

BIOL 1114 Exam #1 (Preview) September 12, 2016

The following material will appear on the upcoming exam. Use this preview to familiarize yourself with the material, and guide you in studying. Be sure to look up the definitions of any words you do not know. You are free to discuss this material or ask questions about it.

Use a #2 pencil to fill in the information on your NCS answer sheet. Put your **O-Key Account Username** in the boxes indicated for **LAST NAME** and darken the appropriate circles. **Write your Name (Last, First)** and **“Star” or “NoStar”** in the space above the boxes containing your O-Key Account Username. Darken the (S) in the last column of the name circles. Enter the number **1631** and **darken the corresponding circles** in the **first 4 columns** of the **“Student ID.”** Failure to perform this correctly will incur a **-10pt handling fee**. Read all questions and answers *carefully* before choosing the **single BEST response** for each question. Feel free to ask the instructor for clarification.

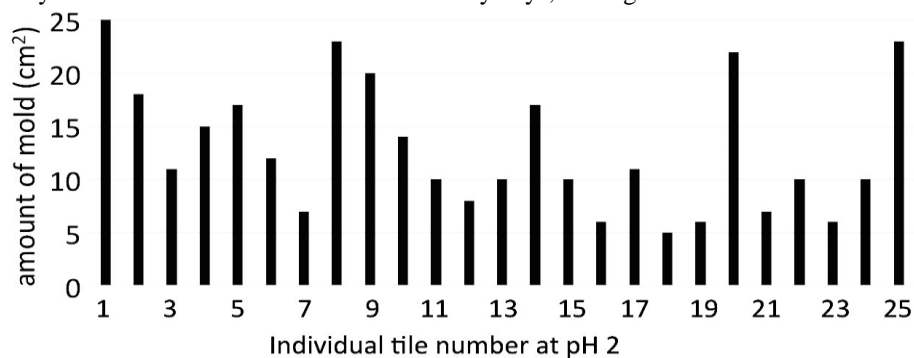
Animal physiologists have captured a dragonfly and its chief predator, the toucan, in the Amazonian rainforest. Because they are interested in measuring the metabolic rates of both species, the physiologists place each in a chamber with temperature control and measure their carbon dioxide (CO₂) production rates at different ambient (environmental) temperatures:

Ambient Temperature	CO ₂ production (millimoles CO ₂ /minute/gram) by:	
	Dragonfly	Toucan
15 °C	100	250
20 °C	150	170
25 °C	210	170
30 °C	250	170
35 °C	320	190

This fox frequently appears curled up (legs tucked under, furry tail wrapped around) on roofs of dark-colored cars in a University of Colorado parking lot, but only on cool, sunny mornings.



Brett, a student who has not taken BIOL 1114, is testing the effect of pH of cleaning solutions on growth of mold (a fungus). pH is a scale ranging from low (below 7 is acidic) to high (above 7 is alkaline), with 7 being neutral. Brett adjusts the cleaning solution to pH 2. Brett then applies the solution to 25 slate tiles that are covered in mold, and measures the amount of mold after 24 hours, in cm². Brett then graphs the amount of mold (on the Y-axis) for each of the 25 tiles (on the X-axis, which Brett labels as pH 2). Brett measures very little mold growth on the tiles after they were immersed in the solutions overnight. The molds initially grew in a thin layer over the entire tile surface. After many days, mold growth was much thicker.



The United States Environmental Protection Agency (EPA) has contracted a laboratory to determine whether a new fungicide (chemical that kills fungi) may be toxic to amphibians at environmentally relevant concentrations. Amphibians absorb chemicals through their skin. The scientists examine whether the fungicide affects the distance Great Plains toads (*Anaxyrus cognatus*) can jump. They expose ten toads to each of five concentrations of the fungicide in heated tanks, and record the distance all toads can jump. The average jump distance for toads exposed to each concentration was:

Fungicide Concentration ($\mu\text{g}/\text{cm}^2$)	Average Jump Distance (cm)
0	8
0.55	7.9
1.1	7.8
2.2	6.9
4.4	5.7
8.8	3.4

The heat lamp in one of the experimental tanks got stuck in the 'On' position, and thus the temperature in that tank was much higher than in the other experimental tanks. The experimenters noticed that toads overheated in that tank, and had a red, flushed look to their normally white belly skin

In their natural habitat, when toads become dehydrated, they press their bellies to the soil to absorb water. When toads become overheated, they burrow underground, where they rest against the cooler soil.

The venom of a newly discovered species of spider affects animals by preventing the formation of NADH from NAD⁺ during respiration.

A researcher wants to filter red blood cells out of a sample of blood. Unfortunately, normal red blood cells are just small enough to pass through the filter.

Different species of hummingbirds inhabit the Amazonian Rainforest. Ornithologist Israel Garcia determined that hummingbird species in this hot and humid ecosystem are remarkably different in size compared with those living in the slopes of the Andean Cordilleras. He measured temperature and humidity in Andean Cordilleras and found that both are low compared to the Amazon Rainforest. Ornithologist Garcia calculates the SA/V ratio of a 1-cm tall Amazonian and a 3 cm tall Andean hummingbird, which have the same shape. As Ornithologist Garcia is retrieving a frosty-cold adult beverage from an ice chest, an Amazonian hummingbird enters the chest and is accidentally enclosed in it for 10 minutes. The ornithologist proposed the hummingbird survived because the temperature was low but the O₂ supply was high. To warm itself, the hummingbird may have made its inner-mitochondrial membranes permeable (leaky) to H⁺. If the air in the chest lacked O₂, the hummingbird would have died.

A researcher studying insects fed only sugar discovers that an insecticide stops all ATP production.