level 300 student examined a 28-year old construction worker and mentioned that the client's heart sounds strong and healthy. The client/patient asked from you to explain what creates the heart sounds. Which of the following explanations given by you to the patient concerning the first heart sound ("*lub*") is correct? That it

D. Possession of a long downward and backwardly pointing spinous process
E. Presence of a tubercle on the transverse process

24. During a recent Outreach Programme organised by the 'MOMIC' team of the medical students' association, a level 300 student examined a 28-year old construction worker and mentioned that the client's heart sounds strong and healthy. The client/patient asked from you to explain what creates the heart sounds. Which of the following explanations given by you to the patient concerning the first heart sound ("*lub*") is correct? That it (the first heart sound or "*lub*") is produced by the:

A. Closure of the tricuspid and pulmonary valves
B. Closure of the atrioventricular valves
C. Opening of the semilunar valves
D. Contraction of the ventricular walls
E. Turbulent flow through the valves

25. A rapidly growing malignancy originating from the bodies of the thoracic vertebrae is likely to spread to the following structures EXCEPT:

A. Closure of the tricuspid and pulmonary valves
B. Closure of the atrioventricular valves
C. Opening of the semilunar valves
D. Contraction of the ventricular walls
E. Turbulent flow through the valves

25. A rapidly growing malignancy originating from the bodies of the thoracic vertebrae is likely to spread to the following structures EXCEPT:

A. Azygous vein
B. Trachea
C. Sympathetic trunk
D. Thoracic duct
E. Right posterior intercostal artery

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26. During auscultation of the heart, which of the following relationships is most likely to be correct in a normal adult?

A. The left 4th intercostal space at the midaxillary line is the site for auscultation of the mitral valve
B. The left 2nd intercostal space at the sternal border is the site for auscultation of the aortic valve
C. The right 3rd intercostal space at the sternal border is the site for auscultation of the pulmonary valve
D. The right 2nd intercostal space at the sternal border is the site for auscultation of the aortic valve

pulmonary valve

D. The right 2nd intercostal space at the sternal border is the site for auscultation of the aortic valve

E. The right 4th intercostal space at the midclavicular line is the site for auscultation of the tricuspid valve

27. During a routine physical examination of a young athlete who is training for the Accra Milo marathon, a physician scrutinizes his (the athlete's) cardiac rhythm for abnormalities. Which of the following events normally occur during ventricular diastole?

A. Contraction of the ventricles
B. Ejection of blood into the pulmonary trunk
C. Opening of the semilunar valves
D. Filling of the coronary arteries
E. Closure of the atrioventricular valves

28. Avascular necrosis of the lung parenchyma is likely to result from the occlusion of which one of these arteries?

D. Filling of the coronary arteries
E. Closure of the atrioventricular valves

28. Avascular necrosis of the lung parenchyma is likely to result from the occlusion of which one of these arteries?

A. Internal thoracic artery
B. Pulmonary arteries
C. Pulmonary veins
D. Bronchial artery
E. Posterior thoracic artery

29. If the right lung suddenly becomes glandular as a result of a tumour thereby losing its crepitating nature associated with a healthy lung, then with the passage of time a shift in the mediastinum and its contents occurs. Where will you expect the apex beat of the heart to be located during your clinical examination under such circumstances? [N.B: This patient is not a known dextrocardia case].

A. 5th left intercostal space in the midclavicular line

A. Internal thoracic artery
B. Pulmonary arteries
C. Pulmonary veins
D. Bronchial artery
E. Posterior thoracic artery

29. If the right lung suddenly becomes glandular as a result of a tumour thereby losing its crepitating nature associated with a healthy lung, then with the passage of time a shift in the mediastinum and its contents occurs. Where will you expect the apex beat of the heart to be located during your clinical examination under such circumstances? [N.B: This patient is not a known dextrocardia case].

A. 5th left intercostal space in the midclavicular line
B. 5th right intercostal space in the midclavicular line
C. Lateral to the 5th left intercostal space in midclavicular line
D. Medial to the 5th right intercostal space in the midaxillary line

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E. At the tip of the xiphoid process in the left midaxillary line

30. The cartilage and the musculature of the walls of the respiratory system have their embryonic origin from which of these germ layers?

A. Ectoderm
B. Mesoderm
C. Endoderm
D. Septum transversum
E. Coelom

A. Ectoderm
B. Mesoderm
C. Endoderm
D. Septum transversum
E. Coelom

31. If a baby is borne with the trachea still attached to the oesophagus (trachea-oesophageal fistula), then it is most likely that during the embryonic development of the respiratory tree:

A. Cardiogenic mesoderm intervenes in the developing laryngotracheal diverticulum
B. Longitudinal fold leading to the formation of the tracheosophageal ridge develops
C. Failure of development of the longitudinal fold between the foregut endoderm and the laryngotracheal diverticulum
D. The oesophageotracheal ridge develops dorsally instead of in the ventral position
E. The coelomic cavity becomes sealed up very early during development

32. Pneumocyte types I and II cells (surfactant-secreting cells) which reduce friction between the pleural membranes of the healthy adult lungs, are believed to be associated with which

C. Failure of development of the longitudinal fold between the foregut endoderm and the laryngotracheal diverticulum

D. The oesophageotracheal ridge develops dorsally instead of in the ventral position

E. The coelomic cavity becomes sealed up very early during development

32. Pneumocyte types I and II cells (surfactant-secreting cells) which reduce friction between the pleural membranes of the healthy adult lungs, are believed to be associated with which of these developmental stages of the respiratory tree?

★ Saccular and alveolar periods of the terminal sac stage

B. Canalicular stage

C. Vascularization of mesoderm and the thinning of the respiratory bronchiole stage

D. Pseudoglandular stage

E. Appearance of the bronchial bud and the bronchopulmonary segment stage (embryonic stage)

33. The superior vena cava empties its contents into the right atrium of the heart. Which of the following correctly describes the formation of the superior vena cava?

B. Canalicular stage
C. Vascularization of mesoderm and the thinning of the respiratory bronchiole stage
D. Pseudoglandular stage
E. Appearance of the bronchial bud and the bronchopulmonary segment stage (embryonic stage)

33. The superior vena cava empties its contents into the right atrium of the heart. Which of the following correctly describes the formation of the superior vena cava?

A. Union of the left and right internal jugular veins
B. Union of the left and right brachiocephalic trunk
C. Union of the left and right pulmonary veins
D. Union of the left and right subclavian veins
E. Union of the right internal jugular vein and the left subclavian vein.

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34. The primary *respiratory* function of the respiratory system is

A. Acid base regulation and balance
B. Maintenance the arterial Po2, Pco2 and pH within narrow limits
C. Defense via the mucocilliary escalator system and IgA
D. Aiding in venous return
E. Activation of angiotensin II from angiotensin I

35. The lungs play a key role in body pH regulation by

A. Changing blood oxygen levels
B. Changing blood bicarbonate levels
C. Changing blood ammonium ion levels
D. Changing blood phosphate ion levels
E. Changing blood carbon dioxide levels

35. The lungs play a key role in body pH regulation by

A. Changing blood oxygen levels
B. Changing blood bicarbonate levels
C. Changing blood ammonium ion levels
D. Changing blood phosphate ion levels
E. Changing blood carbon dioxide levels

36. An intrapleural pressure value of -10cmH2O means

A. 10cmH20 greater than atmospheric pressure
B. 10cmH20 less than the oesophageal pressure
C. 10cmH20 less than atmospheric pressure
D. 10cmH20 times the standard atmospheric pressure
E. None of the above

37. Concerning change in the thoracic volume during inspiration, the following is/are true

37. Concerning change in the thoracic volume during inspiration, the following is/are true

A. The hemi-diaphragms increase the vertical dimension of the thorax via the "bicycle pump handle" effect
B. The upper ribs increase the antero-posterior diameter: via the "water pump handle" effect.
C. The lower ribs increase the lateral (transverse) diameter by outward rotation via the "water bucket handle" effect
★ All the above
E. None of the above

38. The most important component of lung recoil is

★ Surface tension forces
B. Pulmonary elasticity due to elastic fibres
C. Pulmonary elasticity due to collagen
D. Intrapleural pressure
E. Transpulmonary pressure

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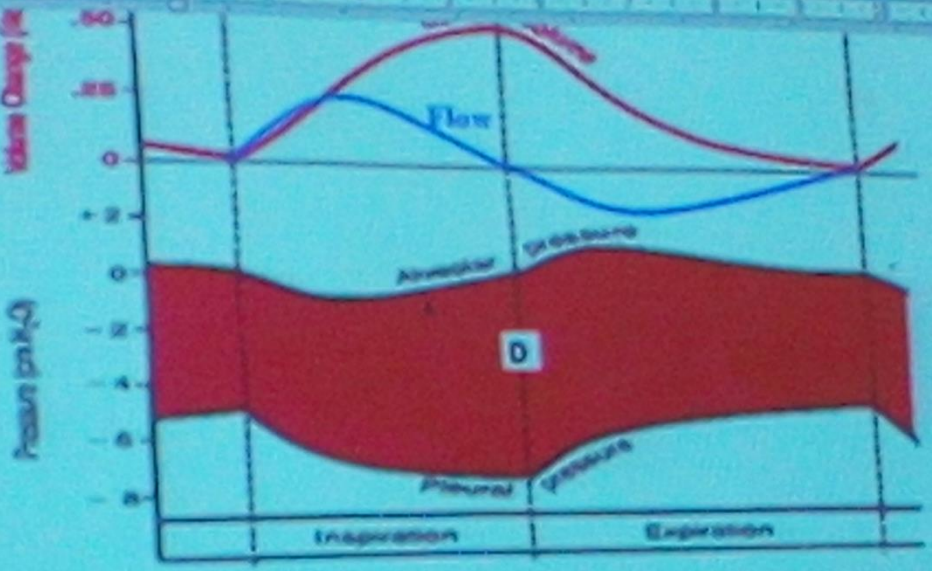
39. Which of the following lung volumes or capacities cannot be measured by spirometry?

A. Tidal volume
B. Inspiratory reserve volume
C. Vital capacity
D. Total lung capacity
E. Expiratory reserve volume

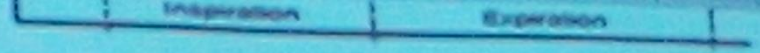
Use the information below to answer the next five questions

The diagram below shows the changes in pulmonary pressures and their effects on lung volumes and airflow rate



40. Identify the part labeled D

A. Intrapulmonary pressure
B. Transpulmonary pressure
C. Intrapleural pressure
D. Atmospheric pressure
E. Intrathoracic pressure



40. Identify the part labeled D

A. Intrapulmonary pressure
B. Transpulmonary pressure
C. Intrapleural pressure
D. Atmospheric pressure
E. Intrathoracic pressure

41. At which stage of the respiratory cycle is the airflow rate greatest?

A. Start of inspiration
B. Mid inspiration or mid expiration
C. End of inspiration
D. Start of expiration
E. End of expiration

42. From the graph, the primary determinant of lung volume is

A. Flow rate
B. Alveolar pressure
C. Pleural pressure
D. Part labeled D
E. None of the above

43. At the start of inspiration, the mean intrapleural pressure is approximately

A. 5 cmH_2O
B. -5 cmH_2O
C. 0 cmH_2O
D. -10 cmH_2O
E. -8 cmH_2O

44. At the end of expiration, the mean alveolar pressure is approximately

B. -5 cmH_2O
C. 0 cmH_2O
D. -10 cmH_2O
E. -8 cmH_2O

44. At the end of expiration, the mean alveolar pressure is approximately

A. 5 cmH_2O
B. -5 cmH_2O
C. 0 cmH_2O
D. -10 cmH_2O
E. -8 cmH_2O

45. In pneumothorax, the following is not true

A. There may be a connection between the atmosphere and intrapleural spaces
B. Intrapleural pressure increases from a mean at -5 cmH2O to equal atmospheric pressure.

D. -10 cmH_2O

E. -8 cmH_2O

45. In pneumothorax, the following is not true

A. There may be a connection between the atmosphere and intrapleural spaces
B. Intrapleural pressure increases from a mean at -5 cmH2O to equal atmospheric pressure.
C. Transpulmonary pressure may fall to zero
D. Lung recoil decreases to zero
E. Chest wall collapses

46. Which of the following pulmonary function indices is an early indicator of small airway narrowing?

A. Tidal volume
B. Functional residual capacity
C. FVC
D. FEV_1

E. Chest wall collapses

46. Which of the following pulmonary function indices is an early indicator of small airway narrowing?

A. Tidal volume
B. Functional residual capacity
C. FVC
D. FEV_1
★ FEF_{25-75}

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47. In obstructive airways disorders like bronchial asthma or COPD,

A. The value of FEV1/FVC is normal
B. The value of FEV1/FVC is increased
C. The value of FEV1/FVC is decreased
D. The value of the total lung capacity is always decreased
E. The value of the forced vital capacity is always decreased.

48. Gradual increase and decrease in respiration with periods of apnea is a feature of

A. Normal respiration in children

47. In obstructive airways disorders like bronchial asthma or COPD,

A. The value of FEV1/FVC is normal
B. The value of FEV1/FVC is increased
C. The value of FEV1/FVC is decreased
D. The value of the total lung capacity is always decreased
E. The value of the forced vital capacity is always decreased.

48. Gradual increase and decrease in respiration with periods of apnea is a feature of

A. Normal respiration in children
B. Normal respiration in adults
C. Cheyne-stokes breathing
D. Kussmaul's breathing
E. Respiration of a patient in metabolic alkalosis

49. Which of the following is not true?

A. In normal respiration, inspiration is active and expiration is passive

A. Normal respiration in children
B. Normal respiration in adults
C. Cheyne-stokes breathing
D. Kussmaul's breathing
E. Respiration of a patient in metabolic alkalosis

49. Which of the following is not true?

A. In normal respiration, inspiration is active and expiration is passive
B. Most important inspiratory muscle is diaphragm
C. Most important expiratory muscle is abdominal recti
D. In severe respiratory disease, expiration is always passive.
E. Fibres in the lungs and surface tension are responsible for elastic property of lungs

50. The epicardium develops from the:

A. Somatopleuric mesoderm
B. Endoderm

D. In severe respiratory disease, expiration is always passive.
E. Fibres in the lungs and surface tension are responsible for elastic property of lungs

50. The epicardium develops from the:

A. Somatopleuric mesoderm
B. Endoderm
C. Cardiac jelly
D. Septum transversum

Splanchnopleuric mesoderm

51. The conus arteriosus gives rise to the:

A. Right ventricle and pulmonary trunk
B. Left ventricle and aorta

Right and left ventricles
D. Smooth portion of left atrium
E. Pulmonary trunk and ascending aorta

52. Which of these pair of embryonic blood vessels and the structure they form in the post-natal life is incorrect?

A. Anterior portion of dorsal aortae – common carotid
B. Ductus arteriosus – ligamentum arteriosus
C. Sinus venosus – ligamentum veonsum
D. Left umbilical vein – ligamentum teres hepatis
★ Umbilical arteries – lateral umbilical folds

53. How many CELL MEMBRANES does a molecule of oxygen in an alveolar lumen have to cross in order to reach the cytoplasm of the red blood cell?

A. 2
B. 3
C. 4
★ D. 5
E. 6

54. Which of the following is not contained in the interalveolar wall or alveolar septum?

53. How many CELL MEMBRANES does a molecule of oxygen in an alveolar lumen have to cross in order to reach the cytoplasm of the red blood cell?

A. 2
B. 3
C. 4
D. 5
E. 6

54. Which of the following is not contained in the interalveolar wall or alveolar septum?

A. Alveolar epithelium
B. Capillary epithelium
C. Dust cells
D. Smooth muscle fibres
E. Supporting tissue

55. The diaphragm and the parietal pleura covering this aspect of the lung mold it into a

B. Capillary epithelium
C. Dust cells
D. Smooth muscle fibres
E. Supporting tissue

53. The diaphragm and the parietal pleura covering this aspect of the lung mold it into a concave shape.

A. Apex
B. Mediastinal surface
C. Base
D. Root
E. None of the above

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56. Which of the following is NOT true about the development of the respiratory tree?

A. The cephalocaudal and lateral folding of the trilaminar disc lead to the formation of the coelom into which it develops
B. The laryngotracheal groove which eventually forms the respiratory tree is a ventral outpouching of the foregut endoderm
C. The laryngotracheal groove grows inferiorly and elongates into the somatic mesoderm
D. The conduction portion undergoes 16 or more generations of branching during the pseudoglandular stage of development
E. The canalicular stage of development involves the formation of respiratory bronchioles and the "thinning of the epithelium lining them

57. Heart valves normally consist of an endothelial surface covering:

A. Cardiac muscle fibres

pseudoglandular stage of development

E. The canalicular stage of development involves the formation of respiratory bronchioles and the "thinning of the epithelium lining them

57. Heart valves normally consist of an endothelial surface covering:

A. Cardiac muscle fibres.
B. Hyaline cartilage.
C. Loose areolar connective tissue.
D. Fibrocollagenous and fibroelastic connective tissue.
E. Adipose connective tissue.

58. Which of the following is **true** about Intercalated discs?

A. They include desmosomes
B. They are found at the boundary between adjacent cardiac muscle cells
C. They include gap junctions
D. They may appear as dark or light bands by light microscopy
E. All of the above are true

B. They are found at the boundary between adjacent cardiac muscle cells
C. They include gap junctions
D. They may appear as dark or light bands by light microscopy
E. All of the above are true

59. Which cell junction, located at intercalated disks, is responsible for electrical communication between cardiac muscle cells?

A. Macula adherens.
B. Zonula adherens.
C. Zonula occludens.
D. Desmosome.
E. Gap junction.

C. Zonula occludens.
D. Desmosome.
E. Gap junction.

60. Which of the following is not true regarding the endocardium?

A. The endocardium contains adipose tissue.
B. The endocardium has sublayers.
C. The endocardium contains blood vessels.
D. The endocardium contains smooth muscles.
E. The endocardium is lined by an endothelium