OCR GCSE GATEWAY BIOLOGY A · J247

BIOLOGY



EXAM QUESTION PACK

B6.2 FEEDING THE HUMAN RACE

SCORE	PERCENTAGE
/111	%

STEMUP

These questions belong to OCR, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by OCR. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with OCR and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. OCR has not endorsed, approved or been involved in the production of it. OCR and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

OCR publishes its past papers, mark schemes and examiner reports. Always check the current specification at ocr.org.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Gateway Biology A (9-1)

Feeding the human race

Please note that you may see slight differences between this paper and the original.

Candidates answer on the Question paper.

OCR supplied materials:
Additional resources may be supplied with this paper.

Other materials required:
- Pencil
- Ruler (cm/mm)

Duration: Not set

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions, unless your teacher tells you otherwise.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Where space is provided below the question, please write your answer there.
- You may use additional paper, or a specific Answer sheet if one is provided, but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

- The quality of written communication is assessed in questions marked with either a pencil or an asterisk. In History and Geography a *Quality of extended response* question is marked with an asterisk, while a pencil is used for questions in which *Spelling, punctuation and grammar and the use of specialist terminology* is assessed.
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **111**.
- The total number of marks may take into account some 'either/or' question choices.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

1 Which of these statements is an example of sustainability?

A Harvesting selected trees from a forest and replanting.
B Replacing forests with food crops.
C Taking fish from the sea faster than they can reproduce.
D Using crude oil to make plastics.

Your answer ☐

[1]

2(a) In many countries people rely on bananas for food.

Black sigatoka is a disease of banana plants.

It is caused by a fungus.

The food security of bananas could be improved using different methods.

Draw a straight line to join each **method** to a step that it **involves**.

method	involves
biological control	putting a gene for resistance into banana plants
	growing bananas in a greenhouse
genetic engineering	choosing resistant banana plants to use for reproduction
	using hydroponics
selective breeding	introducing a virus that kills black sigatoka fungus

[3]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

(b) A type of pesticide called fungicide can be used to kill the fungus.

Scientists are investigating how well the fungicide works.

They also want to see if it works better if they add a chemical called a sticking agent.

This helps the fungicide stick to the banana leaves.

The scientists grow banana plants in four blocks.

The table shows the treatments each block is given.

	treatment	
block	fungicide	sticking agent
A	✓	✓
B	✓	X
C	X	✓
D	X	X

(i) Why did the scientists include the treatments given to block C and block D?

Block C was used so the scientists could

Block D was used so the scientists could

---

[2]

(ii) After a few months the scientists gave the plants in each area a disease rating.
The higher the rating the more disease present.

block	disease rating
A	20
B	35
C	45
D	60

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

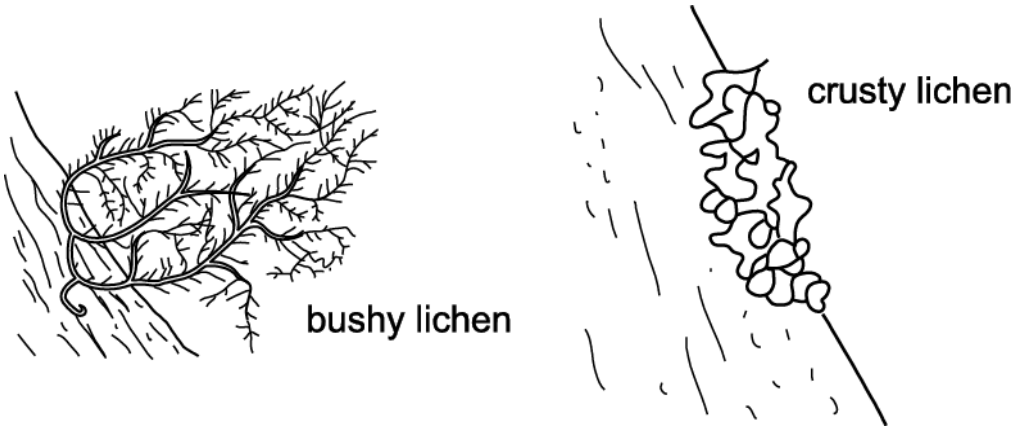
STEMUP.CO.UK

What conclusions could the scientists make from this study?

---[3]

3 Lichens are sensitive to pollution because they take up chemicals from the air.

The diagram shows a 'bushy' species of lichen and a 'crusty' species of lichen.



Bushy lichens are usually more sensitive to pollution than crusty lichens.

Students decide to use lichens to try and work out how polluted their school grounds are.

They read about a scale called the Lichen Diversity Value (LDV).

It is worked out in this way:

- choose four trees in the area
- hold a quadrat on the north side of the trunk of one tree
- count the total number of all the lichens in the quadrat
- then do this on the east, south and west side of the tree
- repeat this for each tree.

(i) Suggest how the students could choose four trees.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

_____

_____ [1]

(ii) The students put their results into a table.

	Number of individual lichens found in each quadrat			
Tree number	North	East	South	West
1	3	11	18	7
2	4	12	17	8
3	5	10	15	12
4	4	15	12	9
mean	4.0	12.0	15.5	

The LDV is found by adding together the four mean values.

The students calculate the mean number of lichens on the north, east and south sides of the trees.

Calculate the mean for the west side and use this to calculate the LDV.

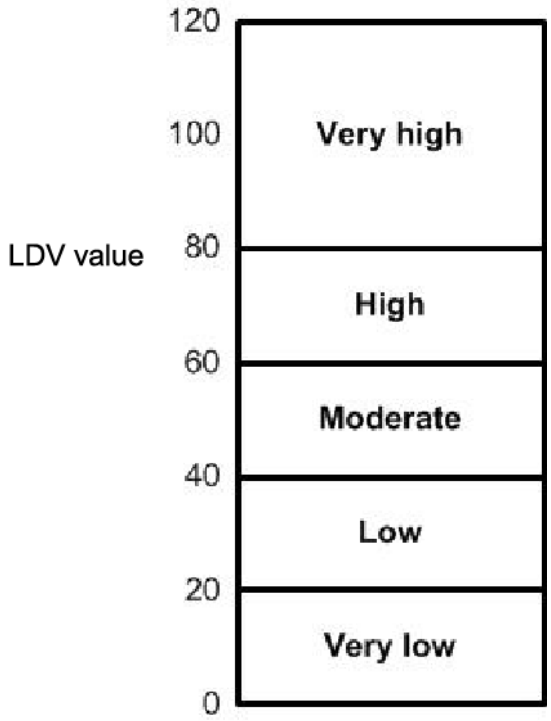
LDV = _____ **[2]**

(iii) This scale shows the type of diversity shown by the LDV.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK



What does the LDV show about the amount of diversity in the school grounds?

---

[2]

(iv) LDV is calculated by counting all the lichens present.

What else about the lichens could the students look for to make a better assessment of pollution?

---

[3]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

4 Bacteria are used in genetic engineering.

A plasmid is used to transfer the required DNA into the bacterium.

What is the term used to describe role of the plasmid in this technology?

A enzyme
B host
C transgenic
D vector

Your answer ☐

[1]

5 Some plants have been genetically engineered so that they grow larger.

Each cell of the plant has a new gene inserted so that it produces a different protein.

What does genetic engineering do to the plant?

A It changes the phenotype and the genotype.
B It changes the genotype but not the phenotype.
C It changes the phenotype but not the genotype.
D It changes neither the genotype nor the phenotype.

Your answer ☐

[1]

© OCR 2022. You may photocopy this page.

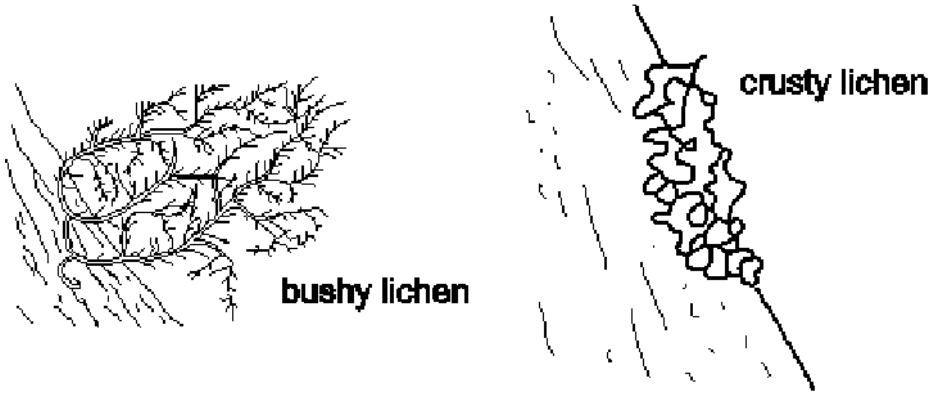
Created in ExamBuilder

STEMUP.CO.UK

6 Some students are investigating lichens.

Lichens are often studied because they are sensitive to pollution.

Lichens are sensitive to pollution because they take up chemicals from the air.



Students decide to use lichens to try and work out how polluted their school grounds are.

They read about a scale called the Lichen Diversity Value (LDV).

It is worked out in this way:

- choose four trees in the area
- hold a quadrat on the north side of the trunk of one tree
- count the total number of all the lichens in the quadrat
- then do this on the east, south and west side of the tree.
- repeat this for each tree.

(i) Suggest how the students could choose four trees.

---

[1]

(ii) The students put their results into a table.

	Number of individual lichens found in each quadrat			
Tree number	North	East	South	West
1	3	11	18	7

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

2	4	12	17	8
3	5	10	15	12
4	4	15	12	9
mean	4.0	12.0	15.5	

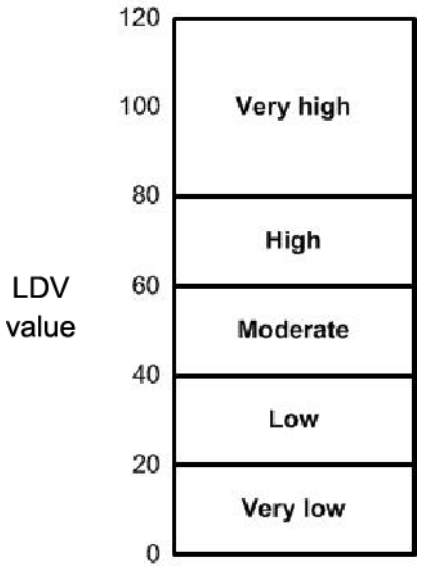
The LDV is found by adding together the four mean values.

The students calculate the mean number of lichens on the north, east and south sides of the trees.

Calculate the mean for the west side and use this to calculate the LDV.

LDV = _____ [2]

(iii) This scale shows the diversity of the lichens shown by the LDV.



What does the LDV show about the diversity of lichens in the school grounds?

_____

_____ [2]

(iv) LDV is calculated by counting all the lichens present.

What else about the lichens could the students look for to make a better assessment of pollution?

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

---[3]

7(a) In many countries people rely on bananas for food.

Black sigatoka is a disease of banana plants.

It is caused by a fungus.

Explain how the food security / growth of bananas could be improved:

(i) by using fungicide.

---[1]

(ii) by using selective breeding.

---[3]

(b) Scientists have been investigating the conditions needed for the fungus to grow.

They compiled this data.

	Conditions needed for fungus to grow	
	Temperature in °C	Percentage humidity (%)
Grows well	25–28	>90
Some growth	20–25 or 28–35	90–80
Will not grow	< 20 or >35	<70

Write in the boxes how well the fungus will grow in these conditions.

25 °C and a humidity of 85%	
27 °C and a humidity of 92%	

[2]

STEMUP.CO.UK

(c) Scientists have tried to predict the effect of climate change on the growth of the fungus.

They have used four different predictions for how the climate might change, **A**, **B**, **C** and **D**.

They then tried different ways of calculating where the fungus cannot grow.

Their results are shown in the table.

	Percentage area of the world where fungus cannot grow (%)			
Climate model	1st calculation	2nd calculation	3rd calculation	4th calculation
A	87.6	87.9	87.7	87.8
B	88.4	88.6	89.0	88.8
C	91.1	91.5	91.4	91.3
D	88.4	88.9	89.5	89.2

(i) Which climate model produces the lowest **range** of results in the four calculations? Choose from **A**, **B**, **C** or **D**.

---------- [1]

(ii) At present the fungus **cannot** grow over 86.4% of the World.

What do the calculations predict about the effect of climate change on the fungus?

---------- [1]

STEMUP.CO.UK

(d) Scientists are developing a genetically engineered banana plant.

This would be resistant to black sigatoka.

Look at the newspaper headline from an African newspaper.

> **Trouble at the genetic research station**
>
> Police have been called to a research station.
>
> They are needed to guard the genetically modified plants.
>
> This is because people have been trying to steal the plants to grow themselves.

In Europe, police have been used to guard genetically engineered crops from protesters.

Suggest why the protesters in Europe want to destroy the crops and why the response in Africa is so different.

---

[2]

© OCR 2022. You may photocopy this page.

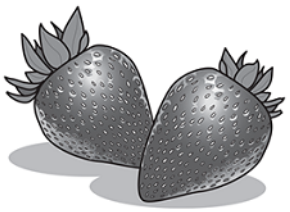
Created in ExamBuilder

STEMUP.CO.UK

8(a) A farmer is choosing which strawberry plants to grow.

He reads an advert in his farming magazine.

Buy strawberry plants from us!



We have been selectively breeding strawberry plants for many years.

This has produced a plant with very sweet tasting strawberries.

All the plants we sell are clones of this plant.

We guarantee that none of the plants we sell are genetically modified.

Why does selective breeding take many years?
Put a tick (✓) in the box next to the **correct** reason.

It takes a long time for mutations to occur. ☐

Moving genes between plants is difficult. ☐

The plants have to be selected over many generations. ☐

[1]

(b) The plant company say that none of their plants are genetically modified.

Suggest **two** reasons why the company wants to let people know this.

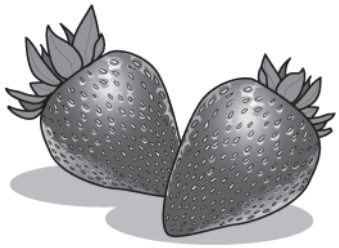
---

[2]

9(a) A farmer is choosing which strawberry plants to grow.

He reads an advert in his farming magazine.

Buy strawberry plants from us!



We have been selectively breeding strawberry plants for many years.

This produced a plant with very sweet tasting strawberries.

All the plants we now sell are clones of this plant.

We guarantee that none of the plants we sell are genetically modified.

The strawberry plants sold by the company are all clones.

Write about the **disadvantages** of a farmer only growing this one type of strawberry plant.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

---[2]

(b) The plant company say that none of their plants are genetically modified.

Suggest **two** reasons why the company wants to let people know this.

---[2]

10 Some people agree with the use of pesticides and others disagree with the use.

Suggest reasons why people may have different opinions.

---[2]

11(a) The picture shows crops being grown using hydroponics.

Hydroponics is a form of intensive farming where plants are grown without soil.



Hydroponics allows more crops to be grown in a limited space.

Explain **one other** advantage and **one** disadvantage of growing crops using hydroponics.

advantage

---

disadvantage

---

[2]

(b) In Africa farmers often have problems with droughts and high temperatures.

This makes growing crops in soil difficult.

Farmers in Africa often use intensive farming methods such as hydroponics.

In the UK, farmers often use organic farming methods.

Write about why the development of intensive farming methods like hydroponics maybe more important in Africa than in the UK.

---

[2]

12 A gardener releases spiders into a greenhouse. They eat the insects which are eating her plants.

What is this an example of?

A Biological control
B Gene technology
C Homeostasis
D Parasitism

Your answer ☐ [1]

13 In selective breeding which organisms breed?

A Humans choose which organisms breed.
B Organisms that are best suited to their environment will breed.
C Random organisms will breed.
D The youngest organisms will breed.

Your answer ☐ [1]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

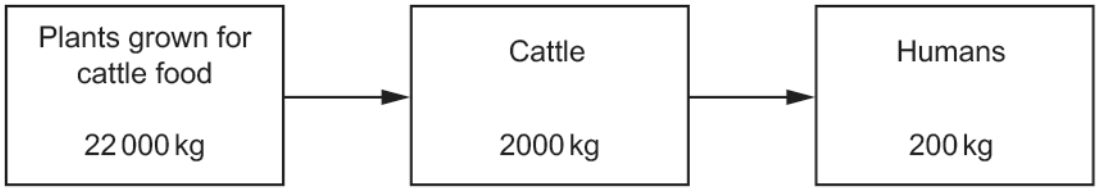
14 Plants can be grown in water.

What is the name of this growth method?

A Active transport
B Germination
C Hypothermia
D Hydroponics

Your answer [ ] [1]

15 The diagram shows the flow of biomass through an agricultural food chain.



The plants grown for cattle food often have their leaves eaten by insects.

Scientists have produced genetically modified (GM) plants that make insecticide in their leaves.

(i) Explain why these GM plants would make more biomass available to humans.

In your answer use the diagram of the agricultural food chain and ideas about photosynthesis.

STEMUP.CO.UK

[6]

(ii) Suggest **two** reasons why some people are against this type of genetic engineering.

1

2

[2]

16 Which of these is used to **cut DNA molecules** in genetic engineering?

A Ligase enzymes
B Plasmids
C Restriction enzymes
D Sticky ends

Your answer [1]

STEMUP.CO.UK

17 Which is an advantage of growing crop plants by hydroponics?

A The plants can be grown where there is poor soil.
B The plants can support themselves more securely.
C The plants do not require minerals.
D The plants require less sunlight.

Your answer [ ] [1]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

18 Switching off the protection mechanism described in part **(b)** involves the plant making a **protein.**

Scientists have put extra copies of the gene for this protein into the plants. This makes the plant make more mRNA molecules.

(i) Explain why making more mRNA will switch off the mechanism faster.

---

[2]

(ii) Scientists have found that the genetically modified plants make 20% more biomass.

Use the agricultural food chain on page 21 to calculate the increase in biomass this would provide for humans.

Answer = ---------- kg **[2]**

(iii) Inserting extra copies of a plant's gene into a plant is a type of genetic modification (GM).

Another example of GM involves inserting a bacterial gene into a plant which makes the plant produce an insecticide.

Suggest reasons why.

---

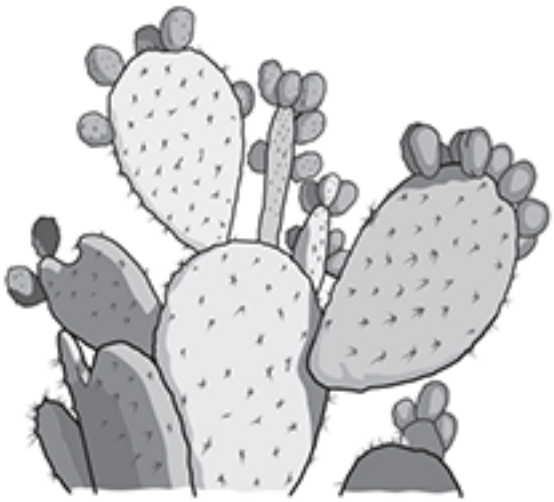
[2]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

19 The prickly pear is a cactus plant that was introduced into Australia.



The prickly pear cactus spread across the country.

To control the spread of the prickly pear cactus, a caterpillar was released to eat it.

What is the name of this type of control?

A Biodiversity
B Biological
C Mutualism
D Pesticide

Your answer [ ] [1]

STEMUP.CO.UK

20(a) This question is about selective breeding.

The table shows the main steps in the process of selective breeding.

They are **not** in the correct order.

A	Repeat the process over many generations.
B	Decide which features are wanted.
C	Choose the individuals that have the features that are wanted.
D	Choose the offspring that have the features that are wanted.
E	Allow the individuals to mate.

Write the letters in the boxes below to give the correct order.

Two have been done for you.

[ ] [C] [ ] [ ] [A]

[2]

STEMUP.CO.UK

(b) Cows are female and are used by farmers to produce milk.

Bulls are male.

Look at the details of different varieties of cows and bulls.

Variety	Milk production	Aggressive
Cow A	thin and watery	no
Cow B	medium yield and creamy	no
Cow C	medium yield and creamy	yes
Bull A	mother produced high yield	yes
Bull B	mother produced high yield	no
Bull C	mother produced low yield	no

A farmer wants to produce cows that produce a high yield of creamy milk.

He does **not** want his animals to be aggressive.

Suggest which cow and bull he should choose to mate with each other.

Explain your answer.

cow ..... × bull .....

explanation _____

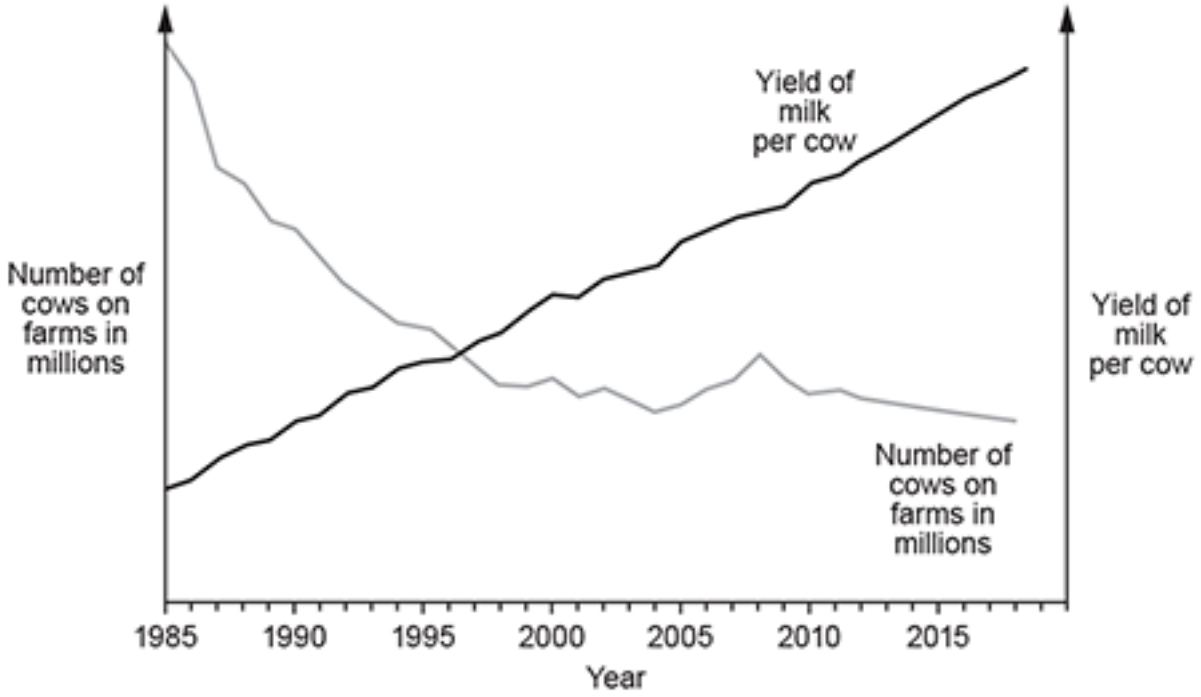
_____

_____

_____

_____ **[4]**

(c) The graph shows the number of cows and the yield of milk per cow on farms in the USA since 1985.



(i) Describe the relationship between number of cows and yield of milk shown in the graph.

---

[1]

(ii) Suggest **two** reasons for the relationship shown in the graph.

1 ---

---

2 ---

---

[2]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

21(a) Over the whole world the demand for food to feed humans is increasing.

Describe why is there an increasing demand for food.

---

[1]

(b) Genetic modification (GM) is one method that humans are using to try and produce more food.

(i) What is genetic modification?

---

[2]

(ii) Scientists can use GM to alter the features of crops.

One feature is crop yield.

Suggest **two other** features of crops they could change.

1 ---

2 ---

[2]

(iii) In a recent survey **200** people were asked about GM crops.

The people surveyed were shown six statements. Three were negative statements and three were positive statements.

They were asked to choose **one** statement they agreed with.

These are the results.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

	Statement	Number of people choosing statement
Negative	GM crops are not safe enough to use.	42
	Growing GM crops does more harm than good.	32
	Growing GM crops tampers with nature.	22
Positive	Growing GM crops can prevent people being hungry.	35
	Eating GM crops has very little risk to consumers.	35
	Growing GM crops can make food more nutritious.	34

Calculate the percentage of people in the survey that have a **negative** opinion of genetic modification.

Percentage = ... % **[2]**

22 In food chains, biomass is lost between different trophic levels.

One reason for this is the release of undigested food from the body.

Which term is used to describe this release?

A Decomposition
B Egestion
C Excretion
D Peristalsis

Your answer ☐ **[1]**

STEMUP.CO.UK

23 Two farmers grow barley in their fields.

They both have a problem with barley powdery mildew infecting their crops.

The farmers want to prevent their crops from getting powdery mildew.

(i) Explain how burning plants after the barley has been harvested can protect the crops.

---

[1]

(ii) Explain how growing barley in the fields one year, then wheat the next year can protect the crops.

---

[2]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

24 Scientists think that they might be able to reduce rat populations by using genetic engineering. They want to insert a gene into male rats that destroys all sperm that contain an X chromosome.

(i) Name the enzyme used to join two sections of DNA together in genetic engineering.

[1]

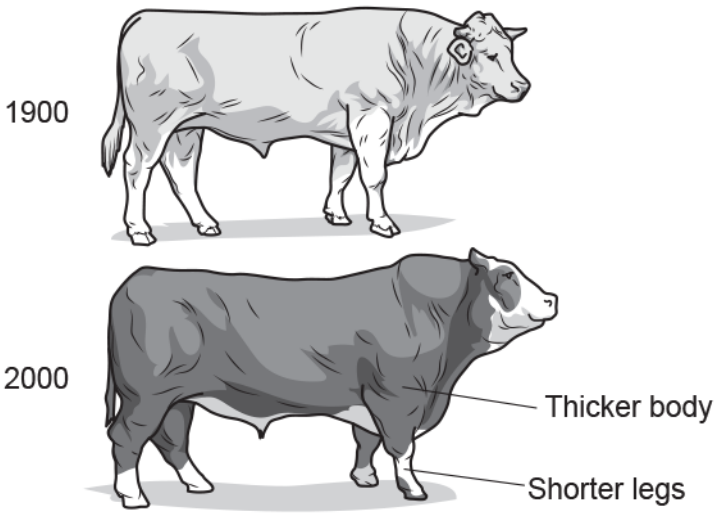
(ii) Explain how this method of genetic engineering would rapidly reduce the rat population.

You may use a diagram in your answer.

[3]

STEMUP.CO.UK

25 The drawings show typical cattle kept by farmers in 1900 and in 2000.



Which process would have been used between 1900 and 2000 to produce these changes in the cattle?

A Artificial classification
B Biological control
C Natural selection
D Selective breeding

Your answer ☐ [1]

26 Which of these is an **advantage** of using hydroponics for crop production?

A Fertilisers are not required for crop growth.
B The crops can be grown in areas where the soil is poor.
C The crop plants do not need extra support.
D The crops will not be eaten by pests.

Your answer ☐ [1]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

27 Many types of cancer have been linked to certain genes.

Scientists are trying to find ways to change the genes in embryos to reduce the risks of cancer.

(i) What name is given to the process scientists use to change the genes of an organism?

[1]

(ii) Write down **one** reason why some people disagree with the process given in **(i)**.

[1]

28 Which of these is an **advantage** of using hydroponics for crop production?

A Fertilisers are not required for crop growth.
B The crops can be grown in areas where the soil is poor.
C The crop plants do not need extra support.
D The crops will not be eaten by pests.

Your answer ☐ [1]

29 Which of these is a **similarity** between selective breeding and natural selection?

A Cause a change in organisms' genotypes but not phenotypes.
B Humans decide which organisms will reproduce.
C Only some organisms reproduce.
D Take place over many thousands of years.

Your answer ☐ [1]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

30 Large quantities of one type of antibody can be made by the process shown in **Fig. 20.2**.

These antibodies are called monoclonal antibodies.

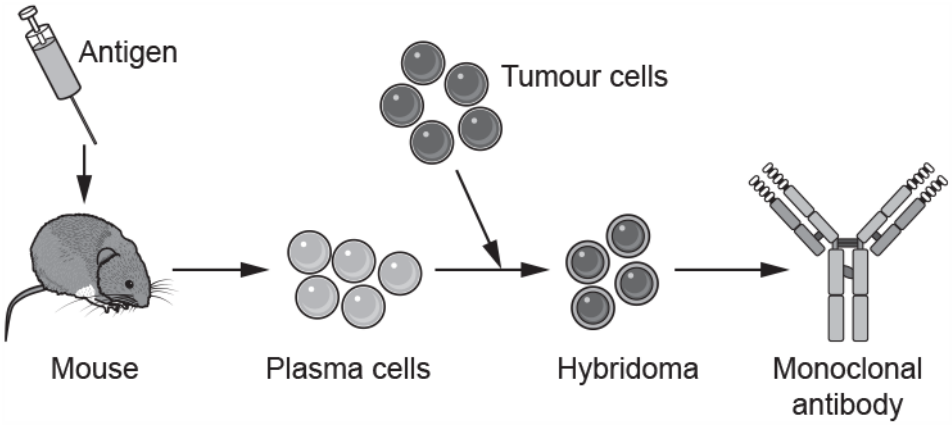


Fig. 20.2

Two scientists discovered a different method of making monoclonal antibodies.

They put genes that code for many different antibodies into viruses. The viruses then make the antibodies on their surfaces.

If an antigen attaches to an antibody, the scientists use the gene for this antibody to genetically engineer bacteria. The bacteria are then used to make large quantities of the antibody.

(i) Describe how scientists could use the antibody gene to genetically engineer bacteria to make many copies of the antibody.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

[4]

(ii) Many people would prefer to use antibodies made using bacteria and viruses, rather than the method shown in **Fig. 20.2.**

Suggest an explanation for this.

[2]

(iii) In 2018, the scientists were awarded the Nobel Prize for their work.

Explain why their work had to be peer reviewed before they were awarded the prize.

[2]

31 **Fig. 16.2** shows a food web containing stevia.

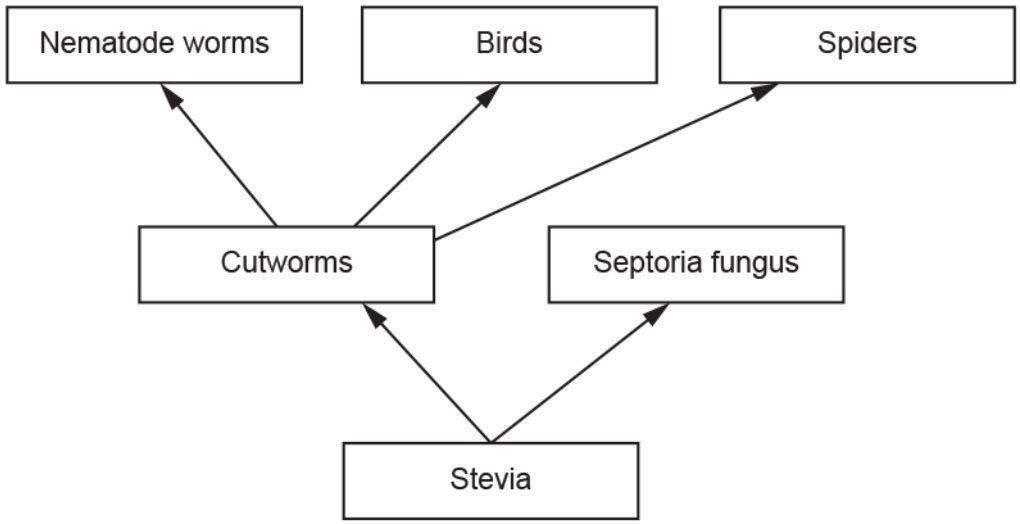


Fig. 16.2

The leaves of stevia taste very sweet. People are now trying to grow stevia as a crop.

Stevia farmers often add nematode worms to their fields.

Explain why farmers do this.

Use **Fig. 16.2** in your answer.

---

[3]

END OF QUESTION PAPER

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK