Individual MCQ

1. **D**
2. **B**
3. **B**
4. **C**
5. **A**
6. **E**
7. **A**
8. **B**
9. **D**
10. **A**
11. **C or D**
12. **A**
13. **A**
14. **A**
15. **B**
16. **D**

Group MCQ

1. **D**
2. **B**
3. **B**
4. **C**
5. **A**
6. **E**
7. **C**
8. **B**
9. **D**
10. **A**
11. **C or D**
12. **E**
13. **D**
14. **A**
15. **B**
16. **D**

Individual Exam

Part B: Short answers

A. In a CSL placement, you discovered two new genetic traits in drosophila possibly caused by two different mutations. In the first trait, you can clearly distinguish that the flies can have either 2 or 3 stripes on their body. For the other trait, you can distinguish yellow bodies in some flies and white bodies in others. You hypothesize that the stripe trait is control by 1 gene (where 3 stripes (S) is dominant over 2 stripes (s)) and that a different gene determines the body colour (where yellow (Y) is dominant over white (y)). You also hypothesize that the genes are on different chromosomes.

To test your hypothesis, you cross (what you believe) a true-breeding yellow and 3 striped flies with true-breeding white-2striped flies. You then cross the F1 offspring to obtain an F2.

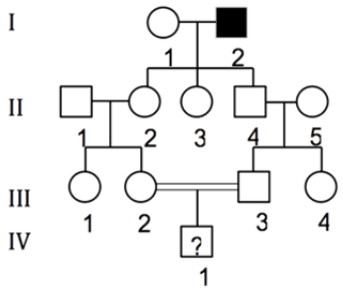
1. If your hypothesis is correct, what are the genotypes of your F1 flies: ____**SsYy**____ **(1 point)**

2. To statically test your hypothesis, you perform a chi-square analysis on data obtained from crossing the F1 individuals. The observed phenotypes and the numbers of flies obtained at the F2 for each phenotype are indicated in the table below. Using your hypothesis as your basis to analyse the results, fill in the unshaded portions of the chi-square table. **(2 points)**

Phenotypes	Observed F2	Hypothesized Phenotypic ratio	Expected numbers	Chi-square
White, 2 striped	33	**1/16 or 0.0625**	**10.8**	XXXXXXXXX
Yellow, 3 striped	35	**9/16 or 0.5625**	**97.3**	XXXXXXXXX
White 3 striped	12	**3/16 or 0.1875**	**32.4**	XXXXXXXXX
Yellow, 2 striped	93	**3/16 or 0.1875**	**32.4**	XXXXXXXXX

0.25 marks for every element in table. Please put an X over incorrect elements. Please put a ----X---- for boxes left blank. No need to put a checkmark for every correctly filled box. Just put the total point awarded on the left hand margin.

B. In this pedigree, I-2 is affected with a rare X-linked recessive mutation.



(i) What is the genotype of female II-2? _____X^rX^r_____ (1 mark)

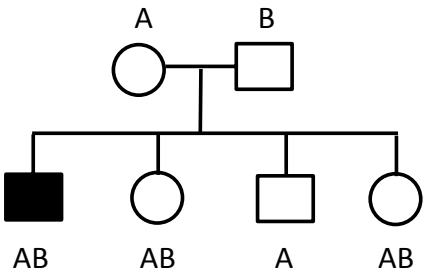
(ii) What is the probability that male III-2 is a carrier? _____**1/2**____ (1 mark)

C. Each of the following pedigrees has an individual with Klinefelter syndrome (a set of abnormalities seen in XXY individuals - Males who are XXY are indicated with shaded boxes). In each pedigree, A and B refer to co-dominant alleles of the X-linked *G6PD* gene. The phenotypes of each individual (A, B, or AB) are shown in the pedigree.
For each pedigree, indicate if the nondisjunction occurred in the mother or the father of the son with Klinefelter syndrome and determine if the nondisjunction occurred in meiosis I or II or either.

Pedigree 1

Parent: (Mother, Father, or either) : ___**Father**__ (1 point)

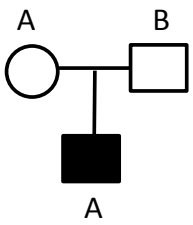
Meiosis: (Meiosis I, Meiosis II, or either): __**Meiosis I**__ (1 point)



Pedigree 2

Parent: (Mother, Father, or either) : ____**Mother**___ (1 point)

Meiosis: (Meiosis I, Meiosis II, or either): ____**Either**____ (1 point)



Group Exam

A. In a CSL placement, you discovered two new genetic traits in drosophila possibly caused by two different mutations. In the first trait, you can clearly distinguish that the flies can have either 2 or 3 stripes on their body. For the other trait, you can distinguish yellow bodies in some flies and white bodies in others. You hypothesize that the stripe trait is control by 1 gene (where 3 stripes (S) is dominant over 2 stripes (s)) and that a different gene determines the body colour (where yellow (Y) is dominant over white (y)). You also hypothesize that the genes are on different chromosomes.

   To test your hypothesis, you cross (what you believe) a true-breeding yellow and 3 striped flies with true-breeding white-2striped flies. You then cross the F1 offspring to obtain an F2.

3. If your hypothesis is correct, what are the genotypes of your F1 flies: ____ **SsYy** ____ **(1 point)**

4. To statically test your hypothesis, you perform a chi-square analysis on data obtained from crossing the F1 individuals. The observed phenotypes and the numbers of flies obtained at the F2 for each phenotype are indicated in the table below. Using your hypothesis as your basis to analyse the results, fill in the unshaded portions of the chi-square table. **(2 points)**

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B. The following chart shows the results of different matings between jimsonweed plants that had either purple or white flowers and spiny or smooth pods. Which of the following choices indicates the dominant alleles for the two traits?

Parents	**Offsprings**			
	Purple & Spiny	White and Spiny	Purple and Smooth	White and Smooth
1. purple spiny X purple spiny	94	32	28	11
2. purple spiny X purple smooth	40	0	38	0
3. purple spiny X white spiny	34	30	0	0
4. purple spiny X white spiny	89	92	31	27
5. purple smooth X purple smooth	0	0	36	11
6. white spiny X white spiny	0	45	0	16

What are the genotypes of the parents in the following crosses:

Cross #1: ____**PpSs**___ X _____ **PpSs** _____ (1 point)

Cross #2: ____**PPSs** ___ X _____ **PPss**_____ (1 point)

Cross #4: ____ **PpSs** __ X _____ **ppSs** _____ (1 point)

Cross #6: ____ **ppSs** __ X _____ **ppSs** _____ (1 point)

C. Each of the following pedigrees has an individual with Klinefelter syndrome (a set of abnormalities seen in XXY individuals - Males who are XXY are indicated with shaded boxes). In each pedigree, A and B refer to co-dominant alleles of the X-linked *G6PD* gene. The phenotypes of each individual (A, B, or AB) are shown in the pedigree.

For each pedigree, indicate if the nondisjunction occurred in the mother or the father of the son with Klinefelter syndrome and determine if the nondisjunction occurred in meiosis I or II or either.

Pedigree 1

Parent: (Mother, Father, or either) : ____ **Either** __ (1 point)

Meiosis: (Meiosis I, Meiosis II, or either): __ **Either** __ (1 point)