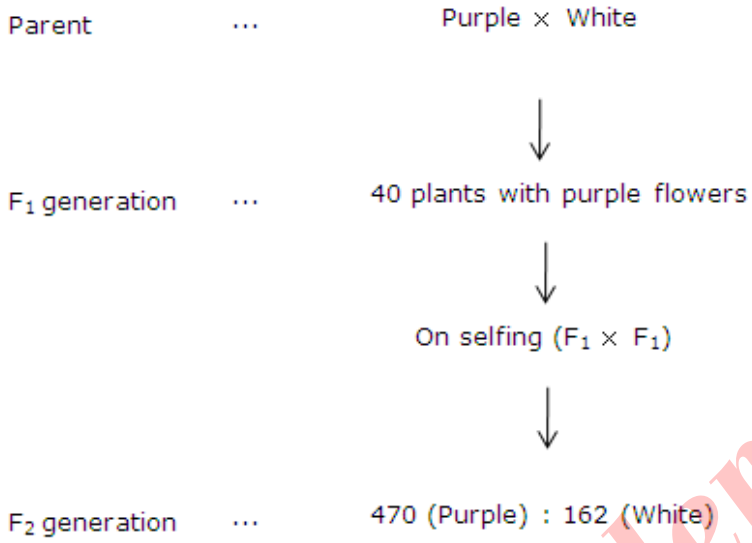
Section D

23. Anand, a 14-year-old boy, thinks smoking makes him more energetic and feels like an adult and thus a more responsible citizen. He tries to smoke when he is with his peer group. As a friend, you have to educate him on [4]

(a) Why he feels more energetic while smoking
(b) The effects of CO in smoke
(c) Other ill effects on the body
(d) What values are reflected here?

13. Ans



In the F_1 generation, only plants producing purple flowers appeared. This means the purple colour is dominant which does not allow the white colour to express itself. In the F_2 generation, purple and white-coloured flowers were produced in the ratio of 3:1.

Here, the parental character of white again reappeared in about quarter of the progeny. This occurs because of the segregation of genes during gamete formation. This represents the law of segregation and the monohybrid ratio.

14. Ans

Lactose acts as an inducer in the lac operon. The inducer lactose binds to the repressor and forms a complex which remains unable to bind to the operator. RNA polymerase now becomes free to join with the promoter and so the operator comes to the switched on position. This initiates the transcription of the structural genes, producing the three polypeptides (enzymes). These enzymes bring about the metabolism of lactose into glucose and galactose.

15. Ans

(a) This representation indicates a normal human because glutamic acid is present at the sixth position in the respective amino acid chain.

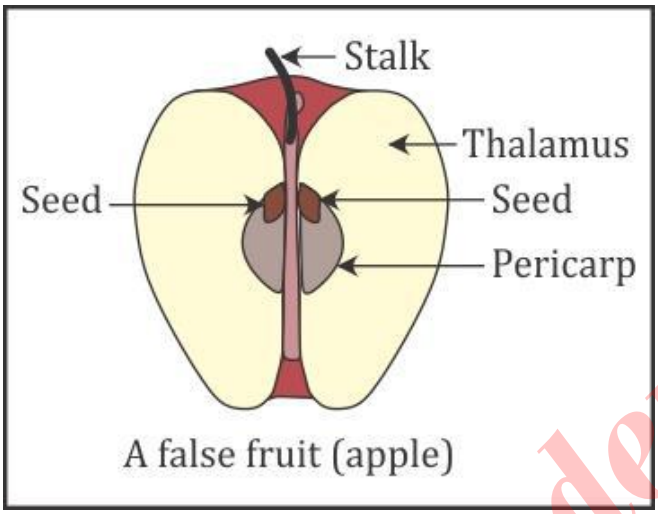
(b) In a person who exhibits sickle cell trait, the defect is caused by the substitution of glutamic acid (Glu) by valine (Val) at the sixth position of the β-chain of haemoglobin.

(c) Both males and females suffer equally because sickle cell anaemia is not a sex-linked disease. It is an autosomal disease and sickle-shaped RBCs will cause equal deficiency of oxygen in both males and females.

Section E

24. Ans

V.S. of apple:



A false fruit (apple)

Biological importance of fruits:

(i) Fruits form a protective covering around the seeds against adverse climatic conditions and animals.

(ii) Fruits on maturity become coloured, sweet and flavoured to attract the seed-dispersing agents for disposal to distant localities through wind, water and animals.

(iii) The immature fruits are bitter and possess unpalatable and repelling substances such as tannins and bitter alkaloids to provide chemical defence against animals.

(iv) The colours of many young fruits resemble the green leaves and so they are not easily spotted by animals.

OR

(i) Seminal vesicles: These are paired, tubular, club-shaped structures situated just above the prostate gland and near the base of the urinary bladder and at the interior of the rectum. The ducts from the seminal vesicles join the posterior part of the vas deferens and form the common ejaculatory duct. The seminal vesicles secrete clear, alkaline, yellowish, viscous fluid and contain globulin, citrate, inositol, fructose and flavins. Fructose provides energy to facilitate the motility of sperms after ejaculation and flavin gives semen a strong fluorescence in ultraviolet light. The secretion of the seminal vesicles constitutes approximately 60% of the ejaculate.

(ii) Prostate gland: It is the largest auxiliary gland with a chestnut-like shape situated around the 1st part of the urethra below the urinary bladder. It is