



**AMREF INTERNATIONAL UNIVERSITY  
SCHOOL OF MEDICAL SCIENCE  
DEPARTMENT OF REHABILITATION MEDICINE  
BACHELOR OF SCIENCE IN PHYSIOTHERAPY  
END OF MAY-AUGUST 2024 TRIMESTER EXAMINATIONS**

**UNIT CODE: PHT 322      UNIT NAME: CARDIOPULMONARY PHYSIOTHERAPY  
(MAIN EXAM)**

**DATE:                    MONDAY/ 12TH/ AUGUST  
TIME:                    TWO HOURS  
START:                   11.15 AM                    STOP: 1.15PM**

**INSTRUCTIONS (physical exams)**

- 1. Do not write on this question paper**

(Marks and questions distribution as per program curriculum.)

**INSTRUCTIONS (Online examinations)**

1. This exam is marked out of 70 marks
2. This Examination comprises 3 Sections
3. This online exam shall take 2 Hours
4. Late submission of the answers will not be accepted
5. Ensure your web-camera is on at all times during the examination period
6. No movement is allowed during the examination
7. Idling of your machine for 5 min or more will lead to lock out from the exam
8. The Learning Management System (LMS) has inbuilt integrity checks to detect cheating
9. Any aspect of cheating detected during and or after the exam administration will lead to nullification of your exam
10. In case you have any questions call the invigilator for this exam on Tel. 0705833434 and or the Head of Department on Tel 0720491032

For adverse incidences please write an email to: [amiu.examinations@amref.ac.ke](mailto:amiu.examinations@amref.ac.ke)

**SECTION A: MULTIPLE CHOICE QUESTIONS (MCQ) 30 MARKS**

1. A patient has a right pleural effusion postoperatively after a right lower lobe wedge resection. Which physiotherapy treatment would be MOST effective for this patient to complete three times per day?
  - A. Acapella in postural drainage positions, 10-15 breaths each session
  - B. Segmental breathing while positioned in sitting and left side lying, 10 minutes, three times a day
  - C. Autogenic drainage, repeating steps as needed
  - D. Percussion and shaking, 5 minutes per lobe in prone and head of bed flat
2. An elderly patient presents with severe COPD, GOLD stage 4. Which of the following physical examination findings would the therapist expect to find?
  - A. Kyphosis with an increased thoracic excursion.
  - B. Barreled chest with a decreased thoracic excursion.
  - C. Pectus excavatum with an increased thoracic excursion.
  - D. Pectus carinatum with decreased thoracic excursion.
3. Which finding is present on this image



- A. Normal X-ray image
- B. Sail sign
- C. Meniscus sign
- D. Pneumothorax
- E. Air bronchogram

4. What is the most likely cause of chest pain seen in this close-up chest X-ray image?



- A. Infection
  - B. Cancer
  - C. Trauma
  - D. Fibrosis
  - E. Sarcoidosis
5. A patient has the following pulmonary function tests results

Measure	Predicted	Observed	% predicted
Spirometry			
FVC (L)	3.19	2.48	78%
FEV <sub>1</sub> (L)	2.62	0.96	37%
FEV <sub>1</sub> /FVC (%)	82%	39%	
FEF 25-75% (L/S)	2.85	0.35	12%

What findings would you expect to see on a chest film given these PFT results?

- A. Blunted costophrenic angle
- B. Lung hyperinflation
- C. Pulmonary congestion
- D. Tracheal deviation

6. A PT should be alert to recognize the signs and symptoms associated with the onset of aspiration pneumonia. Which patient diagnosis is the MOST susceptible to develop this form of pneumonia?
- A. A circumferential burn of the thorax associated with significant pain.
  - B. Severe scoliosis with compression of internal organs, including the lungs.
  - C. Amyotrophic lateral sclerosis (ALS) with dysphagia and diminished gag reflex.
  - D. A complete spinal cord lesion at T2 with diminished coughing ability and forced vital capacity (FVC).
7. A patient with no significant past medical history who now presents with a bacterial pneumonia in the right anterior base would present with which of the following exam findings?
- A. Decreased breath sounds throughout all lung fields, increased SaO<sub>2</sub>, febrile.
  - B. Bronchial breath sounds at the right anterior base, increased SaO<sub>2</sub>, febrile.
  - C. Crackles on inspiration only at right anterior base, decreased SaO<sub>2</sub> and productive cough x 3 days.
  - D. Wheezes on inspiration only throughout the right lung fields, decreased SaO<sub>2</sub>, dry cough x 1 day.
8. A Physical therapist performs an evaluation of an inpatient 1 day after upper abdominal surgery. The therapist notices that there is an incentive spirometer on the patient's bedside table. What is the MOST appropriate indication for the use of incentive spirometry?
- A. Presence of atelectasis.
  - B. Signs of cognitive impairment.
  - C. Presence of ascites.
  - D. Sputum in the lungs.
9. The therapist is reading a recent report of arterial blood gas analysis with the following values:
- Fraction of inspired oxygen (FiO<sub>2</sub>) = 0.21  
Arterial oxygen pressure (PaO<sub>2</sub>) = 53 mm Hg  
Arterial carbon dioxide pressure (PaCO<sub>2</sub>) = 30 mm Hg  
PH = 7.48  
Bicarbonate ion = 24 mEq/L
- What patient state do these findings indicate?
- A. Metabolic alkalosis.
  - B. Respiratory alkalosis.
  - C. Metabolic acidosis.
  - D. Respiratory acidosis.
10. A patient in the ICU is referred to physical therapy and presents with significant shortness of breath. Notable on physical examination is a deviated trachea to the left. Which of the following processes would account for such a finding?
- A. Right lung collapse.

- B. Left pleural effusion.
  - C. Right hemothorax.
  - D. Left pneumothorax.
11. After an uncomplicated acute myocardial infarction (MI), which graded exercise test (GXT) should be administered to the patient before hospital discharge?
- A. Symptom-limited GXT at 10 days post MI.
  - B. Low level GXT at 4 to 6 days post MI.
  - C. GXT to 85% age predicted maximum HR 3 to 5 days post MI.
  - D. GXT to 75% age predicted maximum HR 4 to 6 days post MI.
12. A physical therapist is treating a recently extubated patient with medical COPD in the medical ICU. The most recent ABGs include:  
Fraction of inspired oxygen (FiO<sub>2</sub>): 0.21  
PaO<sub>2</sub>-73mmHg  
PaCO<sub>2</sub> -64mmHg  
PH: 7.28  
Bicarbonate: 24mEq/L  
What do these findings indicate?
- A. Metabolic alkalosis
  - B. Respiratory alkalosis
  - C. Metabolic acidosis
  - D. Respiratory acidosis
13. A patient is referred for physical therapy after a graded exercise test (GXT). The physician reports the test was positive and had to be terminated in 7 minutes. Which of the following criteria is an absolute indication for terminating exercise testing?
- A. Mild angina and dyspnea with progressive increases in the treadmill speed and grade.
  - B. A hypertensive response with blood pressure of at least 170/95.
  - C. ST segment depression from baseline of 3-mm horizontal or down sloping depression.
  - D. ECG changes from baseline of 1-mm ST segment elevation.
14. A patient with a recent history of rib fractures suddenly becomes short of breath during a bout of coughing. The patient looks panicked and complains of sharp pain in the left chest. A quick screen shows a deviated trachea to the right, among other signs and symptoms. What is the MOST likely diagnosis based on these symptoms?
- A. Pulmonary emboli.
  - B. Pneumothorax.
  - C. Angina.
  - D. Mucous plugging of an airway

15. An apparently healthy individual has several risk factors for coronary artery disease. The client is interested in improving overall fitness and cardiac health. After a graded exercise test, which was asymptomatic, the client is referred for an exercise class. Which is the BEST measure of exercise intensity in a newly tested and exercising individual?
- A. Heart rate (HR).
  - B. Rating of perceived exertion (RPE).
  - C. MET level.
  - D. Respiratory rate.
16. A patient with a long history of systemic steroid use for asthma control is hospitalized with pneumonia. Which of the following is a contraindication to percussion?
- A. Barrel chest.
  - B. BP > 140/90.
  - C. Intercostal muscle wasting.
  - D. Decreased bone density
17. What will a patient with a significant right thoracic structural scoliosis demonstrate on examination?
- A. Decreased breath sounds on the right.
  - B. Decreased thoracic rib elevation on the right.
  - C. Increased lateral costal expansion on the right.
  - D. Shortened internal and external intercostals on the right.
18. A patient with a long history of cigarette smoking has been admitted to the hospital and presents with tachycardia, signs of lung infection, abnormal breath sounds in both lower lobes, and dullness to percussion. What should the therapist's initial intervention focus on with this patient?
- A. Getting the patient to quit smoking.
  - B. Breathing reeducation to increase efficiency of ventilation.
  - C. Airway clearance and secretion removal.
  - D. Graded inspiratory muscle training.
19. Pursed lip breathing as part of the treatment regimen would be MOST appropriate for a patient with which condition?
- A. Circumferential thoracic burns.
  - B. Asbestosis.
  - C. Rib fracture.
  - D. Emphysema.

20. A therapist is planning to use percussion and shaking for assisting airway clearance with a patient diagnosed with chronic obstructive pulmonary disease (COPD). What major precaution might curtail selection of this form of intervention?
- A. A platelet count of 20,000.
  - B. Dyspnea when in the Trendelenburg position.
  - C. SaO<sub>2</sub> ranges of 88% to 94% on room air.
  - D. Functional Independence Measure (FIM) score of 4.
21. Phase 2 of cardiac rehabilitation is.
- A. Community based.
  - B. Inpatient rehabilitation
  - C. Outpatient rehabilitation
  - D. A and B
22. Regarding sternal precautions
- A. There should be no bilateral stretching of UEs.
  - B. One can stretch by pushing against the wall.
  - C. Stretching is okay as long as is done one a week.
  - D. There should be no stretching at all.
23. The patient in room calls on the call light to tell you something is wrong with his chest tube. When you arrive to the room you note that the drainage system has fallen on its side and is leaking drainage onto the floor from a crack in the system. What is your next PRIORITY?
- A. Place the patient in supine position and clamp the tubing.
  - B. Notify the physician immediately.
  - C. Disconnect the drainage system and get a new one.
  - D. Disconnect the tubing from the drainage system and insert the tubing 1 inch into a bottle of sterile water and obtain a new system.
24. A patient is recovering from pneumothorax and has a chest tube present. Which of the following is an appropriate finding when assessing the chest tube drainage system?
- A. Intermittent bubbling may be noted in the water seal chamber.
  - B. 200cc of drainage per hour is expected during recovery of a pneumothorax.
  - C. The chest tube is positioned at the patient's chest level to facilitate drainage.
  - D. All these options are appropriate findings.
25. In a paralyzed patient on intermittent positive pressure ventilation (IPPV)
- A. Inspiration is brought about by a fall in intrapleural and alveolar pressure.
  - B. If hypoxia occurs the tidal volume and respiratory frequency of the ventilator should be increased
  - C. The usual settings include an inspiratory time which is longer than the expiratory time.

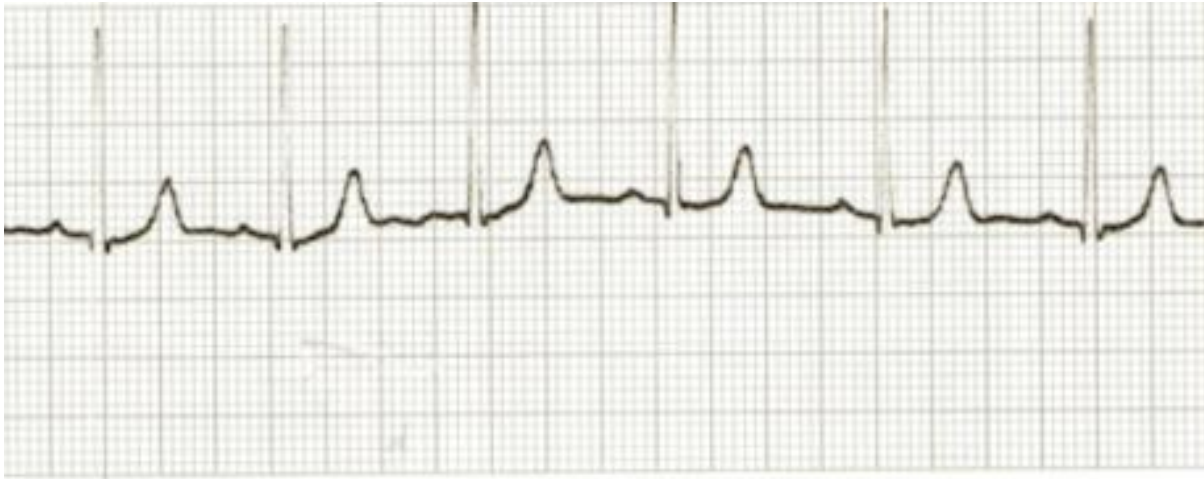
- D. Minute ventilation is usually adjusted to maintain a  $paco_2$  at a near normal level (~5 kpa, 37 mmhg).
26. Which statement is INCORRECT concerning continuous positive airway pressure (CPAP)?
- A. It can be used to take over the work of breathing.
  - B. It is applied using a nasal or face mask.
  - C. It can be used to prevent upper airways collapse in sleep apnea
  - D. It can be used in interstitial diseases to reduce VA/Q mismatch.
27. Non-invasive intermittent positive pressure ventilation, NIPPV,
- A. Produces a similar airway pressure profile to that produced by a tank ventilator ('iron lung')
  - B. helps reduce the work of breathing and is very useful for exhausted patients with respiratory failure.
  - C. Is not a suitable technique for exacerbations of severe chronic obstructive pulmonary disease (COPD)
  - D. is usually applied through an endotracheal tube.
28. Based on the weaning protocol all of the following conditions must be met for consideration of a weaning attempt except:
- A. Hemodynamic stability
  - B. Little or no sedation required.
  - C.  $PaO_2/FIO_2$
  - D. Presence of inspiratory effort
29. Other causes of increased airflow resistance during mechanical ventilation include all the following conditions except:
- A. Kinking of the ET tube
  - B. Secretions in ET tube
  - C. Use of a humidifier
  - D. Use of an HME
30. The \_\_\_\_ is measured by dividing the patient's tidal volume (measured at the airway opening) by the difference in the plateau pressure and the PEEP.
- A. Airway resistance
  - B. Static lung compliance
  - C. Dead space to tidal volume ratio
  - D. Dynamic lung compliance



**SECTION B: SHORT ANSWER QUESTIONS (SAQ)**  
**ANSWER ALL QUESTIONS.**

**20 MARKS**

1. Use the following diagram to answer the questions



HEART RATE:

HEART RHYTHM:

(2 marks)

2.



B). HEART RATE:

HEART RHYTHM:

(2 marks)

3. How does emphysema differ from chronic bronchitis? (4 marks)

4. What response should you see to determine if bronchodilators have a positive effect on pulmonary function? (2 marks)

5. Define pulmonary rehabilitation. Discuss the various components of pulmonary rehabilitation (5 marks)

6. You are working with a 54-year-old pt. who has just undergone a cardiac transplant. What should his target heart rate be (assuming you want it to be 70% of his max. heart rate)? (Show your working) (5 marks)

**SECTION C: LONG ANSWER QUESTIONS (LAQS)**

**20 MARKS**

**ANSWER ALL QUESTIONS EACH ONE IS 10 MARKS**

1. The patient is a 78-year-old male recently discharged from the hospital (post-operative day #4) following admission for open cholecystectomy (midline incision). Throughout the entire post-op period, the patient noted significant incisional pain. A chest X-ray performed on post-operative day (POD) #4 revealed diffuse infiltrates within the bilateral posterior lower lobes consistent with pneumonia. The patient was insistent upon hospital discharge and consequently returned home on 2 liters of oxygen via nasal cannula with continued activity-related shortness of breath. Home PT services have been ordered.

PMH: emphysema, non-insulin dependent diabetes mellitus, early Parkinson's disease, hypertension

SH: At baseline, the patient was an independent community ambulatory with a single point cane and was able to engage in functional activities without use of home oxygen. The patient quit smoking (55 pack year history) in 2009 following his emphysema diagnosis. He reports social alcohol and recreational marijuana use. Patient lives with significant other in a 3<sup>rd</sup> floor condo (elevator building) within a retirement community. Currently retired, patient was formerly employed as a math professor at the local university.

Meds: levodopa-carbidopa combination (Parkinson's disease), beta blocker (hypertension), inhaled corticosteroid (emphysema), opioid (pain management)

The physical therapist presents to the patient's home on POD # 6 for the initial evaluation. Upon arrival, the patient is in a recliner with nasal cannula properly positioned. The patient continues with complaints of pain with movement despite adhering to his prescribed pain medication schedule. He reports being able to ambulate short household distances though is limited by shortness of breath.

- a). Instruct patient in an appropriate breathing exercise. (5 marks)
- b). Instruct patient in an appropriate mobility or standing endurance activity. (2 marks)
- d). Is postural drainage/percussion/vibration justified? Explain. (2 marks)
- e). What factors would indicate that the activity selected was dosed for a cardiopulmonary endurance response as compared to a muscular strength response? (1marks)

2. Describe the phases of cardiac rehabilitation after Open Heart Surgery and the precautions to be taken (10 marks)

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