

Name:

Edexcel Style

Combined Science GCSE

Natural Selection and Genetic Modification
(Levels 4–9)

Date:

Time allowed: 50mins

Question	Links to Student Progress Sheet	Score	Total marks Available
1	4.2, 4.3		8
2	4.4, 4.5		9
3	4.8		7
4	4.10, 4.11		14
5	4.14 a, b		12
Total			50

Score	Estimated Grade
47 – 50	9
40 – 46	8
33 – 39	7
28 – 32	6
24 – 27	5
20 – 23	4
0 – 19	U

Please be aware that these grade boundaries are Twinkl's own, and may not be in-line with Edexcel's own.

Area for Improvement:

1. (a) What was the name of the scientist who proposed the theory of evolution by natural selection? (1)

- ☐ William Darwin
- ☐ Charles Dickens
- ☐ Charles Darwin
- ☐ Richard Dawkins

(b) Use words from the box below to complete the following sentences about evolution. (3)

organism	variation	species
reproduce	evolve	adapted

The theory of evolution by natural selection describes how a _____ can change over time.

Most organisms show _____ within the species. Some organisms are better _____ to their environment and survive to reproduce.

(c) Explain how the emergence of antibiotic resistant bacteria, such as MRSA, can provide evidence for the theory of evolution by natural selection. (4)

(Total for Question 1 = 8 marks)

2. (a) Complete the sentence by putting a [✓] in the box next to your answer.

A fossil is...

- ☐ the imprint or remains of organisms which were alive millions of years ago.
- ☐ the imprint or remains of animals which were alive millions of years ago.
- ☐ the imprint or remains of organisms which are alive today.
- ☐ the imprint or remains of animals which are alive today.

(1)

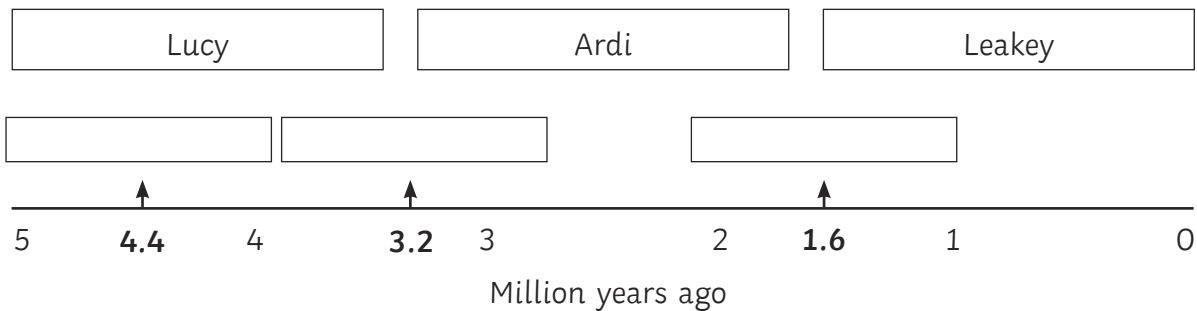
(b) Fossils provide evidence for theories of human evolution.

Lucy and Ardi are two human-like fossils.

Mary and Louis Leakey discovered other human-like fossils.

Write the names of the fossil evidence, given in the box below, onto the timeline to show when each discovery was made.

(3)



(c) The photograph below shows the fossil known as Lucy.

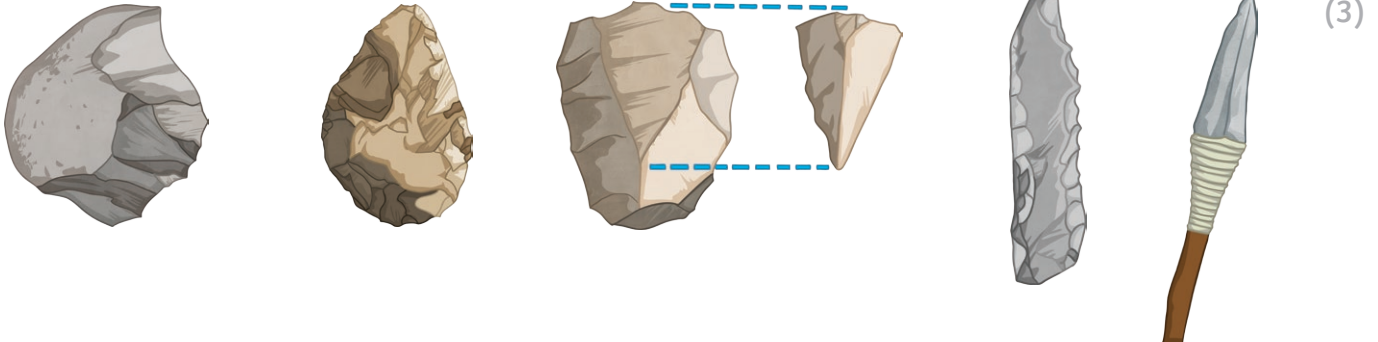
(2)



Photo courtesy of 120 (via wikimedia commons) - granted under creative commons licence - attribution

Describe how the fossil shows evidence to support a theory of human evolution.

(d) Describe how the use of stone tools has changed over time.



(Total for Question 2 = 9 marks)

3. (a) Complete the sentence by putting a [✓] in the box next to your answer.

(1)

Selective breeding is...

- ☐ a natural process in which animals with more desirable characteristics are genetically crossed to produce offspring.
- ☐ an artificial process in which animals with more desirable characteristics are genetically crossed to produce offspring.
- ☐ a natural process in which organisms with more desirable characteristics are genetically crossed to produce offspring.
- ☐ an artificial process in which organisms with more desirable characteristics are genetically crossed to produce offspring.

(b) State two ways which farmers can use selective breeding for economical benefits, such as providing better quality food.

(2)

(c) Describe the process of selective breeding.

(4)

(Total for Question 3 = 7 marks)

4. (a) Shown below are the four key stages of the process of genetic modification. In the box beside each one, write the numbers 1 to 4 to show the correct order.

(3)

- ☐ Insertion of the desired gene into another organism.
- ☐ Isolating the gene which codes for the desired characteristic.
- ☐ Decide the important characteristic.
- ☐ Replication of the transgenic organism.

- (b) Bacteria are often used to carry the desired gene. Explain why.

(2)

- (c) Use words from the box below to complete the following sentences about genetic engineering.

(3)

lipase	restriction	carrier
vector	ligase	resistance

The desirable gene is placed into either a bacterial or viral cell which acts as a _____

The desirable gene is cut from the human DNA using _____ enzymes. The gene is inserted into the plasmid using _____ enzymes.

- (d) Explain the process of genetic engineering.

(6)

(Total for Question 4 = 14 marks)

5. (a) State two advantages and two disadvantages of selective breeding in agriculture.

(4)

Advantage 1

Advantage 2

Disadvantage 1

Disadvantage 2

(b) Some people are against genetic engineering and the use of genetically modified organisms (GMOs). Give two reasons why.

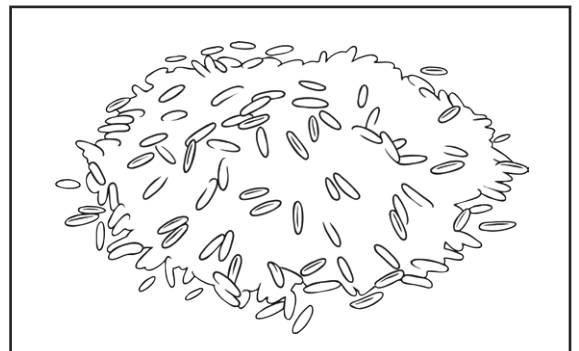
(2)

Golden Rice – A New ‘Superfood’?

Genetic Scientists have created a new food with the potential to end human malnutrition. The simple rice grain has been elevated to produce high levels of beta carotene. Beta carotene is needed in humans for the production of vitamin A which is needed for good eye health.

The golden rice can be supplied to areas where the vitamin deficiency is common and help to improve health and prevent blindness.

However critics have suggested that the rice may not be enough to make a significant difference to health and there are many fears about possible harm to human health and the environment of GM crops in general.



(c) Use information from the article and your own understanding to explain why:

(6)

(i) Golden rice may be advantageous to human health.

(ii) Golden rice may be disadvantageous to human health.

(iii) Golden rice may be damaging to the environment.

(Total for Question 5 = 12 marks)

TOTAL FOR PAPER = 50 MARKS