

SimBioSys Chapter

Chapter 1: Membrane Physiology

Exercise 1: Diffusion in a Free Fluid

Exercise 2: Diffusion across a Membrane

Chapter 2: Cellular Excitability

Exercise 1: Nernst Equation

Exercise 2: Determinants of the Resting Membrane Potential

Exercise 3: Action Potentials

Chapter 3: Cell Signaling

Exercise 1: Dose Response Curves

Exercise 2: Competitive and Noncompetitive Antagonists

Exercise 3: Epinephrine and Propranolol

Chapter 4: Muscle Contraction

Exercise 1: The Length-Tension Relationship

Chapter 5: Pressure and Flow

Exercise 1: Systemic Vascular Resistance

Exercise 2: Pulmonary Vascular Resistance

Exercise 3: Shape of the Pulse Waveform

Chapter 6: Cardiac Excitation

Exercise 1: AV Nodal Conduction

Exercise 2: Automaticity

Exercise 3: Rhythms

Corresponding Human Organ Systems Lecture

Cardiac Electrophysiology

Cardiac Electrophysiology

Cardiac Electrophysiology

Cardiac Pump

"Cardiac Pump, Heart-Vascular Coupling and Integrative Cardiovascular Control, Arterial and Venous Systems and Microcirculation"

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Cardiac Electrophysiology, The Electrocardiogram

Cardiac Electrophysiology

Cardiac Electrophysiology

The Electrocardiogram

Chapter 7: The Cardiac Cycle

Exercise 1: Ventricular Ejection

Cardiac Pump

Exercise 2: Ventricular Filling

Cardiac Pump

Exercise 3: Aortic Stenosis

Clinical Applications of Cardiovascular Physiology

Exercise 4: Aortic Regurgitation

Clinical Applications of Cardiovascular Physiology

Chapter 8: Cardiac Pressure Volume Relationships

Cardiac Pump

Exercise 1: Diastolic PV Relationships

Cardiac Pump

Exercise 2: Cardiac Preload

Cardiac Pump

Exercise 3: Cardiac Afterload

Cardiac Pump

Exercise 4: Systolic PV Relationships

Cardiac Pump

Exercise 5: Measuring Contractility

Cardiac Pump

Exercise 6: Heart Rate

Cardiac Pump

"Overview of Circulation and Hemodynamics, Heart-Vasculature coupling and integrative Cardiovascular Control"

Chapter 9: Control of Circulation

Exercise 1: Circulatory Pause

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Exercise 2: Hemorrhage

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Exercise 3: Tamponade

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Exercise 4: Dobutamine

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Chapter 10: Autonomic Control

Regulation of the Heart

Exercise 1: Parasympathetic Tone

Regulation of the Heart

Exercise 2: Sympathetic Tone

Regulation of the Heart

Exercise 3: Hemorrhage

Cardiovascular, autonomic, and body fluid balance: adaptations to hemorrhage and heart failure

Exercise 4: Ganglionic Blockade

Regulation of the Heart

Chapter 11: Blood Gas Transport

Exercise 1: Altitude	Gas Transport and Ventilation
Exercise 2: Respiratory Quotient	Gas Transport and Ventilation
Exercise 3: Hemoglobin Oxygen Dissociation	Gas Transport and Ventilation
Exercise 4: CO ₂ Content	Gas Transport and Ventilation
Exercise 5: Arterial and Venous Blood	Gas Transport and Ventilation

Chapter 12: Systemic Oxygen Transport

Exercise 1: Hypoxic Hypoxia	"Mechanisms of Hypoxemia, Systemic Oxygen Transport"
Exercise 2: Stagnant Hypoxia	""
Exercise 3: Anemic Hypoxia	""
Exercise 4: Supply Dependency	""

Chapter 13: Lung Gas Exchange

Exercise 1: Carbon Dioxide and Ventilation	"Overview of Respiratory Function, Gas Transport and Ventilation"
Exercise 2: Hemoglobin and Oxygen	""

Chapter 14: Shunt and Dead Space

Exercise 1: Dead Space	Gas Transport and Ventilation
Exercise 2: V _E and CO ₂	Gas Transport and Ventilation
Exercise 3: Shunt	Mechanisms of Hypoxia
Exercise 4: VA/Q Matching	Mechanisms of Hypoxia

Chapter 15 Respiratory Statics

	"Overview of Respiratory Function, Pulmonary Mechanics"
Exercise 1: Spirometry Tracing	""
Exercise 2: Predicted Normal Lung Values	""
Exercise 3: Collagene and Lung Mechanics	""

Exercise 4: Elastin and Lung Mechanics

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Exercise 5: Water Surface Tension and Lung Mechanics

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Exercise 6: Chest Wall Mechanics

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Exercise 7: Integrated Mechanics

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Chapter 16 Respiratory Dynamics

"Overview of Respiratory Function, Pulmonary Mechanics"

Exercise 1: Respiratory Muscle Function

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Exercise 2: Pressure, Flow and Volume

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Exercise 3: Airflow in the Upper Airways

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Exercise 4: Forced Expiratory Flow

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Exercise 5: The Flow Volume Loop

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Chapter 17: Fluid Compartments

Exercise 1: Fluid Volumes

Body Fluids

Chapter 18: Kidneys and Filtration

Exercise 1: Glomerular Filtration

Introduction to the Kidney and Its Glomerulus

Chapter 19: Acid-Base Physiology

Regulation of Acid-Base Balance

Exercise 1: CO₂ Effects

Regulation of Acid-Base Balance

Exercise 2: Relationship of [H⁺] and pH to SID

Regulation of Acid-Base Balance

Exercise 3: Gamblegrams

Regulation of Acid-Base Balance

Exercise 4: Strong Ion Difference

Regulation of Acid-Base Balance

Exercise 5: SID = 42.

Regulation of Acid-Base Balance