GENETICS QUESTIONS

Q1.

In humans tongue rolling is governed by a single pair of allelic genes, **R** and **r**. The allele **R** is the dominant allele which allows for tongue rolling whilst the allele **r** does not. Another pair of allelic genes, which are NOT linked to the tongue-rolling gene, govern hair colour. In this second pair brown hair, **B**, is dominant to red, **b**.

Answer the following using the above information:

(i) Draw a simple diagram to show the genotypes of all the possible gametes that a person, who is heterozygous in respect for tongue rolling and hair colour, can produce.

(ii) State briefly how these gamete genotypes demonstrate the Principal of Independent Assortment.

(iii) State the phenotype of the person. What other genotypes would give rise to this phenotype?

Q2.

A large number of roses with red flowers and green leaves were crossed with white roses with variegated leaves. All the offspring were pink with green leaves.

(a) Explain this cross using suitable diagrams. Give both the phenotype and genotype of the cross.

(b) What would happen if the offspring were crossed with each other?

Q3.

A red flowered broad-leafed snapdragon plant was crossed with a white flowered narrow leafed plant. All the F1 off spring had pink flowers with broad leaves. One of the F1 plants was crossed with a white flowered, narrow leafed plant.

(i) Use the punnett square technique to show the possible phenotypes and genotypes of the last cross

Q4.

In a species of plant, the colour of the petals is controlled by one pair of allelic genes. A second pair of allelic genes controls leaf size.

A. A plant with red petals was crossed with a plant with white petals. All the offspring had red petals
B. A plant with large leaves was crossed with a plant with small leaves. All the offspring had large leaves.
C. A plant with red petals and large leaves was crossed with plant with petals and small leaves

The results were as follows:

46 plants with red petals and large leaves
43 plants with red petals and small leaves
45 plants with white petals and large leaves
42 plants with white petals and small leaves

(a) State the dominant phenotype for each gene

(b) Suggest suitable symbols for the alleles in crosses **A** and **B**

(ii) State the genotypes of the parents, gametes and offspring in Cross **A**

(iii) Show, using a punnet square technique, how the genotypes of the offspring were produced in cross **C**

(b) Draw simple chromosome diagrams to show the positions of the alleles on the chromosomes in the parents of cross **C**

2005

Q10:

(b) Cystic fibrosis is a serious condition that affects the lungs and digestive system. The condition
results from the inheritance of a single pair of recessive alleles.

(i) Explain each of the underlined terms.

(ii) Suggest why a person with a heterozygous allele pair does not suffer from the condition.

(iii) If both parents are heterozygous what is the percentage chance that one of their children may inherit the condition? Explain how you obtained your answer.

2003

Q8:

(b) A child of a marriage between a woman of blood group A and a man of blood group B had blood group O.

(i) What are multiple alleles?
(ii) Give the genotype of each of the parents above.
(iv) What other blood groups may children of these parents have? **(18)**

2007
Q11:
(iii) The allele for brown eye (B) is dominant to the allele for blue eye (b).
Explain each of the underlined terms.

(iv) Use a Punnet square to find the possible genotypes of children of parents who are both heterozygous for brown eye. State the eye colour resulting from each of these genotypes.

2006
Q11:
(a) Explain the following terms, which are used in genetics: allele, homozygous, genotype. **(9)**
(b) (i) Name or draw the sex chromosomes that are present in a human body cell in the case of:

1. A male,
2. A female.

(ii) Use a Punnet square to show that there is a fifty percent chance that fertilization will lead to a male and fifty percent chance that it will lead to a female. **(27)**

2005

Q13:

(a) For each of the following parents give the genotypes of all the possible gametes that it can produce.
(i) Parent Aa.
(ii) Parent AaBb. **(9)**

2004
Q12:

(a) Explain the following terms that are used in genetics; dominance, genotype, phenotype. **(9)**

(b) In Aberdeen Angus cattle, the polled (**P**) condition (absence of horns) is dominant to the horned (**p**)
condition. A heterozygous polled bull was crossed with a horned cow. Use the following layout in your
answer book to find the possible genotypes and phenotypes of the calves that may result from this cross.

Heterozygous polled bull X Horned cow
Genotypes of parents ……. …….
Gametes …….. …….. ……..
Genotypes of calves …… ……
Phenotypes of calves …… …… **(27)**

2003
Q8:

(a) Explain the following terms that are used in genetics:
gene, locus, homozygous, genotype.

(b) In pea plants, the allele for purple flower (**P**) is dominant to the allele for white flower (**p**).
Copy the following into your answer book and complete the spaces to show the following crosses. Make sure that you distinguish between upper case **P** and lowercase **p** in your answer.

Cross 1. A plant that was homozygous for purple flowers was crossed with a plant with white flowers and all the progeny were found to have purple flowers.

Phenotypes of parents _____ X _____

Genotypes of parents ( ) ( )

Genotypes of gametes ( ) ( )

Genotype of progeny ( )

Phenotype of progeny _____

Cross 2. The progeny of cross 1 were then crossed with white-flowered plants.

Phenotypes of parents _____ X _____

Genotypes of parents ( ) ( )

Genotypes of gametes ( ) ( ) ( )

Genotypes of progeny ( )( )

Phenotypes of progeny _____ _____

(26)