

AQA, OCR, Edexcel

A Level

A Level Biology

Inheritance Questions

Name:

M M E

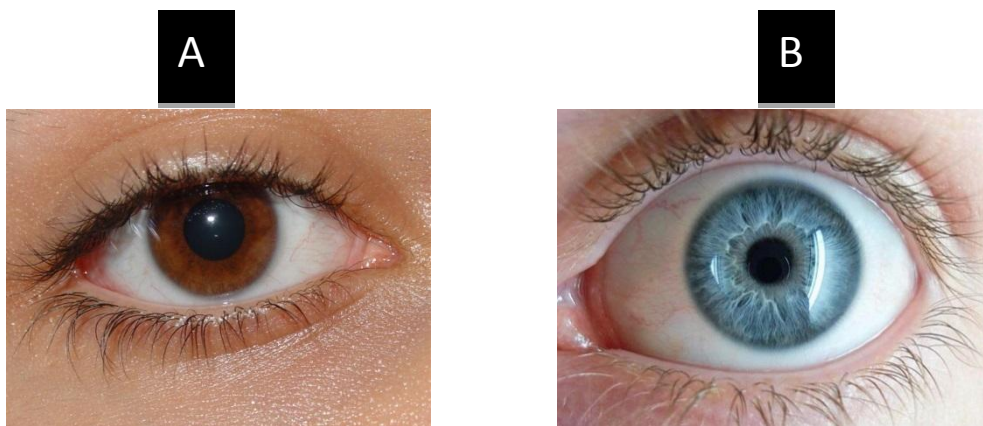
Mathsmadeeasy.co.uk

Total Marks: /33

Inheritance

Biological inheritance is defined as ‘the process by which an offspring cell or organisms acquires or is predisposed to the genetic characteristics of its parents. In organisms this can range from eye-colour and hair-colour, to genetic diseases to personality traits.

1. a) i) The allele for blue eyes is recessive. Explain why individual A, pictured below has brown eyes and individual B has blue eyes. (2 marks)



- ii) What is the difference between genotype and phenotype? (2 marks)

2. Individuals have two copies of each gene, however these are separate into the haploid cells created in meiosis so each cell only has one copy of each gene. In fertilisation two cells are fused together which forms the genotype of the offspring. Genetic diagrams can be used to predict the genotypes of offspring.

- a) Gregor Mendel was the first person to theorise the idea of inheritance. He analysed garden peas; specifically round and wrinkled peas and the genetic offspring created when these were crossed which turned out to be an example of monohybrid inheritance. The wrinkled peas contained recessive alleles (r).

i) Using a genetic diagram identify the genotypes of the F₂ generation of pea plants if a homozygous round pea and a homozygous wrinkled pea were crossed initially. (6 marks)

ii) What is the phenotypic ratio of the offspring peas? (1 mark)

b) Sickle cell anaemia is a disease that affects the red blood cells; a mutation causes the cells to be sickle shape which lowers their oxygen carrying capacity. Sickle cell anaemia is an example of codominance.

i) What is meant by the term codominance? (2 marks)

ii) The allele for normal haemoglobin is H^N, the allele for sickle haemoglobin is H^S. Complete the table below to show the possible genotypes and phenotypes of offspring when two heterozygous parents reproduce. (3 marks)

Genotype	Phenotype

c) Some characteristics are sex-linked.

i) What is meant by a sex linked characteristic? (1 mark)

ii) Why are males more likely than females to show recessive, sex-linked phenotypes. (4 marks)

d) Colour blindness is a sex-linked disorder carried on the X-chromosome.

- i) Complete the punnet square below shows the possible genotypes of offspring when the male and female shown below are crossed. (2 marks)

	X^N	X^n
X^N	A?	B?
Y	C?	D?

- ii) What are the phenotypes of the offspring A-D? (4 marks)
3. Gene interaction is not just confined to the way pairs of alleles interact, but also how genes interact with each other.

a) A flower may be white, yellow or pink. In the DNA at particular loci, white petals are produced by gene **W**. At a different locus, allele **Y** produces yellow flowers and is dominant to allele **y** which codes for pink flowers. Gene **W** is a dominant, epistatic gene.

- i) What is meant by the term epistatic allele? (1 mark)
- ii) Draw a genetic diagram to show the genotypes of the potential offspring between a homozygous dominant white flower and a homozygous recessive pink flower. (4 marks)
- iii) What is the phenotypic ratio? (1 mark)