

BIO 1130FF

An introduction to Organismal biology
Midterm examination
Worth either 15% or 20% of your final grade

Saturday, November 12, 2016

Part A: Multiple choice questions
26 points (1 point/question)

Fill in the bubbles for your name and student number and BIO1130FF for the course code. Fill in the same information in text in the boxes above the bubbles.

Use only a pencil to fill in the answer sheet. If you erase a question be sure to erase all of the pencil mark. Don't place any marks anywhere on the sheet other than where the bubbles are for personal information or your answers.

Do not place any answers on the question sheet.

This is not an open book exam.

CAUTION to minimize paper waste this part of the exam has been printed back to back

NOTE: If you do not fill in the student number and course code as **BIO1130FF** it will be impossible to identify your answer sheet and you will receive a **ZERO** for this part of the exam

BIO 1130FF - Midterm Examination – November 7, 2015
Multiple choice questions - Place your answers on the answer sheet

FF.1 Which of the following conditions is not one of those under which a population of diploid organisms will achieve genetic equilibrium?

- a. the mutation rate is increasing
- b. no immigration from other populations
- c. the population is infinite in size
- d. individuals mate randomly

FF.2 Because of fluctuations in the environment, such as depletion of food supply or an outbreak of disease, a population may periodically experience a rapid and marked decrease in number of individuals, leading to a form of genetic drift called

- a. gene flow.
- b. natural selection.
- c. founder effect.
- d. migration.
- e. a population bottleneck.

FF.3 The latent phase of an animal virus is

- a. the equivalent of the lysogenic cycle of some bacteriophages.
- b. the time it takes to replicate the viral genome.
- c. the time it takes to assemble one viral particle.
- d. the period from infection to host cell lysis.

FF.4 Viruses form a capsid around their nucleic acid core. What is this capsid composed of?

- a. protein
- b. lipoprotein
- c. glycoprotein
- d. polysaccharides

FF.5 Virus particles may contain all of the following components except _____.

- a. ds or ss RNA or DNA
- b. coat proteins
- c. host cell recognition proteins
- d. ribosomes

FF.6 Protobionts (protocells) are

- a. a group of abiotically produced inorganic molecules surrounded by a membrane-like structure.
- b. a group of abiotically produced organic molecules surrounded by a membrane-like structure.
- c. a group of biotically produced inorganic molecules surrounded by a membrane-like structure.
- d. a group of biotically produced organic molecules surrounded by a membrane-like structure.

FF.7 The major structural component of bacterial cell walls is

- a. proteoglycan.
- b. peptidoglycan.
- c. cellulose.
- d. arabinogalactan.

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FF.8 A ring species is one where

- a. an area's climate interferes with speciation.
- b. none of the various populations can successfully mate in nature.
- c. all of the various populations can successfully mate in nature.
- X** d. only intermediary populations can mate successfully.

FF.9 In bacteria the purpose of the sex pilus is to

- a. allow transfer of gametes.
- b. form a gap junction and conjugate.
- X** c. facilitate DNA exchange.
- d. stabilize a network of bacterial cells

FF.10 Which of the following is characteristic of the lytic cycle?

- a. Many bacterial cells containing viral DNA are produced.
- b. Viral DNA is incorporated into the host genome.
- c. The viral genome replicates without destroying the host.
- X** d. A large number of phages are released at a time.

FF.11 Which of the following characteristic would likely be true for a bacterium that stains positive in a gram stain test?

- X** a. Thicker peptidoglycan in cell wall
- b. Less sensitive to penicillin
- c. Two cell membranes
- d. No plasma membrane

FF.12 Which of the following best defines a virus?

- a. a naked fragment of nucleic acid
- b. a disease-causing group of proteins
- X** c. an entity composed of proteins and nucleic acids
- d. an entity composed of proteins, nucleic acids, and ribosomes

FF.13 The habitat overpasses along the transCanada highway in the Canadian Rockies are trying to solve a problem created by this. (Choose the most precise answer)

- X** a. founder Effect
- b. bottle neck effect
- c. genetic drift
- d. gene flow
- e. migration

FF.14 When a retrovirus infects a host cell, reverse transcriptase copies the _____ viral genome into a _____ copy, which is inserted into the host cell genome.

- a. double-stranded RNA; double-stranded DNA
- b. single-stranded RNA; single stranded DNA
- X** c. single-stranded RNA; double-stranded DNA
- d. single-stranded DNA; double-stranded DNA

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- FF.15 The allele frequencies for a particular gene locus are best defined as the _____.
a. number of individuals possessing each genotype
b. number of individuals possessing each allele
X c. proportion of each allele in a population
d. total number of different genes in a population
- FF.16 As the frequency of a recessive allele declines, it is more likely to be _____.
a. found in a homozygous recessive genotype
X b. found in a heterozygous genotype
c. eliminated from the population
d. advantageous to remaining individuals carrying it
- FF.17 Arrange the following layers of a gram-negative bacteria from most external to most internal. 1 = cell membrane, 2 = capsule and 3 = cell wall. This may not be a complete list just arrange the three in order and ignore any missing components.
a. 3, 1, 2
b. 2, 1, 3
X c. 2, 3, 1
d. 1, 2, 3
- FF.18 In modern terminology, diversity is understood to be a result of genetic variation. Sources of variation for evolution include all of the following except
X a. mistakes in translation of structural genes.
b. recombination at fertilization.
c. translocations and mistakes in meiosis.
d. mistakes in DNA replication.
e. recombination by crossing over in meiosis.
- FF.19 Which of these is a statement that Darwin would have rejected?
X a. The smallest entity that can evolve is an individual organism.
b. Inherited variation in a population is a necessary precondition for natural selection to operate.
c. Some individuals possess characteristics that enhance their survival and reproduction in specific environments.
d. Environmental change plays a role in evolution.
e. Natural populations tend to produce more offspring than the environment can support.
- FF.20 In a Hardy-Weinberg population with two alleles, A and a, that are in equilibrium, the frequency of allele a is 0.2. What is the frequency of individuals with Aa genotype?
a. 0.80
b. 0.42
c. 0.20
d. 0.32
X e. Genotype frequency cannot be determined from the information provided.
- FF.21 Ciliates have a micronucleus that functions primarily to _____.
X a. regulate sexual and asexual reproduction
b. regulate housekeeping functions
c. encode cell-surface proteins that bind to host cell receptors
d. produce rRNA

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- FF.22 In a Hardy-Weinberg population with two alleles, A and a, that are in equilibrium, the frequency of allele a is 0.1. What is the percentage of the population that is heterozygous for this allele?
- a. 90
 - X b. 18**
 - c. 81
 - d. 10
 - e. 49
- FF.23 Which free-living cells were the earliest contributors to the formation of Earth's oxidizing atmosphere?
- a. endosymbionts
 - b. mitochondria
 - c. seaweeds
 - X d. cyanobacteria**
 - e. chloroplasts
- FF.24 Carl Woese and collaborators identified two major branches of prokaryotic evolution. What was the basis for dividing prokaryotes into two domains?
- a. ecological characteristics such as the ability to survive in extreme environments
 - X b. genetic characteristics such as ribosomal RNA sequences**
 - c. metabolic characteristics such as chemoautotrophy and photosynthesis
 - d. metabolic characteristics such as the production of methane gas
 - e. microscopic examination of staining characteristics of the cell wall
- FF.25 Which of the following does not tend to promote speciation?
- a. the founder effect
 - b. natural selection
 - X c. gene flow**
 - d. polyploidy
- FF.26 Some viruses contain an envelope, which is made of materials derived from _____.
- a. the virus cell membrane
 - b. bacterial cell walls
 - X c. the host cell's membrane**
 - d. animal cell walls