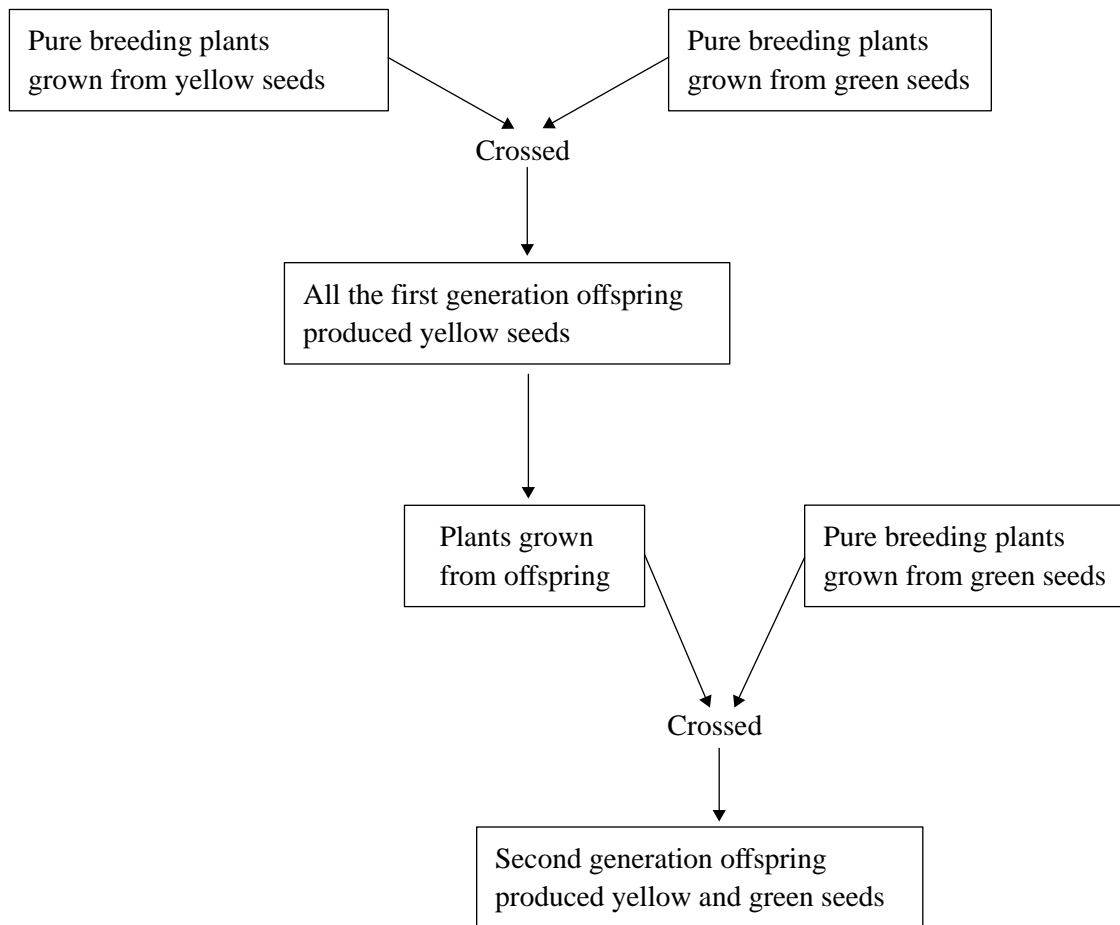


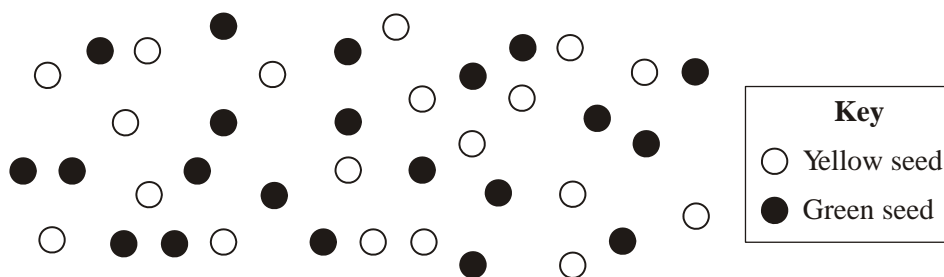
Genetic variation

1. In humans, the sex chromosomes **X** and **Y** determine whether the baby will be male or female (its gender).
- (a) (i) Draw a genetic diagram to show how gender is inherited. The male has **XY** chromosomes and the female has **XX**. (2)
- (ii) What is the likelihood of obtaining a male child?
- (1)
- (b) In the 16th century Henry VIII was the King of England. He blamed some of his wives for giving birth to daughters instead of sons. With our present day knowledge of genetics this mistake could not be made today. Explain why Henry VIII was wrong.
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- (2)
- (Total 5 marks)**

2. In the 1850s, Gregor Mendel carried out breeding experiments using peas.
- (a) The importance of Mendel's work was not recognised until the early 1900s. Explain why.
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- (2)
- (b) A student repeated one of Mendel's experiments. The flow chart shows her procedure.



The diagram shows a representative sample of seeds produced by second generation plants.



(i) Describe how the student could obtain a sample that is representative of seeds produced by the second generation.

.....

(1)

(ii) What was the approximate ratio of yellow seeds to green seeds in the seeds produced by the second generation?

.....

(1)

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- (iii) Seed colour in peas is controlled by a single gene which has two alleles.
Use a genetic diagram to show why this ratio of yellow seeds to green seeds was produced by the second generation.
Use the symbol **A** to represent the dominant allele, and **a** to represent the recessive allele.

(4)
(Total 8 marks)

3. Read the passage.

Designer Denim Genes

USA scientists have successfully used genetic engineering to insert genes for blue pigment into cotton plants. Their aim is to get cotton plants which produce blue cotton so that denims can be manufactured without the need for dyeing. The scientists have also inserted genes that prevent cotton fibres twisting, with the aim of producing drip dry shirts made from natural fibres. Other cotton plants are being genetically engineered to produce their own insecticides. When they have perfected these new types of cotton plants, the scientists will use cloning techniques to produce large numbers of them.

- (i) Name the substance in cells which carries genetic information.

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(1)

- (ii) Explain how molecules of this substance control characteristics such as blue colour in cotton plants.

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(3)
(Total 4 marks)