AQA GCSE

Notes and Questions

Combined Science
Biology Revision

a

Label each of the following statements with either mitosis or meiosis.

Produces identical cells. _____

Produces non-identical cells. _____

Daughter cells have one set of chromosomes. _____

Daughter cells have two sets of chromosomes. _____

Includes one nuclear division. _____

Includes two nuclear divisions. _____

Produces 4 daughter cells. _____

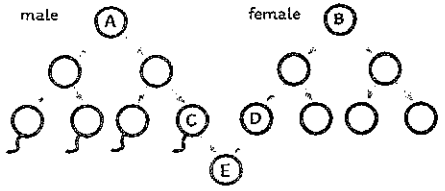
Produces 2 daughter cells. _____

b

What are the names of the male and female gametes...
in plants? _____
in animals? _____

Fill in the gaps:
_____ reproduction involves only one parent and no fusion of _____. Only _____ is involved, so there is no mixing of genetic information. The offspring are _____ (genetically identical).

c



How many chromosomes are in cell B? _____
What is the process called that produces cell C from cell A? _____
How many chromosomes are in cell C? _____
How many chromosomes are in cell E? _____
What is the process that produces cell E called? _____

d

Fill in the gaps:
Gametes join at _____ to restore the normal number of chromosomes. The new cell that is produced divides by _____, so the number of cells _____. As the embryo develops, the cells _____.

e

Match each of the keywords with its definition.
Keywords: genome, gamete, chromosome, gene, allele, dominant, recessive, homozygous, heterozygous, genotype, phenotype.

The entire genetic material of an organism. _____

The alleles present in an individual for a particular characteristic. _____

A section of DNA that codes for a particular sequence of amino acids that makes a specific protein. _____

Only controls the physical characteristic if it is present on both chromosomes. _____

A different form or variant of a gene. _____

Two identical alleles for a characteristic. _____

Different alleles for a characteristic. _____

Found in the nucleus, they are made from long DNA molecules and passed from parent to offspring. _____

The sex cells (sperm and egg cells), which contain one set of genetic information. _____

The physical appearance of an individual for a particular characteristic. _____

Controls the characteristic, even if it is only present on one chromosome. _____

f

How many strands does DNA have?
_____

What is the name of the structure of DNA?
_____

How many pairs of chromosomes does an ordinary human body cell contain?
_____

g

Label the diagram below with the keywords: cell, nucleus, chromosome, gene, DNA.

h

Give three reasons it's important to study the human genome.

1. _____
2. _____
3. _____

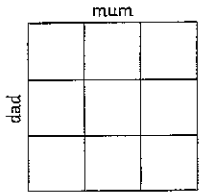
i

Give an example of a characteristic caused by a single gene.
_____

What causes most characteristics?
_____

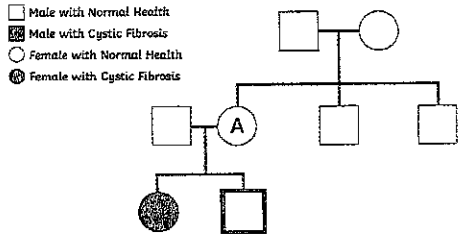
j

A woman with polydactyly is heterozygous for the polydactyly allele. The woman marries a man who does not have polydactyly. Draw a punnet square diagram and highlight the possible offspring genotypes that would have polydactyly.
Use the symbol A for the dominant allele and the symbol a for the recessive allele.



k

The diagram shows the inheritance of cystic fibrosis in one family.

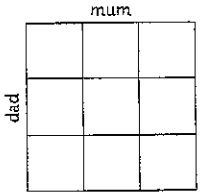


Use the symbol N for the allele for normal health, and the symbol n for the allele for cystic fibrosis.

What is the genotype for person A?
_____

How do you know?
_____

Person A is pregnant with their third child. Draw a genetic diagram to show the probability of the child having cystic fibrosis.



a

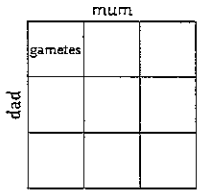
Which sex chromosomes do human females carry?

_____

Which sex chromosomes do human males carry?

_____

Use a punnet square to show the inheritance of sex.



What is the chance that a pregnancy produces a boy?

_____

b

What are the benefits of embryo screening?

What are the risks of embryo screening?

What are the economic concerns surrounding embryo screening?

c

Give an example of variation between individuals that is affected by genetics (genetic variation).

Give an example of variation between individuals that is affected by the environment (environmental variation).

Give an example of variation between individuals that is affected by a combination of genetic and environmental variation.

d

Fill in the gaps.

_____ occur continuously and give rise to new variants in the _____ of a species. Most variants have no effect on the _____. Sometimes a variant is harmful and means the individual is less likely to _____. Very rarely it might produce a phenotype that is beneficial, making the individual better _____ to the environment.

e

What is evolution? Fill in the gaps.

A _____ in the _____ characteristics of a population over _____ through a process of _____. This may result in the formation of a new _____.

When did the first simple life forms develop?

What evidence do we have for evolution?

f

The anole lizards are found on the Caribbean islands. There are around 150 species of the lizard which evolved from a single species that colonised the islands.

Use the keywords to help explain how two species of the anole lizard, found on different Caribbean islands, could have evolved from a common ancestor.

Keywords: successfully interbreed, separated, environmental conditions, survive, offspring, geographical isolation, reproduce, variation, adapted, natural selection, alleles.

The ancestral populations of anole lizards were _____ because they lived on different islands. This is called _____.

Each environment would have had different _____.

There was genetic _____ in each population.

The individuals in each population that were better _____ to those conditions would _____ and _____. This is called _____.

The _____ for the beneficial phenotypes were passed to their _____.

Eventually, the two populations would be so different they could not _____.

g

What is selective breeding?

Describe how farmers would use selective breeding to produce cows that make lots of milk. Fill in the gaps.

1. Pick parents that _____;
2. _____;
3. from the offspring, pick _____;
4. _____;
5. repeat for _____ until all of the offspring _____.

Give four other examples of characteristics that might be chosen for selective breeding in plants or animals.

1. _____
2. _____
3. _____
4. _____

h

What is the benefit of selective breeding?

What is a risk of selective breeding?

a

What is genetic engineering?

Give an example of how genetic engineering is used in plants.

Give an example of how genetic engineering is used in bacterial cells.

b

What are GM crops?

What are the benefits of GM crops? Fill in the gaps.

1. They can be resistant to _____, _____ or _____.
2. They have increased _____.
3. They can be engineered to grow in more difficult _____.

c

What are the concerns about genetic engineering?

d

Complete the boxes to show the way Linnaeus classified living things.

Kingdom → [ ] → [ ] → [ ] → [ ] → [ ] → [ ] → [ ]

How are organisms named?

e

What are fossils?

Fill in the gaps to complete the three ways fossils may be formed.

1. From parts of organisms that have not _____ because one or more of the conditions for decay are _____.
2. When parts of the organism are _____ by _____ as they decay.
3. As preserved _____ of organisms, such as _____, _____ and _____.

f

What can we learn from fossils?

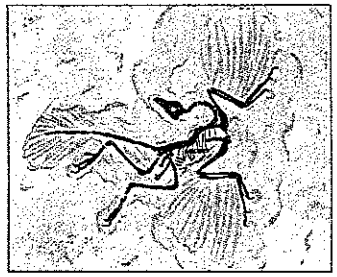
Why can scientists not be certain about how life began on Earth?

g

Chemical analysis led Carl Woese to adapt the system we used for classification. What are the domains of his three domain system called? Fill in the gaps.

1. _____, primitive bacteria who live in extreme environments;
2. _____;
3. _____, which includes p_____, f_____, p_____ and a_____.

h



This is a fossil of the prehistoric bird Archaeopteryx. Archaeopteryx is now extinct, give some factors that could contribute to a species extinction.

i

Why can bacteria evolve rapidly?

Fill in the gaps to explain how bacteria can become resistant to antibiotics.

_____ arise that produce new strains.

Some _____ may cause the strain to become _____ to antibiotics.

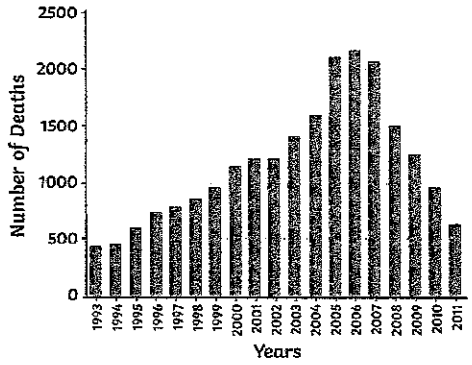
Bacteria are no longer _____ by antibiotics so they _____ and _____, this increases the population of antibiotic resistant bacteria.

The resistant strain is _____ between people because they are not _____ to it and there is no effective _____.

Why is the development of new antibiotics not likely to keep up with new strains of bacteria?

j

MRSA is resistant to antibiotics. The graph shows how the number of MRSA deaths has changed over the last 15 years.



Describe the trend in the data.

From 1993 to 2006... _____

After 2006... _____

Measures were put into place to prevent the spread of antibiotic resistant bacteria.

How did this affect doctors' decisions to prescribe antibiotics?

What must patients need to do when they are prescribed antibiotics?

Give two ways that hospitals reduce the spread of bacterial infections.

AQA Style

SPECIMEN MATERIAL

COMBINED SCIENCE

GCSE

F

Unit 6: Inheritance, Variation and Evolution

Foundation Tier

Time allowed: 50 minutes

Question	Mark	Total Marks Available
1		5
2		5
3		6
4		7
5		6
6		13
7		8
Total		**50**

Name _____

Date _____

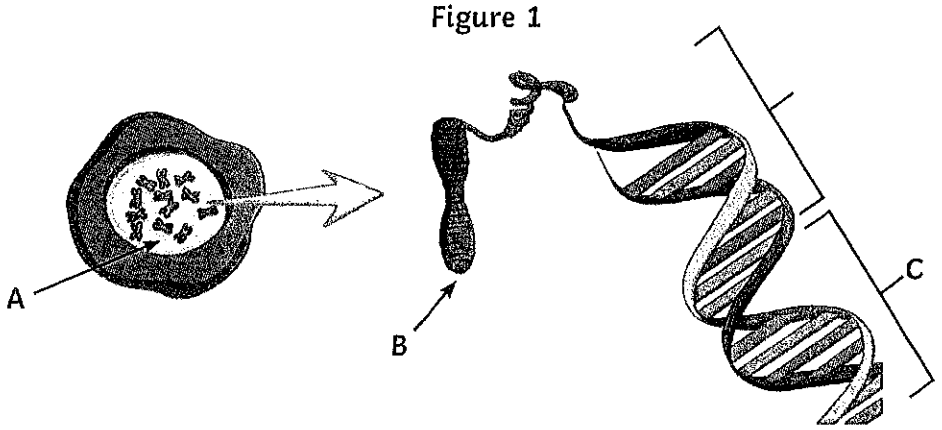
0 1 Figure 1 shows the genetic material found in an animal cell..

0 1 . A Label **figure 1** using the keywords below.

[3 marks]

chromosome cytoplasm nucleus protein DNA gene

Figure 1



A - _____

B - _____

C - _____

0 1 . B Define the term **genome**.

[1 mark]

_____

_____

_____

0 1 . A Give one reason it's important to study the human genome.

[1 mark]

_____

_____

_____

0 2 Organisms can reproduce by either sexual or asexual reproduction. In sexual reproduction, gametes fuse during fertilisation.

0 2 . A What are the **male** gametes in...

[2 marks]

i. animals? _____

ii. flowering plants? _____

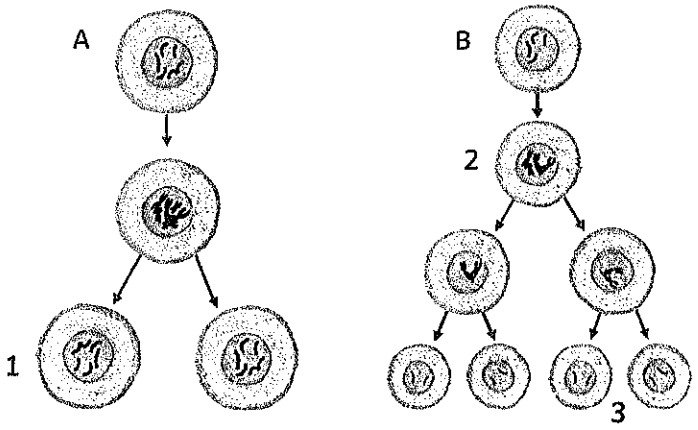
0 2 . B Tick one box on each row to show whether the statement is about sexual or asexual reproduction.

[3 marks]

	Asexual Reproduction	Sexual Reproduction
There is no variation in the offspring.		
There is mixing of genetic information.		
Only mitosis is involved.		

0 3 Meiosis and mitosis are different types of cell division. A diagram of each is shown in **figure 2.**

Figure 2



0 3 . A Name the type of cell division in each diagram.

[1 mark]

A - _____

B - _____

The diagrams **do not** show the correct number of chromosomes.

0 3 . B State the number of chromosomes that would be found in each of the numbered cells.

[3 marks]

Cell 1: _____

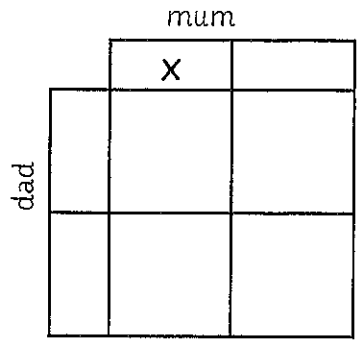
Cell 2: _____

Cell 3: _____

The sex chromosomes determine the sex of a baby.

0 3 . C Complete the punnet square below to show how the sex is determined.

[2 marks]



0 4 Variation can be influenced by the environment or by an organism's genes.

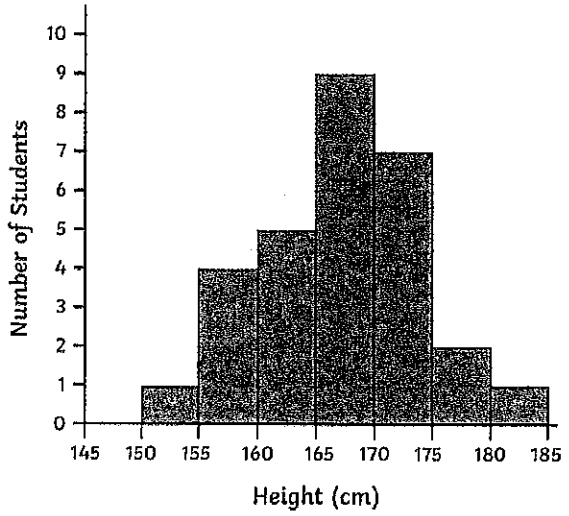
0 4 . A Draw one line from each characteristic to show whether it is influenced by the environment, genes, or both.

[3 marks]

language spoken	environment
weight	genes
natural eye colour	both

A teacher measured the height of each student in their class. They drew a graph of the results, which is shown in **figure 3**.

Figure 3



0 4 . B What is the modal height in the class? _____

[1 mark]

0 4 . C What is the range of heights in the class? _____

[1 mark]

0 4 . D Why did the teacher choose this type of graph to present their data?

[2 marks]

0 5 Huntington's disease is caused by a dominant allele. It usually develops between the ages of 30 and 50 after many people have already had children.

0 5 . A What is an allele?

[1 mark]

_____

_____

0 5 . B What does dominant mean?

[1 mark]

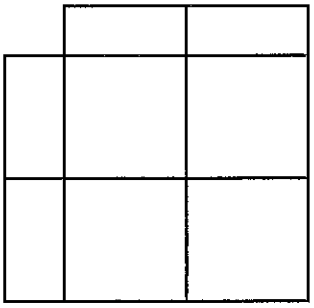
_____

_____

Jacob's dad has just been diagnosed with Huntington's disease, he is a heterozygote. His mum does not carry the Huntington's allele.

0 5 . C Complete the punnet square to show the chance that Jacob has inherited Huntington's.
Use the letter H to represent the dominant allele and the letter h to represent the recessive allele.
Identify the offspring who would inherit Huntington's disease.

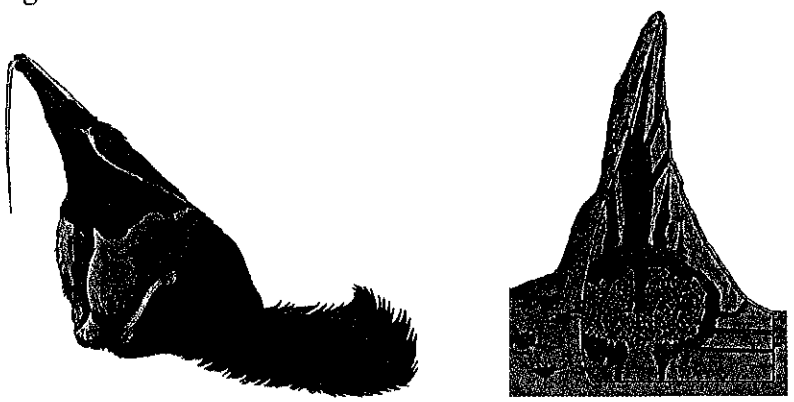
[3 marks]



0 5 . D What is the probability that Jacob has inherited Huntington's disease? _____

[1 mark]

0 6 Anteaters have very long and sticky tongues that they use to eat termites and ants. Since ants and termites are so small, they have to eat thousands of them every day to get enough food.



0 6 . A Explain how the anteater evolved to be a specialised ant and termite eater.

[6 marks]

The anteater's binomial name is *Myrmecophaga tridactyla*.

0 6 . B Tick the correct box to show where this name comes from.

[1 mark]

- ☐ domain and kingdom
- ☐ kingdom and genus
- ☐ genus and species
- ☐ kingdom and species

0 6 . C What is a fossil?

[2 marks]

0 6 . D What can we learn from fossils?

[1 mark]

In the past, scientists' understanding of the evolution of organisms was based on their morphology.

0 6 . E Give two developments in biology that have given scientists more information about the evolutionary relationships between organisms.

[2 marks]

1.

2.

0 6 . F These developments led Carl Woese to develop a new classification system. What change did he make to the previous Linnean system?

[1 mark]

0 7 Rice crops have to be sprayed with pesticides three or four times a season to control pests. One of the pests that can cause problems for rice farmers is the rice borer.

The bacteria *Bacillus thuringiensis* has a gene which provides resistance to a variety of pests, including the rice borer.

BT rice has been genetically modified to express this gene.

0 7 . A What is genetic engineering?

[3 marks]

0 7 . B Evaluate the use of genetic engineering to modify rice plants.

[5 marks]