

Exam Copy 4

NROSCI/BIOSC 1070 and MSNBIO 2070

Exam # 1

September 29, 2017

Total POINTS: 100	20% of grade in class
--------------------------	------------------------------

- 1) Indicate whether the aortic and mitral valves would be open or closed during each of the following conditions? **(8 points)**.

<u>Condition</u>	<u>Mitral Valve</u>		<u>Aortic Valve</u>	
Atrial a-Wave	Open	Closed	Open	Closed
Isovolumetric Contraction	Open	Closed	Open	Closed
Third Heart Sound	Open	Closed	Open	Closed
Onset of ECG T-Wave	Open	Closed	Open	Closed

- 2) Echocardiography shows that a patient has regurgitation through the mitral valve. Describe differences in the heart sounds (if any) in this patient from a normal individual. Your answer should reflect whether the heart sounds occur during ventricular diastole or systole. **(2 points)**.

Exam Copy 4

- 3) Digoxin, sold under the brand name Lanoxin among others, is a medication used to treat heart failure. Digoxin is an inhibitor for sodium-potassium ATPase. Briefly describe the mechanism through which an inhibitor for sodium-potassium ATPase acts to treat heart failure. **(5 points)**.
- 4) Skeletal and cardiac muscle cells are isolated and placed in a tissue bath. Both types of cells are stretched identically. Which type of cell would generate the most amount of tension when stretched passively? Briefly indicate why stretch of this particular type of muscle cell would create extensive tension. Your answer should encapsulate the molecular differences between the muscle cells that lead to tension differences when they are stretched. **(5 points)**.

Exam Copy 4

- 5) Congestive heart failure occurs when one ventricle does not pump out the same volume of blood per unit time as the other. However, in the vast majority of individuals, heart failure does not occur. Briefly describe the mechanism through which cardiac output from both ventricles is always balanced. Your answer should include a discussion of how cardiac output imbalances from the two ventricles are quickly corrected. **(7 points)**.

Exam Copy 4

- 6) In the table below, circle which type of blood vessel corresponds to each property described. (12 points).

Property	Type of Blood Vessel			
Highest Surface Tension	Large Artery	Arteriole	Capillary	Vein
Slowest Velocity Blood Flow	Large Artery	Arteriole	Capillary	Vein
Contains the Most Blood (all vessels of type combined)	Large Artery	Arteriole	Capillary	Vein
Highest Compliance	Large Artery	Arteriole	Capillary	Vein
Least Amount of Smooth Muscle in Wall	Large Artery	Arteriole	Capillary	Vein
Largest Pulse Pressure	Large Artery	Arteriole	Capillary	Vein

Exam Copy 4

- 7) A cuff is inflated around the upper arm to a pressure greater than systolic pressure. Prior to cuff inflation the mean arterial pressure is 100 mmHg and the venous pressure in the arm is 5 mmHg. If venous compliance in the forearm is 20 times greater than the arterial compliance, what will the final equilibrium pressure be on complete cessation of blood flow? **(15 points)**.

Exam Copy 4

- 8) The drug Ditropan (oxybutynin) has been used to treat patients with an overactive bladder. The main side effect of the drug is a dry mouth, but patients taking Ditropan are advised to avoid exercise in a hot environment, as the drug increases the possibility of having a heat stroke. Briefly describe why Ditropan makes a patient more susceptible to heat stroke. **(6 points)**.

Exam Copy 4

- 9) Blockers of L-type Ca^{2+} channels are often used to treat angina, cardiac pain that occurs when the heart is overworked. Actions of such drugs on three distinct types of cells contribute to their efficacy in treating angina. List each of these cell types, and the mechanisms through which the actions of Ca^{2+} -channel blockers on these cells reduces myocardial oxygen consumption. **(15 points).**

Cell Type 1

Cell Type 2

Cell Type 3

Exam Copy 4

- 12) Because of the potential side effects of taking Pyridostigmine, elaborated in your answers to question 11, this drug is usually combined with a second drug that diminishes these unwanted effects. How would such a drug act to diminish the side effects? **(4 points)**.
- 13) Contraction of skeletal muscle entails a variety of molecular and biochemical events. Which of these events is the slowest, and thus the “rate limiting” step of muscle contraction? **(3 points)**.

Exam Copy 4

Please Take This Page With You As A Record of Your
Exam #

Exam # 1
September 29, 2017

Exam Copy 4

Please Print Your Name Below
This page will be filed away until exam grading is
complete.

Print Your Name

Exam # 1
September 29, 2017