

Understanding Genetics And Evolution

Question Paper 1

Level	GCSE (9-1)
Subject	Combined Science – Trilogy - Biology
Exam Board	AQA
Topic	4.6 Inheritance Variation and Evolution
Sub-Topic	Dev. Understanding Genetics + Evolution
Difficulty Level	Bronze Level
Booklet	Question Paper 1

Time Allowed: 56 minutes

Score: / 54

Percentage: /100

Grade Boundaries:

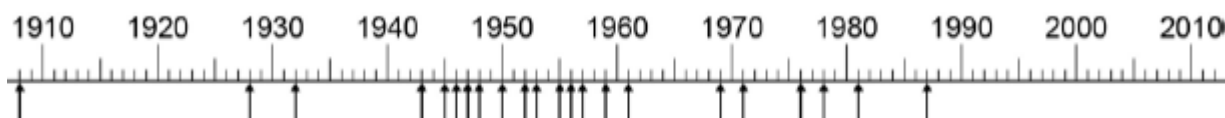
Q1.(a) Some antibiotics work by destroying the cell membranes of bacteria.

Suggest why these antibiotics may have side effects in the animals that are given these antibiotics.

.....

(1)

(b) Each arrow on the figure below shows the date of discovery of each new type of antibiotic.



In which 10 year period were most new types of antibiotic discovered?

.....

(1)

(c) The figure above shows 22 new types of antibiotic. These were discovered before 2010.

Determine the percentage of types of antibiotic that have been discovered between 1980 and 2010.

Use information from the figure above.

Give your answer to 2 significant figures.

.....

.....

..... %

(2)

(d) Bacteria can evolve rapidly.

Many bacteria can develop into new strains which are resistant to antibiotics.

Complete the table below to show if each action is **more likely** or **less likely** to help bacteria to become antibiotic resistant.

Put a tick in each row.

Action	More likely	Less likely
Take painkillers for headache		
Washing with antiseptic hand gel		
Adding antibiotics to food for cows		
Giving antibiotics for colds and flu		
Stopping antibiotics as soon as you feel better		

(4)
(Total 8 marks)

Q2. Sexual reproduction in humans involves the joining together of an egg cell and a sperm cell.

The sex of an embryo is decided by the chromosomes they inherit from their mother and father.

(a) Where in the cell are the chromosomes?

Tick **one** box.

Cell membrane

☐

Cytoplasm

☐

Nucleus

☐

Ribosomes

☐

(1)

(b) Draw **one** line from each type of cell to the number of chromosomes in the cell.

**Type of
cell**

**Number of
chromosomes**

	23
Sperm cell	26
	46
Embryo cell	52
	69

(2)

- (c) A man and a woman decide to have a child.

Complete the genetic diagram in the figure below.

		Parent	
		X	X
Parent	X	XX	
	Y		

(2)

- (d) On the figure above, circle a male child.

(1)

- (e) What is the chance of the man and woman having a boy?

Tick **one** box.

1 in 2

☐

1 in 3

☐

1 in 4

☐

1 in 8

☐

(1)
(Total 7 marks)

Q3. A person's characteristics can be due to:

- environmental causes
- genetic causes
- both environmental and genetic causes.

(a) Complete **Table 1**.

Put a tick to show what each characteristic is due to.

Table 1

Characteristic	Characteristic due to		
	Environmental causes	Genetic causes	Both environmental and genetic causes
Eye colour			
A scar			
Weight			

(3)

(b) Draw **one** line from each key term to the correct definition.

**Key
term**

Definition

	The set of alleles for a characteristic
Genotype	The genus of an organism
	The inheritance of chromosomes
Phenotype	The mutation of genes
	The physical characteristic of an organism

(2)

- (c) Farmers use selective breeding to control the characteristics in cows.

Table 2 shows the stages of selective breeding in cows.

Complete **Table 2** to show the correct order of the stages.

The first stage has been numbered for you.

Table 2

Stage in selective breeding	Order of stage
Cows are bred over many generations	
Parents are bred together	
Cows with the desired characteristics are chosen	1
Calves with the most desired characteristics are bred together	

(2)

- (d) Farmers selectively breed cows for many different reasons.

Suggest **two** characteristics that cows may be bred for.

Do **not** suggest coat colour.

1

.....

2

.....

(2)

- (e) Selective breeding can lead to problems.

Suggest how problems caused by selective breeding in cows can have negative financial effects for the farmer.

.....

.....

.....

.....

(2)

(Total 11 marks)

Q4.Fossils give us information about organisms from a long time ago.

- (a) Amber is a solid, glass-like material. Amber is formed from a thick, sticky liquid which oozes out of pine trees.

The image shows two fossil insects in amber.



Insects

- (i) Suggest how the insects came to be preserved in the amber.

.....

.....

.....

.....

(2)

- (ii) Give **two** other ways fossils are formed.

1.....

.....

2.....

.....

(2)

- (b) The fossil record shows that many organisms, including the dinosaurs, became extinct 65 million years ago.

One theory was that volcanic activity might have caused this mass extinction. Many scientists believe that this extinction was caused when an asteroid collided with the Earth.

- (i) A new scientific theory may replace an old theory.

Why might this happen?

Tick (✓) **one** box.

Evidence from amber is unreliable.

☐

Internet evidence is more reliable than fossil evidence.

☐

New technology provides more valid evidence.

☐

(1)

- (ii) Give **three** reasons, other than volcanic activity and collision with an asteroid, why a species may become extinct.

1.....

.....

2.....

.....

3.....

.....

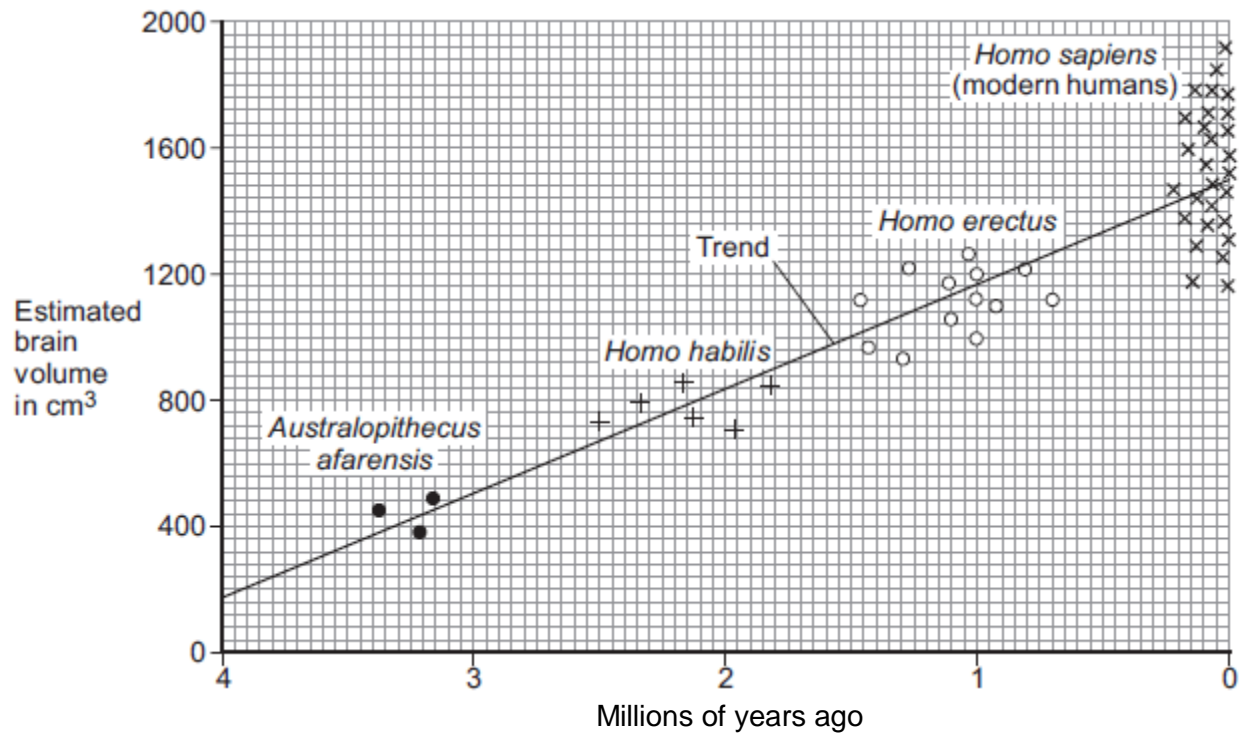
(3)
(Total 8 marks)

Q5. This question is about evolution in humans.

The graph shows:

- the estimated brain volume of different species of humans
- the time when the different species existed on Earth.

The data is plotted for modern humans (*Homo sapiens*) and for three types of extinct ancestors of humans.



Key

Each point plotted on the graph shows the estimate for one human.

- (a) (i) As humans evolved, their brain volume changed.

What has happened to human brain volume over the past 4 million years?

.....

(1)

- (ii) Why is the evidence for estimated brain volume for *Homo sapiens* stronger than the evidence for *Australopithecus afarensis*?

.....

(1)

- (b) In a book, the brain volume of a different species, *Australopithecus africanus*, is stated to be about 600 cm³.

Use evidence from the graphic above to estimate when *Australopithecus africanus* lived on Earth.

Estimate = million years ago

(1)

- (c) Scientists believe that modern humans evolved by natural selection from *Australopithecus afarensis*.

- (i) Complete the following sentence.

In the nineteenth century, the scientist who suggested the theory of evolution by natural selection was Charles

(1)

- (ii) In the nineteenth century, many people did not accept this scientist's theory.

Give **one** reason why.

.....
.....

(1)

(Total 5 marks)

Q6.Figure 1 shows a fossil of a sea animal called a Plesiosaur.
The Plesiosaur was alive about 135 million years ago.

Figure 1



By Andy Dingley (Own work) [CC-BY-SA-3.0 (<http://creativecommons.org/licenses/by-sa/3.0>)], via Wikimedia Commons

- (a) How can fossils give evidence for evolution?

Tick (✓) **one** box.

Newer fossils are simpler than older fossils.

☐

Fossils show change over time.

☐

All fossils show the bones of animals.

☐

(1)

- (b) Plesiosaurs lived in the sea. There was mud at the bottom of the sea.

Suggest how the fossil shown in **Figure 1** may have been formed after the animal died.

.....

.....

.....

.....

.....

.....

(3)

- (c) **Figure 2** shows what scientists think a living Plesiosaur may have looked like.

Figure 2



© Andreas Meyer/Hemera/Thinkstock

Scientists think that the Plesiosaur had smooth skin, with no scales.

The scientists **cannot** be certain what the skin of a Plesiosaur was like.

Suggest why.

.....
.....

(1)

- (d) Plesiosaurs are now extinct.

Give **two** possible reasons why.

1
.....
2
.....

(2)

(Total 7 marks)

- Q7.(a)** Complete the sentences about evolution.

Draw a ring around the correct answer to complete each sentence.

- (i) Darwin suggested the theory of evolution by

artificial
natural
asexual

selection.

(1)

- (ii) Darwin's theory of evolution says that all species of living things have

evolved from

artificial
complex

life forms.

simple

(1)

- (iii) Most scientists believe that life first developed about

three billion
three million
three thousand

years ago.

(1)

- (b) Darwin's theory of evolution was only slowly accepted by other people.

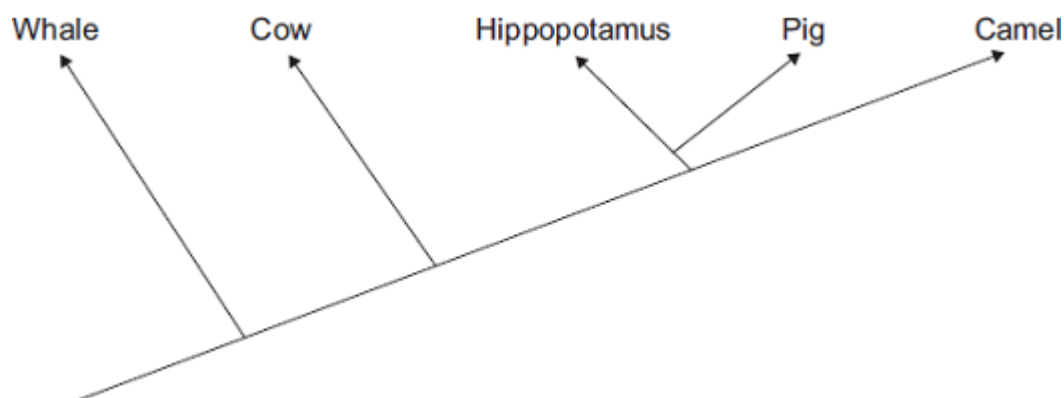
Give **two** reasons why.

- 1.....
.....
2.....
.....

(2)

- (c) **Diagram 1** shows one model of the relationship between some animals.

Diagram 1



- (i) Complete the sentence.

The model shown in **Diagram 1** is an evolutionary

(1)

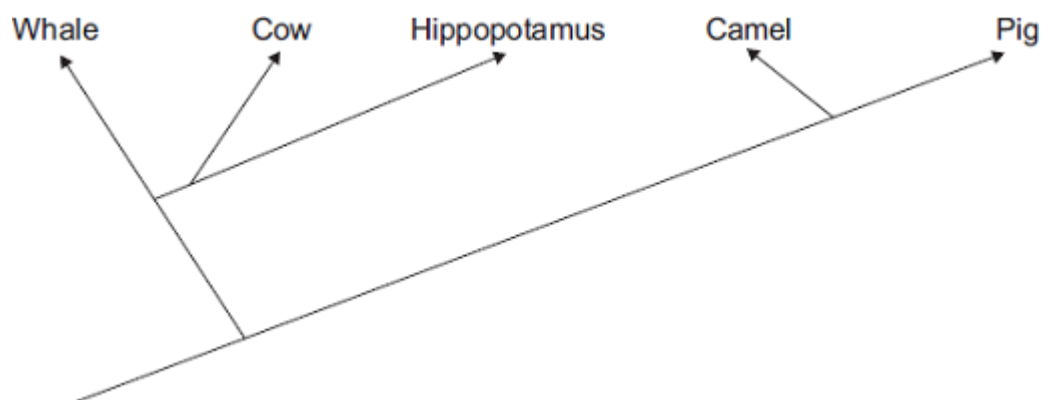
- (ii) Which **two** of the animals in **Diagram 1** are most closely related?

..... and

(1)

- (iii) Diagram 2 shows a more recent model of the relationship between the animals.

Diagram 2



Suggest **one** reason why scientists have changed the model of the relationships between the animals shown in the diagram.

Draw a ring around the correct answer.

**more powerful
computers**

**new evidence
from fossils**

**new species
discovered**

(1)
(Total 8 marks)