Q1. Our understanding of genetics and inheritance has improved due to the work of many scientists.

(a) Draw **one** line from each scientist to the description of their significant work.

Scientist	Description of significant work
Charles Darwin	Carried out breeding experiments on pea plants.
Alfred Russel Wallance	Wrote 'On the origin of species'.
Gregor Mendel	Worked on plant defence systems.
	Worked on warning colouration in animals.

(3)

(b) In the mid-20th century the structure of DNA was discovered.

What is a section of DNA which codes for one specific protein called?

.....

(1)

(c) **Figure 1** shows one strand of DNA.

The strand has a sequence of bases (A, C, G and T).

Figure 1



How many amino acids does the strand of DNA in **Figure 1** code for?

Tick **one** box.

2 ☐

3 ☐

4 ☐

6 ☐

(1)

(d) Mutations of DNA cause some inherited disorders.

One inherited disorder is cystic fibrosis (CF).

A recessive allele causes CF.

Complete the genetic diagram in **Figure 2**.

- Identify any children with CF.
- Give the probability of any children having CF.

Each parent does not have CF.

The following symbols have been used:

D = dominant allele for **not** having CF

d = recessive allele for having CF

Figure 2

		Mother	
		D	d
Father	D	DD	
	d		

Probability of a child with CF = ...

(3)

(e) What is the genotype of the mother shown in **Figure 2**?

Tick **one** box.

Heterozygous ☐

Homozygous dominant ☐

Homozygous recessive ☐

(1)
(Total 9 marks)

Q2. In the 1800s, Charles Darwin visited the Galapagos Islands. On the islands he found many different species of bird called finches. Darwin thought that all the different finch species had evolved from one species of finch that had reached the islands many years before.

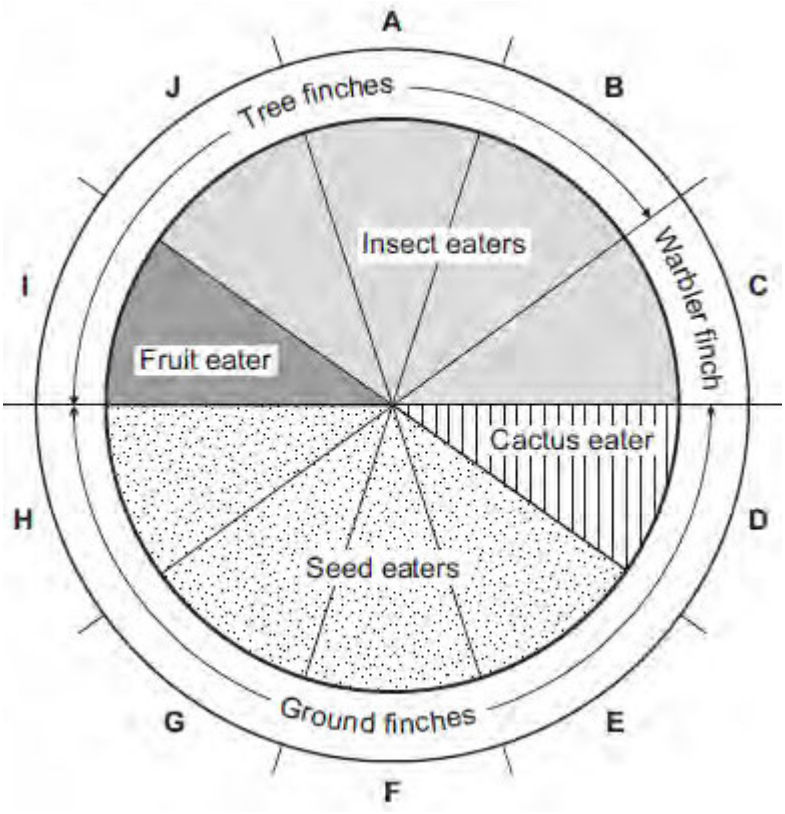
(a) Complete the following sentence.

Darwin suggested the theory of evolution by natural

.....

(1)

(b) The pie chart shows information about ten species of finch, **A – J**.



(i) How many of the species of finch eat insects?

Draw a ring around the correct answer.

4 **5** **6**

(1)

(ii) Describe finch species **G**.
Use **only** information from the pie chart.

.....

.....

.....

.....

(2)

(c) When Darwin returned to the UK very few people believed his theory of evolution.

A different scientist suggested that the changes that occur in an organism during its

lifetime can be inherited by its offspring.

What was the name of this scientist?

Tick (✓) **one** box.

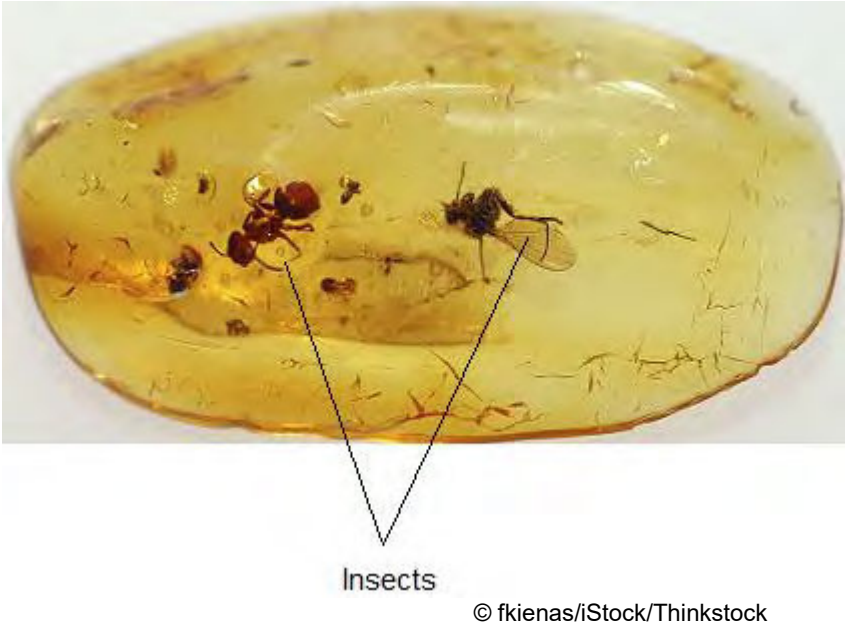
Lamarck	☐
Mendel	☐
Semmelweis	☐

(1)
(Total 5 marks)

Q3. 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.



© fkienas/iStock/Thinkstock

(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.....

.....

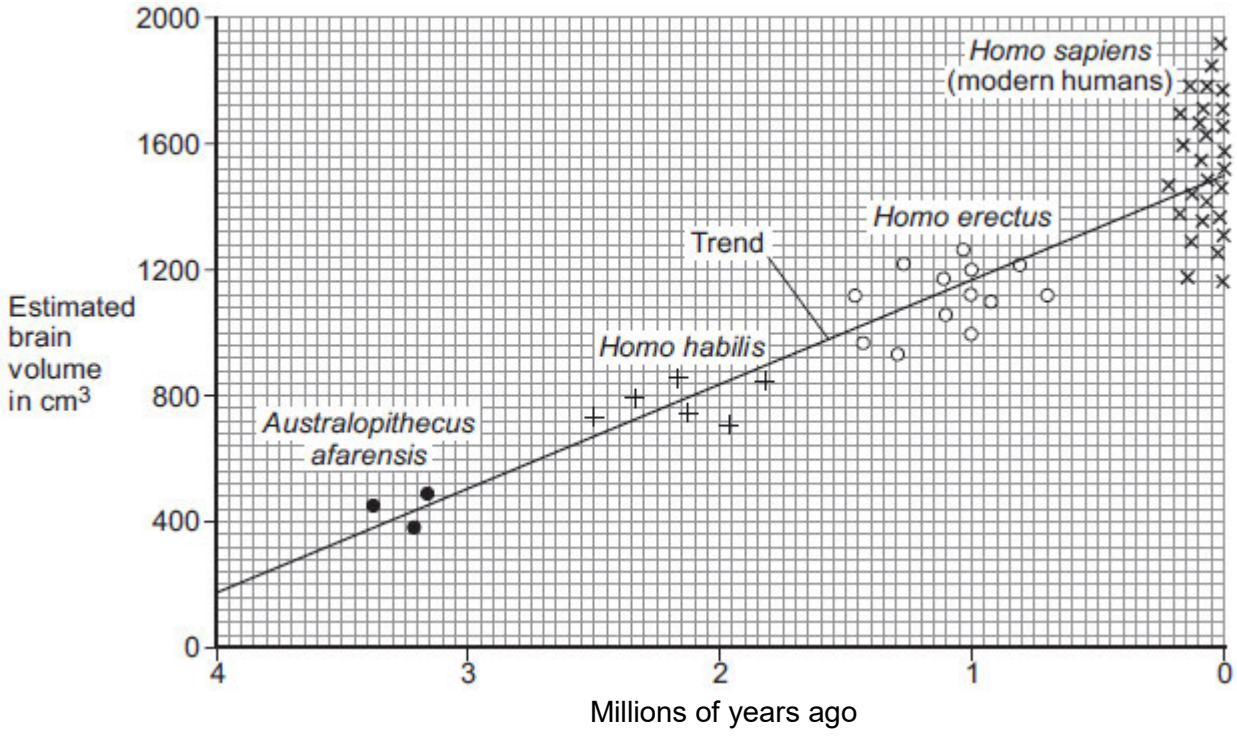
(3)
(Total 8 marks)

Q4. 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 cm^3.

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)

Q5.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)

Q6. Viruses and bacteria cause diseases in humans.

(a) Draw a ring around the correct word to complete the sentence.

Organisms that cause disease are called	algae.
	pathogens.
	vaccines.

(1)

(b) In August 2011 the United Nations gave a warning that there was a new strain of the bird flu virus in China.

Bird flu may kill humans. The new strain of the bird flu virus could cause a *pandemic* very quickly.

(i) What is a *pandemic*?

Tick (✓) **one** box.

A disease affecting the people all over one country. ☐

A disease affecting hundreds of people. ☐

A disease affecting people in many countries. ☐

(1)

(ii) The swine flu virus is carried by pigs.

The bird flu virus is likely to spread much more quickly than the swine flu virus.

Suggest **one** reason why.

.....

.....

(1)

This notice is from a doctor's surgery.

**Unfortunately,
antibiotics
will NOT get
rid of your flu.**

(c) (i) Why will antibiotics **not** get rid of flu?

.....

.....

(1)

(ii) The symptoms of flu include a sore throat and aching muscles.

What would a doctor give to a patient to relieve the symptoms of flu?

.....

(1)

(iii) It is important that antibiotics are **not** overused.

Explain why.

Use words from the box to complete the sentence.

antibody	**bacteria**	**immune**	**resistant**	**viruses**

Overuse of antibiotics might speed up the development

of ..... strains of ..... .

(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
simple

life forms.

(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.....

.....

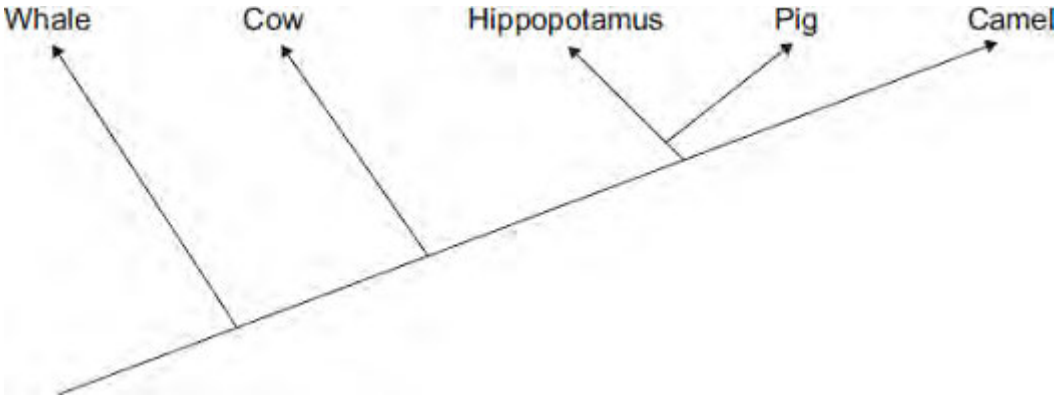
2.....

.....

(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)

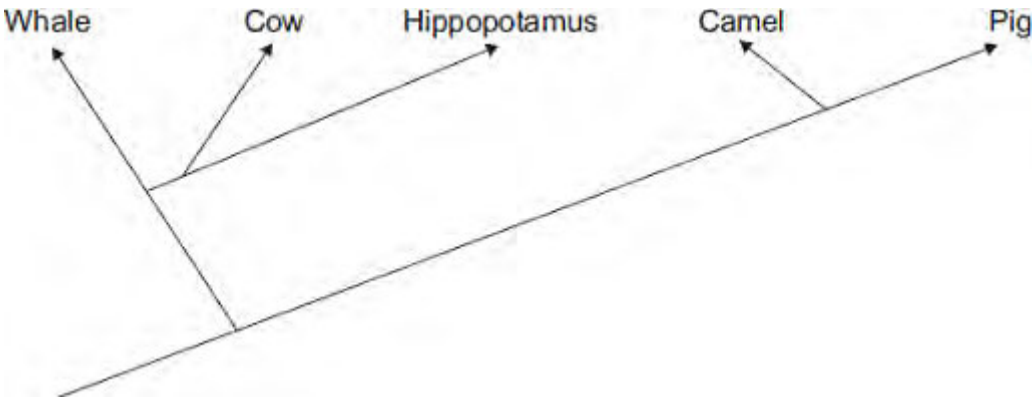
(ii) Which **two** of the animals in **Diagram 1** are most closely related?

..... 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)

Q8. The photograph shows a fossil footprint. The fossil was found in a rock at the bottom of a shallow river.

Scientists believe this is the footprint of a dinosaur. The dinosaur was alive 110 million years ago.



© Pearl Jackson/iStock

(a) (i) Suggest how the fossil shown in the photograph was formed.

.....

.....

(1)

(ii) Fossils may also be formed by other methods.

Describe **one** other method of forming a fossil.

.....

.....

(1)

(b) Dinosaurs are now extinct.

Give **two** factors that can cause extinction.

1 .....

.....

2 .....

.....

(2)

(c) How can fossils give evidence for evolution?

.....

.....

(1)

(d) Scientists are uncertain about how life began on Earth.

Why?

.....

.....

(1)

(Total 6 marks)

Q9. Darwin was the first scientist to state that humans and other primates had common ancestors.

Many people were against Darwin's ideas at that time.

Give **two** reasons why they were against his ideas.

1 .....

.....

2 .....

.....

(Total 2 marks)