

Variation and Inheritance

12. Variation in a characteristic can either be discrete or continuous. The range of heights and weights for a group of students were measured and recorded. Ear lobe types were also examined and categorised into groups.

Which line in the table below identifies the type of variation shown by each of these human characteristics?

	<i>Height</i>	<i>Weight</i>	<i>Ear lobe types</i>
A	continuous	continuous	discrete
B	discrete	continuous	continuous
C	discrete	discrete	continuous
D	continuous	discrete	discrete

9. Coat colour in Labrador dogs is an inherited characteristic. Black coat (**B**) colour is dominant to chocolate coat colour (**b**).



- (a) A homozygous black Labrador was crossed with a Labrador with a chocolate coloured coat.

Complete the diagram below to show the genotypes of each of the parents and the F₁ phenotype.

2

Parents: black coat X chocolate coat

Genotypes:





F₁ genotype: All Bb

F₁ phenotype:

8. The diagrams below show the same sections of matching chromosomes found in four flies, A, B, C and D.

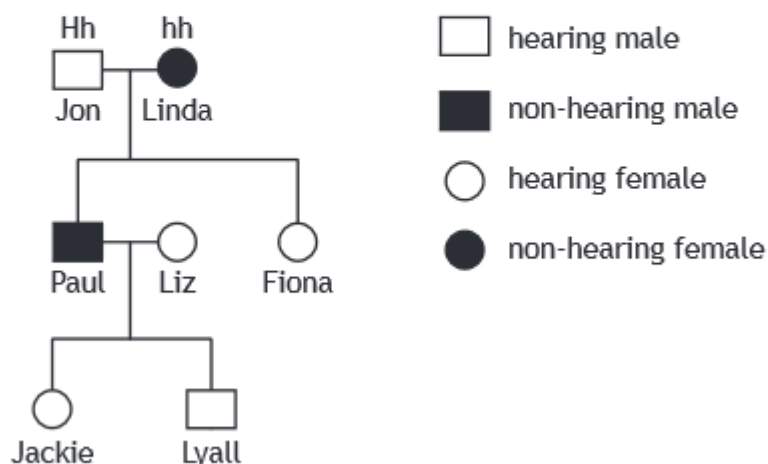


The alleles shown on the chromosomes can be identified using the following key.

-  allele for striped body
-  allele for unstriped body
-  allele for normal antennae
-  allele for abnormal antennae

Which fly is homozygous for body pattern and heterozygous for antennae type?

7. (a) One type of deafness in humans is caused by a single gene.
 The diagram below shows the pattern of inheritance in one family.
 H represents the hearing form of the gene.
 h represents the non-hearing form of the gene.



- (i) Using Jon as an example, explain how it is known that the hearing form of the gene is dominant. 1

- (ii) Use information in the family tree to complete the following table to show the genotype and phenotype of each individual. 2

<i>Individual</i>	<i>Genotype</i>	<i>Phenotype</i>
Paul		
Lyall		

- (iii) Fiona has a child with a man who has the same genotype as her. State the chance of their child being able to hear. 1

Space for calculation

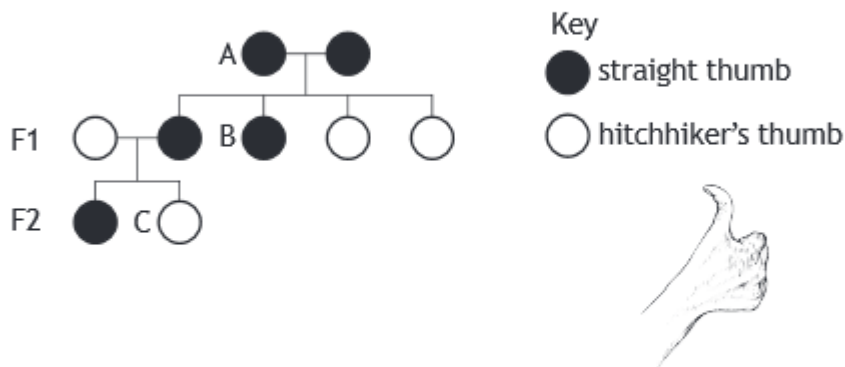
13. The following diagram shows the inheritance of coat colour in guinea pigs.

P Phenotype	Black guinea pig	X	White guinea pig
P Genotype:	BB		bb
F1 Genotype:		Bb	
F2 Genotypes:	BB and Bb and bb		

Which of the following generations contain heterozygous individuals?

- A P and F1
- B P and F2
- C F1 and F2
- D P, F1 and F2

6. The following diagram represents part of a family tree showing the inheritance of hitchhiker's thumb, where the thumb can bend back as shown below.



- (a) Complete the table below for individuals A and C.

2

<i>Individual</i>	<i>Possible Genotype(s)</i>	<i>Phenotype</i>
A		straight thumb
B	TT or Tt	straight thumb
C	tt	

- (b) In a survey of 90 students it was found that 25 of them had hitchhiker's thumb.

- (i) Calculate the number of students with straight thumb to hitchhiker's thumb as a simple, whole number ratio.

1

Space for calculation

_____ : _____
 straight thumb hitchhiker's thumb

- (ii) The predicted ratio was 3 straight thumb : 1 hitchhiker's thumb.

Explain why the predicted ratio was different to the actual ratio.

1

6. Chromosomes contain the genetic information responsible for variation amongst members of a species.

Fruit flies can have either a grey or black body colour.

The parent flies used in a cross are shown in the diagram.



Genotype:
Phenotype:

GG
Grey body

gg
Black body

- (a) Using the information given, underline one option in each bracket to complete the following sentences.

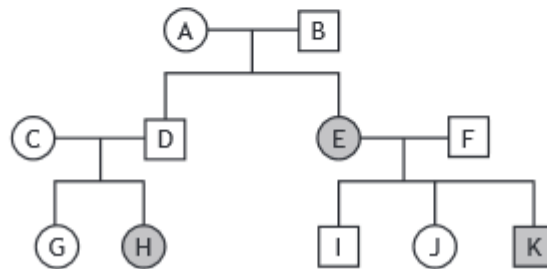
2

Body colour in fruit flies is an example of $\left\{ \begin{array}{l} \text{discrete} \\ \text{continuous} \end{array} \right\}$ variation.

The F_1 flies produced from this cross will be $\left\{ \begin{array}{l} \text{homozygous} \\ \text{heterozygous} \end{array} \right\}$.

11. (a) Tongue-rolling is an inherited characteristic controlled by different forms of a gene. T (roller) represents the dominant form of the gene, and t (non-roller) represents the recessive form.

The family tree diagram shows a pattern of inheritance of the characteristic.



- (i) Use letters from the diagram to identify all the individuals in the F_2 generation. 1

- (ii) Give the genotypes of individuals E and F. 2

E _____ F _____

- (iii) Complete the Punnett square to show the gametes and expected genotypes of the offspring of E and F. 2

		<i>Genotype of gametes from F</i>	
<i>Genotype of gametes from E</i>			