1 Animals have adaptations that enable them to survive.

(a) The photograph shows an echidna.

The echidna has pointed spines on its back.

Explain how these spines might help the echidna to survive.

_____

_____

_____

_____

_____

(2)

(b) The photograph shows a caterpillar.

Explain how the caterpillar's appearance might help it to survive.

_____

_____

_____

_____

_____

(2)

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

(i) Evolution can be explained by a theory called

genetic engineering
mutation
natural selection

.

(1)

(ii) This theory was suggested by a scientist called Charles

Darwin
Lamarck
Semmelweiss

.

(1)

(iii) This scientist said that all living things have evolved from

monkeys
dinosaurs
simple life forms

.

(1)

(d) Many religious people oppose the theory of evolution.

Give **one** reason why.

_____

_____

(1)

(Total 8 marks)

2 Complete each sentence by choosing the correct terms from the box.

23	**46**	**ADH**	**DNA**	**XX**	**XY**	**YY**
dominant	**female**	**male**	**recessive**	**strong**	**weak**	

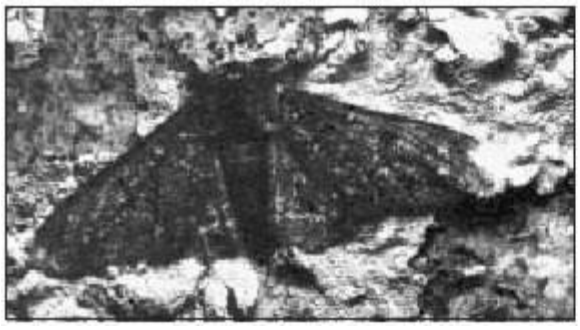
A gene is made up of a substance called _____. Genes are found on chromosomes and most human cells contain _____ pairs of chromosomes.

In females the two sex chromosomes are _____ but in males the two sex chromosomes are _____.

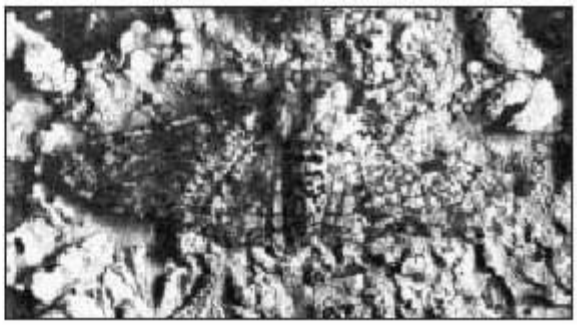
Alleles are alternative forms of a gene. Two healthy parents can sometimes have a child with a genetic disorder such as cystic fibrosis. This is because cystic fibrosis is caused by a _____ allele. The two parents are healthy because they also have the _____ allele.

(Total 6 marks)

3 The photographs show two varieties of moths, **X** and **Y**. The moths belong to the same species. The moths are resting on a tree trunk in open countryside.



Moth **X**



Moth **Y**

(a) Which variety of moth, **X** or **Y**, is more likely to be killed by insect-eating birds? Give a reason for your answer.

Variety of moth: _____

Reason _____

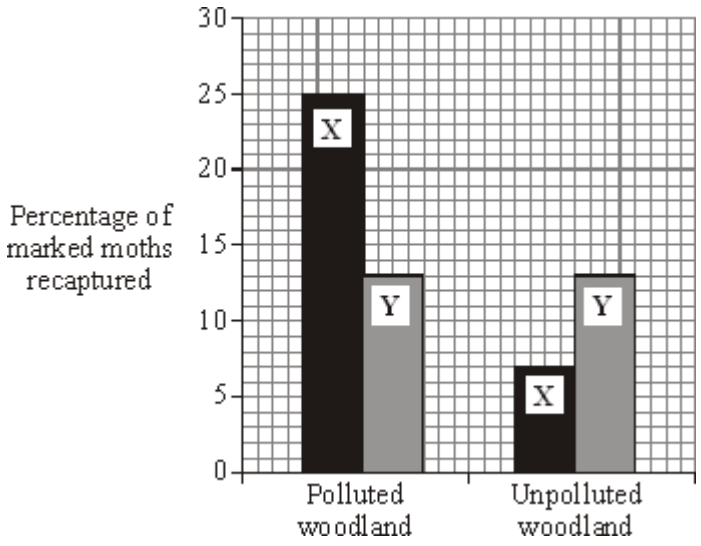
_____

(1)

(b) In an experiment, large numbers of each variety of moth were caught in a trap.

- They were marked with a spot of paint on the underside of one wing and then released.
- A few days later, moths were again trapped and the number of marked moths was counted.
- The experiment was carried out in a woodland polluted by smoke and soot, and also in an unpolluted woodland.

The results are shown in the bar graph.



(i) When the moths were being marked, suggest why the paint was put on the underside of the wing and not on the top.

_____

(1)

(ii) What percentage of moths of type **X** was recaptured in:

the polluted woodland; _____

the unpolluted woodland? _____

(2)

(iii) In each woodland, only a small number of marked moths of both varieties were recaptured. Suggest **one** reason for this.

_____

_____

(1)

(c) (i) The colour of the moths is controlled by a gene. The dark form was first produced by a mutation in the gene.

What chemical, found in a gene, is changed by a mutation? Draw a ring around your answer.

carbohydrate **DNA** **fat** **protein**

(1)

(ii) Some of the offspring from the original dark moth were also dark. What caused this?

_____

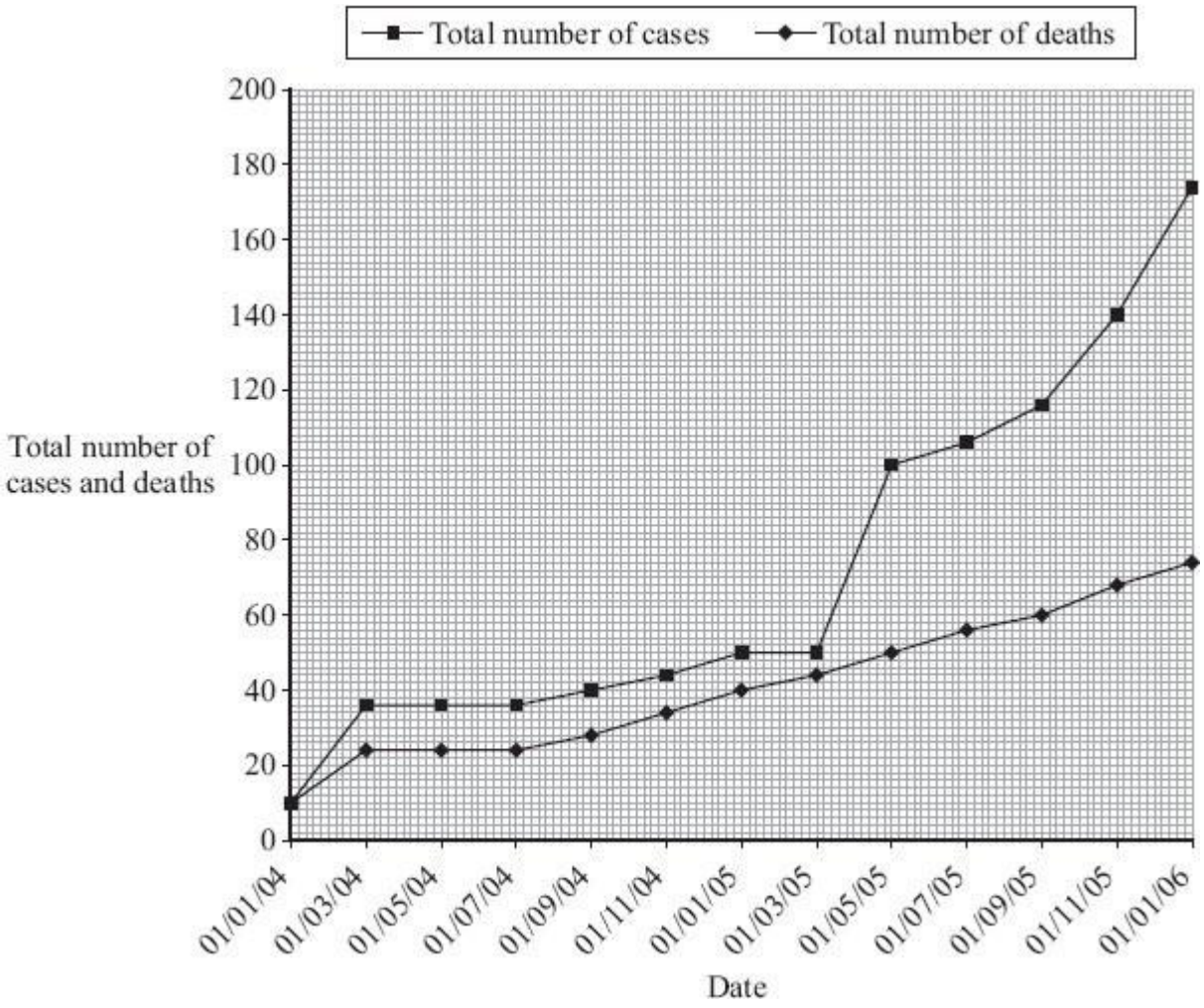
_____

(1)

(Total 7 marks)

4 Scientists began to keep records of cases of H5N1 bird flu in humans in January 2004.

The graph shows the total number of cases of bird flu in humans and the total number of deaths up to January 2006.



(a) (i) How many people had died from bird flu up to 01/07/05?

_____

(1)

(ii) Describe, as fully as you can, how the number of cases of bird flu in humans changed between 01/07/04 and 01/01/06.

_____

_____

_____

_____

(2)

(b) At present, humans can only catch bird flu from contact with infected birds. The bird flu virus may mutate into a form that can be passed from one human to another.

Explain why millions of people may die if the bird flu virus mutates in this way.

_____

_____

_____

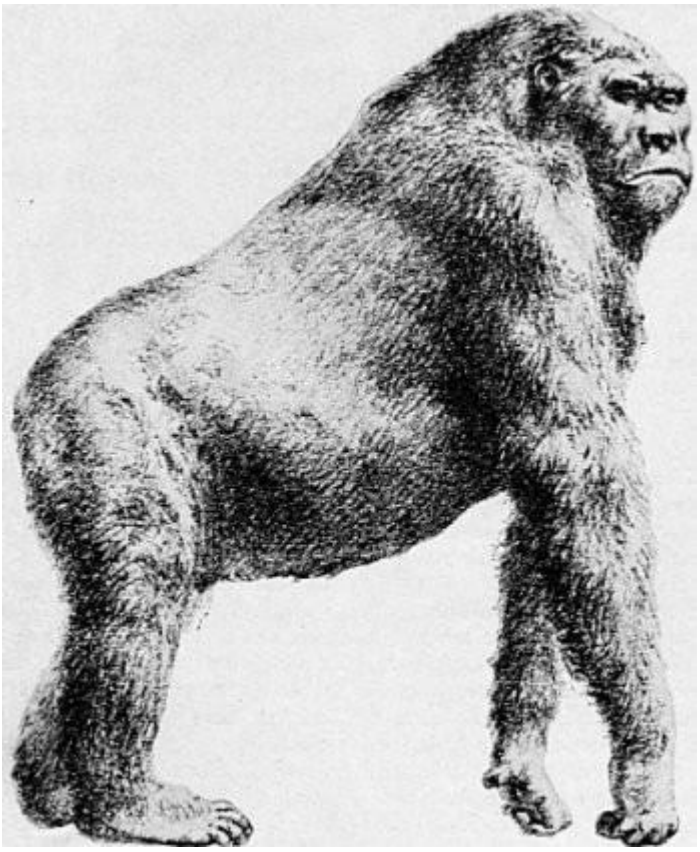
_____

(2)

(Total 5 marks)

5 Read the article from a recent newspaper.

'King Kong' with inch-wide teeth who walked alongside early man.



Gigantopithecus blackii, R F Zallinger

The largest ape that walked on Earth was a prehistoric animal that weighed up to 540 kg. It was 3 metres tall and had inch-wide teeth. This giant ape roamed bamboo forests until 100 000 years ago. It is quite likely that the giant ape lived at the same time as early humans.

(a) What evidence might scientists have that the great ape existed?

_____

_____

(1)

(b) The drawing is an artist's impression of what the giant ape might have looked like.

Why do scientists not know exactly what the animal looked like?

_____

_____

(1)

(c) Scientists do not know why this giant ape became extinct.

Suggest **two** reasons why this giant ape became extinct.

1. _____

_____

2. _____

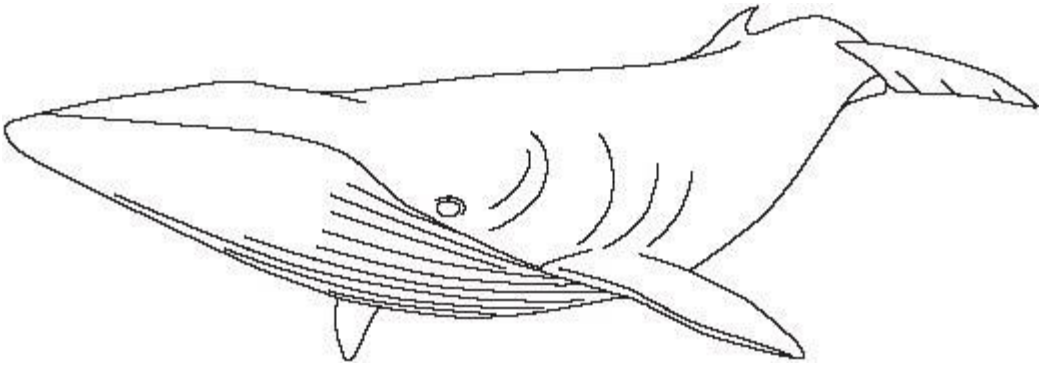
_____

(2)

(Total 4 marks)

6 (a) **Figure 1** shows a minke whale. Whales live in the sea.

Figure 1



Write down **two** ways in which the body of the whale is adapted for swimming.

1. _____

_____

2. _____

_____

(2)

(b) **Figure 2** shows the skeleton of a minke whale.

Figure 2

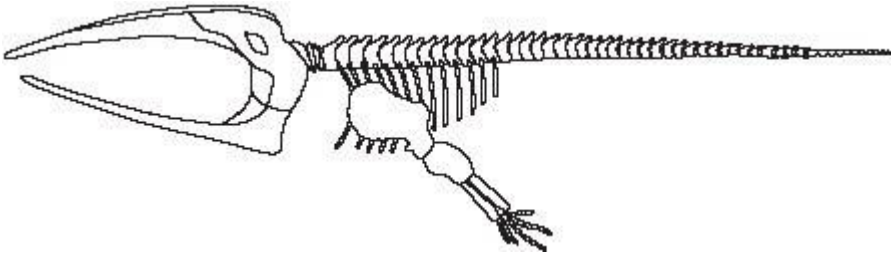
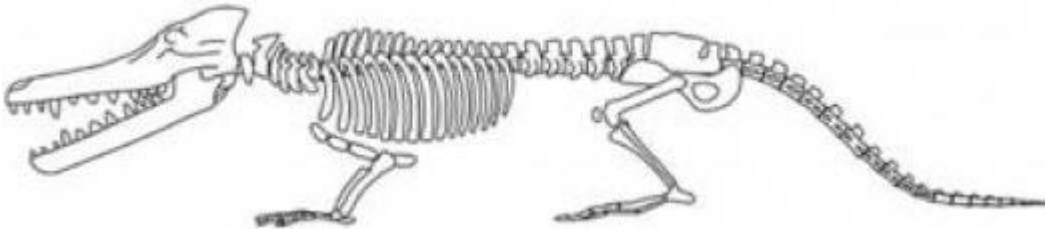


Figure 3 shows the fossil skeleton of an extinct whale.

Figure 3



Hans G Thewissen/ The Thewissen Lab

(i) Apart from size, give **two** differences between the skeleton of the minke whale and the fossil skeleton of the extinct whale.

1. _____

_____

2. _____

_____

(2)

(ii) In each of the sentences below, draw a ring around the correct answer.

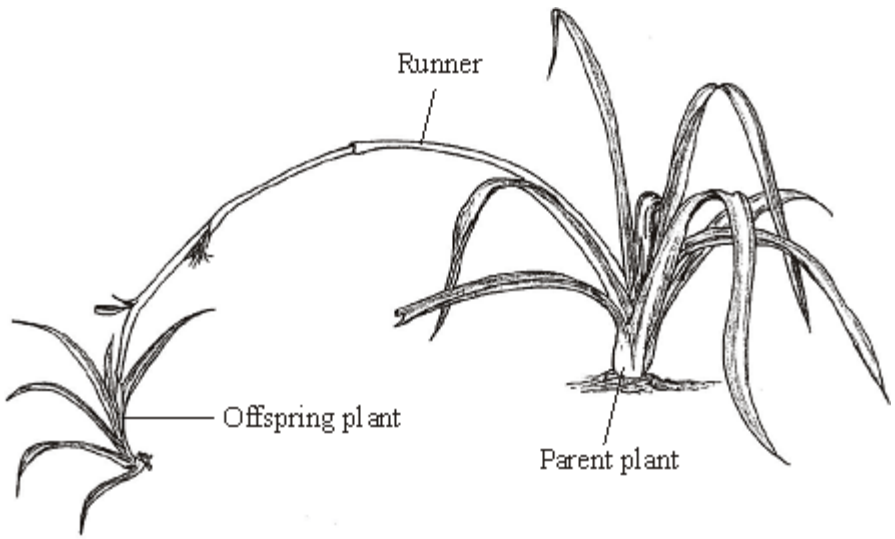
Life on Earth first developed more than three | billion / million / thousand | years ago.

Fossils | disprove / give evidence for / prove | the theory of evolution.

(2)

(Total 6 marks)

7 The diagram shows a spider plant during one type of reproduction.



Complete the sentences using words from the box.

asexual	**characteristics**	**chromosomes**	
gametes	**genes**	**mitosis**	**sexual**

(a) The colour and shape of the leaves of a spider plant are known as _____

(1)

(b) The shape of the leaves is controlled by _____

(1)

(c) The thread-like structures inside the nucleus of the cells are

called _____

(1)

(d) The spider plant produces new cells in the runner by a process

called _____

(1)

(e) This type of reproduction is called_____reproduction.

(1)

(Total 5 marks)

8 Scientists have produced many different types of GM (genetically modified) food crops.

(a) Use words from the box to complete the sentence about genetic engineering.

clones	**chromosomes**	**embryos**	**genes**

GM crops are produced by cutting_____out of the_____of one plant and inserting them into the cells of a crop plant.

(2)

(b) Read the information about GM food crops.

- Herbicide-resistant GM crops produce higher yields.
- Scientists are uncertain about how eating GM food affects our health.
- Insect-resistant GM crops reduce the total use of pesticides.
- GM crops might breed naturally with wild plants.
- Seeds for GM crops can be bought from only one manufacturer.
- The numbers of bees will fall in areas where GM crops are grown.

Use this information to answer these questions.

(i) Give **two** reasons why some farmers are in favour of growing GM crops.

1. _____

_____

2. _____

_____

(2)

(ii) Give **two** reasons why many people are against the growing of GM crops.

1. _____

_____

2. _____

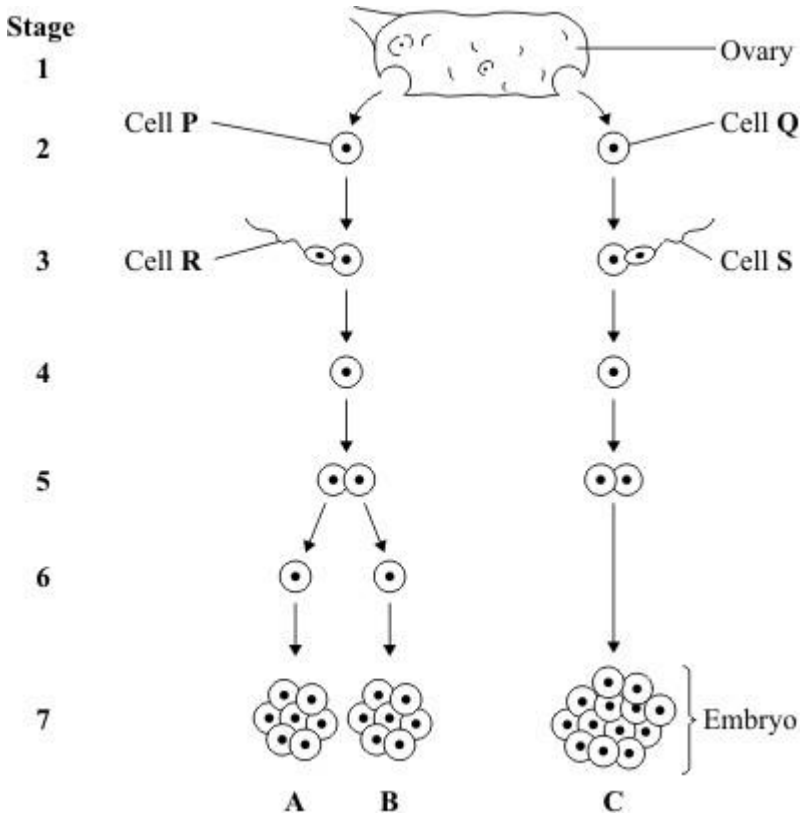
_____

(2)

(Total 6 marks)

9 A woman gives birth to triplets.
Two of the triplets are boys and the third is a girl.
The triplets developed from two egg cells released from the ovary at the same time.

The diagram shows how triplets **A**, **B** and **C** developed.



(a) Which stages on the diagram show gametes?

Draw a ring around your answer.

1 and 2 **2 and 3** **3 and 7** **1 and 7**

(1)

(b) Embryo **B** is male.

Which of the following explains why embryo **B** is male?

Tick (✓) **one** box.

Cell **P** has an X chromosome; cell **R** has an X chromosome. ☐

Cell **P** has a Y chromosome; cell **R** has an X chromosome. ☐

Cell **P** has an X chromosome; cell **R** has a Y chromosome. ☐

(1)

(c) The children that develop from embryos **A** and **C** will **not** be identical.

Explain why.

You may use words from the box in your answer.

egg	**genes**	**sperm**

_____

_____

_____

_____

_____

(2)

(d) Single cells from an embryo at **Stage 7** can be separated and grown in a special solution.

(i) What term describes cells that are grown in this way?

Draw a ring around your answer.

lleles **screened cells** **stem cells**

(1)

(ii) What happens when the cells are placed in the special solution?

Tick (✓) **two** boxes.

The cells divide	☐
The cells fertilise	☐
The cells differentiate	☐
The cells separate	☐

(2)

(iii) Give **one** use of cells grown in this way.

_____

_____

(1)

(iv) Some people might object to using cells from embryos in this way.

Give **one** reason why.

_____

_____

_____

(1)

(Total 9 marks)

10 The photographs show a zorse and its parents, a zebra and a horse.

Horse

Zebra

Zorse

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

The zorse was produced by

cloning
asexual reproduction
sexual reproduction

.

(1)

(b) Explain the appearance of the zorse.

Use **both** words from the box in your explanation.

gametes	**genes**

(3)

(Total 4 marks)

Mark schemes

1 (a) protection / defence

*ignore insulation **or** rolls into a ball*

ignore camouflage

1

from predators / from being attacked / from being eaten

1

(b) looks like snake / looks scary

1

deters predators **or** has large eyes to spot predator **or** camouflage **or** warning colouration from predator or prey

*allow **two** separate adaptations for **2** marks*

1

(c) (i) natural selection

1

(ii) Darwin

1

(iii) simple life forms

1

(d) believe that God created all organisms **or** humans there from the beginning

1

[8]

2 in the correct order

DNA

1

23

1

XX

1

XY

1

recessive

1

dominant

1

[6]

3 (a) **X** (no mark)

X is more visible **or Y** is more camouflaged

1

(b) (i) so camouflage not changed **or** so not easier to see

1

(ii) 25

1

7

1

(iii) any **one** from:

- eaten (by birds) / died
- mixed in with large number of unmarked moths
- moved away

1

(c) (i) DNA

1

(ii) the gene / allele for being dark / dominant

1

[7]

4 (a) (i) 56

accept 54 – 58

1

(ii) increased

1

reasonable qualification eg slowly then more quickly
or
to 174 / 176
or
by 138 / 140

1

(b) any **two** from:

- no immunity **or** antibodies ineffective
  accept no resistance
- no vaccines **or** humans not immunised
- idea of large scale contact **or** large scale travel
  *do **not** accept passed on*
  ignore no cure

2

[5]

5 (a) fossils / teeth / bones / skeleton / foot prints

allow cave drawings

*do **not** accept scientists have seen them*

1

(b) only (some) bones remain / soft parts have decayed

accept 'no-one has ever seen one'

allow no photos, no pictures, no drawings

1

(c) any **two** from:

- hunted by human
- (new) predator

  allow more predators
- (new) competitor
- (new) disease
- environment changed / named environmental change

  allow natural disaster
- prey extinct / loss of food supply

  ignore not enough food

2

[4]

6 (a) any **two** from:

- streamlined / shape reduces friction / long and thin / smooth surface OWTTE
- fins / flippers / tail / paddle

  *do **not** accept 'arms' or 'legs'*
- structures that push against water

2

(b) (i) any **two** from:

fossil has hind limb / legs / feet

it = minke

accept any valid comparison

fossil has more ribs / bones

fossil has teeth

fossil has curved spine

2

(ii) billion

1

give evidence for

1

[6]

7 (a) characteristics

1

(b) genes

1

(c) chromosomes

1

(d) mitosis

1

(e) asexual

1

[5]

8 (a) genes

1

chromosomes

1

(b) (i) higher yield

1

less use of pesticides

1

(ii) any **two** from:

- uncertain about effects on health
- fewer bees
- might breed with wild plant
- seeds only from one manufacturer

2

[6]

9 (a) 2 and 3

1

(b) cell **P** has an X chromosome; cell **R** has a Y chromosome

1

(c) any **two** from:

- (formed from) different egg / 2 eggs
- (formed from) different sperm / 2 sperm
- have different genes / alleles / chromosomes / DNA
  allow genetics

2

(d) (i) stem cells

1

(ii) the cells divide

1

the cells differentiate

1

(iii) (medical) research / named eg growing organs
or

medical / patient treatment

allow (embryo) cloning

*do **not** allow designer babies / more babies*

1

(iv) any **one** from:

- ethical / moral / religious objections
  ignore cruel / not natural / playing God
- potential harm to embryo
  allow deformed
  ignore harm to mother

1

[9]

10 (a) sexual reproduction

1

(b) any **three** from:

- coat colour inherited / controlled by genes
- it has horse and zebra features
- gets gametes from both parents
- genes / DNA / chromosomes / genetic information in gametes
- zorse receives genes / DNA / chromosomes / genetic information from parents

3

[4]