

## *DISCUSSION QUESTIONS 4*

### *GENETICS*

1. Cattle may be red or white and a hybrid is described as roan colour. If a roan cow is crossed with a roan bull, the offspring would be expected to be
  - B. all roan
  - C. all red
  - D. all white
  - E. a mixture of red, white and roan.
2. In cattle, the gene for hornless is dominant to the gene for horns (gene P and p respectively). If a bull and cow with genotypes Pp are crossed, what percentage of the offspring would be expected to have horns?
  - A. 25%
  - B. 50%
  - C. 75%
  - D. 100%
3. Give all the genotypes of offspring from a father and a mother of blood group A and A respectively.
  - A. All AB
  - B. 3 AB : 1AO
  - C. 1AO : 2AB : 1BO
  - D. 2AA : 1AO : 1AB : 2BO
4. A defect affecting shape of blood cells which can be inherited is known as
  - A. haemophilia
  - B. diabetes
  - C. anaemia
  - D. sickle cell.
5. Genes responsible for ABO blood groups in man are examples
  - A. multiple alleles.
  - B. multiple genes.
  - C. sex linked genes.
  - D. mandelian factors.
6. If a normal heterozygous man marries an albino woman, what will be the genotype of the offspring?
  - A. Aa and aa.
  - B. Aa only.
  - C. AA and aa
  - D. Aa and AA
7. A trait which does not express itself unless homozygous is said to be
  - A. sex-linked
  - B. linked and cumulative
  - C. a multiple allele
  - D. recessive

8. If a species has 24 chromosomes in each somatic cell, how many chromosomes will a sperm cell contain?
- 6
  - 12
  - 24
  - 48
9. In peas, the gene for tallness (T) is dominant over that for shortness (t). If peas of different genotypes were crossed and all off springs appeared tall, what would be the genotype of the parental peas?
- Tt x Tt
  - Tt x tt
  - TT x tt
  - TT x TT
10. A heterozygous red flowered plant (Rr) is crossed with a homozygous white flowered plant (rr). If R is dominant over r, what will be the phenotypes of the offspring?
- All red
  - All white
  - Pink and white
  - Red and white.
11. If a man of blood group A is married to a woman of blood group O, what are the possible genotypes of their children?
- AA, OO
  - AA, AO
  - AO, OO
  - AO only.
12. When a homozygous black mouse (WW), the offspring were all brown. What would be the colour of the mice produced if F1 offspring is crossed with a homozygous white parent?
- 3 brown: 1 white
  - 1 brown : 3 white
  - 1 brown : 1 white
  - All white.
13. Which one of the following sets contains only characteristics of continuous variation?
- Tongue rolling, blood groups, skin colour.
  - Height, body weight, intelligence.
  - Sex, haemophilia, height.
  - Finger prints, intelligence, albinism.
14. In cattle, when a bull is mated with a red cow, the offspring is roan. This indicates that the gene for white is
- dominant to that for red.
  - recessive to that for red.
  - codominant with that for red.
  - mutated to show roan.

15. What would be the ratio of the phenotypes if a roan bull and roan cow from the offspring referred to in question 15 were mated?
- 1 red: 2 roan: 1 white
  - 2 red: 1 roan: 1 white
  - 1 red: 1 roan: 2 white
  - 1 red: 1 white
16. Which one of these characters is an example of continuous variation in man?
- Skin colour.
  - Albinism
  - Dwarfism
  - Blood group.
17. Albinism, is inherited through double recessive genes. If A stands for normal skin colour and a the recessive character, which of these parental crosses would produce 25% albino offspring?
- AA x Aa
  - AA x aa
  - Aa x Aa
  - aa x aa
18. Red flowered peas were crossed with white flowered peas. The F1 were all pink flowered. What would be the results of selfing these pink flowered peas?
- All the flowers would be pink.
  - Half the flowers would be pink and half would be white.
  - Half the flowers would be red and half would be pink.
  - None of above
19. A quarter of the flowers would be red, half would be pink and a quarter Six fingers in man is controlled by a sex-linked recessive gene. If a normal woman marries a six fingered man, which of the children will have six fingers?
- All the sons
  - All the daughters
  - All will be normal
  - Half the number of girls and boys will be normal
20. One of two identical twins brought up differently was fatter and more healthy than the other. What kind of variation do these show?
- Discontinuous variation.
  - Genetic variation.
  - Social variation.
  - Habitat variation.
21. A couple produced four children who were of different blood groups with the following genotypes: AO, B, AB and OO. What were the genotypes of their parents?
- AA and OB
  - AO and OB
  - BB and OB
  - AB and OO
22. A heterozygous red flower plant (Rr) is crossed with a homozygous white plant (rr). If R is dominant over r, what will be the phenotypes of the offspring?
- All red

- B. All white  
 C. Pink and white  
 D. Red and white
23. A heterozygous red flowered plant is crossed with a homozygous white flower. If red is dominant over white, what will be the phenotypes of the offspring?  
 A.  $\frac{1}{2}$  red and  $\frac{1}{2}$  white.  
 B. All white.  
 C. All red  
 D.  $\frac{3}{4}$  red and  $\frac{1}{4}$  white.
24. In humans, the male sex chromosomes are X and Y (XY) and the female sex chromosomes are X and X (XX). When a male gamete fuses with a female gamete the sex ratio is  
 A. 1:2  
 B. 1:3  
 C. 1:1  
 D. 1:4
25. Which one of the following is an example of discontinuous variation in humans?  
 A. Skin colour  
 B. Intelligence  
 C. Height  
 D. Blood groups.
26. In cattle the gene for red coat colour, R is co-dominant to that for white coat colour, W. If a red cow was mated to a white bull, what would be the phenotype of the F<sub>1</sub> generation?  
 A. All red  
 B. All white  
 C. 3 red:1 white  
 D. Intermediate coat colour (roan).
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 D. Red and white.
28. If a man of blood group A is married to a woman of blood group O, what are the possible genotypes of their children?  
 A. AA, OO  
 B. AA, AO  
 C. AO, OO  
 D. AO only.
29. When a homozygous black mouse (WW), the offspring were all brown. What would be the colour of the mice produced if F<sub>1</sub> offspring is crossed with a homozygous white parent?  
 A. 3 brown: 1 white  
 B. 1 brown : 3 white  
 C. 1 brown : 1 white  
 D. All white.
30. Which one of the following sets contains only characteristics of continuous variation?

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 B. Height, body weight, intelligence.  
 C. Sex, haemophilia, height.  
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 C. codominant with that for red.  
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32. What would be the ratio of the phenotypes if a roan bull and roan cow from the offspring referred to in question 15 were mated?
- A. 1 red: 2 roan: 1 white  
 B. 2 red: 1 roan: 1 white  
 C. 1 red: 1 roan: 2 white  
 D. 1 red: 1 white
33. (a) Explain briefly what you understand by the terms:
- (i) Meiosis  
 (ii) Mitosis
- (b) Where do meiosis and mitosis occur?
- (c) A plant with yellow leaves was crossed with a plant with green leaves. The gene for yellow leaves is recessive to that of green leaves. The offspring obtained were all green.
- (i) What is the genetic ratio if F<sub>1</sub> is selfed?  
 Show your working.
- (ii) What is the phenotypic ratio of F<sub>2</sub>?
34. (a) What is meiosis and where does it occur in plants and animals?  
 (b) What is the relevance of meiosis in reproduction?  
 (c) In a breeding experiment, plants which were homozygous for white flowers were crossed with those homozygous for red flowers. The resultant F<sub>1</sub> generation all had red flowers.
- a. Explain the absence of white flowers in the F<sub>1</sub> generation.  
 b. Using genetic symbols, show the results in the F<sub>2</sub> generation after selfing the F<sub>1</sub> generation.
35. In an experiment, a long winged male drosophillia was crossed with a short winged female drosophillia. All the offspring in the F<sub>1</sub> generation were long winged. When two members of the F<sub>1</sub> generation were mated, the F<sub>2</sub> generation consisted of 62 long winged files and 21 short winged files.

- (a) Suggest an explanation why all the  $F_1$  generation flies were long winged.
- (b) (i) What type of flies would develop from a mating between short winged flies in the second generation?  
(ii) Give a reason for your answer.
- (c) Mating between a short winged fly in  $F_2$  generation with a long winged fly in  $F_1$  generation produced 90 flies. How many of them were long winged? Show your working.

36. (a) (i) Which chromosomes are responsible for determining sex in humans?  
(ii) Using appropriate symbols show how sex is determined in humans.
- (b) Red - green colour blindness is a defect caused by a recessive gene carried on the X chromosome. What would be the phenotype of the offspring when a normal woman marries a colour blind man? Show your working.

- 37 (a) What is meant by the term mutation?  
(b) The gene for normal production of haemoglobin is dominant to the mutant gene which causes sickle cell anaemia. If a female heterozygous for the sickle cell anaemia marries a normal man, illustrate, using suitable symbols, the possible genotypes and phenotypes of the offspring.

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40. (a) Distinguish between dominance and codominance in genetics. (02 marks)  
(b) When tall pea plants were crossed with short pea plants, all the plants in  $F_1$  generation were tall. When two plants of the  $F_1$  generation were crossed, both tall and short plants were produced in the  $F_2$  generation.  
(i) why were all plants tall in the  $F_1$  generation.

- (ii) using suitable symbols, show the crosses to produce the  $F_1$  and  $F_2$  generations.

(c) In rose plants, when a red flowered plant is crossed with a white flowered plant, all plants produced bear pink flowers.

41. (a) Using suitable symbols show the result of crossing a pink flowered plant and a white flowered plant.

What do you understand by a recessive gene

(b) A man who is a carrier for albinism married a normal woman. Using suitable symbols, work out the proportions of the possible genotypes and phenotypes of their children.

(c) Give two benefits of studying human genetics.