GRADE 12 TERM 2 PRACTICAL **TOTAL: 40 MARKS**

GENETICS AND HEREDITY - MEMORANDUM

QUESTION 1

1. What are the independent and dependent variables in the investigation?

   Independent: ***Allele combinations of parents / Genes that the parents carry / Bead colours of the parents / genotypes of the offspring***

   Dependent: ***Allele combinations of the offspring / Genes that the offspring carry / Bead colours of the offspring / Genotypes of the parents***

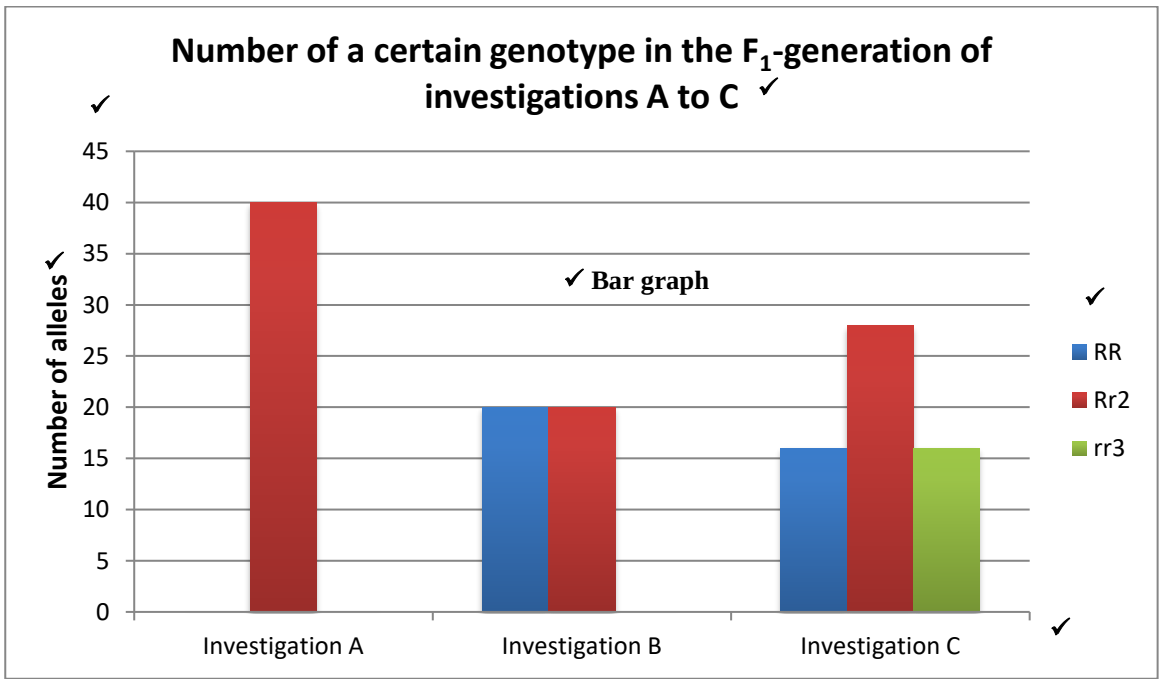
(2)

2.

GENOTYPES OF THE F_1-GENERATION OF THE DIFFERENT INVESTIGATIONS A TO C			
Bead combinations	Red	Red-white	White
Genotypes	*3.1.1.* ***RR***	*3.1.2.* ***Rr***	*3.1.3.* ***rr***
Investigation A		*3.1.4.* ***40***	
Investigation B	*3.1.5.* ***20***	*3.1.6.* ***20***	
Investigation C	*3.1.7.* ***16***	*3.1.8.* ***28***	*3.1.9.* ***16***

(6)

3. Now use the information in the table to draw a column graph to display the resulting F_1-generations of your three investigations. Use the space provided below:



(6)

4. Explain the relationship between the dependent and independent variable in each investigation. ***HINT***: *use the words homozygous and heterozygous*..

Investigation A: If both **parents are homozygous** the **offspring** will inherit one of each allele and they will **all** be **heterozygous** for the characteristic.

Investigation B: If **one parent is homozygous and the other parent is heterozygous, 50%** of the offspring will be **homozygous and 50%** will be **heterozygous.**

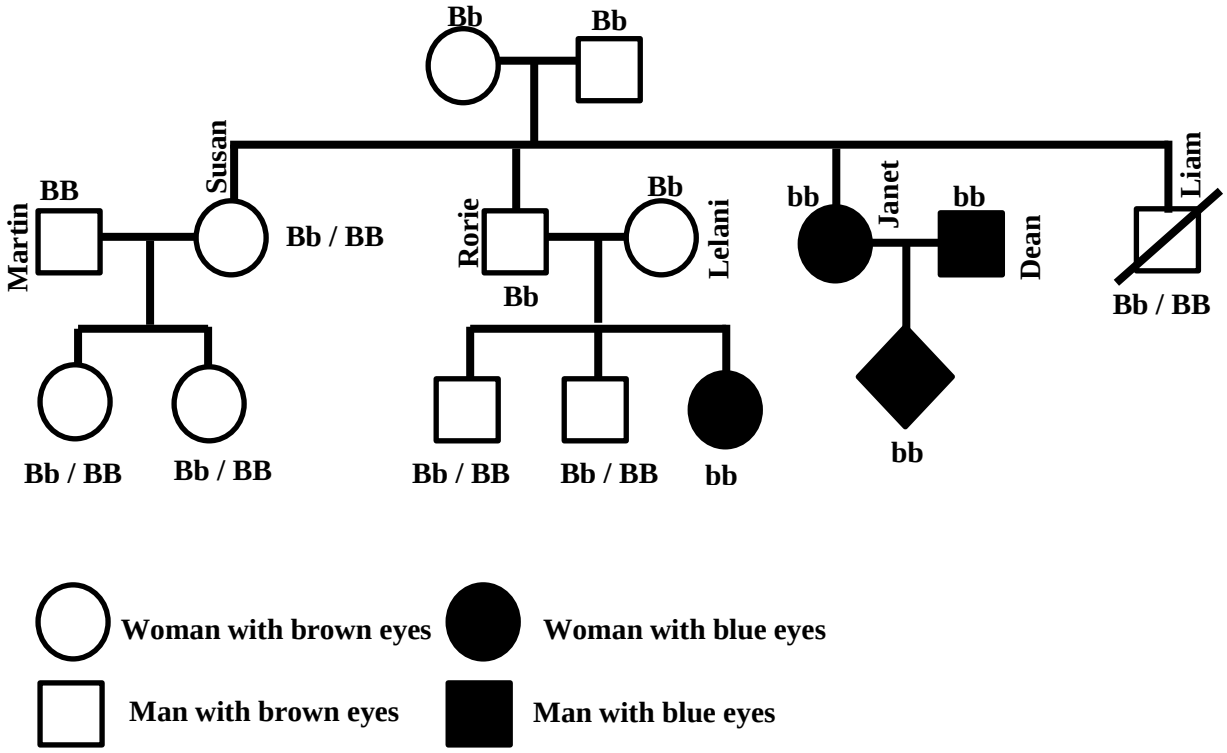
Investigation C: If **both parents are heterozygous**, **25%** the offspring will be **homozygous** for the one characteristic, **50% will be heterozygous** for the characteristic and **25%** will be **homozygous** for the other characteristic.

(6)

TOTAL QUESTION 1: [20]

QUESTION 2

1.



Mark allocation for pedigree diagram		
Correct symbol for Liam	1	0
Correct symbol for unknown child	1	0
Genotypes included	1	0
Genotype of unknown child	2	0
Phenotypes included with a key	2	0
Pedigree diagram correctly drawn (lines, levels etc.)	1	0
All sexes included and correct	2	0
All genotypes correct 1 – 2 genotypes incorrect 3 – 4 genotypes incorrect 5 – 6 genotypes incorrect More than 6 genotypes incorrect	4 3 2 1 0	
TOTAL	**14 marks**	

2. The genotype of the mother is ii. Man 1's only possible genotype is I^AI^B. Man 2 has two possible genotypes: I^BI^B of I^Bi. The following two test crosses prove that Man 2 is the father of the child with blood group O (genotype ii):

Test cross 1: MAN 1 with woman			
Gametes	**I^A**	**I^B**	✓
i	I^Ai	I^Bi	
i	I^Ai	I^Bi	✓

Man 1 (blood group AB) cannot be the father, as this genotype combination cannot produce offspring with blood group O ✓

Test cross 2: MAN 2 with woman			
Gametes	**I^B**	**i**	✓
i	I^Bi	ii	
i	I^Bi	ii	✓

Man 2 (blood group B) could be the father, if his genotype is I^Bi, there will be a 50% chance that the offspring will have blood group O. ✓

(6)

TOTAL QUESTION 2: [20]

SUM TOTAL: [40]