GENETICS AND INHERITANCE

1. Define the following terms:

Genetics .....

Gene: .....

Allele: .....

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Dominant allele .....

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Recessive allele: .....

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Genotype: .....

Phenotype: .....

Homozygous: .....

Heterozygous: .....

Monohybrid cross:.....

Dihybrid cross: .....

3. An Austrian monk, **Gregor Mendel(1822 - 18840,** is regarded as " 'the father of genetics'. He was the first person to identify and document some of the basic principles of heredity through many experiments with pea plants.

Based on his experiments he formulated the following laws:

1. Mendel's Law of Segregation states that .....

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2. Mendel's Law of Dominance states that .....

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3. Mendel's principle of independent assortment states that .....

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4. A Monohybrid cross is a cross between 2 individuals that looks at **ONE TRAIT**

E.g.: Just looking at the height of a person

TEMPLATE FOR A GENETIC CROSS – note the mark allocation

P_1	Phenotype	.....	x	.....✓
	Genotype	.....	x	.....✓
Meiosis	Gametes	.....	x	..... ✓

Fertilisation

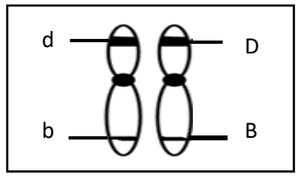
Gametes		

F_1	Phenotype	.....✓
	Genotype	.....✓

P_1 and F_1 ✓

Meiosis and fertilisation✓

2. The diagram below shows alleles controlling skin colour and hair shape.



KEY
B-- brown eye colour
b-- blue eye colour
D-- curly hair
d – straight hair

2.1 Write the genotype for an individual who is heterozygous for hair shape. .....

2.2 Give the genotype of an individual with blue eye colour.....

2.3 Explain why an individual with Dd has curly hair.

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2.4 Why is individual with genotype dd said to be homozygous? .....

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5. In rabbits the dominant allele (B) produces black fur and the recessive allele (b) produces white fur. Study the table below showing the genotypes of four rabbits.

Rabbit	1	2	3	4
Genotype	BB	Bb	Bb	bb

5.1 What are the phenotypes for rabbits 2 and 4 respectively. (2)

2- ..... 4 - .....

5.2 State the genotypic ratio shown in the table.

..... (1)

5.3 Rabbit 2 was allowed to breed with rabbit 3. Use a genetic cross to show the possible phenotypes and genotypes of the F1 generation for fur colour. (6)

P_1	Phenotype	.....	X	.....
	Genotype	.....	X	.....
.....	Gametes	.....	X	.....

Gametes		

.....

F_1	Phenotype	.....
	Genotype	.....

6. Types of Dominance

Distinguish between Complete dominance, co-dominance and incomplete dominance and give one example of each.

Complete dominance: .....

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Incomplete dominance: .....

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Co-dominance:.....

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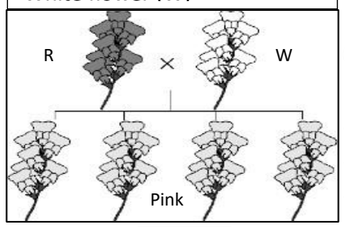
6.1 Study the diagram below and answer the questions.

Red flower (R)
White flower (W)



6.1.1 Identify the type of dominance illustrated in the diagram. (1)

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6.1.2 Explain your answer in Question 6.1.1

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..... (2)

6.1.3Complete the Punnett square: P_1 genotype: ..... X .....

Gametes		

F_1 genotype: .....

F_1 phenotype: ..... (6)

6.2 In certain marine invertebrates the colour of the shell is under the control of one gene with three alleles. In different combinations, the three alleles produce four phenotypes: orange, yellow, orange-yellow and black.

The table below shows the results of the offspring produced from crosses involving parents of different phenotypes.

CROSS	PHENOTYPES OF SHELLS	
	PARENTS	OFFSPRING
1	Yellow X Yellow	27 yellow:9 black
2	Black X Black	All Black
3	Orange X Orange	30 orange: 10 black
4	Orange X Yellow	All orange-yellow

6.2.1 Name and describe the type of dominance shown by cross 4. (3)

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6.2.2 Which shell colour is controlled by the recessive allele? ..... (1)

6.2.3 Use the information in the table to support your answer to QUESTION 6.2.2 (2)

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