

B15- Genetics and Evolution Exam Practice 1

Name:

Score:

Q1.

Ammonites became extinct millions of years ago.

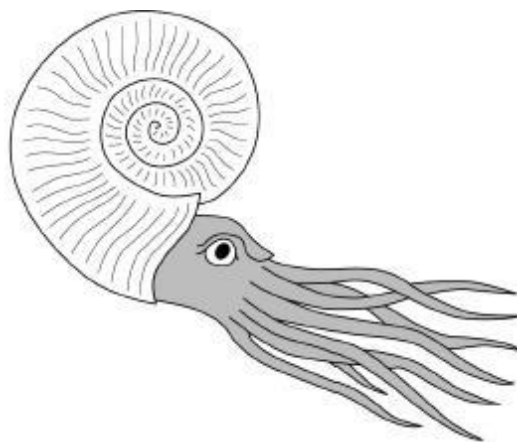
Figure 1 is a photograph of a fossil ammonite. .

Figure 2 is a drawing of what scientists think a living ammonite looked like.

Figure 1



Figure 2



(a) How was the fossil in **Figure 1** formed?

Tick (✓) **one** box.

The ammonite left traces where it moved.

The ammonite shell was replaced by minerals.

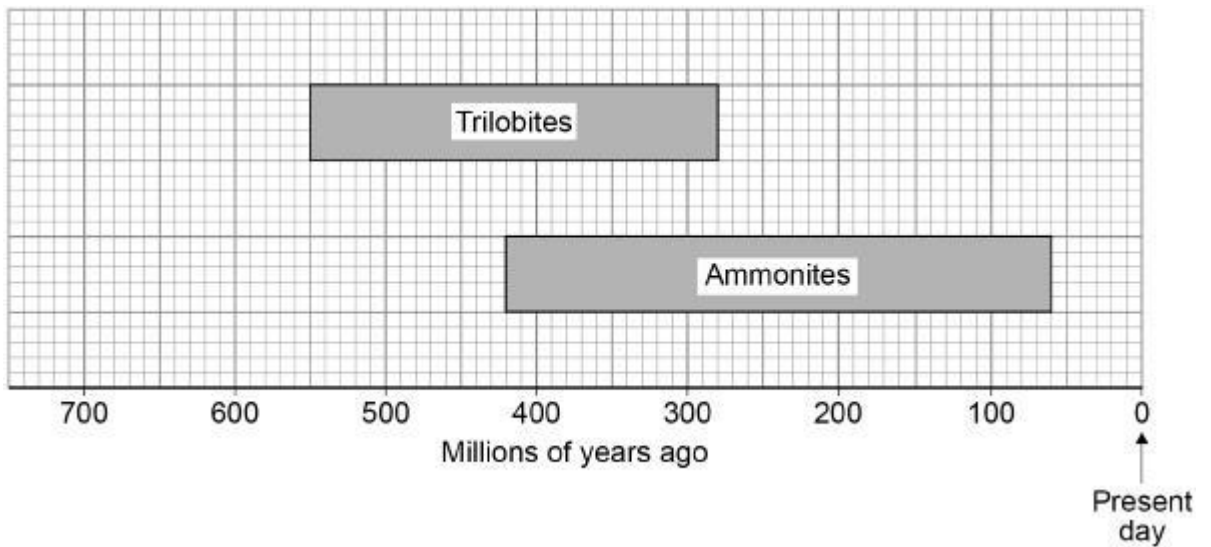
The ammonite was frozen in ice.

(1)

(b) Suggest why scientists are **not** certain what living ammonites looked like.

(1)

The diagram below shows when two different types of organism were alive on Earth.



(c) How many millions of years ago did ammonites become extinct?

Use the diagram above.

_____ million years

(1)

(d) Trilobites lived on Earth for 270 million years.

Calculate how much longer ammonites lived on Earth than trilobites.

Use the diagram above.

_____ million years

(2)

(e) Suggest **two** factors which may have caused ammonites to become extinct.

1. _____

2. _____

(2)

The fossil record provides evidence for the theory of evolution by natural selection.

(f) Which scientist proposed the theory of evolution by natural selection?

Tick (✓) **one** box.

Carl Linnaeus

Carl Woese

Charles Darwin

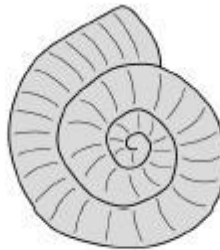
(1)

(g) **Figure 3** shows ammonite fossils from three different time periods.

Figure 3



400 million years ago



300 million years ago



200 million years ago

How do the fossils in **Figure 3** give evidence for the theory of evolution by natural selection?

Tick (✓) **one** box.

All fossils have coiled shells.

More recent fossils are bigger.

Older fossils are more simple.

(1)

(Total 9 marks)

Q2.

Grey wolves (*Canis lupus*) can be found in the USA.

(a) Give the genus name of the grey wolf.

(1)

(b) Describe how biological classification systems have changed over time.

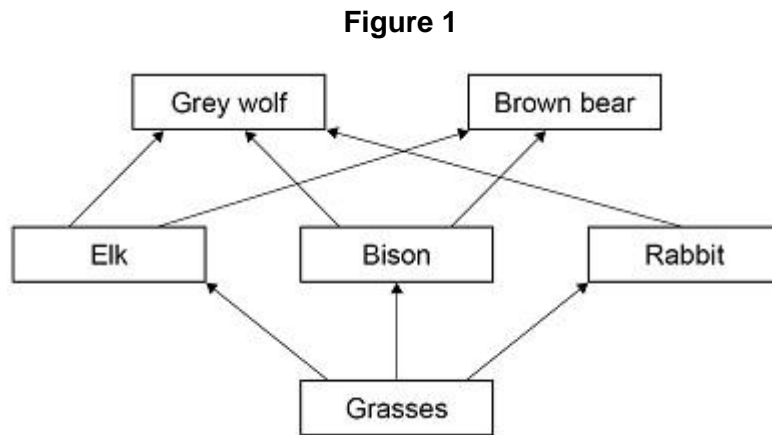
(4)

(c) Population and community are terms used to describe the organisms in an area.

Describe the difference between the terms population and community.

(2)

Figure 1 shows part of a food web.



(d) Look at **Figure 1**.

Explain how killing all the grey wolves could affect the populations of the other organisms.

(6)

In Yellowstone Park in the USA, grey wolves were hunted and killed until there were none left by 1926.

Grey wolves were reintroduced to Yellowstone Park in 1995.

The wolves came from several family groups in different parts of Canada.

(e) Why should scientists select animals from more than one area for reintroduction programmes?

Tick (✓) **one** box.

To reduce the effect of inbreeding

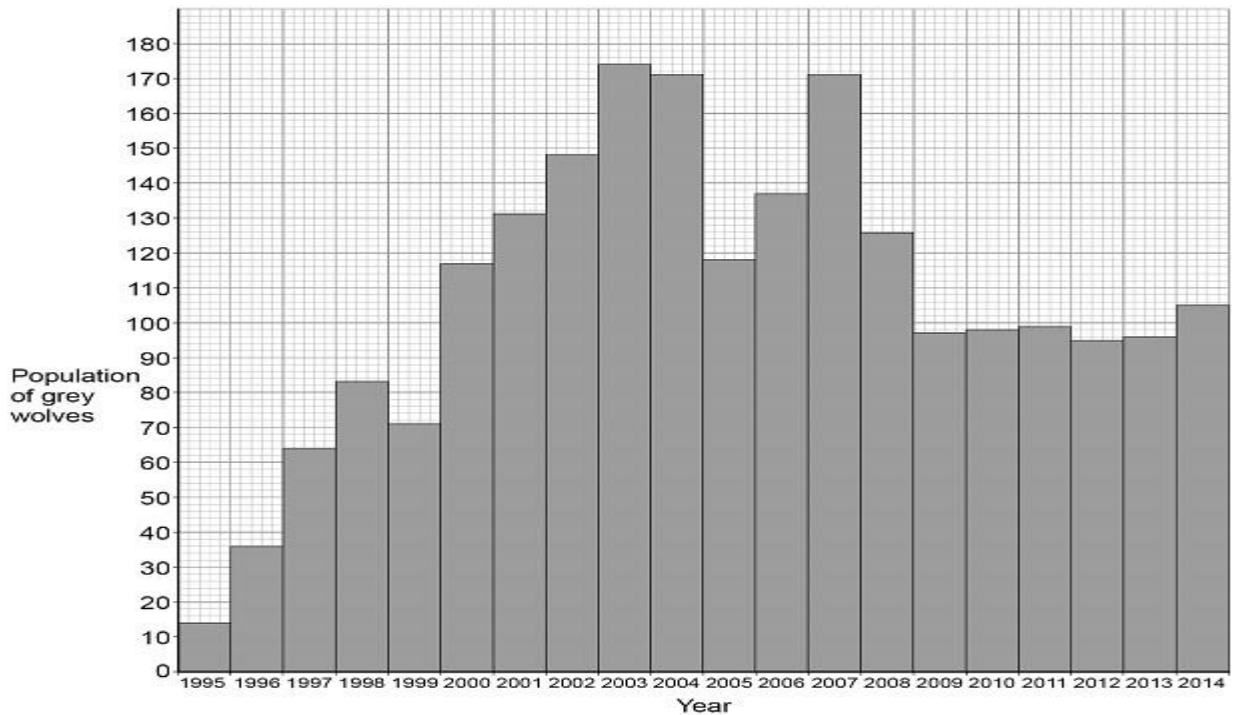
To choose similar characteristics

To reduce genetic diversity

(1)

Figure 2 shows the change in the population of grey wolves in Yellowstone Park since 1995.

Figure 2



(f) The wolf population in 2014 was greater than the wolf population in 1995.

Calculate how many times greater.

Number of times greater = _____

(1)

- (g) Scientists now believe the population of wolves in Yellowstone Park is not likely to decrease to zero.

Describe how the data since 2009 support this belief.

(1)

(Total 16 marks)

Higher Tier Questions

Q3.

In the 18th century a binomial system of grouping similar organisms was developed.

Before the binomial system was developed the common briar rose had the following names:

- *Rosa sylvestris inodora seu canina*
- *Rosa sylvestris alba cum rubore folio glabro.*

In the binomial system, the same rose is called *Rosa canina*.

- (a) One advantage of the binomial system is that the name is shorter than the names used before this system.

Suggest **two other** advantages of the binomial system.

1. _____

2. _____

(2)

- (b) Classification systems have changed in the last 50 years.

Give **one** reason why we now have more information to classify organisms.

(1)

- (c) 'Archaea' is one of the groups in the three-domain system of classification.

Give **two** features of the domain Archaea.

1. _____

2. _____

(2)

(Total 5 marks)

Q4.

Pathogenic bacteria and viruses may make us feel ill if they enter our bodies.

- (a) Why do bacteria and viruses make us feel ill?

Bacteria _____

Viruses _____

(2)

- (b) Most drugs that kill bacteria cannot be used to treat viral infections.

Explain why.

(2)

- (c) Antibiotic-resistant strains of bacteria are causing problems in most hospitals.

Explain, as fully as you can, why there has been a large increase in the number of antibiotic-resistant strains of bacteria.

(4)

(Total 8 marks)

Mark schemes

Q1.

- (a) the ammonite shell was replaced by minerals 1
- (b) any **one** from:
- no living ones around now or during human times
allow there were no humans living then
 - all the soft parts have decayed
 - the soft parts did not mineralise / fossilise. 1
- (c) 60 (million years) 1
- (d) (ammonites) $420 - 60 = 360$ 1
- $360 - 270 = 90$ (million years)
allow ecf from question (c) 1
- (e) any **two** from:
- ignore pollution*
- drought
 - ice age / global warming
ignore temperature change unqualified
 - volcanic activity
allow earthquake / tsunami
 - asteroid / meteor collision
 - (new) predators
allow hunted / eaten by other animals
 - (new) diseases / pathogens
 - competition for food
allow lack of food
 - competition for mates
allow isolation or lack of mates
 - lack of habitat **or** habitat change ignore pollution
if no other mark awarded allow natural disaster or climate change or catastrophic event for 1 mark 2
- (f) Charles Darwin 1
- (g) older fossils are more simple 1

[9]

Q2.

(a) Canis

ignore italics
ignore capitalisation

1

(b) **Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.

3-4

Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.

1-2

No relevant content

0

Indicative content

(originally)

- organisms placed in groups based on similar structures or characteristics
- influenced by where organisms are found
- classification by Carl Linnaeus

(more recent)

- organisms with similar internal structures grouped together
- because of development of microscopes
- organisms with similar biochemical processes grouped together
- organisms with similar DNA grouped together
- more fossils / species have been found / studied
- the three domain system
- classification by Carl Woese

for full marks answers must refer to both original and more recent classification

(c) population is the number of one species (in the area / habitat)

1

(whereas a) community is all the individuals / populations of the different species (living in the area / habitat)

allow (whereas a) community is all the different organisms (living in the area / habitat)
ignore reference to time

1

(d) **Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

5-6

Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

3-4

Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

1-2

No relevant content

0

Indicative content

- no / fewer wolves means more food for (Brown) bears
- so less competition
- so population of bears may increase
- therefore elk / bison population may decrease
- less predation of elk / bison by wolves
- and / or Brown bears unable to control populations of herbivores
- would increase populations of elk / bison
- rabbits predated less
- therefore rabbit population may increase
- grass decreases due to more rabbits
- grass decreases due to more elk / bison
- grass increases due to fewer elk / bison
- decline in all herbivores due to over-grazing

(e) to reduce the effect of inbreeding

1

(f) 7.5

allow 6.93 to 8.15 if clearly calculated from graph values $\pm \frac{1}{2}$ square

1

(g) population has been stable

*allow population has increased (slightly)
ignore population increased in 2014*

1

[16]

Higher Tier Mark Scheme

Q3.

(a) same name to everyone

1

(genus) part gives information on ancestry

1

(b) any **one** from:

- DNA / RNA analysis
- improvements to (electron) microscopes
- improved understanding of biochemical processes
- evidence of internal structures being more developed

1

(c) primitive bacteria / prokaryotes

1

(often) from extreme environments / extremophiles

1

[5]

Q4.

- (a) (bacteria) produce toxins / poisons 1
- (viruses) damage / kills cells **or** toxins released from cell 1
- (b) any **two** from:
- viruses live inside cells
 - viruses inaccessible to drug
 - drug would damage body cells / tissue 2
- (c) any **four** from:
- overuse of antibiotics
 - bacteria mutate
*do **not** allow antibiotic causes mutation*
 - antibiotics kill non-resistant strains **or** idea of selection
 - reduced competition
 - resistant bacteria reproduce 4

[8]