Using Short Answer questions in very large classes

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Acknowledgements

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Students

- Past two years: 451-639 students/semester
Why?


“... the present study suggests that quality of performance does vary as a function of what type of test is anticipated. That is, those expecting an essay test chose for note taking sentences of greater importance to the overall meaning of the passage than those expecting a multiple choice test...”

“... the essay group recalled more high SI items* than the multiple choice group...”

*Structurally Important: A measure of how critical a sentence is to the understanding of a text passage.
21) The figure at the right shows a cell with two pairs of homologous chromosomes. Three genes with two alleles each (A/a, D/d, and R/r) are located on these chromosomes.

a. Draw the cell and its chromosomes as they would appear at metaphase I of meiosis. Include all the possible arrangement(s) for the genes /chromosomes assuming that crossing over DOES NOT occur. (8 pts)

b. List the genotypes of all possible gametes that could be produced by this cell assuming no crossing over. (4 pts)

a Dr  AdR
A Dr  a dR
The figure at the right shows a cell with two pairs of homologous chromosomes. Three genes with two alleles each (A/a, D/d, and R/r) are located on these chromosomes.

Which of the following correctly shows the genotypes of all the possible gametes that could be produced by this cell assuming no crossing over.

a) ADR, adr, Adr, aDR  
b) ADr, adR, AdR, aDr  
c) ADr, adR  
d) AdR, aDr  
e) aDR, Adr
Incorporating Short Answers into a big class

- STEM Grant to hire undergrad scorers
  - 3-6 students who had earned an A in previous 1107

- Exam
  - Started with 1-2 questions per test for 10-20% of score for 180 students
  - Now use 3-4 multipart questions per test for 40% of score for up to 600+ students
Knowledge Questions (3 pts each)

1) Which is made of DNA?
   A) operator
   B) co-repressor
   C) activator
   D) polymerase
   E) inducer

2) Which of the following, when taken up by the cell, binds to the repressor so that the repressor no longer binds to the operator?
   A) promoter
   B) repressor
   C) inducer
   D) corepressor

3) Which would enable production of different proteins from one gene?
   A) changes in chromatin organization
   B) binding of an mRNA by more than one ribosome
   C) changes in RNA splicing
   D) changes in transcriptional regulation
   E) all of the above

4) A cell sends a signal and several nearby cells respond. This is an example of ___ signaling.
   A) endocrine
   B) paracrine
   C) autocrine
   D) synaptic

5) Chromosomes condense during mitosis
   A) to allow the sister chromatids to remain attached
   B) to enable the chromosomes to move without tangling and breaking
   C) to allow the chromosomes to fit within the nuclear envelope
   D) to prevent gene expression during cell division.

6) Homologous chromosomes separate during:
   A) prophase I
   B) anaphase II
   C) mitosis
   D) anaphase I

7) Chromatids separate from each other during
   A) Mitosis and meiosis I.
   B) Mitosis and meiosis II.
   C) Mitosis only.
   D) Meiosis I only.
   E) Meiosis II only.

8) An allele that expresses its phenotype when heterozygous with a recessive allele is termed the ___ allele
   A) recessive
   B) independently assorting
   C) dominant
   D) parental

Concept Application Questions (3 pts each)

9) A gene that codes for an enzyme used to break down fatty acids is controlled by means of negative regulation. Which statement might describe regulation of this gene?
   A) If fatty acid levels are high, activator protein is turned on and the gene is expressed
   B) If fatty acid levels are high, this turns off a repressor and the gene is expressed
   C) If fatty acid levels are high, this turns on a repressor preventing expression of the gene
   D) None of these are examples of negative regulation

10) Expression of most genes is tightly regulated but some genes are expressed at roughly constant rates (i.e., constitutively). Which of the following genes would you predict to be constitutively expressed?
    A) genes involved in the breakdown of the polysaccharide chitin
    B) genes involved in the production of the amino acid tryptophan
    C) genes involved in the transport of the sugar lactose
    D) genes that code for enzymes involved in glycolysis

11) The function of an activator protein in gene expression would be analogous to a car's
    A) engine
    B) gear shift
    C) steering wheel
    D) parking brake
    E) accelerator pedal
Short Answer Questions

21) The figure at the right shows a cell with two pairs of homologous chromosomes. Three genes with two alleles each (A/a, D/d, and R/r) are located on these chromosomes.

a. Draw the cell and its chromosomes as they would appear at metaphase I of meiosis. Include all the possible arrangement(s) for the genes /chromosomes assuming that crossing over DOES NOT occur. (8 pts)

b. List the genotypes of all possible gametes that could be produced by this cell assuming no crossing over. (4 pts)

22) BRIEFLY and clearly describe (or draw and label a diagram) two different mechanisms reducing expression of a gene at the transcriptional level. (6 pts)
23) In rabbits, two independently assorting genes control body color (B) and ear length (b). Black short (bbSs) rabbits are generated by crossing a black short rabbit with a black long rabbit. Black short rabbits from the F₁ generation are used in the breeding study. The F₂ generation is generated by crossing F₁ rabbits with each other.

a) Given that the genotype of the parental animal that was black with short ears was (bbSs), what is the genotype of the parental animal that was black with long ears? (1 pt)

b) Given that the genotype of the parental animal that was black with long ears was (BBss), what is the genotype of the parental animal that was black with short ears? (1 pt)

c) Using the gene symbols described above, answer the following questions.

i. (1 pt) List all possible genotypes of the F₂ generation. (2 pt)

ii. (1 pt) List all possible phenotypes of the F₂ generation. (2 pt)

iii. (1 pt) List all possible genotypes of the F₁ generation. (1 pt)

iv. (1 pt) List all possible phenotypes of the F₁ generation. (1 pt)

iv. (1 pt) List all possible genotypes of the parental animals that were black with long ears. (2 pt)

v. (1 pt) List all possible phenotypes of the parental animals that were black with long ears. (2 pt)

b) Explain the concept of genotypes and phenotypes. (2 pt)

c) Explain the concept of codominance and incomplete dominance. (2 pt)

24) Pea shape and flower color are two independently assorting traits in pea plants. You have a true-breeding pea plant with short, pink flowers. You cross this plant with a true-breeding pea plant with tall, white flowers. The F₁ generation has tall, pink flowers. You then cross the F₁ generation with short, white flowers to generate the F₂ generation.

a) What is the phenotype of the F₁ generation? (1 pt)

b) Above the lines on the Punnett square below, write the genotype for each of the F₁ parents. (1 pt)

c) To the left of the Punnett square, write the genotype for each of the F₁ parents. (1 pt)

d) In each square, write the genotype for each of the F₁ parents. (1 pt)

e) In each square, write the genotype for each of the F₂ plants. (1 pt)

f) Each trait is controlled by dominant and recessive alleles as follows:

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<th>Character</th>
<th>Dominant Allele</th>
<th>Recessive Allele</th>
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<tr>
<td>Pea shape</td>
<td>Short (s)</td>
<td>Long (S)</td>
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<tr>
<td>Flower color</td>
<td>Purple (P)</td>
<td>White (p)</td>
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g) Complete the Punnett square below. (4 pts)
21. Give the sequence and polarity of two DNA primers 6 nucleotides long that would allow you to amplify the entire fragment. (6 pts)

22. Assuming the bottom strand is the DNA template used for transcription, what is the amino acid sequence of the protein that is produced by sequence #1? (10 pts)
21. Give the sequence and polarity of two DNA primers 6 nucleotides long that would allow you to amplify the entire fragment. (6 pts)

$$5' \text{ACG}_{9}9_{9}3'$$  $$3' \text{GG}_{3}C_{9}5'$$

22. Assuming the bottom strand is the DNA template used for transcription, what is the amino acid sequence of the protein that is produced by sequence #1? (10 pts)

Met - Ser - Thr - Ala - Ile
Outbox Login

Please enter your UGA MyID and password to access the Outbox.

UGA MyID: narmstro
Password: 

Login
Biol 1107 S12 11AM, Test #3

Last Initial: D  
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Short Answer Questions

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Sequence #1

5' ACGGCCCATGTCACAACCTGCGATCTAG 3'
3' TGCCCGGTACAGTGACGCTTAGATC 5'
5' AcGGc g CGg TAc AgG Cg c gCTAAG G 3'

Sequence #2

5' ACGGCCATGTAACCTGCGATCTAG 3'
3' TGCCCGGTACAGTGACGCTTAGATC 5'

The DNA fragments shown above contain the complete sequence for a small gene. Sequence #1 is a typical gene. Sequence #2 contains a point mutation.

21. Give the sequence and polarity of two DNA primers 6 nucleotides long that would allow you to amplify the entire fragment. (6 pts)

5' ACGGGC 3'
3' TGGCCG 5'

22. Assuming the bottom strand is the DNA template used for transcription, what is the amino acid sequence of the protein that is produced by sequence #1? (10 pts)

Met - Ser - Thr - Ala - Ile

23. For Sequence #2
a. On Sequence #2: circle the nucleotide change that has occurred. (2 pts)

b. Name the type of mutation that has occurred. (2 pts)
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Spring 2012

BIOL 1107

(load roster - add assignment)

Test 1  (View Documents - Retrieve Regrade Requests)

Test 2  (View Documents - Retrieve Regrade Requests)

Test 3  (View Documents - Retrieve Regrade Requests)

Fall 2011

BIOL 1107