

1 There are two types of reproduction, asexual and sexual. Use the words in the box to complete the sentences about reproduction.

You may use each word once or not at all.

asexual	eggs	gametes	fertilisation	inheritance
ovaries	sexual	sperms	testes	variation

The genetic information from the mother is carried in the _____
which are made in the _____.

The genetic information from the father is carried in the _____
which are made in the _____.

In _____ reproduction, offspring are produced that are genetically
different from either parent.

This happens because genetic information from each parent is carried in the
_____ and joined together during _____
to develop into a fetus.

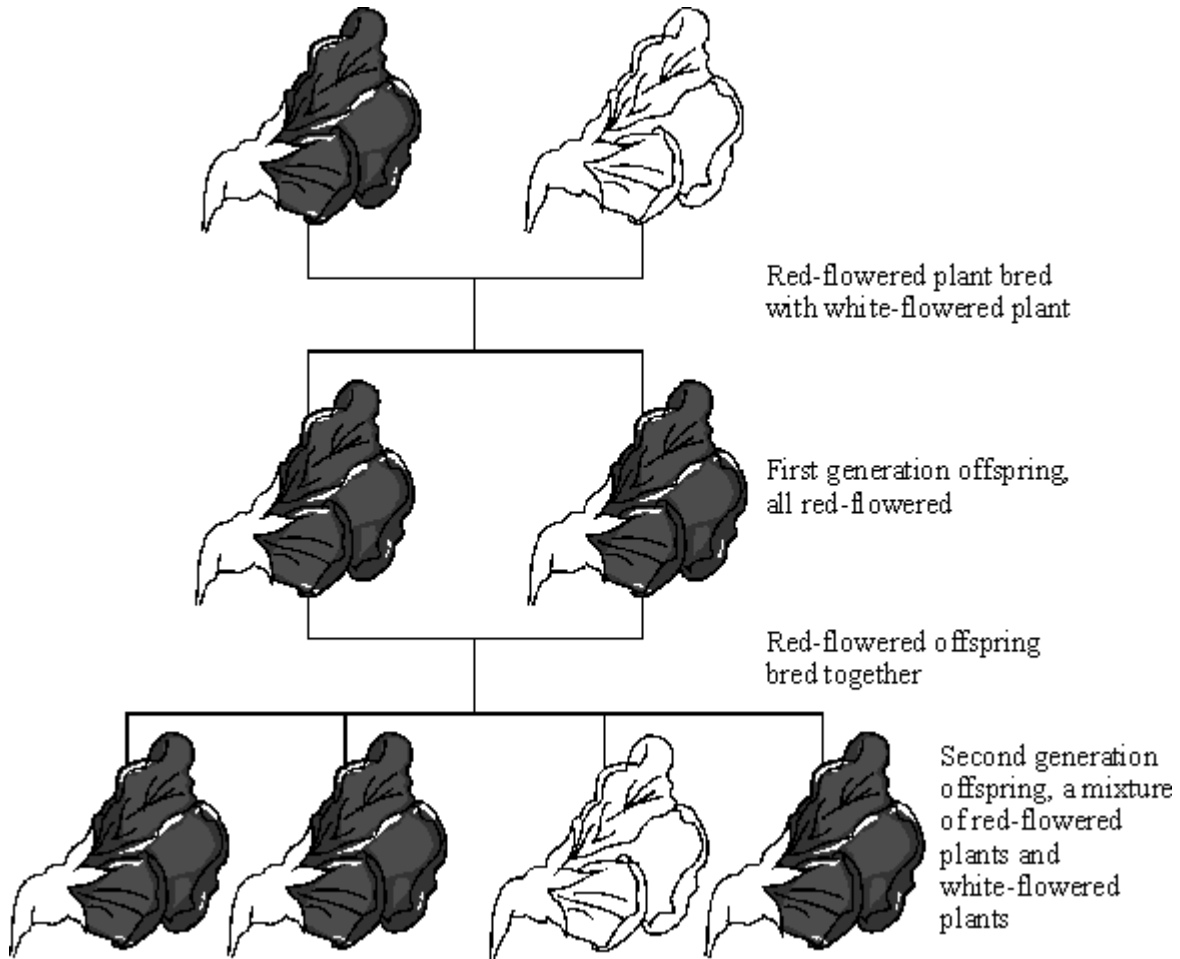
In _____ reproduction, genetically identical offspring are
produced because no mixing of genetic material takes place.

(Total 8 marks)

2

The diagrams show one of the experiments performed by a scientist called Mendel.

He bred sweet pea plants.



In the sentences below, cross out the **two** lines which are wrong in each box.

Mendel proposed that flower colour was controlled by inherited factors.

The first generation plants show that the red factor is

dominant
environmental
recessive

The second generation plants show that the white factor is

dominant
environmental
recessive

We now call inherited factors

chromosomes
gametes
genes

These factors are passed from generation to generation in

gametes
glands
organs

The red-flowered sweet pea plants did not all grow to the same height.

This was due to

dominant
environmental
recessive

factors.

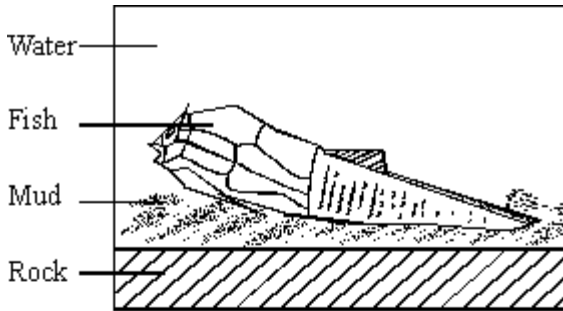
(Total 5 marks)

3

Fossils give us evidence for the theory of evolution.

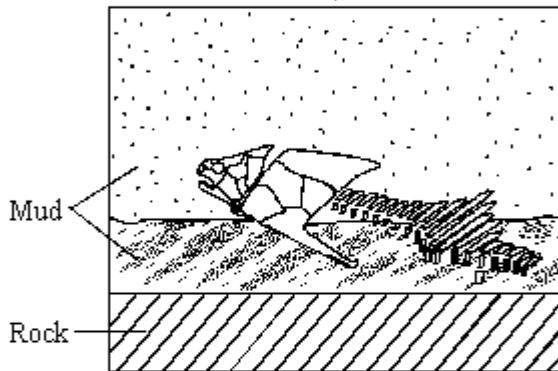
The diagrams show how a fish became a fossil.

(a) In the sentences below, cross out the two lines which are wrong in each box.



The fish died and became covered by

- ice
- mud
- rock

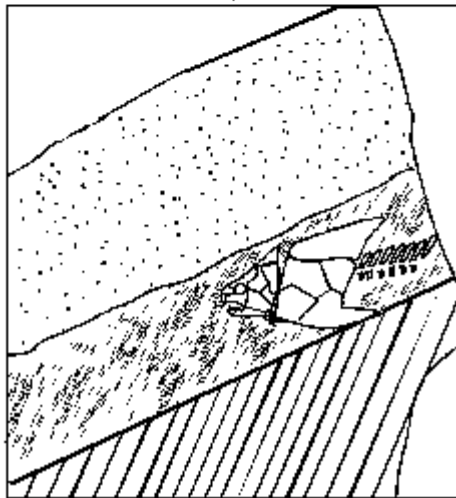


The organs of the fish

- decayed
- became extinct
- mutated

The only part of the fish then left was its

- brain
- heart
- skeleton



The mud surrounding the remains of the fish turned into

- ice
- rock
- water

(4)

(b) Give **one** way in which fossils provide evidence for the theory of evolution.

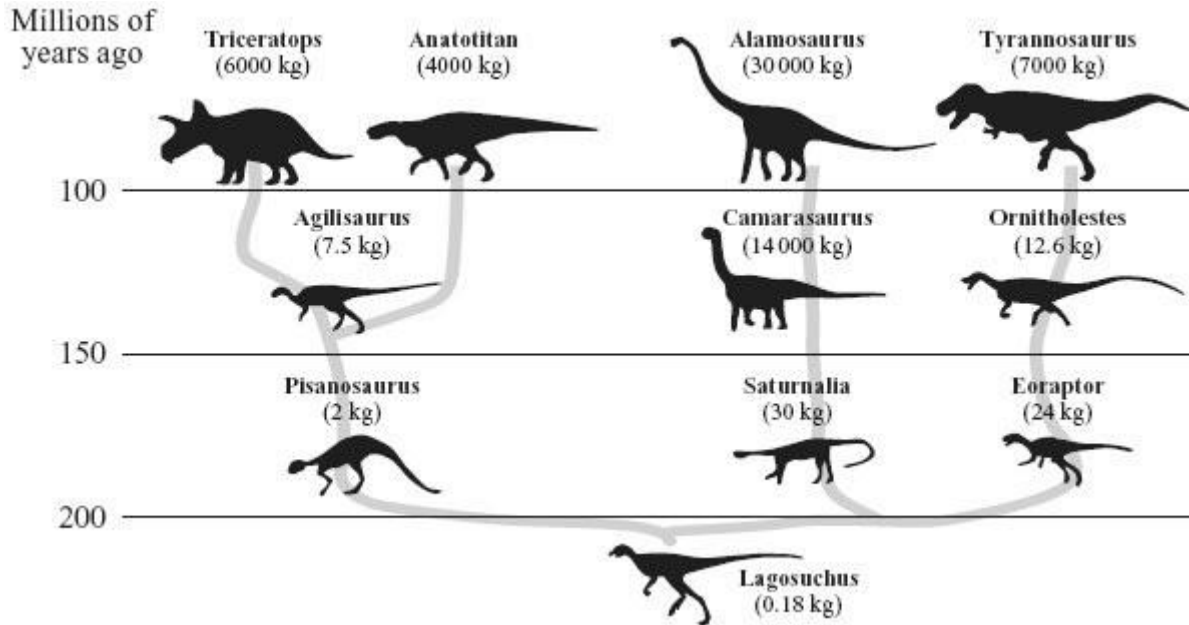
(1)

(Total 5 marks)

4

The diagram shows a timeline for the evolution of some dinosaurs.

The mass of each dinosaur is shown in the brackets by its name.



(a) Name **one** dinosaur which lived between 100 and 150 million years ago.

(1)

(b) Which dinosaur did Ornitholestes evolve from?

(1)

(c) Apart from body size and mass, give **one other** difference between Lagosuchus and Alamosaurus.

(1)

(d) (i) Which dinosaur had the largest mass?

(1)

(ii) What happened to the mass of dinosaurs during evolution?

(1)

(e) We know about dinosaurs from their fossils.

Describe **one** way in which fossils are formed

(1)

(f) Complete the sentence by using the correct words from the box.

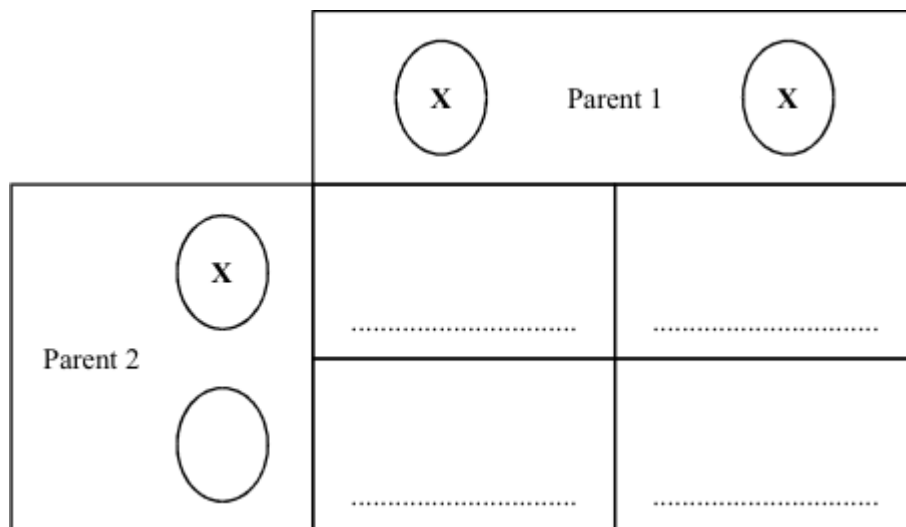
billion complex large million simple thousand

The theory of evolution states that all species of living things have evolved from _____ life forms which first developed more than three _____ years ago.

(2)

(Total 8 marks)

5 The chromosomes for determining the gender or sex of a person are labelled **X** and **Y**.



(a) Complete the Punnett Square to show the genotype of parent 2 and of the four offspring.

(3)

(b) Which parent is the mother?

(1)

(c) What are the chances of getting a baby boy?

(1)

(Total 5 marks)

6

In humans, the sex chromosomes **X** and **Y** determine whether the baby will be male or female (its gender).

(a) (i) Draw a genetic diagram to show how gender is inherited. The male has **XY** chromosomes and the female has **XX**.

(2)

(ii) What is the likelihood of obtaining a male child?

(1)

(b) In the 16th century Henry VIII was the King of England. He blamed some of his wives for giving birth to daughters instead of sons. With our present day knowledge of genetics this mistake could not be made today. Explain why Henry VIII was wrong.


(2)

(Total 5 marks)

7

These are all dogs. They are *in the same species*.

Type:	Great Dane	Yorkshire Terrier	Standard Dachshund
Weight:	54 kg	3.5 kg	9 kg
Height to shoulder:	57 cm	25 cm	20 cm



(a) What does it mean to be *in the same species*?

(2)

(b) Complete the following sentences.

- When dogs reproduce the _____ produces sperm in the _____ and the female produces eggs in the _____
- Sperm and eggs are also called _____
- During mating, the sperm and eggs fuse together. This is known as _____
- Once this has happened the _____ starts to develop in the uterus of the mother.

(6)

(c) Explain why puppies have some of the characteristics of both parents.

(2)

(Total 10 marks)

8

(a) Complete the following passage

Chromosomes carry genetic information. Chromosomes are made up of _____ . Human body cells contain 46 chromosomes. There are twenty-two matching pairs but the final pair does not always match. It is these two that determine the gender, or sex, of the human. If you are a _____ the final pair of chromosomes matches. If you are a _____ the final pair of chromosomes does not match.

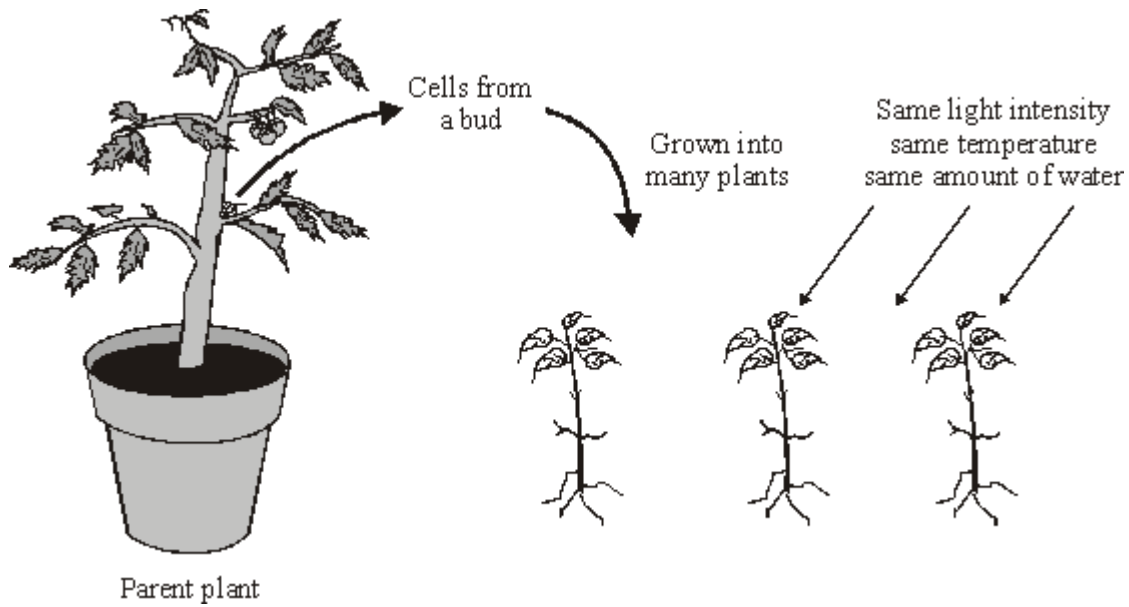
(2)

(b) Draw a labelled diagram to show that there is an equal chance of parents producing a baby boy or girl. Use the symbols **X** and **Y** for the chromosomes.

(4)

(Total 6 marks)

- 9 The diagram shows a method of producing a large number of plants which all look the same. Cells taken from the bud can be split into many groups. Each group of cells is then grown under the same conditions.



- (i) What do scientists call organisms which are all produced from one parent and which all look the same?

Draw a ring around **one** answer.

clones

communities

populations

(1)

- (ii) Give **two** reasons why plants produced by this method will all look the same.

1. _____

2. _____

(2)

(Total 3 marks)

- 10 (a) Alleles are different forms of the same gene.

Why does a person usually inherit **two** alleles of each gene?

(1)

- (b) Some humans are albino (they have white hair and pale skin). This condition is caused by a recessive allele, **n**. The other allele, **N**, causes a coloured pigment to be made.

There are three possible combinations of these alleles:

NN **Nn** **nn**

- (i) Which **one** of these combinations will an albino person have?

(1)

- (ii) Two non-albino parents can sometimes have an albino child.

Which **one** of the following combinations of alleles must these two parents have?

Tick (✓) the box next to the correct answer.

Tick **one** box only.

Parent 1	Parent 2	
NN	NN	<input type="checkbox"/>
NN	Nn	<input type="checkbox"/>
Nn	Nn	<input type="checkbox"/>
nn	nn	<input type="checkbox"/>

(1)

(Total 3 marks)

Mark schemes

1	eggs	<i>accept gamete once</i>	1	
	ovaries		1	
	sperms	<i>accept gamete once</i>	1	
	testes		1	
	sexual		1	
	gametes	<i>allow egg and sperm once</i>	1	
	fertilisation		1	
	asexual		1	
				[8]
2	dominant		1	
	recessive		1	
	genes		1	
	gametes		1	
	environmental		1	
				[5]
3	(a) mud		1	
	decayed		1	
	skeleton		1	
	rock		1	

(b) idea that living things have changed (over time)

do not allow 'dating'

do not credit 'evolved'

allow 'compare the skeleton'

1

[5]

4

(a) agilisaurus / camarasaurus / ornitholestes

1

(b) eorapter

allow lagosuchus

1

(c) lagosuchus (it) walks on hind limbs / two limbs / alamosaurus has longer neck / lagosuchus has back legs longer than front but alamosaurus has the reverse

1

(d) (i) alamosaurus

1

(ii) increased

1

(e) from hard parts / bones / imprints
e.g. footprints / parts replaced by other materials / conditions for decay absent or example

buried is neutral

1

(f) simple

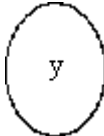
1

billion

1

[8]

5

(a)  clearly labelled 'y'

1

mark the offspring in two horizontal rows

1 mark for each fully correct row

allow transferred error if parent 2 is incorrect

XX XX

1

XY XY

accept YX

1

(b) parent 1

accept XX

1

(c) 50:50

or

equal **or** even

or

1:1 **or** 50%

*accept 1/2 **or** 2/4*

1

[5]

6

(a) (i) gametes correct

allow by implication from line diagram

only need on X from female

1

offspring genotype correctly derived

on suitable diagram

	X	X
X	XX	XX
Y	XY	XY

or

	X
X	XX
Y	XY

1

(ii) 1:1 **or** 50% **or** 1/2 **or** 0.5 **or** 1 in 2

or 1 out of 2 **or** 50 : 50

*do **not** accept 50/50*

accept 'equal' (probability)

1

(b) Y chromosome needed for male child

1

only male has the Y **or** wives had only X (chromosomes)



or sex determined by the sperm

1

[5]

- 7 (a) breed (together)
accept have same number of chromosomes
*do **not** accept have the same number of genes* 1
- to produce fertile offspring 1
- (b) male **or** testes
accept dog 1
- testes **or** male
accept testis
*do **not** accept testicles* 1
- ovary **or** ovaries 1
- gametes 1
- fertilisation
*do **not** accept conception* 1
- fetus **or** zygote **or** embryo
*do **not** accept baby **or** puppy* 1
- (c) genetic information **or** genes **or**
 chromosomes **or** DNA
*do **not** accept characteristics by itself* 1
- (comes) **from** two parents
*accept **from** both parents* 1

[10]

- 8 (a) genes/DNA 1
- female/girl/woman/ 
*both required **in** the correct place for this last mark*
- male/boy/man/ 
*do **not** accept homo/heterogametic, homo/heterozygous* 1

	(b)	parents correct			
		<i>n.b if parents are wrong, candidates can score a maximum of 3 marks</i>			
					1
		gametes correct			
		<i>allow just 1 mark for female</i>			
					1
		combinations correct			
					1
		correct analysis of the 50:50 ratio of what is written			
					1
					[6]
9	(i)	clones			
		<i>accept other positive indications</i>			
					1
	(ii)	same genes / alleles / DNA			
		<i>accept same genetics / genetic information do not accept same chromosomes</i>			
					1
		grown in same (environmental) conditions or correct eg – same amount of water / same temperature / same amount of light			
					1
					[3]
10	(a)	one from each parent / one from egg and one from sperm			
		<i>do not accept egg and sperm join / fertilisation unqualified</i>			
					1
	(b)	(i) nn			
		<i>accept a ring around printed nn</i>			
					1
		(ii) Nn Nn			
					1
					[3]