

Name: _____

Q.1

(b) Read the paragraph below and answer the questions that follow.

The rabbit in the photograph has no pigment in its skin, fur or eyes. This is due to an inherited condition known as albinism. Such animals are unable to produce melanin, a protein pigment that gives colour to the skin, eyes, fur or hair. This condition makes an animal more likely to be preyed upon.

Albinism is caused by genetic mutation. The gene that causes albinism (lack of pigment) is a recessive gene. If an animal has one gene for albinism and one gene for pigmentation, it will have enough genetic information to make pigment and the animal will not have this disorder. However, if both genes are recessive the result is albinism. At least 300 species of animal have albino individuals e.g. rabbits, turtles, squirrels, deer and frogs.



- (i) What are the main characteristics of albinism?
- (ii) What is meant by the term *recessive* gene?
- (iii) What is a mutation?
- (iv) Mutations can lead to variation in organisms. Variations that make an organism better adapted to its environment can lead to evolution.
 1. What is meant by *evolution*?
 2. Name **one** of the scientists who first explained how evolution occurs by natural selection.
 3. Give **one** source of evidence for evolution.
- (v) People with albinism should always apply a high-factor sunscreen when going outdoors and must avoid strong sunshine. Suggest a reason for these precautions.

(27)

Q.2

In the sweet pea plant the texture and colour of the testa (seed coat) are governed by two pairs of alleles, which are not linked. The allele for smooth (S) is dominant to the allele for wrinkled (s) and the allele for yellow (Y) is dominant to the allele for green (y).

- (i) State the Law of Segregation **and** the Law of Independent Assortment.
- (ii) Using the above symbols, and taking particular care to differentiate between upper case and lower case letters:
 1. give the genotype of a pea plant that is homozygous in respect of seed texture and heterozygous in respect of seed colour.
 2. state the phenotype that will result from the genotype referred to in 1.
- (iii) What phenotype will be produced by the genotype SsYy?
Give another genotype that will produce the same phenotype. Do not use a genotype that you have already given in response to part (ii) 1.
- (iv) If the allele for smooth were linked to the allele for green and the allele for wrinkled were linked to the allele for yellow, give the genotypes of the **two** gametes that parent SsYy would produce **in the greatest numbers**.

(27)