MODULE 1 & 2:
EXAM REVIEW

MIDTERM 1 Exam:

Saturday, February 5th, 1pm-3pm

ROOM ASSIGNMENTS (by last name):

Section A: MNT 202 - Abd to Leu

Section A: MNT 203 - Lin to Zia

Midterm 1 Exam - Topics:

Module 1: The programs of genetic investigations
Forward and reverse genetics; Model organisms; Genetic variants (mutations)

Module 2: Methodologies for genetic analysis
Crosses; genetic screens;

Note: the following topics will not be assessed on midterm #1:*gene targeting technologies; recombinant DNA technology; DNA sequencing; bioinformatics and genomics*

Learning outcomes:

Module 1

1. **Define key terms and concepts.**
2. **Describe the programs of genetic investigation.**
3. **Analyse the experimental design in a published scientific paper.**
4. **Identify model organisms and their benefits to the study of genetics.**
5. **Compare different types of mutations and their value in the study of genetics.**
6. **Explain the molecular basis for alleles with different genetic outcomes.**

Learning outcomes:

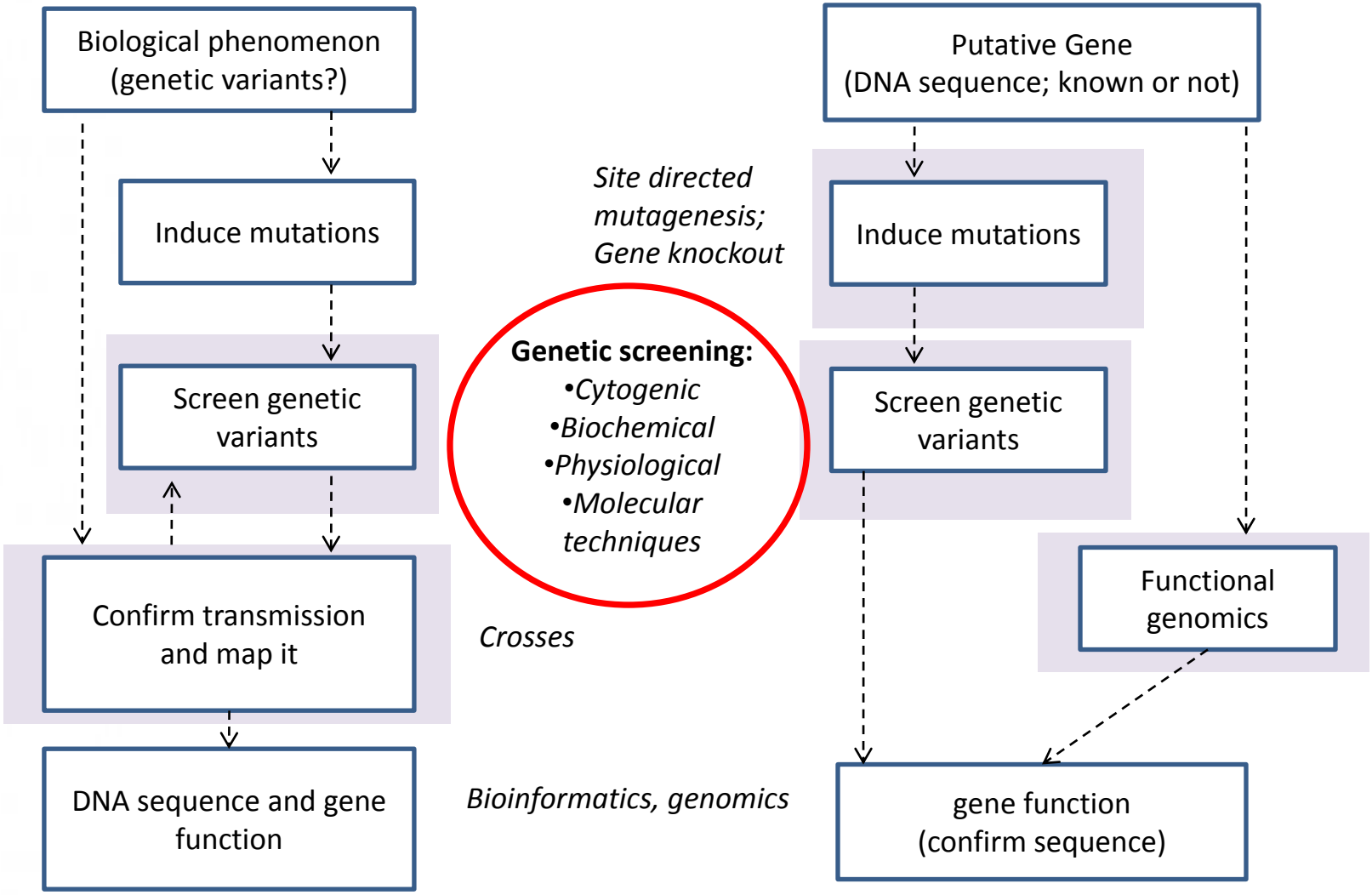
Module 2

7. **Define key terms and concepts.**

8. **Describe methodologies for genetic analysis and interpret observations they provide.**

9. **Justify the use of different methodologies for genetic analysis.**

Forward Genetics vs. Reverse Genetics



A Forward Genetics Screen in Mice Identifies Recessive Deafness Traits and Reveals That Pejvakin Is Essential for Outer Hair Cell Function

What was the goal of the investigation?

How were mutant lines of mice produced in this study? (L.O. 3,5)

How can investigators confirm a genetic basis for deafness? A recessive case of deafness? (L.O. 7,8,9)

What is meant by phenotype screening ? (L.O. 7, 8)

How were the authors able to confirm a role for the Pejvakin allele in progressive hearing loss? (L.O. 2, 3,7,8,9)

What type of mutation caused the Pejvakin allele? (L.O. 5,6)

Define the following terms: (L.O. #1, 7)

Functional genetics:

Autosomal mutation:

Missense mutation:

Model organism:

Genomics:

Testcross:

Nucleotide blotting:

Law of independent assortment:

Short answers:

Explain why mutations are indispensable for the study of genetics. (L.O. #5)

Identify 3 model organisms and discuss the benefits of using theme for the study of genetics. For each, identify a key feature that makes them a model organism. (L.O. #4)

Explain how dihybrid crosses allow investigators to test the laws of segregation and independent assortment. (L.O. 8,9)

Explain the molecular basis for alleles with different genetic outcomes. (L.O. #6)

Long answer:

As a geneticist working for Monsanto Corp., you are charged with finding new genes controlling fruit size in tomatoes. You accidentally find a tomato plant in the green house with fruits three times normal size. You decided to test if it is caused by a single gene mutation. Describe what you will do to find out and how this would help you draw conclusions. Justify your approache(s). (**Note:** you do not have enough funding to carry out molecular techniques!).

Other questions?