S3 Biology Genetics TEST PRACTICE QUESTIONS

**DO NOT WRITE ON THESE SHEETS**

GRAPH PAPER NEEDED Q2b booklet number

1. Write the correct word from the following list to match the definition below it.

Word list

chromosomes, discrete, dominant, gamete, heterozygous

a) the allele that will mask the effect of a recessive allele

b) type of variation where characteristics fall into separate categories

c) long thread-like structures made of DNA

d) male or female sex cell, contains only one set of genes

e) the genotype when the two alleles an organism inherits are different

2. Variation

a) Draw a table like the one below and add the letters in the correct column for each type of variation shown in the list below it.

|  |  |
| --- | --- |
| discrete variation | continuous variation |
|  |  |

1. Ear lobe type in humans
2. Mass of seeds in sunflower
3. Resting heart rate in humans
4. Flower colour in sweet pea plants
5. Blood group in humans
6. Limpet shell diameter
7. Tongue rolling ability in humans
8. Body length of trout

b) Fingerprint type in humans shows discrete variation. The 3 main types, loop, arch and whorl are shown on the right.

Present the information in the table below as a graph.

|  |  |  |
| --- | --- | --- |
| Finger print type | Gender | % of population |
| Loop | Male | 60 |
| Female | 54 |
| Arch | Male | 8 |
| Female | 18 |
| Whorl  | Male | 32 |
| Female | 28 |

*REMEMBER TO MARK YOUR WORK REGULARLY*

3. Write the following structures in the correct order from **biggest** to **smallest**.

cell chromosome gene nucleus

4. Look at the diagram on the right.

a) What is the name of this procedure used when DNA profiling?



b) Using the results from the DNA profiling shown on the left. Name the person who left the blood stain. Explain your choice of answer.

c) A female chimpanzee recently gave birth to an infant while in captivity. Because the paternity of the infant is unclear, scientists tested the DNA from two male chimpanzees, along with the female and infant. The results are shown below.

Based on the gel electrophoresis result, what can be concluded?

I. Male 1 could possibly be the parent.

II. Male 1 can be ruled out as the parent.

III. Male 2 could possibly be the parent.

IV. Male 2 can be ruled out as the parent.

Chose from the following options

A. II only
B. I and III
C. I and IV
D. II and III
E. II and IV
5. The photograph shows a child with dimples. Dimples are small indentations in the cheeks. Their presence is controlled by a single gene which has two forms. The dominant form (D) gives dimples and the recessive form (d) gives no dimples.

a) What name is given to different forms of the same gene?

b) The parents of the child are known to have the following genotypes. DD X dd

Choose the correct option from each bracket to make the following sentence correct.

c) What is the genotype of the child?

6. Some plant characteristics show discrete variation.

a) What is discrete variation?

b) Give two examples of discrete variation.

7. In corn on the cob, yellow seed (G) is dominant to purple seed (g). The cob shown below shows some purple seeds and some yellow seeds. The seeds have been counted.



The genotypes of the parents that produced this cob were.

1. GG X gg
2. Gg X gg
3. gg X gg
4. Gg X Gg

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**8.** Hair appearance in mice is controlled by a single gene.

Wavy hair (H) is dominant to straight hair (h).

Two homozygous mice were crossed, one had wavy hair and one had straight hair.

a) What were the genotypes of the parents?

b) What is the phenotype of the F1 mice?

c) Draw a punnet square of the following cross. A mouse from the F1 generation with a straight haired mouse.

d) What is the phenotype ratio of the offspring from this cross?

**9.** The diagram below represents some of the processes in human reproduction.

The sex chromosomes are shown in each cell.



Which numbered cells are female?

10. Tongue rolling is an inherited characteristic. The diagram below shows the pattern of inheritance in one family.



a) Using the letters R and r, state the genotypes of

i) Maureen ii) Jim iii) Kevin

You may need to draw punnet squares to help you answer these questions

b) If Rab and Fiona have a child what are the chances of the child being able to roll its tongue?

c) Which of the original parents was homozygous?

d) Name a tongue roller in the F1 generation.

11. The diagram shows a cross between tall and dwarf pea plants.



a) What would be the predicted ratio of Tall to Dwarf plants in the F2 generation?

b) The actual ratio of Tall:Dwarf plants was different form the expected ratio. Give an explanation for this difference.

12. Fruit flies show variation in wing structure which can be inherited.

Flies were crossed as shown below.

a) Using N form the normal form and n for the vestigial form, give the genotypes of each of the following:

i) parent with normal wings

ii) a fly from the F1 generation

iii) an F2 fly with vestigial wings

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13. a) What sex will a child be if an X chromosome is inherited from one parent and a Y chromosome from the other?

b) If the same parents have a second child, what are the chances that it will be the same sex as its older sibling?

14. A cross between two homozygous pea plants is shown below.





a) Identify the dominant characteristic and give a reason for your answer.

b) Some of the tall pea plants produced from the cross were bred with each other to produce another generation of pea plants.

i) What symbol is used to identify this generation?

ii) This result of this final cross was that 240 tall plants were produced and 60 dwarf ones. What is the simple whole number ratio of Tall to dwarf plants in this cross?

15. In humans, the allele for blood group A is dominant to the allele for blood group O. Two parents both have blood group A. their child has blood group O. What is the best explanation for this pattern of inheritance?

1. the child has inherited the blood group directly from a parent
2. The parents are homozygous for the blood group alleles
3. The parents are heterozygous for the blood group alleles
4. There has been a mutation (genetic change) in the blood group alleles

16. Cells contain sets of chromosomes. State the number of sets present in each of the following cells.

a) i) body cells ii) sex cells

b) What general name is given to the sex cells of animals and plants?

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17. The shape of the human ear lobe is controlled by two different alleles of the same gene. The family tree below show the inheritance of ear lobe type.

a) Name the two phenotypes of this characteristic, shown in the family tree.

b) From the information, identify

i) a male with attached ear lobes ii) a female with free ear lobes

c) From the information, state which form of ear lobe shape is **dominant**.

d) What symbol is used to identify the **generation** of each of the following individuals

i) Fiona ii) Linda

e) What type of variation is shown by this genetic characteristic?

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18. Sorghum is an important food crop in some parts of the world.

The colour of the seed husk (coat) is controlled by a single gene.

Purple husk (H) is dominant to tan husk colour (h).



a) A homozygous purple husk plant is crossed with a homozygous tan husk plant.

i) What are the genotypes of the parents?

ii) What are the phenotype(s) of the F1 plants?

b) An individual from the F1 generation is crossed with a tan husk plant.

i) Draw a punnet square to show the expected results of this cross.

ii) State the expected phenotype ratio for the offspring of this cross.

19. In dogs, uniform coat colour is dominant to spotted coat.



From the family tree above, in which generation(s) are all dogs heterozygous for coat colour?

1. P only
2. F1 only
3. F2 only
4. P and F1

20. Polydactyl is a condition which results in extra toes in mice. It is controlled by the dominant form of the gene (N). The normal phenotype is controlled by the recessive form of the gene (n).

The diagram right shows a cross between two mice of different phenotypes

a) Copy and complete the diagram to show the possible genotypes of the F2 generation.

b) Give the phenotypes of each of the following mice

i) Parent 1 ii) Parent 2 iii) F1

c) What term is used to describe the type of variation shown by these phenotypes?

d) Why are the actual phenotype ratios in the F2 generation different from the predicted ones?



21. a) What name is given to the image on the right?

b) What two things can you tell about the individual that this image came from?

*THE END ….phew !– MAKE SURE YOU HAVE MARKED ALL YOUR WORK*