Time: 1 hour | GMB Quiz 2 | 10 marks each question | All questions are mandatory Any 5

Q1. In pigeons, a dominant allele C causes a checkered pattern in the feathers; its recessive allele c produces a plain pattern. Feather coloration is controlled by an independently assorting gene; the dominant allele B produces red feathers, and the recessive allele b produces brown feathers. Birds from a true-breeding checkered (CC BB), red variety are crossed with birds from a true-breeding plain, brown variety (cc bb).

(a) Predict the phenotype of their progeny.

(b) If these progeny are intercrossed, what phenotypes will appear in the F2, and in what proportions?

QZ: In humans, the ABO blood group system is controlled by a single gene with three alleles: I^A, I^B, and i. A woman with blood type AB marries a man with blood type B whose mother had blood type O.

(a) What are the possible blood types and their ratios of the children?

(b) Explain the type of dominance displayed in each possible offspring's blood type.

Q3: In mice, coat color is determined by two independently assorting genes. The first gene, located on chromosome 5, controls pigment production, with the dominant allele A resulting in the production of black pigment and the recessive allele A resulting in no pigment (albino). The second gene, located on chromosome 8, controls pigment deposition, with the dominant allele B allowing the pigment (if produced) to be deposited in the fur, resulting in black fur, and the recessive allele b resulting in a failure to deposit pigment, leading to brown fur. A homozygous black mouse (AABB) is crossed with an albino mouse (aabb), and their offspring are intercrossed to produce an F2 generation.

(a) Identify the type of epistasis and explain how epistasis is involved in determining the coat color of the F2 generation.

(b) Calculate the expected phenotypic ratios for coat color in the F2 generation (black, brown, and albino).

M: In a rare genetic disorder affecting muscle development, a single dominant allele M causes muscle weakness. However, not all individuals with the M allele show symptoms, and the severity of the weakness varies among those who do. What genetic phenomenon can explain this variation, and how might they affect the expression of the disorder?

55: In the study of bacterial genetics, understanding how bacteria exchange genetic material is crucial for grasping their adaptability and evolution. Write about the types of gene transfer in bacteria and differentiate between them with the help of a diagram.

Q6: In a population of mice, fur color is controlled by a gene with two alleles: B (black) and b (brown), where B is dominant and b is recessive. Another gene controls tail length, with two alleles: L (long tail) and I (short tail), where L is dominant and I is recessive. 50% of the mice are heterozygous for fur color (Bb), 30% are homozygous dominant (BB), and 20% are homozygous recessive (bb). 60% of the mice are heterozygous for tail length (LI), 25% are homozygous dominant (LL), and 15% are homozygous recessive (II).

What is the probability that a randomly selected mouse:

(a) Has black fur and a long tail?

(b) Is either homozygous dominant or heterozygous for both fur color and tail length?

(c) Suppose that a disease breaks out in the population, and it is discovered that only mice with brown fur and short tails (genotype bb and II) are immune to the disease. What is the probability that a randomly selected mouse is immune to the disease?

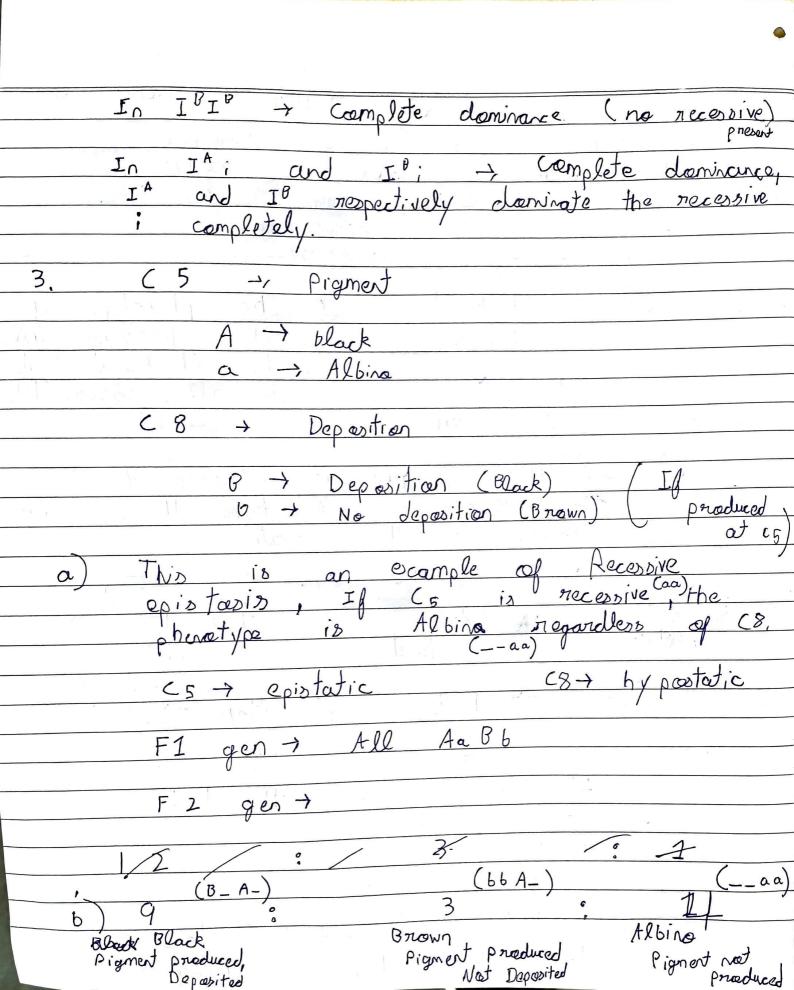


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INTERNAL ASSESSMENT SHEET

Total Page: 08

Name : Devoy Rathone Course Code: Blo 211 Date : 30 September 24 Student Sig :	Winter 20 Summer 20 Roll No. : 20 23/90 Course Title : GM B - Q 2 No. of Additional Sheet : Invigilator Sig :
1. C → Checkened	a) The phenotype of
c -> Plain	the pragery will
Both are	be Checkened Red
independently B -> Red	in all cases. (F1)
assorting 6 -, brown	Cc Bb
b) If this pro	igeny is intercrossed the
F2 generation	will have the fellowing
pherotypes in	these ratios.
3	3 : 1
Checkered Plain	Checkened Plain
Red	ed Brown Brown Fother (IB)
7 Manago - TA 78	A WOTHER CITY
2. Vonas - IA IB	Man -> I bi
o) Purnett square	Possible blood types
TA TB	AR A R
I B I A I B I B I B	IAIB, IA, IBIB and IB;
IA; IB;	
b) In IAIB I	A and IB show Co-dominance
traits of both show in shoretype	



4. The genetic phenomenan of expressivity, explains
this variation.

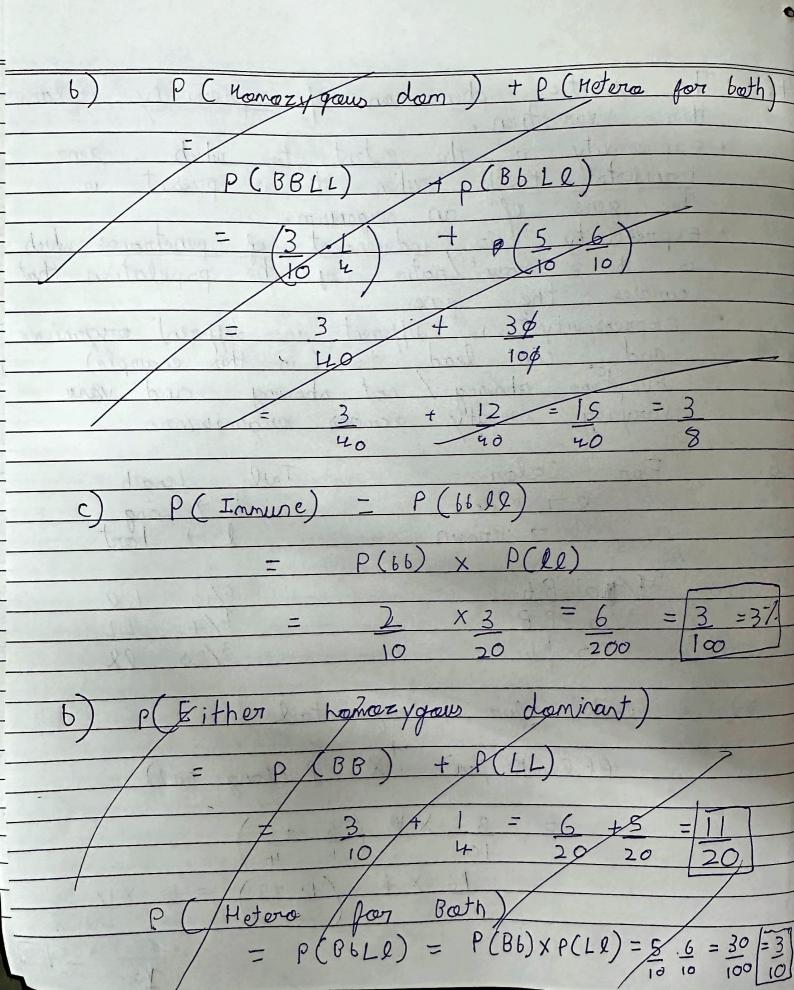
Expressivity is the extent to which a gene
manifests itself when it is present in
the gene of an argansm.

Expressivity is independent of penetrare which
is the amount/ratio of the population that
carries the gene.

Expressivity is different in different arguisms
and can lead to (in this accomple)
symptoms showing / not showing and variation or showing and variation or showing across organisms. 6. Fur Calor Tail Length

B + Black L+ Long

h + Brown L+ Short 2/10 66 00 Black for Long tail P(Plack fur) X P (Long tail) P(B61.8) = P(B6) x P(L8) = 5 6 =



P (Homozygous + P(Hetero for both) P(BBLL 40