

Get Through

Final FRCR Part A: SBAs for the Modular Examination

Megan Bydder • Alexander Clark
Nicholas Coupe • John Pattison



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SBAs for the Modular Examination**

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Preface

In 2008 the Royal College of Radiologists announced proposed changes to the format of the Examinations for the Fellowship in Clinical Radiology, which included the introduction of single best answer questions (SBAs) for the Final FRCR Part A examination from the Autumn 2009 sitting.

SBAs are being increasingly adopted by the Royal Colleges, because they have a number of advantages over traditional true/false multiple-choice questions. In particular they are better suited to the assessment of higher levels of knowledge such as problem-solving and decision-making, and are more relevant to everyday clinical practice.

The modular format of the Final FRCR Part A examination remains, and the following six modules are examined:

Module 1: Cardiothoracic and Vascular

Module 2: Musculoskeletal and Trauma

Module 3: Gastrointestinal

Module 4: Genitourinary, Adrenal, Obstetrics & Gynaecology, and Breast

Module 5: Paediatrics

Module 6: Central Nervous System and Head & Neck

Each module consists of a single paper of two hours in duration containing 75 questions. Radiological anatomy and techniques continue to be part of the Final FRCR Part A examination, but physics is now examined entirely in the First FRCR examination. Negative marking has been discontinued. Further detailed guidance is available from the College website (www.rcr.ac.uk).

This book contains six chapters mirroring the six modules of the Final FRCR Part A examination, each of which contains 100 single best answer format questions. The questions have been written using the commonly used radiology textbooks, together with specialist textbooks and radiology journals. All questions are accompanied by detailed explanations, and are comprehensively referenced for further reading. Many of the journal references are available in free full-text version on the internet. To provide additional feedback, each question is assigned a difficulty level, ranging from * (easiest) to ***** (most difficult).

This book aims to give radiology trainees a valuable insight into the new Final FRCR Part A examination format, while providing a comprehensive collection of practice questions to aid thorough preparation for the examination.

Single best answer question (SBA) format

SBAs are composed of a stem, often in the form of a clinical scenario, followed by a question to which the candidate must select a single response from a list of possible options. The options consist of one correct answer and a number of incorrect options or distractors, which are not necessarily completely wrong, merely less correct in the given scenario.

When attempting SBAs, it is advisable to read the question carefully and attempt to formulate the answer initially without looking at the options. If you are unsure of the answer, it is usually possible to eliminate several of the distractors, improving your chances of guessing the answer correctly. If you are unable to answer the question straight away, return to it at a later stage. Ensure that you give yourself time to attempt all the questions, and do not leave any out, as incorrect answers are no longer penalised.

In our experience, attempting practice questions is essential for optimal exam preparation, as a means of identifying gaps in knowledge and, when performed under examination conditions, as a valuable self-assessment technique. In addition, increasing familiarity with the examination format is likely to enhance performance.

Further information about single best answer format questions and guidance on attempting them can be obtained from these sources:

Case SM, Swanson DB. *Constructing Written Test Questions for the Basic and Clinical Sciences*, 3rd edn. Philadelphia: National Board of Medical Examiners. Available at: www.nbme.org/publications/item-writing-manual.html.

McCoubrie P, McKnight L. Single best answer MCQs: a new format for the FRCR part 2a exam. *Clin Radiol* 2008; 63: 506–10.

Abbreviations

2D	two-dimensional
ADC	apparent diffusion coefficient
AFP	alfa-fetoprotein
AIDS	acquired immune deficiency syndrome
AP	anteroposterior
β -hCG	beta-human chorionic gonadotrophin
CA-15-3	cancer antigen 15-3
CA-125	cancer antigen 125
CA-19-9	carbohydrate antigen 19-9
CEA	carcinoembryonic antigen
CMV	cytomegalovirus
CNS	central nervous system
CSF	cerebrospinal fluid
CT	computed tomography
CT KUB	computed tomography of the kidneys, ureters and bladder
DMSA	dimercaptosuccinic acid
DNA	deoxyribonucleic acid
DTPA	diethylene triamine pentaacetic acid
DWI	diffusion-weighted imaging
ECD	ethyl cysteine dimer
ECG	electrocardiogram
ERCP	endoscopic retrograde cholangiopancreatography
^{18}F FDG	[^{18}F]-fluorodeoxyglucose
FLAIR	fluid-attenuated inversion recovery
FNA	fine-needle aspiration
FOV	field of view
GCS	Glasgow Coma Scale
Gd	gadolinium
GI	gastrointestinal
HIV	human immunodeficiency virus
HMPAO	hexamethylpropylene amine oxime
HMSO	Her Majesty's Stationery Office
HU	Hounsfield units
IDA	iminodiacetic acid
^{111}In	indium-111
IQ	intelligence quotient
IVC	inferior vena cava
IVU	intravenous urogram
MAA	macroaggregated albumin
MAG3	mercaptoacetyl triglycine
MIBG	metaiodobenzylguanidine
MR	magnetic resonance
MRCP	magnetic resonance cholangiopancreatography
MRI	magnetic resonance imaging
Na^+/K^+ ATPase	sodium-potassium adenosine triphosphatase
PA	posteroanterior
pANCA	perinuclear anti-neutrophil cytoplasmic antibody

PET	positron emission tomography
PET/CT	combined positron emission and computed tomography
PSA	prostate-specific antigen
SPECT	single photon emission computed tomography
STIR	short TI inversion recovery
SVC	superior vena cava
T1W	T1-weighted
T2W	T2-weighted
T2*W	T2*-weighted
^{99m}Tc	technetium-99m
TNM	TNM Classification of Malignant Tumours
V/Q	ventilation–perfusion
WHO	World Health Organization

MODULE I
CARDIOTHORACIC AND VASCULAR

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Module 1: Cardiothoracic and Vascular: Questions

- 1) A 40-year-old male presents with shortness of breath. He also has lower back pain and stiffness of the spine. A chest radiograph shows bilateral upper-zone fibrosis with elevation of the hila. Spinal ligamentous ossification is also noted. High-resolution CT shows peripheral interstitial changes with traction bronchiectasis and paraseptal emphysematous changes in the upper zones. What is the most likely diagnosis?
 - a. ankylosing spondylitis
 - b. Reiter's syndrome
 - c. tuberculosis
 - d. sarcoidosis
 - e. chronic extrinsic allergic alveolitis

- 2) In acute respiratory distress syndrome what is the first change usually seen on the chest radiograph?
 - a. confluent consolidation
 - b. pleural effusions
 - c. increased heart size with globular shape
 - d. volume loss with atelectasis
 - e. patchy ill-defined opacities

- 3) A 32-year-old female presents with shortness of breath and haemoptysis. There is no leg swelling and an ECG is normal. A chest radiograph shows a triangular, pleurally based opacity in the right mid-zone with an ipsilateral effusion. Which investigation would be most helpful in making the diagnosis?
 - a. $\dot{V}/\dot{Q}$ scan
 - b. CT pulmonary angiogram
 - c. conventional pulmonary angiogram
 - d. high-resolution CT
 - e. staging CT of chest

- 4) A 56-year-old female patient presents with shortness of breath. A chest radiograph is unremarkable. A high-resolution CT scan is performed which shows mosaic perfusion with no air trapping on expiratory scan. What is the most likely diagnosis?
 - a. bronchiolitis obliterans
 - b. cystic fibrosis
 - c. hypersensitivity pneumonitis
 - d. chronic thromboembolic disease
 - e. asthma

- 5) A 28-year-old male with known Marfan's syndrome presents with chest pain and shortness of breath. An echocardiogram is performed. What are the most likely findings?
 - a. aortic regurgitation and dilatation
 - b. pulmonary stenosis
 - c. aortic stenosis and post-stenotic dilatation
 - d. global myocardial wall thickening
 - e. ventricular septal defect

- 6) Into which structure does the thoracic duct normally drain?
 - a. left brachiocephalic vein
 - b. left internal jugular vein
 - c. left subclavian vein
 - d. superior vena cava
 - e. junction of left subclavian and internal jugular veins

- 7) A 43-year-old man with a previous history of polytrauma requiring a long period in intensive care for acute respiratory distress syndrome presents with shortness of breath. An abnormal chest radiograph prompts a high-resolution CT scan. What are the most likely findings?
 - a. bronchiectasis in the lower lobes
 - b. pleural effusions
 - c. fibrosis with volume loss in the upper lobes
 - d. reticular changes in the anterior aspects of the lungs
 - e. reticular changes in the posterior aspects of the lungs

- 8) In systemic sclerosis, what is the most common pulmonary finding on CT?
 - a. consolidation secondary to aspiration pneumonia
 - b. pulmonary hypertension
 - c. pleural effusions
 - d. interstitial lung disease
 - e. pulmonary emboli

- 9) A 28-year-old female presents with menorrhagia and dysmenorrhoea. An ultrasound scan shows a large fibroid in the uterus measuring 7 cm. An MR scan confirms an intramural fibroid which enhances vividly. The patient undergoes uterine artery embolization. What is the commonest complication occurring in the first 12 months following this procedure?
 - a. premature ovarian failure
 - b. failure of therapy with need for re-embolization or hysterectomy
 - c. hysterectomy for uterine infection or pain
 - d. persistent non-offensive vaginal discharge
 - e. post-embolization syndrome

- 10) A 55 year old presents with chest pain. His blood tests show a mild troponin rise, but an ECG is normal. A chest radiograph shows bilateral, symmetrical, hilar adenopathy but no other abnormality. Which feature on cardiac MRI would make cardiac sarcoid a more likely diagnosis than ischaemia secondary to coronary artery disease?
- delayed hyperenhancement of lateral wall
 - full-thickness, abnormal, high T2 signal in lateral wall
 - reduced inferior wall motility
 - partial-thickness, abnormal, high T2 signal with subendocardial sparing at base of septum
 - segmental area of reduced enhancement in lateral wall on early phase study
- 11) Which of the following best describes the radiographic changes seen in acute rejection of a lung transplant?
- mosaic perfusion and air trapping
 - pleural effusion and septal thickening with no left ventricular dysfunction
 - bilateral consolidation at the bases
 - increased lung volumes
 - globular heart and bat-wing perihilar consolidation
- 12) An 87-year-old male presents with fever and cough. A chest radiograph shows dense consolidation in the right mid-zone, which is seen to be in the apical segment of the lower lobe on a lateral view. The oblique fissure is seen to be bulging away from the consolidation. There is an associated effusion. What is the most likely diagnosis?
- Haemophilus influenzae* pneumonia
 - Staphylococcus aureus* pneumonia
 - Streptococcus pneumoniae* pneumonia
 - Klebsiella pneumoniae*
 - Legionnaires' disease
- 13) A 76-year-old female presents with haemoptysis and cough. A chest radiograph shows a mass in the right upper lobe that contains a crescent of air. Which feature on CT would make a cavitating malignancy more likely than aspergilloma?
- thin cavity wall
 - high-density central mass
 - enhancing central mass
 - calcification
 - adjacent bronchiectasis

- 14) A 42-year-old male presents with stridor and persistent cough. He previously has had several nosebleeds. Bloods show mild renal impairment. A chest radiograph shows multiple cavitary lesions with irregular lining, predominantly in the lower lobes. What is the most likely diagnosis?
 - a. metastatic disease from nasopharyngeal carcinoma
 - b. Wegener's granulomatosis
 - c. sarcoidosis
 - d. pyogenic abscesses
 - e. systemic lupus erythematosus

- 15) A 32-year-old male presents with increasing shortness of breath following a road traffic accident, in which he sustained multiple long bone fractures. At 48 hours post-injury, his chest radiograph is normal. The next day a $\dot{V}/\dot{Q}$ scan shows patchy, mottled, peripheral perfusion defects. The following day a chest radiograph shows patchy, bilateral, alveolar infiltrates. What is the most likely diagnosis?
 - a. fat embolism
 - b. thrombotic embolism
 - c. atypical infection
 - d. pulmonary contusions
 - e. pulmonary oedema

- 16) A 50-year-old male with known chronic asthma is seen in an outpatient clinic. He has no current symptoms. A 'routine' chest radiograph is performed. Which feature is most likely to be seen?
 - a. hyperexpansion
 - b. peribronchial cuffing
 - c. bronchiectasis
 - d. parenchymal scars
 - e. normal chest radiograph

- 17) A 65-year-old man presents with painful wrists and ankles. There is no digital clubbing. A chest radiograph shows a well-defined pleural mass, forming an obtuse angle with the chest wall. CT confirms an ovoid, pleurally based, enhancing mass with no bone destruction, effusion or volume loss. Radiographs of the wrists and ankles show symmetrical periosteal reaction. What is the most likely diagnosis?
 - a. hypertrophic osteoarthropathy with bronchogenic carcinoma
 - b. hypertrophic osteoarthropathy with malignant mesothelioma
 - c. hypertrophic osteoarthropathy with pleural fibroma
 - d. rheumatoid arthritis
 - e. tuberculosis

- 18) A right-sided aortic arch with mirror-image branching is most frequently associated with which congenital cardiac abnormality?
- pulmonary atresia and ventricular septal defect
 - truncus arteriosus
 - uncomplicated ventricular septal defect
 - Fallot's tetralogy
 - corrected transposition of the great vessels
- 19) A 68-year-old man presents with increasing dyspnoea. He has a history of asbestos exposure. CT of the chest demonstrates bilateral pleural thickening with calcification, and a 3 cm, rounded, lower lobe mass. This is related to an area of pleural thickening, with bronchovascular markings coursing from it towards the hilum in a curved path. What is the most likely diagnosis?
- rounded atelectasis
 - bronchogenic carcinoma
 - tuberculosis
 - silicosis
 - round pneumonia
- 20) A 43-year-old female with Churg–Strauss syndrome has a high-resolution CT. What is the most likely finding?
- small centrilobular nodules
 - bullous disease
 - bilateral, symmetrical, hilar lymphadenopathy
 - tumour-like mass
 - pleural effusion
- 21) A 32-year-old male presents with headaches and bilateral lower limb claudication. He is noted to have weak pulses in the lower limbs. A chest radiograph shows a 'figure-3' indentation of the aorta and inferior rib notching. The cardiac apex is elevated. There is no previous medical history. What is the most likely diagnosis?
- superior vena caval obstruction
 - aortic dissection
 - coarctation of the aorta
 - aortic thrombosis
 - transposition of the great vessels

- 22) A 25-year-old male presents with recurrent epistaxis, which is progressively worsening. On examination he is noted to have multiple, red, vascular skin blemishes. A chest radiograph shows several opacities in the lung measuring up to 3 cm with bands of opacification extending to the hila. No calcification is seen. What is the most likely diagnosis?
- hereditary haemorrhagic telangiectasia
 - neurofibromatosis
 - tuberous sclerosis
 - Wegener's granulomatosis
 - sarcoidosis
- 23) A 40-year-old female presents with a stroke, which is confirmed on CT of brain. She gives a history of worsening claudication of the limbs and a long history of fever and myalgia. CT of the neck and thorax shows thickening of the arterial walls of the aorta and major vessels with irregular stenotic lesions throughout the aorta, with focal areas of dilatation and stenosis in the brachiocephalic arteries and carotid arteries. What is the most likely diagnosis?
- fibromuscular dysplasia
 - syphilis
 - atherosclerosis
 - Marfan's syndrome
 - Takayasu's arteritis
- 24) The bronchial tree receives blood from one right and two left bronchial arteries. From which vessel does the single right artery usually arise?
- aorta
 - joint origin with left bronchial arteries
 - second posterior right intercostal artery
 - third posterior right intercostal artery
 - fourth posterior right intercostal artery
- 25) A patient with known polyarteritis nodosa presents with acute left loin pain. Which of the following is most likely to be seen on ultrasound scan?
- hydronephrosis
 - a solid mass with a perinephric collection
 - multiple renal artery aneurysms and perinephric collection
 - crossed fused ectopia
 - small kidneys with increased echogenicity

- 26) A 5-year-old female presents with intermittent, colicky, epigastric discomfort with no specific features. A CT shows transverse colon protruding through a small defect anteriorly in the diaphragm in a parasternal position. What is the most likely diagnosis?
- Bochdalek's hernia
 - Morgagni's hernia
 - rolling hiatus hernia
 - eventration
 - septum transversum defect
- 27) A 45-year-old female presents with malaise and cough. She has a history of multiple allergies. Her blood results show an eosinophilia, and the chest radiograph reveals two areas of peripheral consolidation. A further chest radiograph 2 days later shows these to be resolving. Which of the following is the most likely diagnosis?
- histiocytosis
 - pseudomonas pneumonia
 - Klebsiella pneumonia
 - Loeffler's syndrome
 - lipoid pneumonia
- 28) A 26-year-old intravenous drug user presents with reduced conscious level, associated pyrexia and malaise. Clinically, there is a systolic murmur, mild hypotension and an elevated white cell count. A chest radiograph shows multiple opacities in the mid and lower zones, some of which are cavitating. What is the most appropriate next investigation?
- CT of the thorax
 - transthoracic echocardiogram
 - white cell scan
 - MRI of the heart
 - transoesophageal echocardiogram
- 29) A 64-year-old man presents with pain in the left arm when exercising, associated with a headache. The clinical team suspect subclavian steal syndrome. Ultrasound scan, however, shows normal flow in the carotid and vertebral arteries bilaterally. What is most likely to happen to the flow in the vessels during patient exercise to reproduce the pain?
- reversal of flow in the right carotid artery
 - reversal of flow in the left carotid artery
 - reversal of flow in the right vertebral artery
 - reversal of flow in the left vertebral artery
 - no change

- 30) A 19-year-old male presents following blunt chest trauma, with dyspnoea, chest pain and haemoptysis. A chest radiograph shows bilateral pneumothoraces, subcutaneous emphysema and bilateral fractures of multiple upper ribs. The pneumothoraces fail to resolve despite chest drains and he needs intubation and ventilation. Which finding at CT would be most suggestive of the diagnosis of tracheal injury?
- pneumomediastinum
 - bilateral pneumothorax
 - mediastinal haematoma
 - focal overdistension of endotracheal tube cuff
 - chylothorax
- 31) An 80-year-old man presents with haemoptysis and a mass on chest radiograph. A biopsy shows non-small-cell lung cancer. CT of chest shows a 4 cm, right middle lobe mass with pleural tethering but no chest wall invasion. Lymph nodes are seen at the right hilum (17 mm short axis), in the subcarinal space (20 mm short axis) and in the aortopulmonary space (8 mm short axis). No other abnormalities are seen. What is the TNM stage?
- T2 N1 M0
 - T2 N2 M0
 - T2 N3 M0
 - T3 N1 M0
 - T3 N2 M0
- 32) A 48-year-old female with known lung cancer undergoes an ^{18}F FDG PET/CT scan. The tumour is highly FDG avid. Several areas of moderate uptake are noted on the study. Which of the following findings is of concern with regard to metastatic disease?
- diffuse thyroid uptake
 - symmetrical nasopharyngeal tonsil uptake
 - diffuse uptake in caecal wall
 - focal paravertebral muscle uptake
 - focal uterine cavity uptake
- 33) A 42-year-old female with tuberous sclerosis presents with flank pain. Ultrasound scan and CT demonstrate a 7 cm renal angiomyolipoma, with multiple similar smaller lesions in both kidneys. No evidence of acute haemorrhage is seen. She undergoes embolization with polyvinyl alcohol particles. After 48 hours, she presents again with flank pain and is found to have a large perinephric haematoma on the side of the embolization. What is the most likely cause?
- vascular trauma during embolization
 - spontaneous haemorrhage from non-embolized lesion
 - post-embolization rupture
 - revascularization of embolized lesion
 - inadequate embolization material used

- 34) In ventilation–perfusion scintigraphy, which of the following is suggestive of an intermediate probability of pulmonary embolism?
- matched non-segmental defects with a normal chest radiograph
 - multiple unmatched small perfusion defects with normal ventilation
 - large, segmental, matched defect with similar-sized opacity on chest radiograph
 - reverse mismatch
 - two large, unmatched, segmental, perfusion defects
- 35) A 78-year-old man presents with superior vena caval syndrome. A CT scan shows an irregular mass in the superior mediastinum causing near-total occlusion of the superior vena cava. There is no sign of respiratory compromise or raised intracranial pressure. Which of the following would be the most appropriate next step in the patient's management?
- obtain tissue diagnosis
 - chemotherapy
 - radiotherapy
 - stenting of superior vena cava
 - surgical bypass
- 36) A 68-year-old patient presents with cough and dyspnoea. A chest radiograph is performed. Which feature would suggest sarcoidosis as a more likely diagnosis than tuberculosis?
- pleural effusion
 - cavitating upper lobe lesion
 - calcified lung lesion
 - symmetrical hilar lymphadenopathy
 - consolidation
- 37) A 57-year-old man presents with chest pain and fever after an episode of vomiting. A chest radiograph shows a small left pleural effusion and pneumomediastinum. Which investigation will best establish the diagnosis?
- CT of the chest
 - barium swallow
 - water-soluble contrast swallow
 - MRI
 - transoesophageal echocardiogram

- 38) A 65-year-old male presents with a 2-month history of cough and dyspnoea and has had swelling of the face, neck and arms for 1 week. He has had tuberculosis in the past. CT shows an irregular right paratracheal mass with calcification that is compressing the superior vena cava and right main bronchus, with patchy consolidation in the right lung. What is the most likely diagnosis?
- small-cell carcinoma
 - lymphoma
 - malignant teratoma
 - fibrosing mediastinitis
 - bronchogenic cyst
- 39) A 48-year-old female patient presents with mild dyspnoea on exertion. A chest radiograph shows fine calcification overlying the cardiac silhouette adjacent to the left sternal edge at the level of the fourth intercostal space. What is the most likely cause?
- rheumatic heart disease
 - bicuspid valve
 - syphilis
 - ankylosing spondylitis
 - normal ageing
- 40) A 37-year-old male presents to accident and emergency following smoke inhalation in a fire. He feels well and a chest radiograph is normal. The following day he re-presents feeling short of breath and unwell. What are the most likely findings on the chest radiograph now?
- pulmonary oedema
 - pleural effusions
 - upper-zone consolidation
 - diffuse reticular change
 - pneumothorax
- 41) A 40-year-old female with known history of seizures and low IQ presents with severe shortness of breath, progressively worsening over a number of years. A chest radiograph shows extensive honeycombing throughout both lungs, which are of normal volume. A small pneumothorax is also seen on the right side. What is the most likely diagnosis?
- sarcoidosis
 - cystic fibrosis
 - tuberous sclerosis
 - lymphangiomyomatosis
 - idiopathic pulmonary fibrosis

- 42) A 28-year-old male is involved in a road traffic accident and sustains chest trauma. He has chest pain and bruising over the chest with reduced blood pressure. A chest radiograph shows a shift of the trachea to the right at T3–4 level with depression of the left main bronchus and loss of clarity of the aortic knuckle. Which diagnosis should be considered?
- aortic rupture
 - bronchial rupture
 - superior vena caval laceration
 - azygos vein injury
 - internal mammary artery injury
- 43) A 35 year old with asthma presents with malaise, flu-like illness and cough. Previous similar episodes have occurred. A chest radiograph shows patchy airspace opacification in the mid and upper zones. Which feature on high-resolution CT would make allergic bronchopulmonary aspergillosis a more likely diagnosis than extrinsic allergic alveolitis?
- widespread centrilobular micronodules <3 mm
 - tubular finger-like opacities
 - bronchiectasis
 - upper-zone fibrosis
 - pleural effusion
- 44) A 38-year-old pregnant female presents with haemoptysis and shortness of breath. A chest radiograph shows a large effusion, which is drained and found to be chylous. What is the most likely diagnosis?
- histiocytosis
 - tuberculous sclerosis
 - neurofibromatosis
 - lymphangiomyomatosis
 - idiopathic pulmonary fibrosis
- 45) A 42-year-old female patient presents with a swollen calf, and deep venous thrombosis is suspected clinically. The D-dimer is elevated. Doppler ultrasound scan shows no thrombus in the thigh or calf veins. Spectral Doppler shows continuous signal with no respiratory variation. Which further investigation may be of value?
- no further investigation – normal findings
 - pelvic ultrasound
 - CT pulmonary angiogram
 - chest radiograph
 - echocardiogram

- 46) A 27-year-old female with known sickle cell disease has an outpatient appointment. She is feeling unwell and bloods show an anaemia. A chest radiograph shows a right-sided, lobulated, paramediastinal mass in the lower thorax with widening of the rib spaces. CT shows no calcification or bone erosion. What is the most likely diagnosis?
- neurogenic tumour
 - bronchogenic cyst
 - Bochdalek's hernia
 - tuberculous abscess
 - extramedullary haematopoiesis
- 47) A 52-year-old male presents with dyspnoea and cough. A chest radiograph shows an ill-defined opacity in the right mid-zone, obscuring the heart border. A lateral view shows a thin wedge-shaped opacity with base in contact with the pleura anteroinferiorly, and pointing posterosuperiorly. What is the most likely diagnosis?
- right middle lobe collapse
 - right middle lobe consolidation
 - right lower lobe collapse
 - right lower lobe consolidation
 - encysted pleural fluid
- 48) A 42-year-old female patient presents with dyspnoea and pleuritic chest pain. She has previously had pulmonary emboli diagnosed. A CT pulmonary angiogram is performed. Which feature would indicate chronic rather than acute thrombus on the CT?
- complete occlusion of segmental vessel
 - filling defects centrally with peripheral contrast enhancement
 - peripheral mural filling defect forming acute angle with wall
 - peripheral mural filling defect forming obtuse angle with wall
 - linear atelectasis
- 49) A 50-year-old male presents with gradual onset dyspnoea and cough. There is no preceding history. A chest radiograph shows bilateral 'bat-wing' consolidation, with normal heart size and no effusion. High-resolution CT shows diffuse ground-glass change with intralobular and interlobular septal thickening ('crazy-paving' appearance). What is the most likely diagnosis?
- pulmonary oedema
 - atypical pneumonia
 - pulmonary alveolar proteinosis
 - acute respiratory distress syndrome
 - hypersensitivity pneumonitis

- 50) A 56-year-old male presents with wheezing, cough and recurrent chest infections. A chest radiograph shows right middle lobe consolidation. CT of the chest shows a 3 cm mass arising within the right middle lobe bronchus with distal collapse and consolidation. Which feature of the mass would make hamartoma more likely than carcinoid?
- central location
 - presence of calcification
 - cavitation
 - presence of fat
 - prominent enhancement
- 51) A 52-year-old female presents with cough. She is on dialysis, but, apart from abnormal urea and creatinine, her bloods are normal. A chest radiograph is abnormal and high-resolution CT is performed. This demonstrates fluffy, nodular, 5–10 mm opacities of airspace-type appearance with foci of calcification, in an upper lobe distribution with subpleural sparing. Calcification of chest wall vessels is noted. What is the most likely cause of the appearances?
- varicella
 - chronic renal failure
 - tuberculosis
 - histoplasmosis
 - talcosis
- 52) A 75-year-old man presents with worsening shortness of breath. He was a mine worker. A chest radiograph shows multiple nodules in the upper zones with a large upper-zone mass on the left. CT confirms multiple small nodules up to 5 mm with a sausage-shaped mass paralleling the mediastinum. What is the most likely diagnosis?
- coal worker's pneumoconiosis with bronchogenic carcinoma
 - coal worker's pneumoconiosis with progressive massive fibrosis
 - tuberculosis
 - primary lung carcinoma with metastases
 - chronic extrinsic allergic alveolitis

- 53) A 25-year-old male presents with dyspnoea on exertion, cough and haemoptysis. He has a history of recurrent chest infections as a child. A chest radiograph shows a hyperlucent left lung. A pulmonary embolus is suspected and a $\dot{V}/\dot{Q}$ scan is arranged. This shows reduced perfusion and ventilation of the left lung, with delayed washout on ventilation. What is the most likely diagnosis?
- acute pulmonary embolus
 - Macleod's syndrome
 - congenital lobar emphysema
 - Poland's syndrome
 - hypogenetic lung syndrome
- 54) Which of the following is the most typical description of a myxoma?
- left atrial mass, no atrial enlargement, pulmonary oedema
 - right atrial mass, enlarged right atrium, clear lungs
 - left atrial mass, enlarged left atrium, calcified lung nodules, pulmonary oedema
 - right atrial mass, enlarged right atrium, pulmonary oedema
 - left atrial mass, dilated superior vena cava, inferior vena cava and azygos vein
- 55) A 58-year-old male presents with malaise and left chest discomfort. A chest radiograph shows a well-defined mass in the left paravertebral region. CT shows that this is fatty but has soft-tissue stranding within it. Some enhancement of soft-tissue elements is seen along with foci of calcification. What is the most likely diagnosis?
- lipoma
 - liposarcoma
 - hamartoma
 - neurofibroma
 - thymolipoma
- 56) In patients with rheumatoid arthritis, what is the commonest pulmonary finding seen on the chest radiograph?
- pleural effusion
 - fibrosis
 - pulmonary nodules
 - bronchiectasis
 - heart failure

- 57) A 35-year-old man presents following a chest injury. A chest radiograph shows a smooth, curvilinear, tubular opacity adjacent to the right heart border. No other abnormality is seen. The accident and emergency team are requesting a CT of the chest. What is the most likely diagnosis?
- a. pulmonary contusion
 - b. pneumothorax
 - c. pericardial injury
 - d. extralobar sequestration
 - e. partial anomalous pulmonary venous return
- 58) In multidetector CT angiography of the lower limbs, the effects of calcification on the images can be reduced by the use of which post-processing technique?
- a. curved planar reformat
 - b. maximum-intensity projection
 - c. minimum-intensity projection
 - d. volume rendering
 - e. digital subtraction of pre- and post-contrast studies
- 59) A 52-year-old male presents with mild dyspnoea. A chest radiograph shows a raised left hemidiaphragm which demonstrates paradoxical movement on fluoroscopy. Which of the following would be the most likely cause?
- a. Pancoast's tumour
 - b. left lower lobe tumour
 - c. mediastinal small cell carcinoma
 - d. eventration
 - e. cerebrovascular accident
- 60) A 74-year-old male presents with low back pain. MRI shows some degenerative changes but no disc protrusion or neural compromise. A 6 cm, abdominal aortic aneurysm is seen, which has an irregular wall, with patchy high signal within mural thrombus and in the wall on T1W images. No perianeurysmal fluid to suggest leak is seen. What advice should be given regarding the aneurysm?
- a. follow-up with ultrasound scan
 - b. follow-up with CT
 - c. follow-up with MRI
 - d. routine referral to vascular surgeon
 - e. emergency assessment by vascular surgeon

- 61) A 44-year-old male presents with a solitary pulmonary nodule on a chest radiograph performed for a suspected chest infection. CT shows this to be 20 mm in diameter with a central cavity and smooth internal walls. No additional findings are seen. Which investigation should be arranged?
- none; findings are entirely benign
 - CT enhancement study
 - interval volumetric CT
 - contrast MRI
 - ^{18}F FDG PET/CT scan
- 62) In coronary artery anatomy, the vessel supplying the sinoatrial node most commonly arises from which structure?
- left anterior descending/anterior interventricular artery
 - circumflex artery
 - right coronary artery
 - right coronary sinus at aortic root
 - left coronary artery main stem
- 63) In MRI of the heart in the assessment of hypertrophic cardiomyopathy, muscle mass is best assessed by using a steady-state free-precession sequence in which plane?
- left ventricular vertical long axis
 - left ventricular horizontal long axis
 - left ventricular short axis
 - left ventricular short axis oblique
 - four-chamber plane
- 64) A 33-year-old female with renal failure has an indwelling right internal jugular venous catheter. She presents with swelling of the right arm. Ultrasound Doppler scan of the neck and arm veins is performed. Which feature would suggest occlusion of the right brachiocephalic vein?
- collapse of right internal jugular vein on sniffing
 - variation of flow with respiration in right subclavian vein
 - variation with cardiac cycle in right subclavian vein
 - continuous monophasic flow in the right subclavian vein
 - collapse of the left internal jugular vein on sniffing

- 65) A 43-year-old female presents with stridor. A chest radiograph shows a superior mediastinal mass with narrowing of the trachea and displacement to the right. Foci of calcification are seen within it. What is the most likely diagnosis?
- thymoma
 - teratoma
 - aneurysm of the aortic arch
 - thyroid goitre
 - lymph node mass
- 66) A 56-year-old male has a cough. A chest radiograph and CT chest show a 2 cm rounded mass in the apex of the left lung not amenable to biopsy. An ^{18}F FDG PET/CT scan is arranged for further assessment. Which technique may help to improve characterization of the lesion as benign or malignant using the standardized uptake value (SUV)?
- maximum SUV corrected for lean body mass
 - maximum SUV corrected for body weight
 - metabolic tumour burden (volume $\times$ average SUV)
 - dual time point assessment of SUV
 - assessment of SUV centrally and peripherally in the lesion
- 67) A 20 year old presents with shortness of breath and cough. A chest radiograph shows a well-defined right hilar mass. CT shows a 4 cm, rounded, soft-tissue mass arising from the mediastinum adjacent to the right side of the carina. The attenuation value of the lesion is 10 HU. No other abnormal findings are seen. What is the most likely diagnosis?
- bronchogenic cyst
 - pericardial cyst
 - carcinoid tumour
 - lymphoma
 - bronchogenic carcinoma
- 68) A 16-year-old male presents with sudden shortness of breath. A chest radiograph shows multiple, bilateral nodules measuring up to 3 cm, some of which are calcified. There is a moderate left pneumothorax. The patient has been undergoing treatment for a malignant tumour. What is the most likely diagnosis?
- metastases secondary to Wilms' tumour
 - metastases secondary to osteosarcoma
 - metastases secondary to testicular tumour
 - abscesses secondary to immunosuppression
 - varicella pneumonia secondary to immunosuppression

- 69) A 64-year-old male presents with worsening shortness of breath and haemoptysis. A chest radiograph shows a right hilar mass with extensive reticulation in the ipsilateral lung, with Kerley A and B lines and reduced lung volumes. The left lung is clear. CT of the chest demonstrates the right hilar mass, and a thickened parenchymal polygonal network within the mid and lower zones of the ipsilateral lung. Beaded thickening of the interlobular septa is also noted. What is the most likely diagnosis?
- lymphangitis carcinomatosa
 - idiopathic pulmonary fibrosis
 - extrinsic allergic alveolitis
 - histiocytosis
 - sarcoidosis
- 70) A 38-year-old male presents with a cough, not responding to antibiotics. A chest radiograph shows reticular change in both lungs with normal volumes. High-resolution CT confirms multiple thin-walled cysts with centrilobular nodules of 3–10 mm throughout the lungs. The intervening lung is normal. No pleural effusion is present. What is the most likely diagnosis?
- neurofibromatosis
 - tuberous sclerosis
 - lymphangiomyomatosis
 - histiocytosis
 - usual interstitial pneumonitis
- 71) In patients undergoing lung resection for malignancy, which imaging investigation is the best predictor of postoperative lung function?
- perfusion scintigraphy
 - ventilation scintigraphy
 - ventilation and perfusion scintigraphy
 - helical CT of the lungs
 - dynamic MRI of the lungs
- 72) A 42-year-old male suffers a chest injury in a road traffic accident. The presenting chest radiograph shows fractures of the fifth and sixth ribs on the right side with patchy airspace changes. He is admitted and has supportive care. A repeat chest radiograph shows the consolidation to have largely resolved, but a rounded opacity is now present with an air–fluid level. He is otherwise well. What is the most likely diagnosis?
- abscess
 - bronchopleural fistula
 - bronchogenic cyst
 - pulmonary infarct
 - pulmonary laceration

- 73) A 52-year-old man presents 1 year post-heart transplantation and has a routine follow-up chest radiograph. This shows multiple nodules of varying sizes, with enlarged hilar lymph nodes. What is the most likely diagnosis?
- graft-versus-host disease
 - aspergillosis
 - cytomegalovirus infection
 - post-transplantation lymphoproliferative disorder
 - Epstein–Barr virus infection
- 74) A 48-year-old female patient presents with right upper quadrant discomfort. She has previously had a liver biopsy for deranged liver function tests, which was normal. Ultrasound scan shows a rounded, 2 cm, low-echogenicity lesion related to a branch of the hepatic artery. This shows arterial-type flow throughout on Doppler. Which minimally invasive treatment option should be offered?
- injection of thrombin
 - transcatheter coil embolization
 - transcatheter placement of covered stent
 - embolization of hepatic artery
 - no endovascular treatment
- 75) Which lung segments are separated by the superior accessory fissure?
- apical segment of lower lobes from other lower lobe segments
 - apical segment of right upper lobe from other upper lobe segments
 - superior segment of lingula from inferior segment of lingula
 - lingular segment of upper lobe from remainder of left upper lobe
 - right middle lobe from right lower lobe
- 76) In normal anatomy, which vascular structure lies most anteriorly at the level of the thoracic inlet, posterior to the manubrium?
- left common carotid artery
 - brachiocephalic artery
 - superior vena cava
 - left brachiocephalic vein
 - right brachiocephalic vein

- 77) Which of the following descriptions would be most suggestive of a pulmonary hamartoma on imaging?
- round, 2 cm, soft-tissue mass with no calcification or fat, in a central location
 - irregular, 8 cm mass with cavitation and associated effusion
 - multiple lesions of 1–3 cm with calcification, throughout lungs
 - lobulated, 3 cm mass with calcification and fat, in a peripheral location
 - peripheral, 5 cm lesion with no calcification, and band-like opacity connecting it to the hilum
- 78) In persistent left-sided superior vena cava, drainage usually occurs into which structure?
- left atrium
 - right atrium
 - normal right superior vena cava
 - hemiazygos vein
 - coronary sinus
- 79) An 18-year-old male presents with a chest radiograph performed for immigration purposes. He is noted to have dextrocardia. Further investigation reveals nasal polyposis and bronchiectasis. Which further investigation should be considered?
- renal function
 - CT of brain
 - fertility assessment
 - renal angiogram
 - thyroid function test
- 80) A CT scan performed on a patient shows a soft-tissue mass in the medial aspect of the left lung, invading the mediastinum between the aortic arch and pulmonary artery. Neither vessel is compromised. Which symptom may the patient have presented with?
- stridor
 - dysphagia
 - pain
 - swelling of face and neck
 - hoarse voice

- 81) A 65-year-old male presents with chest pain and is referred for myocardial perfusion imaging, as he is unable to exercise due to osteoarthritis of the hips. He is known to have asthma requiring regular inhalers and often has a wheeze. Which pharmacological stress agent should be used?
- adenosine
 - dipyridamole
 - dobutamine
 - glyceryl trinitrate
 - arbutamine
- 82) A 78-year-old patient who had an endovascular aortic aneurysm repair undergoes a routine 6-month follow-up scan. This shows that the aneurysm sac has increased in size compared with the 1-month follow-up scan. On the delayed-phase part of the scan, there is contrast seen in the periphery of the aneurysm sac, not in contact with the stent. What is the most likely diagnosis?
- type I endoleak
 - type II endoleak
 - type III endoleak
 - type IV endoleak
 - type V endoleak
- 83) In thoracic lymphoma, which feature would favour non-Hodgkin's lymphoma over Hodgkin's disease?
- predominantly anterior mediastinal lymph nodal involvement
 - predominantly middle mediastinal lymph nodal involvement
 - predominantly posterior mediastinal lymph nodal involvement
 - nodal calcification
 - mass larger than 5 cm
- 84) In normal anatomy, which structure lies immediately anterior to the left main bronchus at the left hilum?
- left pulmonary artery
 - left inferior pulmonary vein
 - left superior pulmonary vein
 - left phrenic nerve
 - left vagus nerve

- 85) A 62-year-old male presents with increasing shortness of breath. Clinically, he has oedematous ankles, raised central venous pressure, ascites and hepatomegaly. Blood tests show mildly raised inflammatory markers. Which feature on CT would make restrictive cardiomyopathy a more likely diagnosis than constrictive pericarditis?
- dilated inferior vena cava
 - pleural effusions
 - normal pericardial thickness
 - pericardial calcification
 - previous coronary artery surgery
- 86) In an adult patient, which structure, along with the right atrium and superior vena cava, forms the right mediastinal border?
- right brachiocephalic vein
 - inferior vena cava
 - right ventricle
 - trachea
 - brachiocephalic artery
- 87) In bronchopulmonary sequestration, which of the following features would be more suggestive of intralobar than extralobar type?
- enclosed in visceral pleura
 - no connection to bronchial tree
 - systemic venous drainage
 - presentation in infancy
 - systemic arterial supply
- 88) In anatomy of the aortic arch, after the normal configuration of vessels (brachiocephalic, left common carotid and left subclavian arteries), what is the next most common configuration seen?
- left vertebral artery arising from the arch between left common carotid and subclavian arteries
 - common origin of the brachiocephalic artery and left common carotid artery
 - right subclavian arising distal to the left subclavian artery
 - common origin of left common carotid and left subclavian arteries
 - double arch with common carotid and subclavian arteries arising from each side

- 89) A 20-year-old male has a chest radiograph following a slow-to-resolve chest infection. There is a mass arising from the mediastinum on the right side. Teratoma is suspected. Which feature on CT would suggest that the lesion is more likely to be benign?
- a. lobulated margin
 - b. calcification
 - c. pleural effusion
 - d. pericardial effusion
 - e. mass projecting from both sides of the mediastinum
- 90) An 82-year-old man has known renal cell carcinoma, which is inoperable due to co-morbidity. He presents with haematuria that necessitates embolization. He has prophylactic antibiotics during and after the procedure. Twenty-four hours later he presents with loin pain and fever. Blood tests show raised inflammatory markers. A CT scan shows an area of lack of enhancement involving the tumour and adjacent renal parenchyma, with locules of gas within this area. What is the most likely diagnosis?
- a. urinary tract infection
 - b. pyelonephritis
 - c. abscess
 - d. post-embolization syndrome
 - e. unintentional embolization of non-target organ
- 91) A 60-year-old female presents with increasing shortness of breath. She is known to have rheumatoid arthritis. A chest radiograph shows reticulonodular changes, and high-resolution CT is performed. Which feature would suggest underlying sarcoidosis as a more likely diagnosis than rheumatoid lung?
- a. lower-zone predominance of reticulation
 - b. mid-zone predominance of reticulation
 - c. pleural effusion
 - d. multiple nodules larger than 20 mm
 - e. cardiomegaly

- 92) A 23-year-old female who is 23 weeks' pregnant presents with pleuritic chest pain, and pulmonary embolus is suspected. She asks about the relative radiation doses for CT pulmonary angiogram and ventilation–perfusion ($\dot{V}/\dot{Q}$) scintigraphy. What is the dose for a CT pulmonary angiogram relative to a $\dot{V}/\dot{Q}$ scan?
- CT pulmonary angiogram has a higher total body dose but a lower uterine dose
 - CT pulmonary angiogram has the same total body dose but a lower uterine dose
 - CT pulmonary angiogram has a higher total body dose and uterine dose
 - CT pulmonary angiogram has a lower total body dose and uterine dose
 - CT pulmonary angiogram has a higher total body dose but the same uterine dose
- 93) Which of the following would be most in keeping with the appearance of pulmonary hydatid disease?
- multiple subcentimetre nodules throughout both lungs with no cavitation
 - unilateral patchy alveolar changes with unilateral hilar lymphadenopathy
 - solitary ovoid mass with air–fluid level and floating debris
 - bilateral basal reticular change
 - 3 cm, rounded mass with central calcification
- 94) A 56-year-old female has arthralgia. A chest radiograph shows erosion of the lateral ends of the clavicles, superior notching of the third to fifth ribs, and narrowing of the humeral–acromial space. What is the most likely diagnosis?
- hyperparathyroidism
 - rheumatoid arthritis
 - osteoarthritis
 - cleidocranial dysostosis
 - neurofibromatosis
- 95) In the left lower lobe of the lung, the bronchi to which segments share a common origin?
- posterior basal and lateral basal
 - lateral basal and anterior basal
 - anterior basal and medial basal
 - medial basal and posterior basal
 - apical and posterior basal

- 96) A 35-year-old female who smokes presents with hypertension and renal impairment. Ultrasound scan shows normal appearance of the kidneys. Doppler of the renal arteries demonstrates a peak velocity of 180 cm/s and no diastolic flow. Angiography shows multiple stenoses of the renal arteries bilaterally with a normal aorta. Which therapeutic option should be offered?
- angiotensin-converting enzyme inhibitors
 - other antihypertensives
 - angioplasty
 - surgical correction
 - no definitive therapy is of value
- 97) On high-resolution CT of the chest, how can mosaic perfusion be distinguished from ground-glass opacification?
- the opaque areas have abnormally small vessels
 - the lucent areas have abnormally small vessels
 - mosaic perfusion is restricted to lower zones
 - mosaic perfusion is restricted to subpleural regions
 - cannot be reliably distinguished
- 98) A 59 year old with a history of ventricular arrhythmia presents with dyspnoea on exertion. A chest radiograph shows alveolar and interstitial opacification with frank consolidation at the right lung base, which is of high density. There is no peripheral oedema or cyanosis, and the heart size is normal. What is the most likely diagnosis?
- congestive heart failure
 - sarcoidosis
 - extrinsic allergic alveolitis
 - allergic bronchopulmonary aspergillosis
 - amiodarone pulmonary disease
- 99) A 67 year old presents with shortness of breath. A chest radiograph shows a reticulonodular pattern with hilar adenopathy. Which feature on high-resolution CT would make silicosis a more likely diagnosis than sarcoidosis?
- nodules > 10 mm
 - calcified hilar lymph nodes
 - traction bronchiectasis
 - honeycombing
 - progressive massive fibrosis

- 100) A 25-year-old male presents with haemoptysis. A chest radiograph shows symmetrical, bilateral, perihilar consolidation, extending to the bases but with sparing of the apices. There is mild hilar enlargement. The patient is also found to be in renal failure. Appearances on the chest radiograph subsequently progress to an interstitial pattern. What is the most likely diagnosis?
- a. primary pulmonary haemosiderosis
 - b. secondary pulmonary haemosiderosis
 - c. Goodpasture's syndrome
 - d. hereditary haemorrhagic telangiectasia
 - e. histoplasmosis