Topic Test: OxfordAQA International GCSE Combined Science 9204 Biology

Ecology

Name: _____

Class: _____

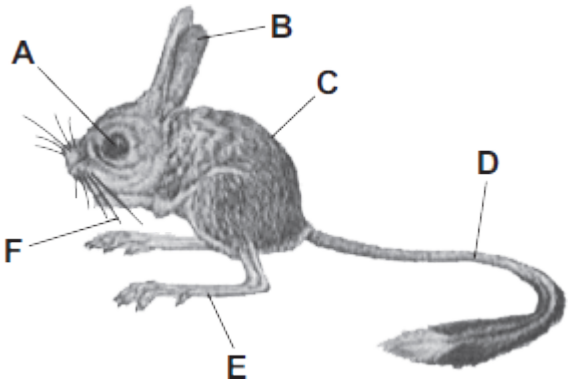
Date: _____

Time: **50 minutes**

Marks: **50 marks**

Comments:

1 The drawing shows a jerboa. Jerboas live in sandy deserts.



Jerboas sleep in underground holes during the hot day and come out during the cold night.

The jerboa's main food is small insects which run across the surface of the sand.

For each question write the correct letter in the box.

Which structure, **A**, **B**, **C**, **D**, **E** or **F**:

(a) helps to insulate the jerboa ☐

(1)

(b) helps the jerboa to detect insects on a dark night ☐

(1)

(c) helps the jerboa to hop quickly to catch an insect ☐

(1)

(d) helps the jerboa to keep its balance when hopping ☐

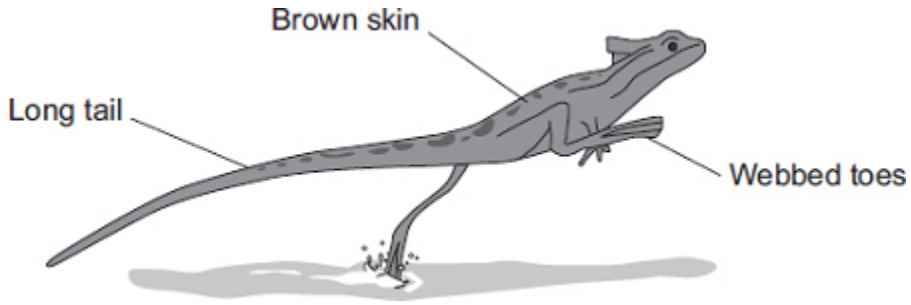
(1)

(e) helps the jerboa to know the width of its underground hole in the dark? ☐

(1)

(Total 5 marks)

2 The picture shows a basilisk lizard. Some of the adaptations of the lizard are labelled.



Basilisk lizards are often found resting on branches of trees that grow next to water.
Basilisk lizards can run across the surface of the water.

(a) Draw **one** line from each adaptation of the lizard to the advantage of the adaptation.

Adaptation	**Advantage**
	For camouflage on branches of trees
Toes on the back feet are webbed	
	Helps the lizard to balance when running
Long tail	
	Warning colours to deter predators
Brown skin	
	Increases surface area in contact with the water

(3)

(b) Suggest **one** advantage to the basilisk lizard of being able to run across the surface of the water.

_____

_____

(1)

(c) Animals, such as lizards, compete with each other.

Give **two** factors that animals compete for.

Tick (✓) **two** boxes.

Oxygen ☐

Food ☐

Territory ☐

Light ☐

(2)

(Total 6 marks)

3 Many organisms are adapted to avoid being eaten.

(a) The photograph shows a gecko on a leafy branch.

The gecko is adapted to avoid being eaten by predators.

Explain how.

_____

_____

_____

_____

(2)

(b) Ants can give a painful bite.

The photograph shows a type of ant living on acacia trees.

Acacia trees have thorns on their branches.

Branch of acacia tree.

By Ryan Somma, cropped by Fama Clamosa,
20 January 2010 (UTC) [CC-BY-SA-2.0], via Wikimedia Commons

(i) Predators are less likely to eat ants living on acacia trees than ants living on the ground.

Suggest why.

_____

_____

(1)

(ii) Giraffes eat the leaves of acacia trees.

Giraffes do **not** eat the leaves of acacia trees that have ants living on them.

Suggest why.

_____

_____

(1)

(c) The photographs show a wasp and a hoverfly.

The wasp and the hoverfly both have black and yellow stripes.

Wasp

© Alexandr Pakhnyushchyy/iStock

Hoverfly

© Richard Majlinder/iStock

Wasps have stings, but hoverflies do **not**.

The stripes on the hoverfly help the hoverfly to avoid being eaten by predators.

Explain why.

_____

_____

_____

_____

(2)

(Total 6 marks)

4 Desert plants are adapted for survival in a dry climate.

(a) Joshua trees live in deserts.

By nyenyec [CC BY-SA 3.0], via Wikimedia Commons

Joshua trees have two different types of root:

- a system of shallow roots spread out over a large area
- roots about 1 m in diameter, shaped like bulbs, deep in the soil.

Explain the advantage to the Joshua tree of having:

(i) shallow roots spread out over a large area

_____

_____

_____

_____

(2)

(ii) large, bulb-like roots deep in the soil.

_____

_____

(1)

(b) Creosote bushes also live in deserts.

By Sue in az (Own work) [Public domain], via Wikimedia Commons

The leaves of creosote bushes:

- are covered with a layer of wax
- fold together during the day.

Explain how the leaves of the Creosote bush help it to survive in deserts.

_____

_____

_____

_____

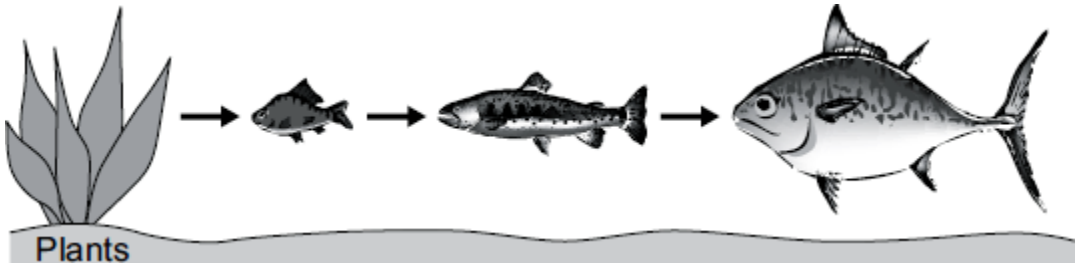
_____

_____

(3)

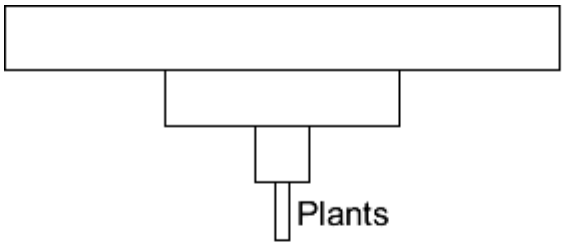
(Total 6 marks)

5 The picture shows a food chain.

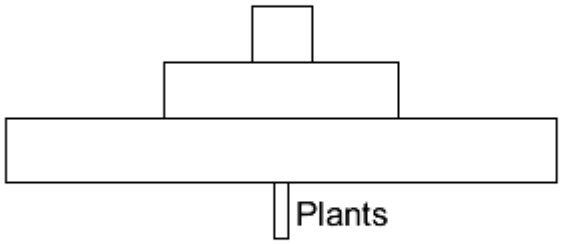


(a) Which diagram shows a pyramid of biomass for the food chain in the picture?

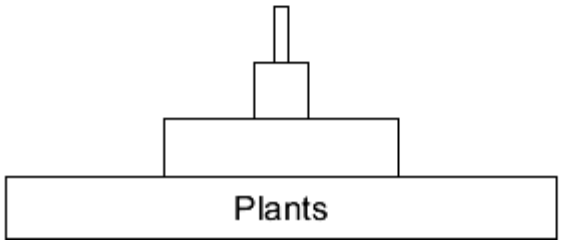
Tick (✓) **one** box.



☐



☐



☐

(1)

(b) The plants at the start of the food chain absorb energy.

Where does this energy come from?

Draw a ring around **one** answer.

the water **the sun** **minerals**

(1)

(c) Some energy is lost at each stage of the food chain.

Give **two** ways in which energy may be lost from the food chain.

1. _____

_____

2. _____

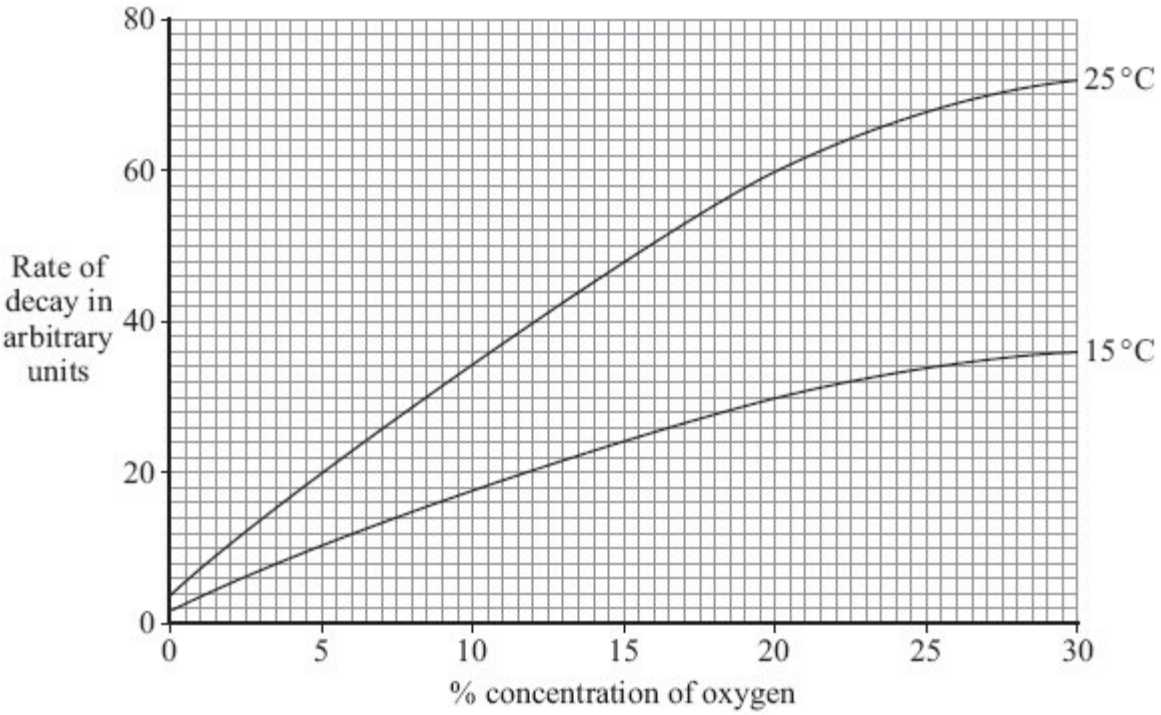
_____

(2)

(Total 4 marks)

6 Gardeners often put waste materials onto compost heaps.

The graph shows how the conditions in a compost heap affect how quickly waste materials in the heap decay.



(a) (i) Describe the effect of increasing the temperature from 15 °C to 25 °C on the rate of decay at 20 % oxygen concentration.

_____

_____

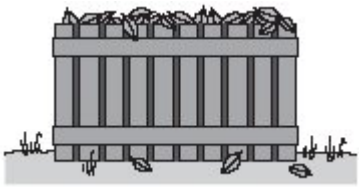
_____

_____

_____

(2)

(ii) Gardeners are advised to put waste materials into special compost bins.
These bins have holes in their sides.



Holes in the sides of the compost bin help the waste materials to decay faster.

Explain why.

_____

_____

_____

_____

_____

(2)

(b) A gardener noticed that some of his plants were growing poorly.

He put some decayed compost onto the soil, around the plants.
Six months later the plants were growing well.

Explain why.

_____

_____

(1)

(Total 5 marks)

7 A group of students investigated populations in a food chain in a garden.

The table shows the estimates of the number and biomass of some of the organisms the students found.

Organism	Number in the garden	Mean mass of each one in grams	Biomass of population in grams
Hedgehog	1	200	200
Slug	600	2	1200
Lettuce	60	100	

(a) (i) Calculate the biomass of the lettuce population.

Show clearly how you work out your answer.

_____

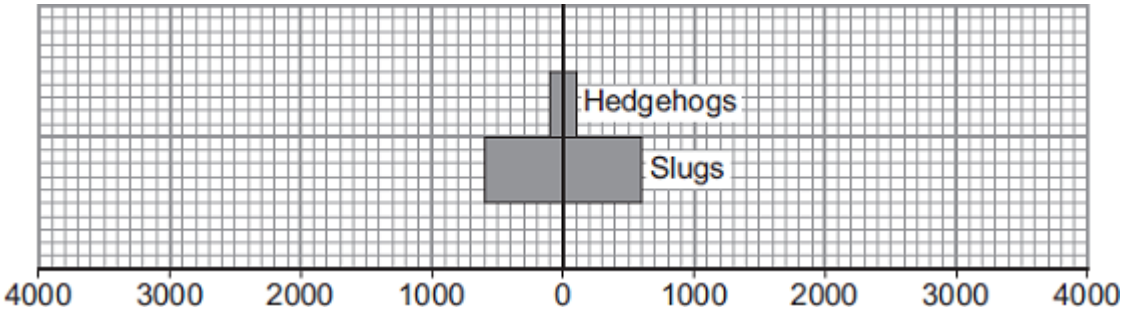
_____

Biomass = _____ grams

(2)

(ii) Use your answer to part (a)(i) to complete the pyramid of biomass.

Show the biomass of the lettuce population in the garden.



Biomass of population in grams

(2)

(b) The energy in the hedgehog population is much less than the energy in the slug population.

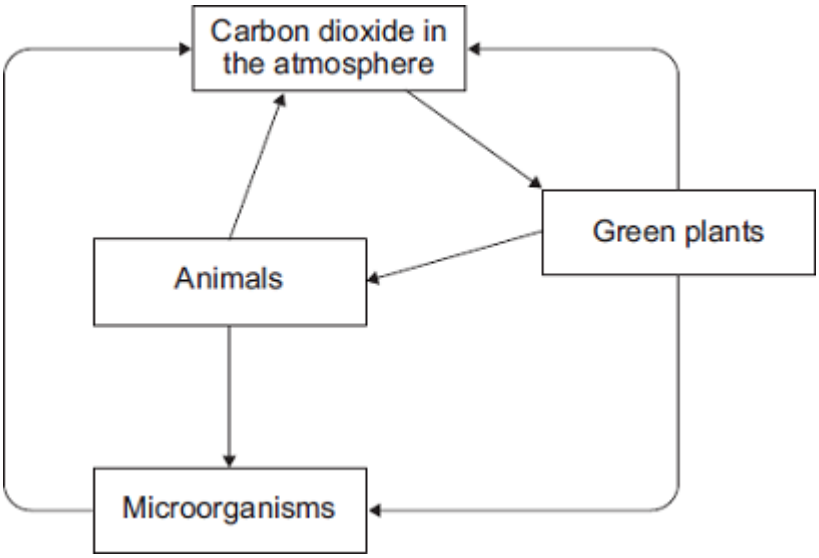
Explain why as fully as you can.

(3)

(Total 7 marks)

8 *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

The diagram shows part of the carbon cycle.



Describe how living things are involved in the constant cycling of carbon.

(Total 6 marks)

9 A food chain has four organisms, **A**, **B**, **C** and **D**.

A → B → C → D

The table shows the amount of energy transferred by each organism in one year.

Organism	Energy transferred in kJ per year
A	87 000
B	14 000
C	1600
D	70

Explain, as fully as you can, why organism **D** would transfer much less energy than organism **A**.

(Total 5 marks)

Mark schemes

1

(a) C

1

(b) B

1

(c) E

1

(d) D

1

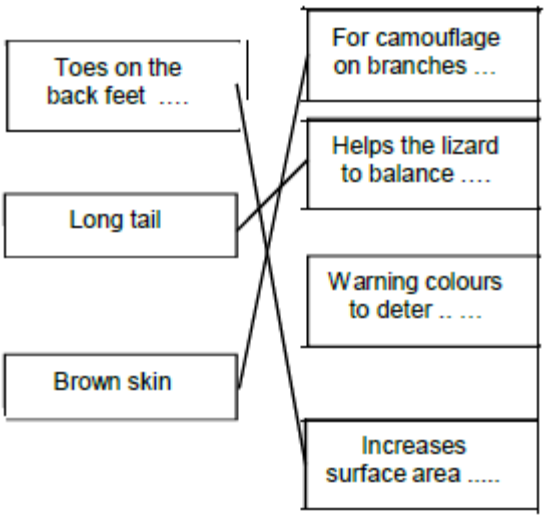
(e) F

1

[5]

2

(a)



one mark for each line

*do **not** award mark for an adaptation if lines are drawn from it to more than one advantage*

3

(b) escape (predators)

accept faster than swimming

allow chase prey

allow it stops them from drowning

1

(c) food

1

territory

1

*deduct **one** mark for each tick in excess of two*

[6]

3 (a) looks like a leaf

1

so predator less likely to / won't see it

allow 'camouflage' as alternative to either point

1

(b) (i) thorns (of acacia tree) hurt (predators)

*allow idea that fewer animals / predators live in trees **or** ground living animals can't reach them (in the trees)*

1

(ii) (giraffe) avoids being bitten by ants

allow ants are poisonous / have unpleasant taste

1

(c) looks like / mimics a wasp **or** has warning colouration

1

so predators think it has a sting

1

[6]

4 (a) (i) increased water uptake

ignore nutrients / food

allow quicker water uptake

allow collects water over larger area

1

(after) rain

accept ideas in terms of more successful competitor

1

(ii) water storage **or** stability **or** safety from predators

ignore absorption of water from soil

1

(b) reduces water loss / evaporation

accept reduces transpiration

allow stops water loss

1

wax protects plant **or** reflects heat **or** keeps plant cool **or** unpalatable

ignore reflects light

1

folding reduces surface area **or** folding reduces warming

*accept enclosed stomata **or** less exposure of stomata **or** increased humidity **or** less water concentration gradient*

allow prevents burning

ignore less likely to be damaged

1

[6]

5 (a) bottom / third pyramid ticked

extra box ticked cancels the mark

1

(b) the sun

extra ring drawn cancels the mark

1

(c) any **two** from:

- heat

  ignore keeping warm

- movement / named example internal or external

  ignore digestion

- respiration

  *do **not** allow <u>for</u> respiration*

- faeces / not all digested

  *allow waste for **1** mark if neither faeces nor excretion given (ie waste + movement = **2** marks waste + faeces = **1** mark*

- excretion/ urine

- not all of animal / all parts eaten

  *do **not** accept growth / reproduction*

2

[4]

6 (a) (i) increase / higher / faster / quicker

1

numerical comparison eg from 30 to 60 / by 30 **or** it is 30 at 15°C and 60 at 25°C

*award **2** marks for doubles / goes twice as fast or 30 units <u>more</u>*

1

(ii) any **two** from:

- oxygen / air (in)

  *do **not** accept lets oxygen / air out*
  ignore reference to other substances / light passing in or out ignore microorganisms passing in

- for microorganisms / bacteria / microbes / fungi / decomposers

  ignore worms / germs / bugs

- (for aerobic) respiration

- let heat out

  ignore heat in

- heat kills microorganisms

2

(b) compost contains minerals / nutrients / elements / ions / named

allow improve moisture / drainage
allow nitrogen
ignore CO_2 / food / goodness / fertilisers
*do **not** accept vitamins / glucose etc*

1

[5]

7 (a) (i) 6000

*award **2** marks for correct answer irrespective of working*
*allow **1** mark for 60 × 100 with incorrect or no answer*
allow answer in table if answer line blank

2

(ii) bar width 6000 **or** to match answer to (a)(i)

anywhere on scale ignore depth / height of bar

1

drawn below slugs

label not required

1

(b) any **three** from:

ignore references to number / size / mass of organisms

assume reference is to / of hedgehog unless stated otherwise

- respiration (by hedgehog)

  *do **not** accept idea that respiration uses / produces energy*

- faeces (of hedgehog) **or** (slug) not absorbed (by hedgehog) **or** (slug) not digested (by hedgehog) /
- excreted / urine / urea (by hedgehog)

  *accept waste for **1** mark if neither faeces nor excretion point made*

- not all slug (s) eaten (by hedgehogs) **or** some slugs eaten by other things **or** not all parts (of slug) eaten

  ignore (some) slugs die

- movement (by hedgehog)

- heat (from hedgehog)

  allow appropriate references to biomass lost by these methods, rather than energy losses

3

[7]

8 Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking guidance.

0 marks
No relevant content.

Level 1 (1-2 marks)
For at least one process **either** the organism that carries it out **or** the carbon compound used **or** the carbon compound produced is described **or** for at least one organism **either** the carbon compound it uses **or** the carbon compound it produces is described **or** at least one process is named

Level 2 (3-4 marks)
For some processes (at least one of which is named) **either** the organisms involved **or** the carbon compounds used **or** the carbon compounds produced are described

Level 3 (5-6 marks)
For at least one named process an organism **and** either the carbon compound used for the process **or** the carbon compound produced by the process are described **and** for other processes (at least one of which is named) **either** the organism **or** the carbon compounds used **or** the carbon compounds produced are described (as in Level 2)

Examples of Biology points made in the response:

- (green) plants photosynthesise
- photosynthesis takes in carbon dioxide
- (green) plants use carbon to make carbohydrate / protein / fat / organic compounds / named (e.g. enzymes / cellulose)
- animals eat (green) plants (and other animals)
- (green) plants respire
- animals respire
- respiration releases carbon dioxide
- (green) plants and animals die
- microorganisms decay / decompose / rot / break down / feed on dead organisms
- microorganisms respire

[6]

9 any **five** from:

- the amount of energy (in the biomass of organisms) is reduced at each successive stage in a food chain
- all of prey organism is not consumed
- energy is 'lost' as the organisms' waste materials
- energy is transferred / lost during respiration
- energy is transferred / lost as movement (kinetic energy)
- energy is transferred / lost as heat (thermal energy)
- energy is transferred / lost to the surroundings
- the only energy transferred to a higher level is that which the organisms have used in growing

statements about energy flow the wrong way are neutral

[5]