102-2 遺傳學 隨堂測驗 02　　姓名 _____ 學號 _____

1. Please explain the following genetic terms:
   a. Homologous chromosomes (10 points)

   b. Reduction division (10 points)

2. Calvin Bridges found primary exceptions of progenies arose from the cross of a white eye female fly and a red eye male fly, and secondary exceptions arose from the cross between the female from the primary exception and a normal red eye male. The phenotypes and number of sex chromosomes of these exceptions were:
   White eye female: XXY (primary & secondary exception)
   Red eye male: X (primary exception); XY (secondary exception)
   Please explain how Calvin Bridges formulated "the Chromosome Theory" from aforementioned observations. (20 points)

3. Red-green color blindness in human is due to an X-linked recessive gene. Both John and Cathy have normal color vision. After 10 years of marriage to John, Cathy gave birth to a color-blind daughter. John claimed that he is not the father of the child. Is John justified in his claim of non-paternity? Explain why. If Cathy had given birth to a color-blind son, would John be justified in claiming non-paternity? (20 points)

4. In mice, black coat color (B) is dominant over brown (b), and a solid pattern(S) is dominant over white spotted (s). Color and spotting are controlled by genes that assort independently. A homozygous black, spotted mouse is crossed with a homozygous brown, solid mouse. All the F1 mice are black and solid. A testcross is then carried out by mating the F1 mice with brown, spotted mice.
   a. Give the genotypes of the parents and the F1 mice. (10 points)
   b. Give the genotypes and the phenotypes, along with their expected ratio, of the progeny expected from the test cross. (10 points)

5. Papaya (木瓜) has three sex forms: female, male, and hermaphrodite. A papaya breeder made several different crosses and observed that different sex forms were segregated with a fixed ratio in each of crosses showing in the table below. Please hypothesize a genetic model for the sex determination in papaya. You need to give clear symbols and statements to indicate the interaction between alleles (such as dominance/recessive) and the genotypes associated to three different sex forms. (20 points)

Crosses (♀ x ♂)	sex ratio		
	hermaphrodite	female	male
female x male	0	1	1
hermaphrodite x hermaphrodite	2	1	0
female x hermaphrodite	1	1	0
hermaphrodite x male	1	1	1